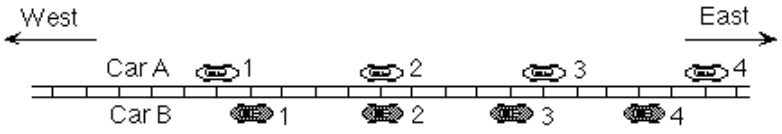
I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. car A always moves faster than car B, thus it seems like car B is going backwards.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. Due to difference in velocity, it seems as though the cars are accelerating apart from each other. Thus B slows down in reference to A.

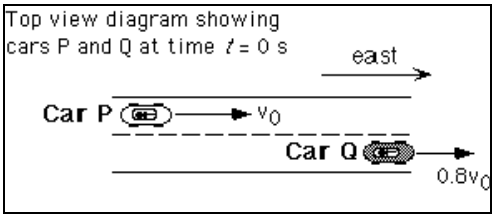
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: i

Q14. Explain. The distance between the cars greatly increase, A bridges the gap between them and then goes farther than car B, thus B seems to be going faster in the other direction.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. The velocity of Q is always less than that of P, so it will seem as though Q is slowing down.

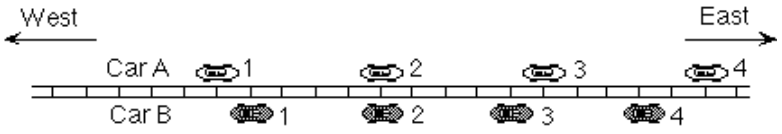
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: unanswered

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. The impotance of the reference frames best solves this problem.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. The position of the two cars best solves this problem if the a car ahead then for sure the car is going faster and so on.

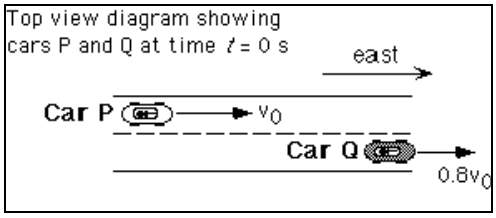
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. the car is slowing down.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the acceleration of the car Q is negative and the othe car is moving at a constant speed so in the reference frame of car P the Car Q is moving toword you.

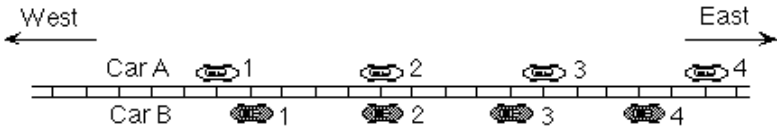
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. the relation ship is linear.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: unanswered

Q8. Explain. They are both traveling at constant velocity but car B is going slower. So car A will see that car B is coming towards him at instand on and right beside him at instant 2.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. car A will be gaining distance on car b thus making car b look as if it going slower.

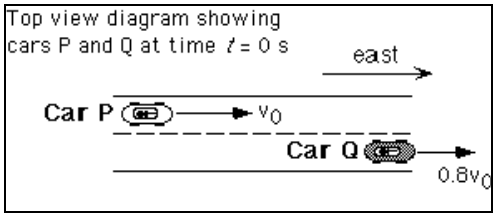
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. car b will be moving in the west direction and at a constant velocity so all the arrows will be in the same direction and magnitude.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain.

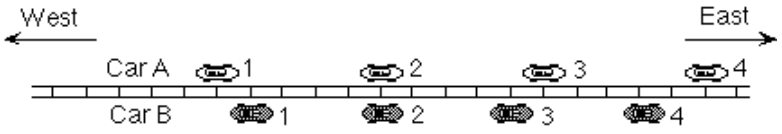
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. the car slows down at a constant velocity

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

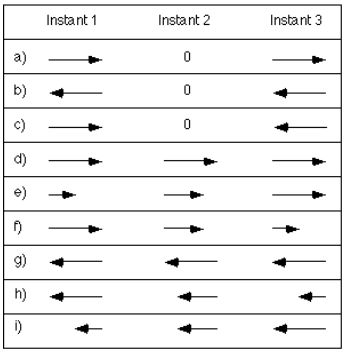
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. since car A is moving faster than car B, car B will appear to move in a direction opposing the motion of car A. Since car A is moving east, car B will appear to move west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. In each of the strobes, car A has moved 1 square past car B. This means that the average speed over these intervals is the same. So, car B will have constant relative speed as well.

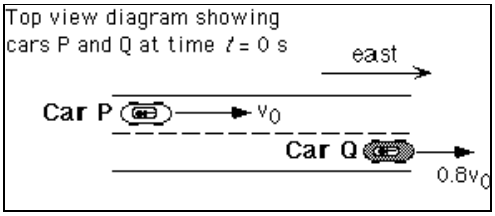


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. The car will appear to be moving to the west (vector pointed left) and is moving at constant velocity (vectors of equal length).

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. car Q will be slowing down relative to the ground, but will be speeding up towards car P in the reference frame of car P.

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

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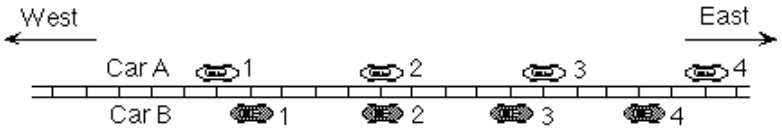


At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Car A is moving past car B to the east, so therefor car B is moving past car A to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Car A gains one 'rectangle' per instant. So the velocity difference between the two cars is constant.

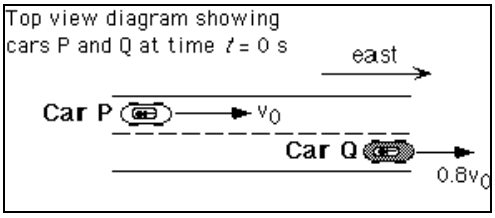
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Vectors are pointing west with a constant magnitude.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. As car Q slows down, car P catches up to it faster. So from the POV of car P, car Q is speeding up in the direction it is traveling relitive to car P (to the west)

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Relitive to car P, car Q is acclerating to the west, or tword car P. So if you measure the diference in the distance between successive equal time intervals, car Q will cover more of the distance between the two cars in the latter interval. Therefor if the first interval covers 10 meters, then the second will cover more than ten and hence, less than 30 meters.

End of response

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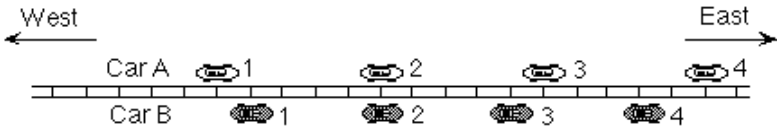


At the instants below, in the reference frame of car A car B is:

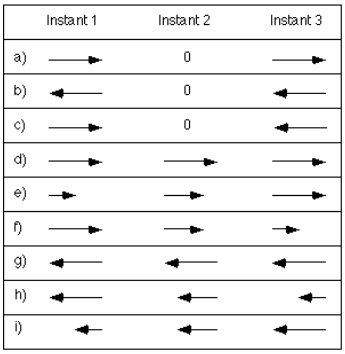
Q5. t_1: moving to the east Q6. t_2: moving to the east Q7. t_3: moving to the east

Q8. Explain. Because Car B is getting closer faster.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: speeding up Q11 t_3: speeding up

Q12. Explain. The distance between them is getting closer and closer every instant.

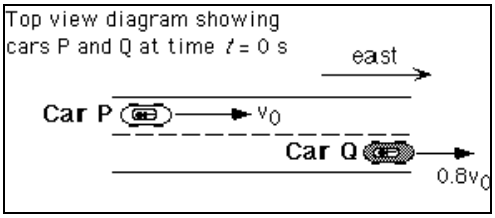


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: a

Q14. Explain. at 2 they are equal and at 1 and 3 it is getting closer therefore B must travel in the same direction to the east.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. because car p is catching up to car q.

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because at t=2 it is 50 and at t=3 it is 40 therefore I concluded it must be less than 30 at t=4 because P is speeding up.

End of response

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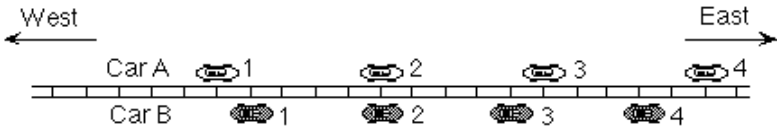
An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. It looks like he is going to the west because he is going slower than CAR A

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. Because CAR A is going faster, that means that if CAR B had speed relative to CAR A, if CAR A was stopped, CAR B would still be going slower than that (going in the opposite direction)

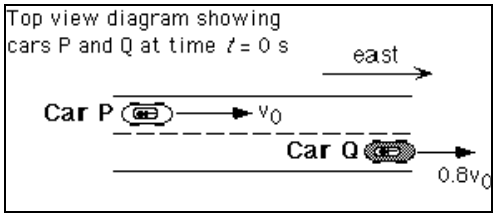
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Cuz he's goin in that direction in every point

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. He is slowing down!

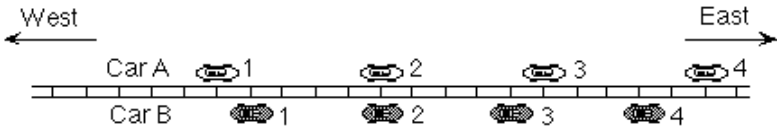
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. He's slowing down... so he's getting closer and closer at an accelerated rate

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. car A is moving east at a faster rate than car b so it looks like car b is moving opposite direction of car a the whole time.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. the change in position between the two cars is constant therefore it looks like the velocities are constant as well to car A.

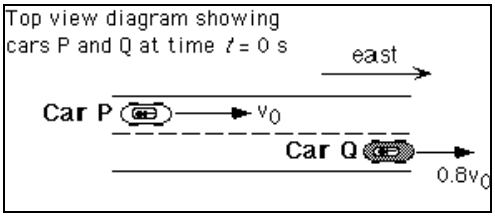
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. to car A it looks like car B is moving to the right with a constant speed so g is the best representaton of that.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the gap between the two cars is decreasing, so to car P, it looks like car Q is slowing down in both cases.

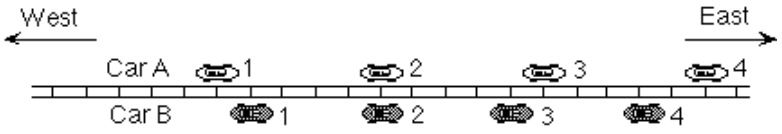
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Car Q is slowing down so car P will close the gap between the two cars at a faster rate as time increases (until it passes car Q of course).

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

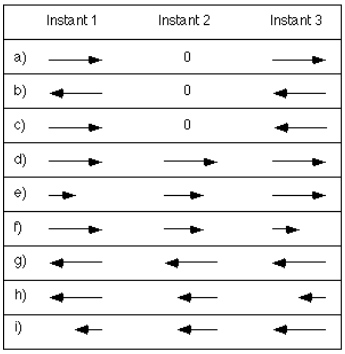
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. The whole time, A is moving faster than B toward then past B so when when A is behind B and catching up it looks like be is moving in the opposite direction of A. At 2 they are right next to eachother so it seems as if car B is stationary with respect to car A. After a passes B it again seems like B is moving in the direction opposite that of A wich is to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. It seems as though B is slowing down at 1 and 3 because A is moving faster than B so it could be taken that b is slowing down relative to a. At 2 they are right next to eachother and if just that instant were taken they would seem to be moving at the same speed.

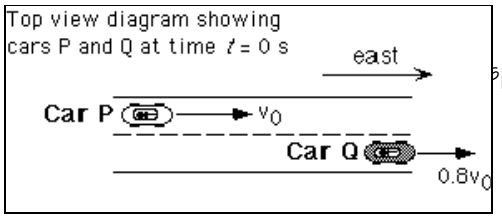


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. it is consistent with my answeres to the previous questions. B seems to be moving west at 1 and 3 and to be moving the same at 2

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. it seems to car p that it moving faster than car q so it seems as if car q is moving at constant speed and car p is only moving toward it because it is moving faster

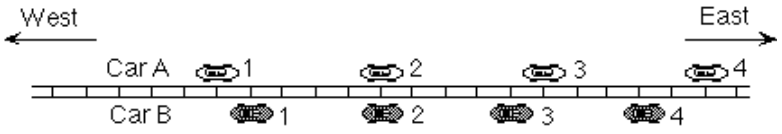
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. the car q is slowing down at a constant rate, so the distance between the two cars should also decrease at a constant rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: at rest Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. For 5 its hard to say. The car starts out ahead but clearly has a lower velocity because in frame 2 A has caught up to B. But im not sure if B has equal velocity as A or a lesser velocity. For 6 and 7 its simple enough. A is passing B so it seems to A that B is moving to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. Similar to the other questions. For 9, i guessed that they start out with the same speed(frame 1) but by frame 2 they have different velocity. Av is > Bv so it would seem to A that B is slowing down when in truth it is speeding up.

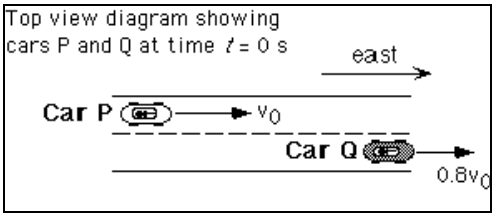
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Car A has greater velocity for at least frames 2 and three. I just chose which looked best and saw that g) seemed the most likely view of what B was doing in the view of A.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. To car P, Q is moving towards it, as time goes on Q comes towards it faster and faster.

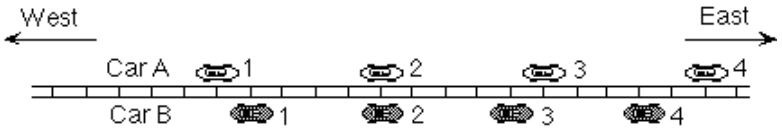
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. The velocity is a linear slope as far as i can tell, so the times would just be constantly smaller.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

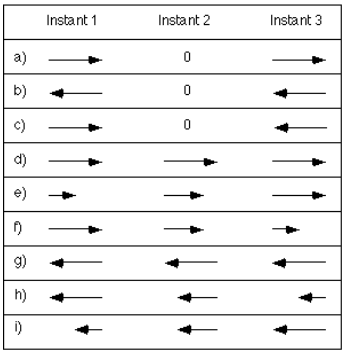
Q8. Explain. Both cars move with constant velocity and car A moves to east faster than car B

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Both cars move with constant speed.

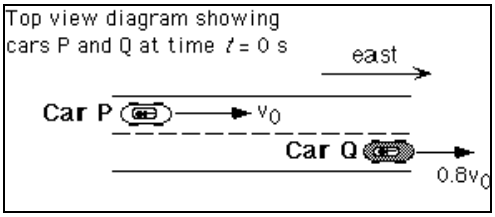
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g



Q14. Explain. Constant velocity (constant magnitude) and always in the same direction.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car Q is slowing down in any reference frame.

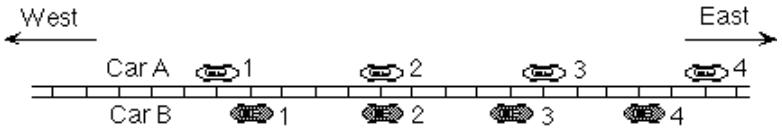
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. The change in the distance between two objects that experience relative acceleration towards or away from each other is proportional to the the square of the time. Therefore, the data above must specify two points on an exponential function, as opposed to a linear function.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

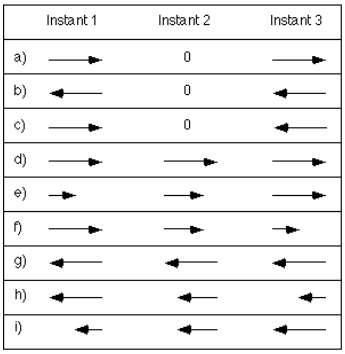
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the east

Q8. Explain. Car A is Going faster than Car B so car B would look like it is slowing down.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. Because Car A is going faster than car B and it would look like Car B is slowing down

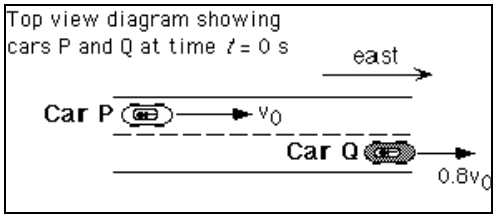


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. because the car B is ahead of car a at instant 1 and and is at the same position in instant 2 and is behind car a at instant 3

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. because car q is slowing down

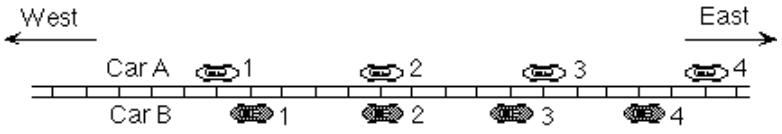
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. not sure. . . gotta look over the book

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Since car A is moving faster than car B, it appears from car A that car B is actually going backwards, which in this case would be west.

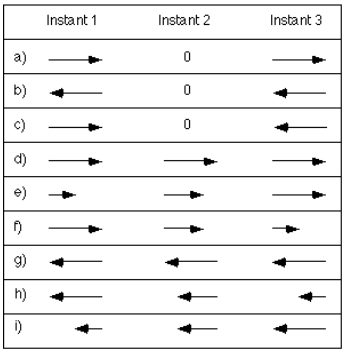
At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. Again, since car A is moving faster than car B, it appears that car B is continually slowing down, because the viewer from car A is gaining ground on them.

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

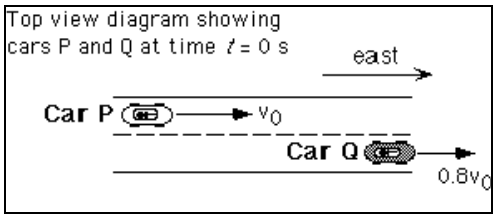
Q14. Explain. To the observer in car A, car B is going towards west throughout the entire section of road. Both cars are moving forward, but since A is going faster, it appears that be is going backwards.



II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:

Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down



Q17. Explain. This situation is much like the previous one. However, since Car Q is actually slowing down, it will appear to car P that car Q is slowing down faster than if it had a continous constant velocity of .8V of Car P

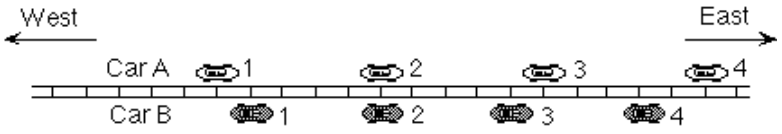
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Since car Q is decelerating, and car P is going at the same speed, it appears that the difference between the two cars velocities is increasing. Therefore, in the one second interval from 2 to 3 seconds the change in distance between the two cars was ten meters. Since car Q is still slowing down, and car P is still at constant speed, in the next time interval 3 to 4 seconds, the change in distance between the cars will be greater than 10m. Since 40 - (# > 10) < 30 the distance between the two is less than 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. car a is going faster than car b. therefore it would appear as though car b is going backwards.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. car a is passing car b with a constant speed and therefore car b is moving with constant speed.

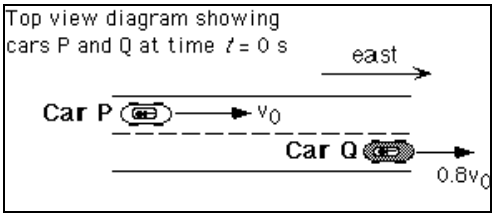
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. the vectors must be going to the west with the same magnitude.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the velocity of car q is decreasing and therefore would be slowing down.

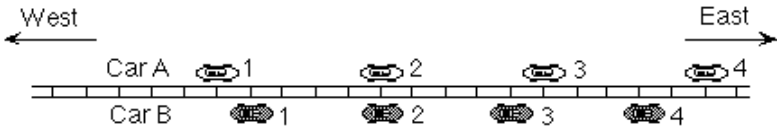
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. car p gains 10 meters on car q every second.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

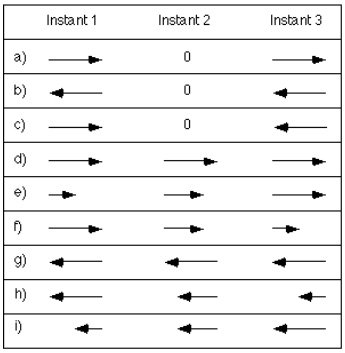
Q8. Explain. For all three reference, car B is seen to be going to the west because car A has a faster speed and also their speed is constant.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Both car is moving at a constant speed.

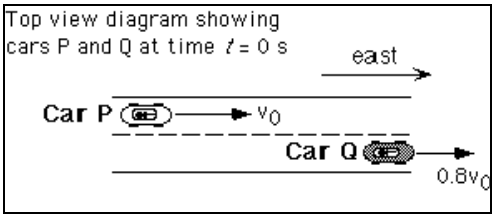
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g



Q14. Explain. Because car B is seen from car A to be traveling to the west with a constant speed, so their vectors are all equal.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. Car P see car Q speeding up, because car Q is moving backward and speeding up to car P.

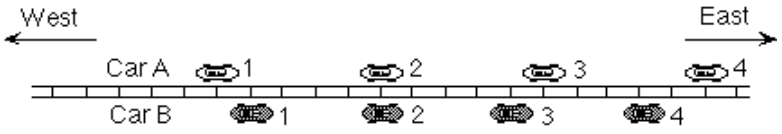
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Because car Q is accelerating towards car P at this time.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: moving to the east Q7. t_3: moving to the east

Q8. Explain. Car B is further along the line in the x-direction

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: speeding up Q11 t_3: speeding up

Q12. Explain. Car A begins behind Car B and then passes it, as long as Car B is moving with constant veloicty, Car A is speeding up

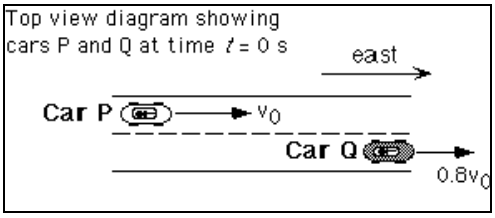
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: d

Q14. Explain. Because Car B is moving with constant velocity

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Because Car P is moving with constant velocity while Car Q is losing velocity

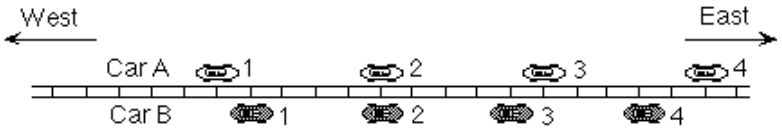
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Because Car Q is decreasing velocity at a uniform rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

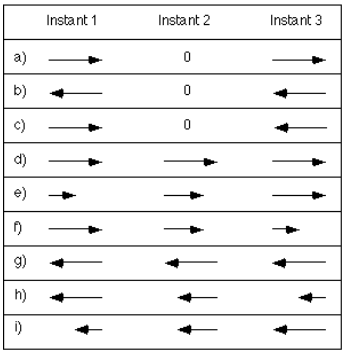
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Since B is moving to the left at a constant rate, it will always seem to be moving to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Since it moves the same amount of space between intervals, it seems to be moving at a constant speed, and the space between intervals is always the same.

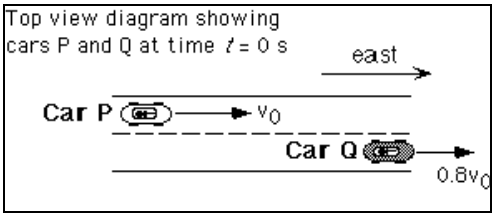


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Since it is moving at a constant speed, then the velocity vectors are all equal in maginiude and direction.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. Since the reference frame is p and so if both were moving at constant speeds, the would both seem stopped, since car Q is slowing down it seems as if it is moving faster to the left, towards P.

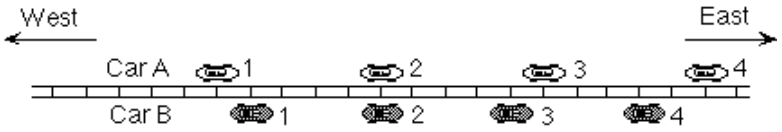
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Since Q is speeding up towards A at a constant rate, then the distance corresponding to time is not linear, so therefore it is less than 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

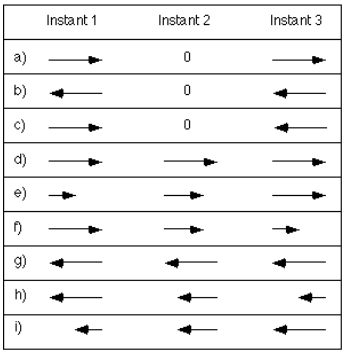
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. At instant 1, car B is ahead of car A, so it seems that B's going east compared with A. At instant 2 they're both at the same place in the diagram, so it looks like B is at rest to A. At instant 3 car B is behind car A so it seems like car B is heading west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. For car B to be ahead of car A at instant 1, car B would have to be speeding up in reference to A. At instant 2 the cars are at the same spot, so to car A, car B is at a constant speed compared to A. At instant 3 car B is lagging behind A, so to A, B is slowing down.

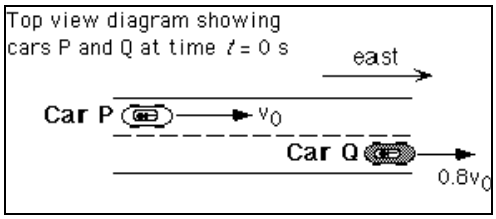


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. At instant 2, the velocity of B in reference to A is zero since they're both at the same speed. So, you can eliminate d-i. Since car B is speeding up compared to A at instant 1, the velocity vector will go the right, which eliminates b as an option. At instant 3, car B is slowing down in comparison to A, so the vector has to be going to the left. This leaves only c as an option.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Since the velocity of car Q is getting smaller as time goes by, and car P's velocity is constant, the relative velocity of Q is decreasing as time goes on, as well as the distance between P and Q.

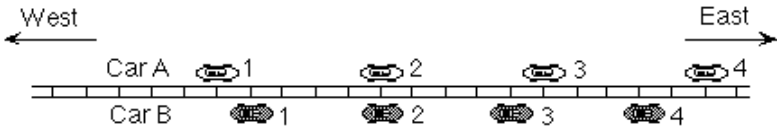
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. The distance between the cars is linearly related to the time, so as each second passes, the distance between the 2 cars decreases by 10 meters. So, at time 4 seconds, the distance should be 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. A is faster than b, so b will be moving west

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. both cars are moving at two different constant speeds.

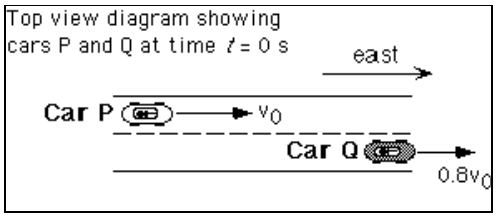
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q14. Explain. looked right

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. you can still tell if the car is slowing.

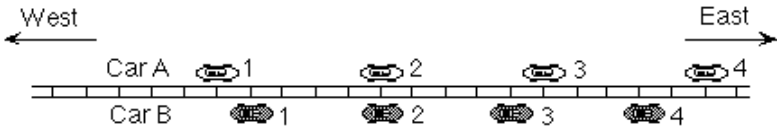
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. it is decellerating.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the east

Q8. Explain. Well, we are looking at car B in the reference frame of car A. At instant 1, car B is ahead of car A, instant 2 they're at the same spot, and at instant 3 car A sees car B moving the opposite direction.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. Well, if we are taking the reference frame of car A, car A thinks it is not moving at all. But car A is gradually catching up to B, then overpassing it. Thus, at all instants it thinks car B is slowing down.

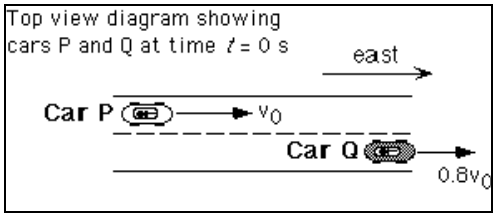
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Well, car B is slowing down at all instants in hte reference frame of car A.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Well, car Q is ahead of car P, but it gradually moves closer to car P since it's speed is .8Vo. Therefore, car P thinks it is slowing down at those instants.

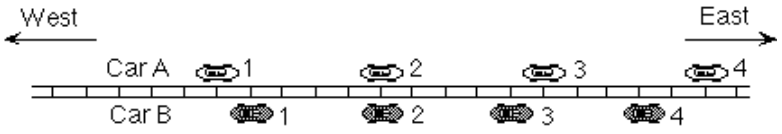
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain. Well, car Q has a velocity of .8Vo. .8 of 40 is 32 which is greater than 30.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. I figured that if Car B was to the right of Car A then it means that it is moving East, if Car B was to the left of Car A then this means that it is moving to the left. However, it is parallel to Car A then this means that it is at rest.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. I figured that if Car A was behind Car B then this means that car B is slowing down. If Car A is in front of Car B then this means that it is slowing down.

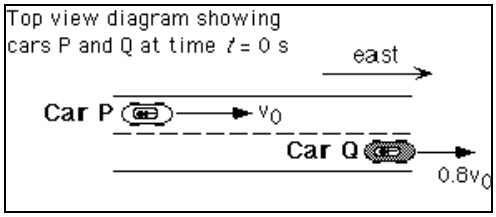
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: e

Q14. Explain. Car B is speeeding up

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. since car p is already moving with a constant speed and it is given that car Q is slowing down at ALL instances.

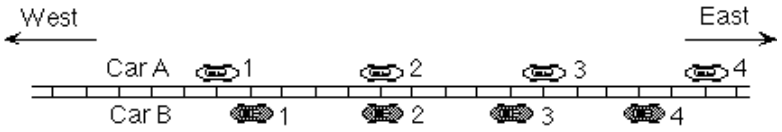
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. since the distance is dereasing at a constant rate

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. difference in velocities

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. they are

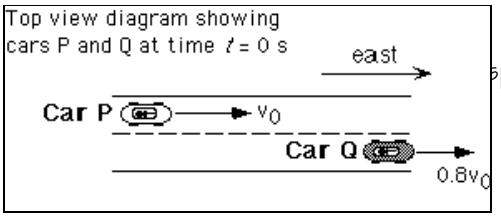
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q14. Explain. constant difference

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. doesn't slow down faster and faster, but at constant rate

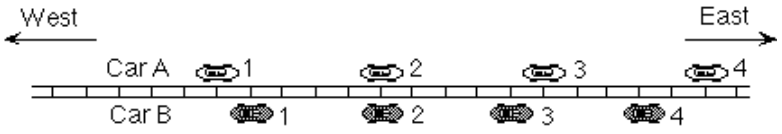
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. constant deceleration

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. When the car is ahead of you, you will see it moving away, when you are side by side, it will apprear as if both of you aren't moving, and when it is behind you, it will look like it is, slowing down, or moving to the west

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. The car will appear to be slowing down whether it is in front of you or behind you because you are moving faster than it. When you are side by side, it will appear as if car B is moving with same speed as you.

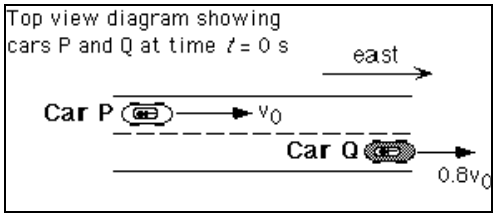
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: f

Q14. Explain. It will appear as if it is moving the fastest when it is ahead of you, and slowest when it is behind you.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. The car is slowing down and it will appear this way because you are moving with constant speed.

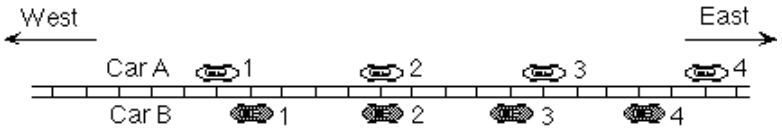
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car Q is slowing down at constant rate and car P is traveling with constant speed.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

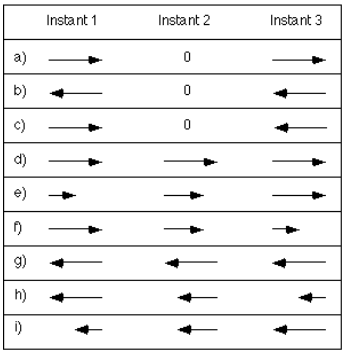
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. since the car appears to be traveling toward car A, it will be appearing to move west, except for instance two, where the cars are in line with each other, and so car B will appear to be at rest at that particular instant

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: speeding up Q11 t_3: speeding up

Q12. Explain. While car b is going toward car a, it will seems as if car b is slowing down. However, at the instance after the cars pass each other, it will appear as if car b has speeded up.

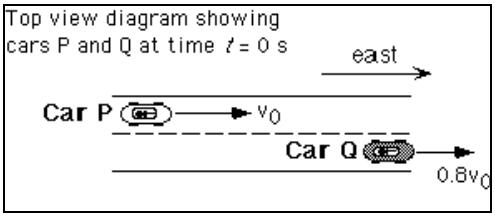


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. c is what agrees with my previous answer the best.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. if Car Q is to remain ahead of car P for the first two seconds, then it will seem as if it is speeding up, rather than slowing down.

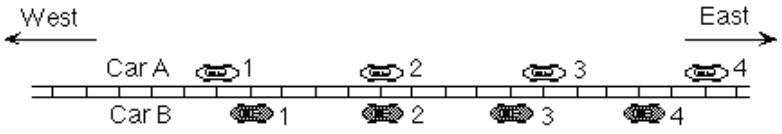
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. It seems as if the speed is decreasing between the two cars. Therefore, by 4 seconds, it will have decreased even more and should by then be less than 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: at rest Q6. t_2: at rest Q7. t_3: at rest

Q8. Explain. Car 2 doesn't move at all with reference to car B so it must be at rest

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Car A is moving on the same distance interval over the same ammount of time.

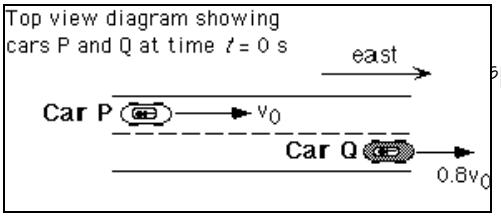
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. IF car A is considered at rest then car B is moving west.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. the velocities of the cars dont change so they are moving at constant speeds.

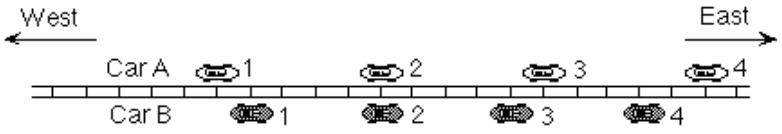
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. the car's distance changes on an interval of 10 for each second so the answer must be 30 M.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Car A is moving faster than car B, so it always apears to car A that car B is going the opposite direction, therefore West.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. They are moving with constant velocity, so car A thinks that car B is moving with a velocity of B-A.

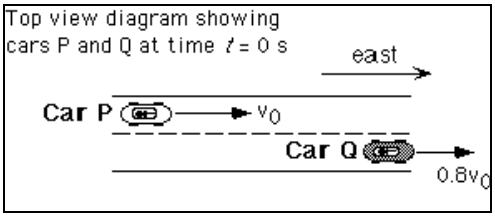
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Again, the velocity of car B doesn't change in the reference frame of car A because noth cars are traveling with a constant speed.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. In the view of car P, car Q is accelerating toward it with a constant acceleration.

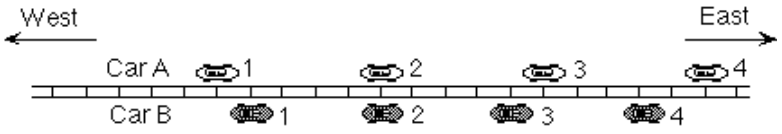
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. The car is accelerating constantly so the velocity changes with a constant rate and the position changes at an exponential rate. Therefore, the differences between the distances will not be constant.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

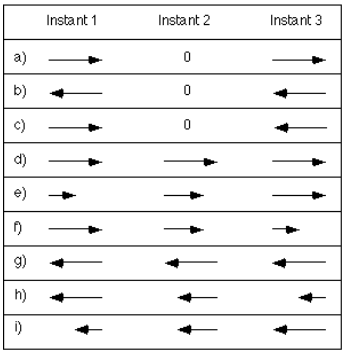
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. You see the car move west the whole time because you are passing it. It just seems like B is moving very slowly towards west. At instant 2, both cars are side by side so it seems like neither car is moving.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. You are catching up with the car so it seems like it is slowing down, then when you are the same it seems that it isn't moving faster or slower, when you have passed it it seems like that the car continues to move west.

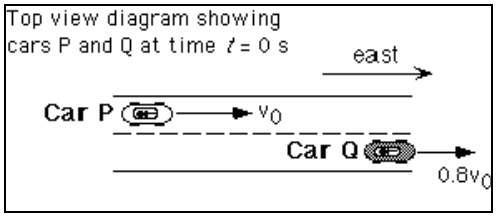


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. It just seems that B is moving towards or the oppisite way of A the whole time. If it was a snapshot of instant 2, you can't tell if B is speeding up or down.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Q is slowing down, from P's point of view they also see that Q is slowing down because it is catching up to it while moving in the same direction.

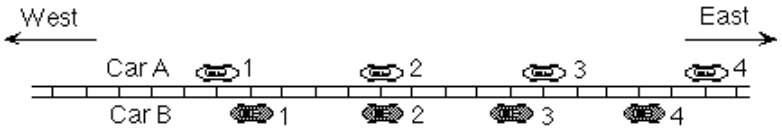
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car Q is slowing down at a constant speed.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the east

Q8. Explain. when the cars are side by side it seems that neither is moving, but when the cars aren't b is moving in the opposite direction as A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. It seems to car A that B is slowing down to a stop and then speeds up again once the cars are side by side.

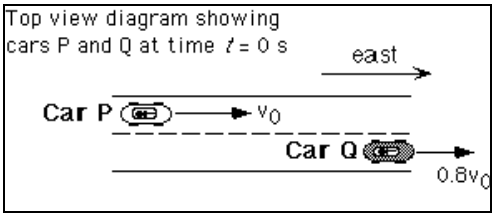
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. it just looks lik the car is going at a speed away, then stops, then goes at that speed away.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. it looks like to car p that car q is speeding up in the opposite direction, because that is where the acceration of Q is in both instances.

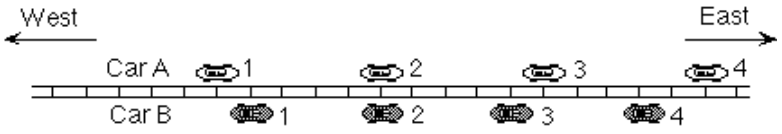
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain. becuase acceleration is a power of two, meaning since the acceleration is negative the distance between the two cars will get smaller in some relatino to a power of 2. if it was 30 meters or less than 30 meters than it would not be a power of 2.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: moving to the east Q7. t_3: moving to the east

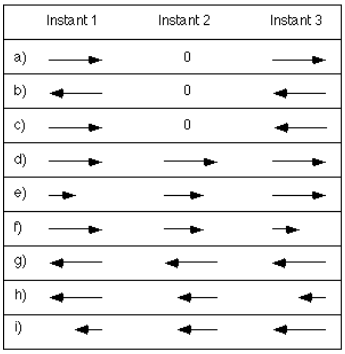
Q8. Explain. the car is always moving east iits just that it might of caught up and we are moving slower

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: speeding up Q11 t_3: speeding up

Q12. Explain. the car is always catching up therefore moving towards us

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: d



Q14. Explain. the car is always moving in the same direction its just that it is going slower den car a

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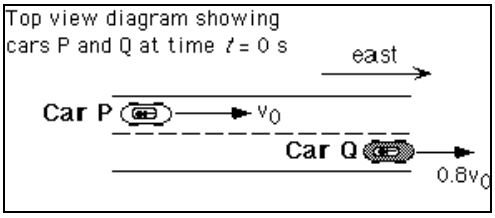
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the car is slwoing down, so it will always be slowing down when we see it

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. the pattern

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

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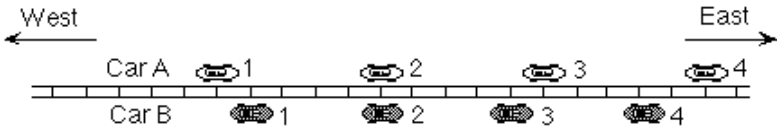


At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the east Q7. t_3: moving to the west

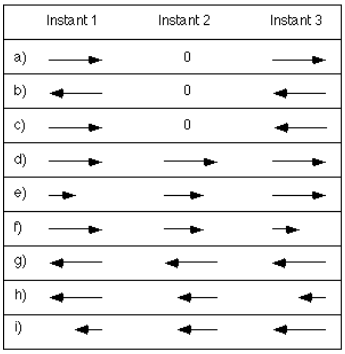
Q8. Explain. cuz... it is pulling

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: speeding up Q11 t_3: slowing down

Q12. Explain. it is pushing

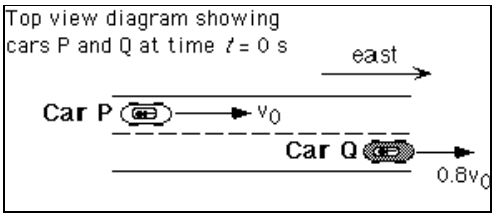
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c



Q14. Explain. cuz vectors move differently..

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ moving with constant speed

Q17. Explain. cuz view showing

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. car p and car q

End of response

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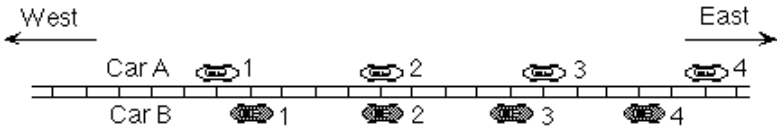


At the instants below, in the reference frame of car A car B is:

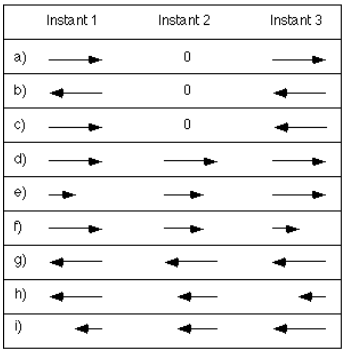
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. When you are passing a car, and if you cannot tell that you are moving (you view things from the reference frame of the car) then it looks like Car B is moving backwards.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. As you are catching up to a car, it looks like it is coming towards you faster and faster. Then, when the car is beside you, it looks like you are going the same speed (0 m/s), then as the other car falls behind, it slowly gets further and further away.

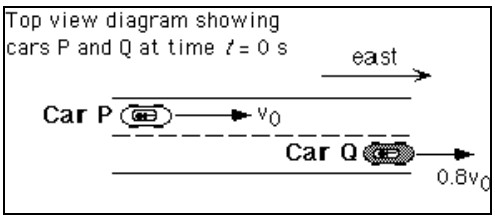


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. Imagine you are stationary on the road and a car is coming by. His velocity is going to be pointing in the direction of motion, except when he is right beside you (instant 2).

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. If Q is ahead the whole time, and you are about to pass him, it is going to look like he is slowing down.

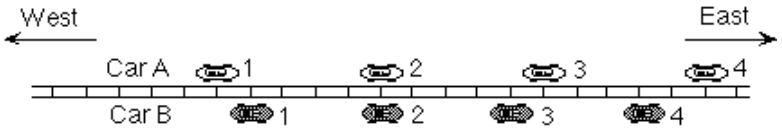
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. The fact that the car ahead of you is slowing down would mean that if you are stationary, he is accelerating toward you, so the distance will get smaller and smaller relative to the acceleration of Q.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

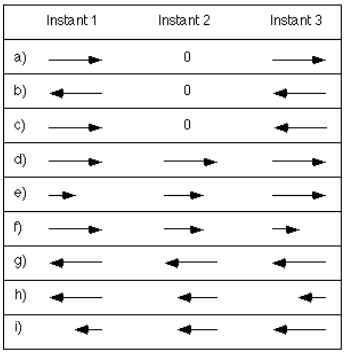
Q8. Explain. From the reference frame of the car, the motion is constantand to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. The difference between to constants is a constant.

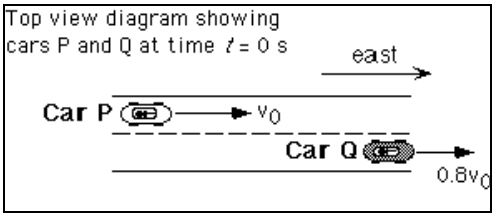
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g



Q14. Explain. constant velocity to the west, as stated in previous two sections.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the change in reference from the road to the car does not change the apparent velocity or acceleration, merely reduces the size of the initial velocity vector.

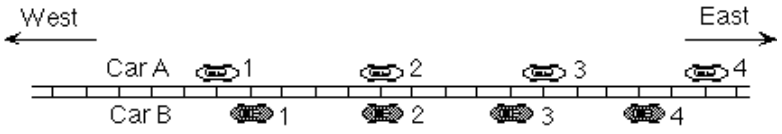
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. as car q is slowing, the reduction in distance would be greater, as car p is continuing at a constant rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. The car appears to be moving to east at instant one because it is ahead of car A. It is at rest at instant two because both are at the same space. It is moving to the west at instant three because it is getting farther and farther away from car A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. It seems to be slowing down at each instant when it is not equal with car A because Car A is always catching up to it. It moves with a constant speed when they are next to each other because they are at the same space.

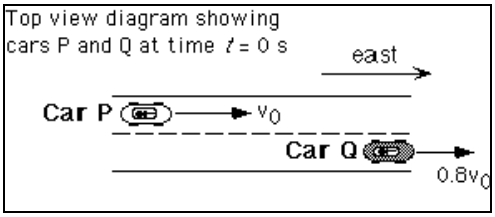
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. For the same reason as above.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. It always looks like it is slowing down because Car P is coming closer to it.

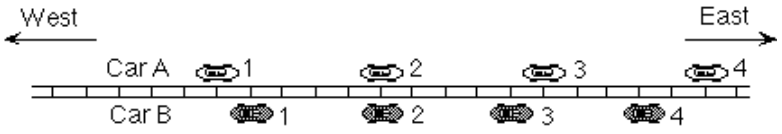
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it is equal to 30 meters becuase the change in velocity is denoted by the change in distance divided by the change in time-- -10/1 in this case. So for every second, the car is decelerating at 10 m/s.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

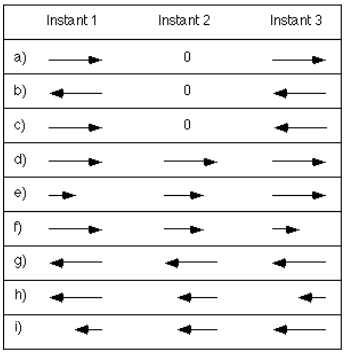
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. the car A is the reference frame

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. the care is slowing down the only difference is how fast it is slowing down.

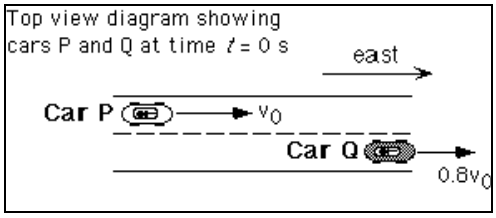


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. it always looks like it is slowing down.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. it appears to be slowing all the time.

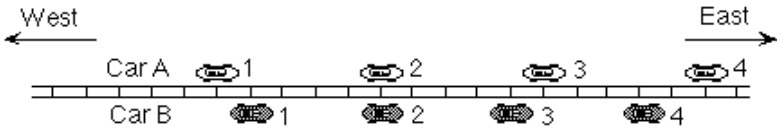
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. time and distance are proportional in the first two, so why not the third.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. Since it is in front of you, it looks like they are going the same direction, then we they are beside you they appear to be at rest, then when they are behind you, it looks like they are moving that way.

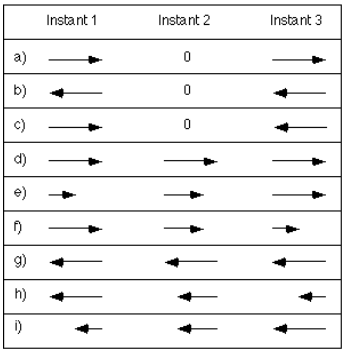
At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. since we are catching up to the car, it looks like they are slowing down. when we are beside it, looks like we are both at the same speed, then when we pass it, it looks like it is speeding up behind us.

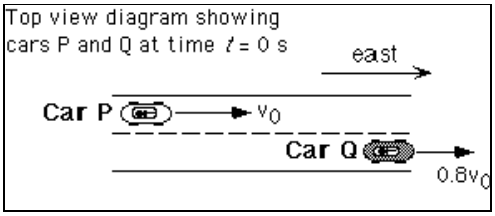
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: e

Q14. Explain. Well, it slower at the begining, then assuming a constant, then going faster.



II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. it appear not to be moving since it occurs at that instance, until it starts to slow down.

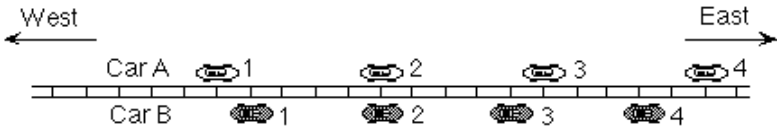
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Since car Q is slowing down, it is getting closer to car p

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: moving to the east Q7. t_3: moving to the east

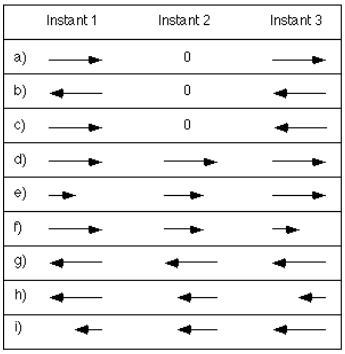
Q8. Explain. They're moving at a constant rate.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. they're moving at a constant rate.

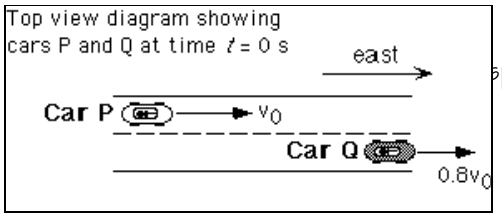
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: d



Q14. Explain. a guess

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. Because car q is moving at constant speed.

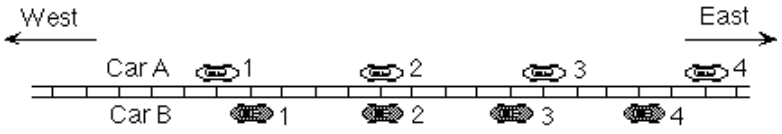
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. moving at a constant rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

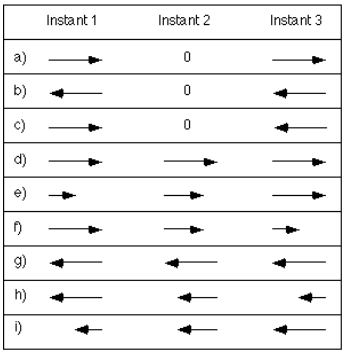
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. According to the diagram, car a is travelling at a greater constant velocity that car b, so car a is overcoming car b and it appears thet car b is travelling in the opposite direction to car a. While they are at the same point, at that instant only does car b appear to be at rest in reference to car a

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. as car a overcomes car b, it would appear to those in car a that car b is slowing down. When they are at the same point at the same instant, it would seem to car a that car b is moving at the same constant velocity. As car a completely overcomes car b, car a is travelling at a faster constant velocity so it would seem that car b is speeding away from them

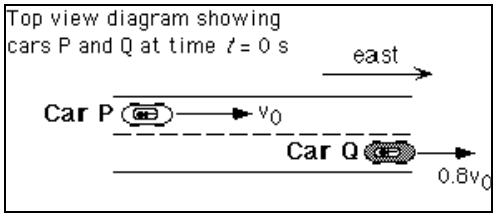


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. to car a, it would seem that the car b is going in the opposite direction to car a at instances 1 and 3 and at rest when the two cars are next to each other like in instant 2

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. if car Q is always ahead of car p and slowing down at a constant rate, according to car p, which is at a constant speed, car q would be slowing down always

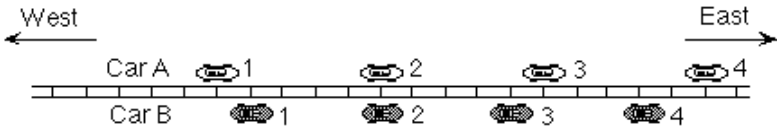
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. car q is slowing down at a constant rate of 10 meters per second

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

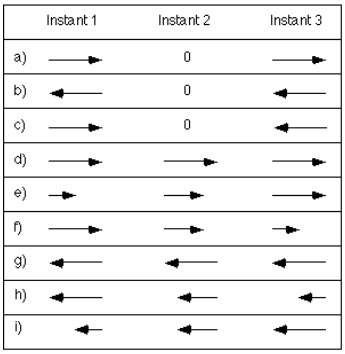
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. As an observer, depending on the position of the car B, its direction may seem to vary.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. At instant 1, Car B is ahead and therefore, it looks as if it is speeding up. When Car A catches up to Car B at instant 2, it seems that both cars are moving at constant speed. Then, at instant 3, Car B is behind Car A. Therefore, Car B seems to have slowed down.

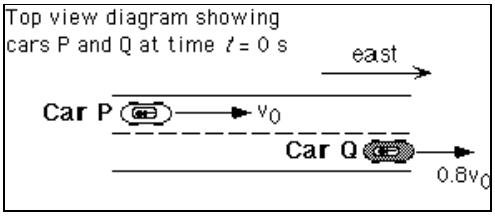


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. At instant 1, Car B is ahead. At instant 2, both cars are traveling at constant speed. At instant 3, Car B has slowed down.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car Q has been slowing down at a constant rate. Therefore, it is slowing down at every instant.

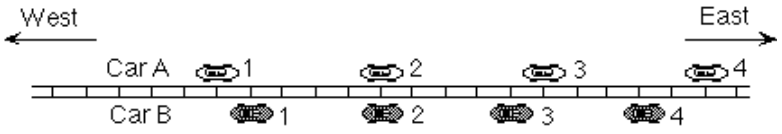
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car Q is slowing down at a constant rate. Therefore, it is at 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: moving to the east Q7. t_3: moving to the east

Q8. Explain. car a is gaining on car b, thus car b seems accelerating towards car a

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. as the cars get closer, they appear to move faster relative to each other.

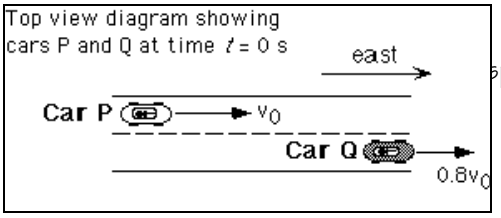
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. its velocity is always west

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. car q always seems to be moving with constant speed because its slowing down counteracts the appeacernce of accelration caused by getting closer.

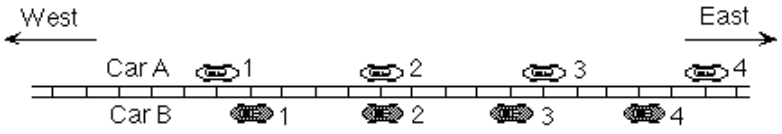
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. slowing down at a constant rate. which means it will lose more gro d between 3 and 4 than between 2 and 3

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

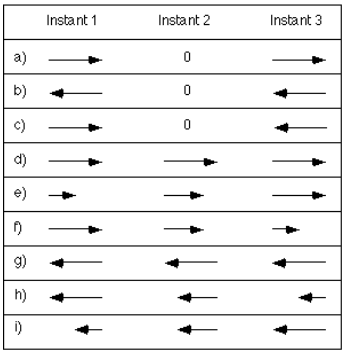
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. It would appear to someone in car A that the car B was moving foward.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: speeding up Q11 t_3: speeding up

Q12. Explain. It would appear that car B was speeding up.

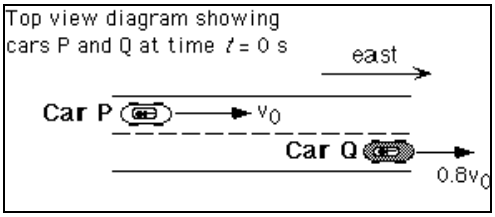


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: i

Q14. Explain. It would be in order of increasing vectors because the car would appear to be accelerating.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. It would appear like the car is slowing down.

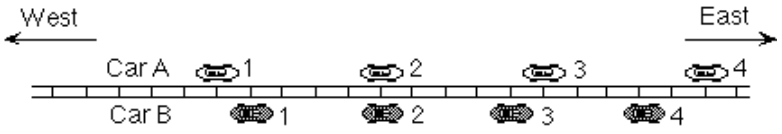
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. If car Q is slowing down, the distance between the two cars will decrease over time until they pass each other.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. At point 2, the car seems like it's at rest because the cars are right next to each other. The other two times, car A is either approaching or moving beyond car B, which would make car B look like it was going in the opposite direction, or West.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Just because B is not in the same position relative to A, doesn't mean that it appears to be accelerating. The pictures suggest that A gains on B uniformly, which means B appears to move backward uniformly as well.

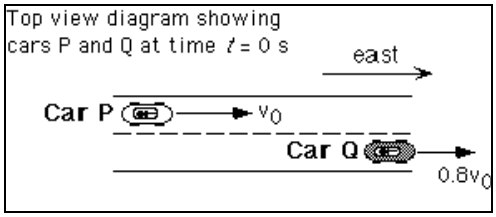
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. Same as reasoning for questions 5-7.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. It appears to be speeding up in the opposite direction because it is approaching car P faster all the time.

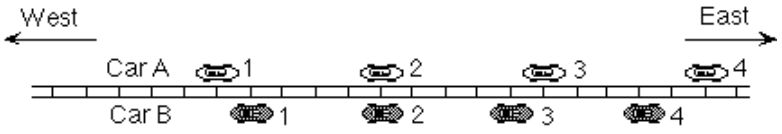
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. The car is decellerating uniformly.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. relative to A, B moves west

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. they both move constant, therefore, B moves west constantly

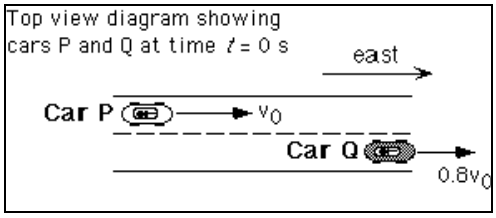
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q14. Explain. B moves constant relative to A

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. Q getting exponentially closer and closer to P.

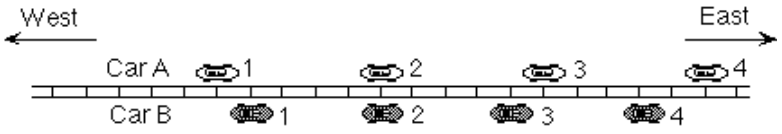
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Q is accelerating towards P (In P's reference frame).

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. even though car b may be moving to the east the whole time at a slower velocity than A. car a is the reference point so you have to take car a as the orgin

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. you have to base all of these answers based on the position of car A

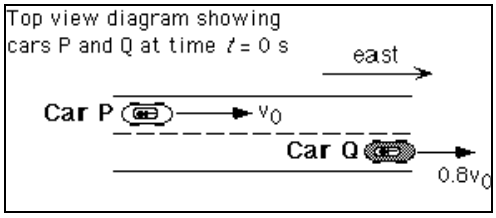
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. at instant 1, it has to appear faster. at instant 2, it has to be at rest, and at instant three, it's slowing down.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ slowing down

Q17. Explain. car q is ahead of p, so it looks like it's speeding up at first, after p starts catching up with q, even though it never passes q, since it catches up, car q looks like it's slowing down.

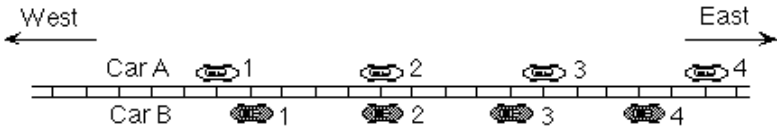
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. d=v*tsince it slows down at a constant rate, you can tell by looking at the other number that it is going to be proportional.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

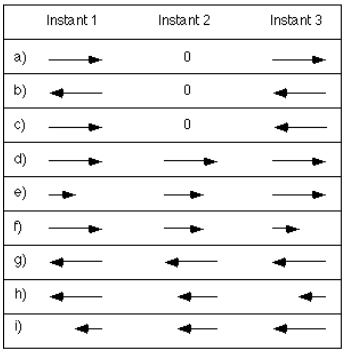
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. The direction in which car B is moving depends on where it's located in respect to car A (such as if it's to the west of it, right along side it, or two the east of it).

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. The velocity of car B is determined using its location compared to car A. If it is ahead of car A, then it can be assumed that it is moving faster than car A. The same idea applies for when car B is behind and along side car A.

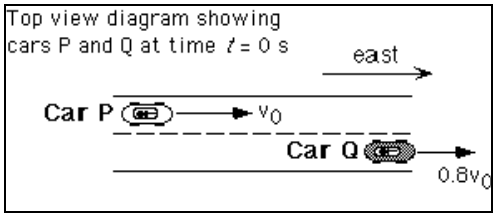


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. I chose the vectors that I did, due to the reasoning provided in question 12.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. At first, car Q will appear to be moving at the same speed since it is ahead of car P, however, car Q has a negative acceleration thus by time t=2, it may be noticeable that it is slowing down.

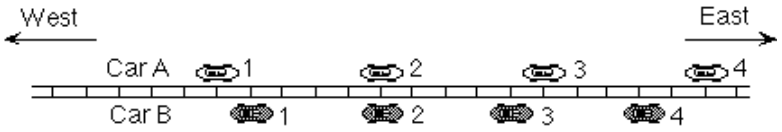
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Since car Q is slowing down at a constant rate, then to go along with the constant decrease of 10 meters per second provided in question 18, at t=4s the distance between the two cars should be 10 meters less than 40, which is 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. When car B is ahead of car A, the person will think car B is moving to the east as the same as car A; however, when they are at the same position at the same time, the person in A will not see the change in position of car B. When car B is behind A, the distance will fall apart, so it will seems like B is moving in the opposite direction.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. When car B is ahead, it seems B is speeding up because the distance between the cars is greater. When they are at the same position, car B will be moving at a constant speed as A because the position is at the same place. When B is behind, the distance between the cars is the largest and car B will seems to slow down.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

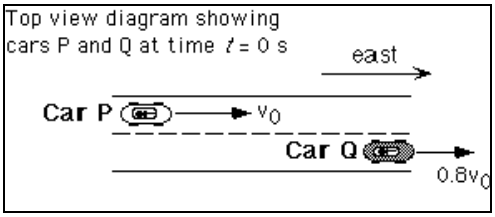
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. Instant 1 seems it's speeding up so the velocity vector is in the positive direction. when it's at the same position, it'll be zero because the velocity is constant. when it's slowing down, i will seems to slow down, so it's in the negative direction.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:

Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up



Q17. Explain. Since car Q is still ahead of car P, the person in P will think Q is speeding up.

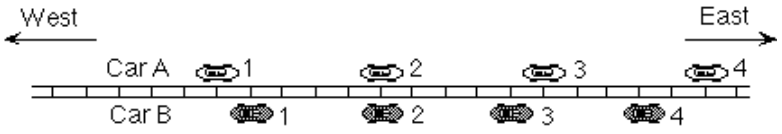
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

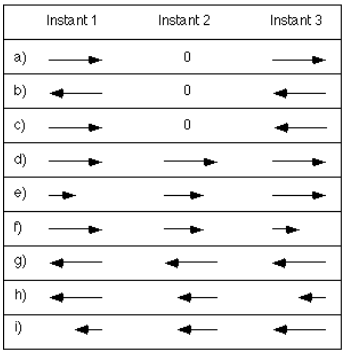
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. Because that is the relative direction of the car B in relation to car A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. Because in 1 it is ahead of car A, and at 2 it is alongside the car, and in 3 it is behind car A.

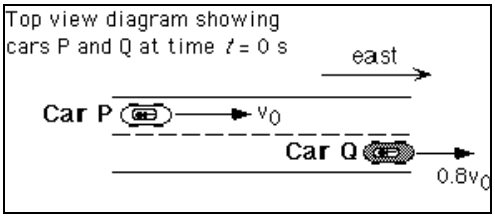


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. This best represents the motion of the car between the different times.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car q is going at a slower and slower rate in comparison to car P.

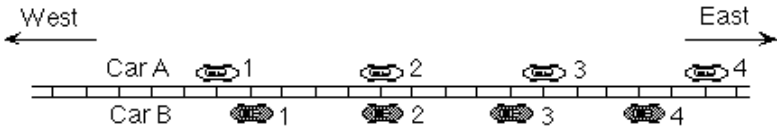
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. because car Q is slowing down at a constant rate, thus it will appear to be 30 meters because P is also gaining at a constant rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. At 1 and 3 the car is pointed in the west direction. At point 2 the car seems to be at rest as it is next to car A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. As the car approaches the same speed as car A. In the reference frame of car A, car B will look like it slows up to meet car A then speeds up to pass it.

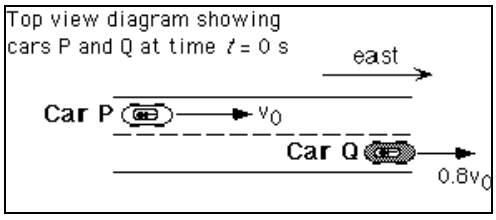
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. As established before, car B apprears to be slowing down[negative velocity], coming to a rest/constant velocity[zero], and then speeding up[a positive velocity]. Choice C refelects this.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. At time 1, the distance between the cars does not change so car Q apprears to be going at a constant speed. At time 2, car P is speeding up so car Q will appear to be going backwards[or slowing down].

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car Q is decellerating at a constant rate.

End of response

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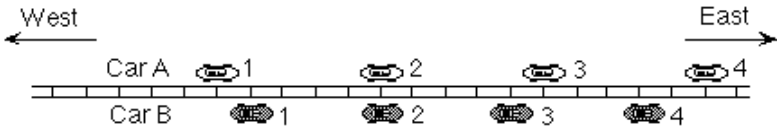


At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. assuming they are both traveling east (I'm having trouble telling, was that actually given?) then car b is always slower, and therefore appearing to move to the west

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. They are moving with constant speed. Even though one is passing the other they are still constant

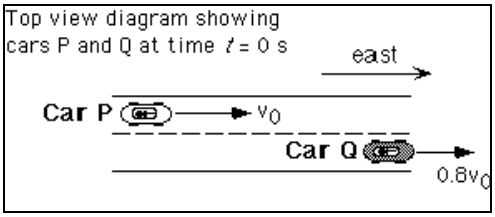
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. uh see my other answers. No change in velocity, and moving west (left)

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. if car Q is slowing down, and my answers are wrong, then I guess I must have missed something

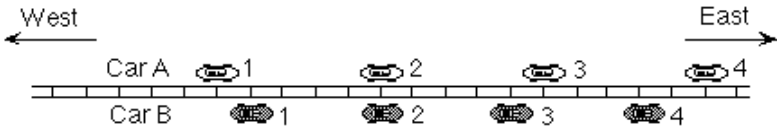
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because the relationship between acceleration and velocity, if accel. is decreasing linearly, then velocity is decreasing quadratically

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

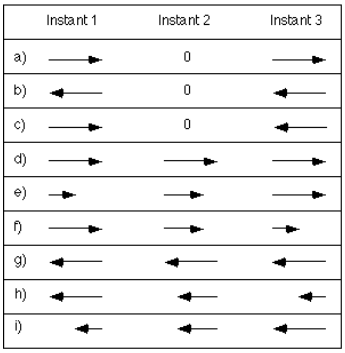
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. because car a is passing by car b in each time interval. so at first it looked like as if car b was going east then as car passes car b it looks like car b is moving in opposite direction.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. since car a's velocity is appearing to be larger, as it passes by car b it looks like it car be going in opposite direction.

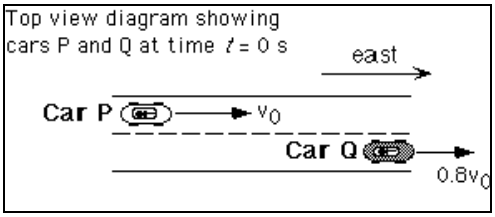


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. check answer to #12

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. car q is slowing down. as long as p is west of q then it would look as if car q is slowing down.

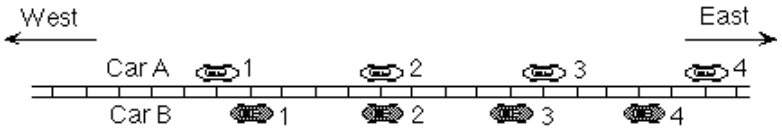
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. it is slowing down at a constant rate but car p is also moving towards car q. so in the next time interval the change has to be greater than from previous two intervals.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. The velocity of Car A is greater than that of Car B, thus, Car B would always be moving to the west despite of its position.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Since both Car A and Car B are moving in constant speed, Car B would be moving in constant speed in the reference frame of car A.

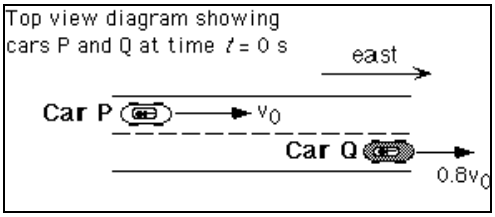
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. the velocity of car B should be the same, which points toward west.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Although Car Q is ahead of car P at both instance, however, the velocity of car P is greater then that of car Q, thus, in car P's reference, car Q is slowing down.

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. since car Q is slowing down with a constant rate, the displacement over time should be proportional.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

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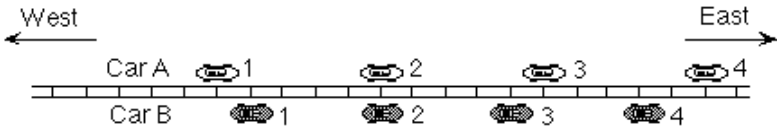


At the instants below, in the reference frame of car A car B is:

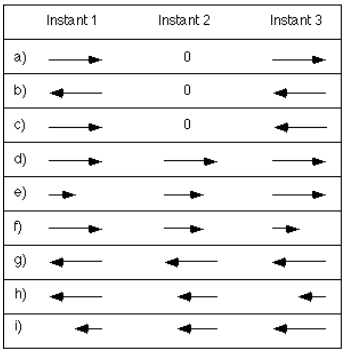
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. car A and car B are moving in the same direction, car A is moving faster than car B, so a man in car A see car B moving tha same direction, then rest, then moving in the opposite direction

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. car A is moving faster than car B, a man in car A see car B moving slowing down, than rest,then speeding up.



Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. car B was seen, at first slowing down, then rest, then speeding up

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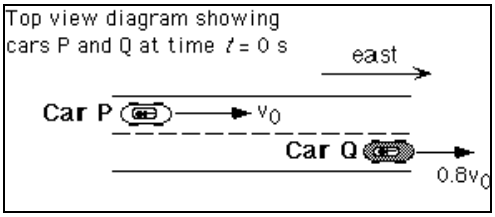
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:

Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down



Q17. Explain. because car A is moving faster than car B, so the distance between 2 cars is shorter, so a man in car A see car B is slowing down

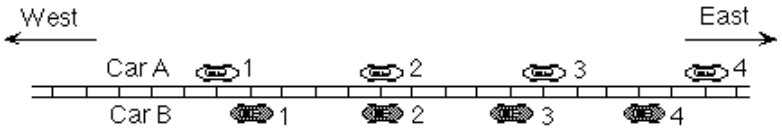
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Because, car A is moving faster car B, so car A gets closer car B in the next minute

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. at every instance if you freeze at that moment, the car is moving toward the direction it is, since at instant 1, the car is infront, it's goin to the east, at instant 2, it's next to you so it's appearing stopped, and at instant 3, it's behind so it's movin toward the west

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. the car is moving at a negative acceleration and it is obvious at every instant.

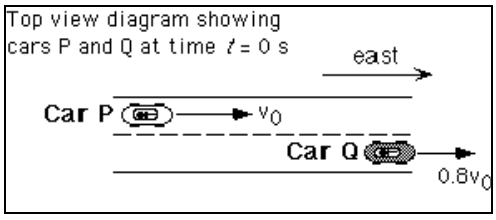
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: i

Q14. Explain. when infront you don't notice the velocity very much so it is a small vector and as it approaches you, you notice a bigger and bigger slow motion from the car as you pass the car.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. because the car is getting closer and closer to the other car so it is showing it's speeding up.

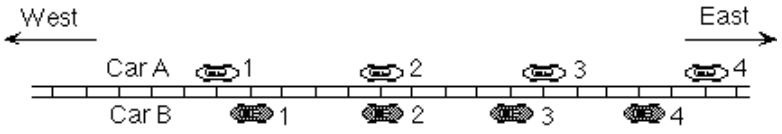
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it's accelerating at a constant speed so the distance is the same length after every second.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. If the reference frame is car A, that is considered 'still' compared to everything else. So then it just looks like B is moving, not A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. Again, with using the reference frame of car A, Car B looks to be the only one moving.

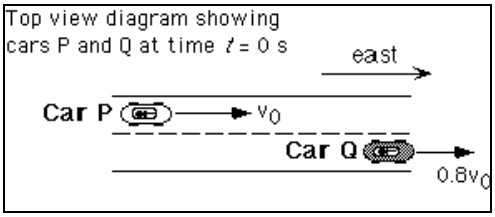
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. Because I chose that it was speeding up, then at a constant speed, then slowing down, the vectors would need to represent B.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. The car Q is slowing down, although it is still ahead of Car P at the end, it is still slowing down.

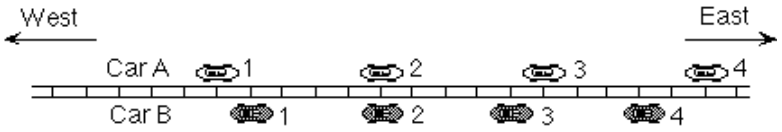
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car Q is constantly going slower so the distance that changes would also be constant.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. for 5, the car is moving toward them, so they look like they're heading west. Same for 7. But in 6, they look like they're at the same point, so it would seem as if they weren't moving at that instant.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. In all instants B is moving closer to A so it looks like its slowing down.

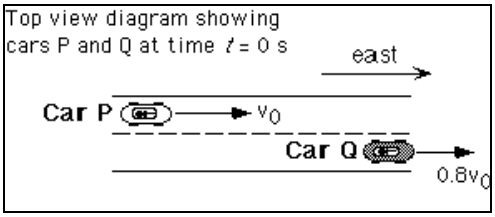
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. Same as above.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. B decelerates during the entire time interval while A is moving at a constant speed, so B looks like its slowing down to A no matter what time interval you look at.

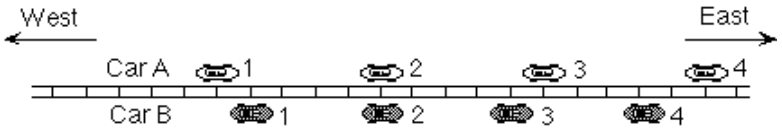
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. The t and displacement should be linear, so following 2, 50 and 3, 40, the next logical choice seems to be 4, 30.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the east

Q8. Explain. 1) since it is moving ahead of you..it must be moving east. 2) since it is even with you it must be traveling at the same speed thus it will be at rest for you. 3) it is behind you so it will seem to be behind you.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. 1) it is moving further east than you so it must be speeding up. 2) you are even with it and it seems as if it is moving with constant speed. 3) it would be slowing down because it was moving with you and now it is behind you.

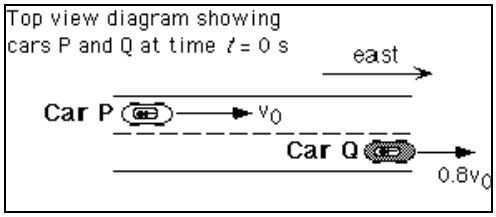
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. reflects my answers below

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. the car is noticably moving closer to you thus it must be slowing down during those time intervals

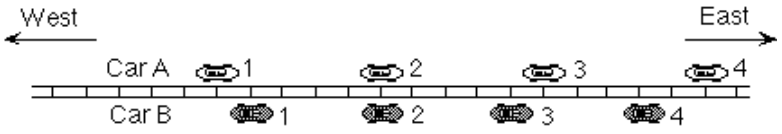
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it is slowing down at a constant velocity so it will decrease with a constant slope with the next step would be 30

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

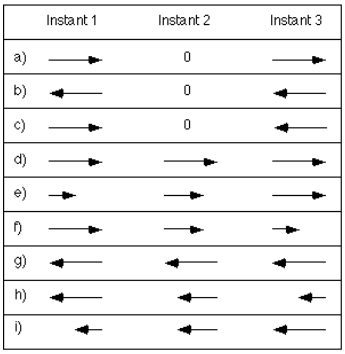
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. In order to describe the motion of car B relative to car A, we have to substract the velocity of the reference frame, assuming that it is cart A. Therefore car B would have a negative velocity relative to car A, thus approaching it at any given moment.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Given that the velocities of the cars are constant, we can conclude that: first of all, the reference frame of car A is not accelerating, and secondly that the difference between the velocity of car B and speed of reference frame of car A is always the same, thus the cars are not accelerating.

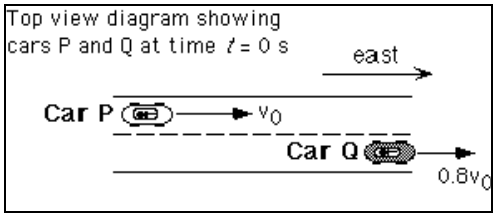


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. The magnitude of the difference between the velocity of car B and speed of reference frame of car A is the same, and direction of the velocity of car B relative to car A is negative.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. If we think about car A as a stationary point, we could substract the speed of its refererence frame which is equal to vo, therefore the initial velocity of car B would become -0.2vo and its final velocity -0.6vo respectively. This shows that if car A would be at rest, then car B would approach it with acceleration of -0.1vo relative to car A, or in other words car B would speed up towards car A.

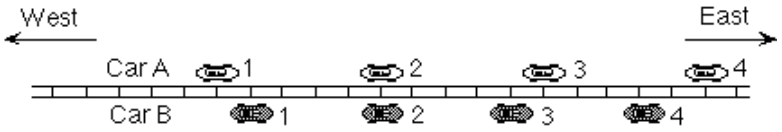
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Since the acceleration is constant we can find it in terms of the average acceleration over 4 seconds which is (0.8vo-0.4vo)/4=0.1vo therefore for every second car B accelerates at 0.1vo relative to car A. The distance between them from t=3s to t=4s should decrease greater than from t=2s to t=3s, therefore it has to be less than 30m.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. For the first instant, car b is ahead of car a so that's why in car a's reference frame, car b is moving east. For instant 2, they are at the same position, so in car a's reference frame, car b is at rest. For the third instant, car b is behind car a so it appears to be going the opposite direction in car a's reference frame.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. For the first instant, car B is speeding up because it's ahead of car A. For the second instant, car B is moving with constant speed because both cars are parallel to each other. In the third instant, car B is slowing down because it is behind car A.

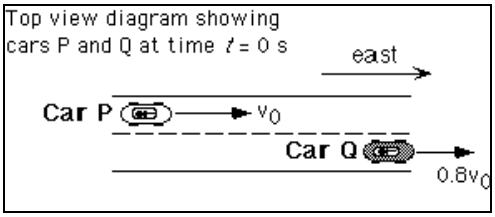
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. Because at the first instant, car B is speeding up in the east direction and the second instant, car B is moving with constant speed so it's 0, and the third instant, car B is slowing down and in the reference frame of car A, it's going the opposite direction.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. In the reference frame of car P, car Q is slowing down because in bo

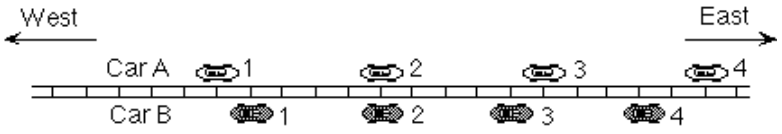
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: unanswered

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. The direction of Car B is the same as the position that it is in relative to Car A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. If Car B is ahead of Car A, it will look like it is speeding up, but when it is parallel with car A, then it will look like it is going at rest. As for when car B is behind car A, it will look like it is slowing down.

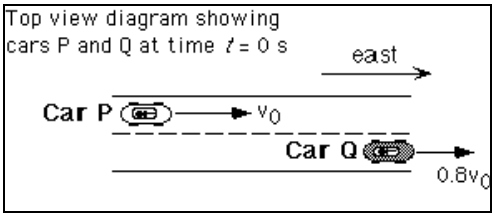
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. Same reasoning as above.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. In Car P, it will look as if car Q is getting closer to it as time goes by, therefore in the reference frame of car P, car Q is always slowing down.

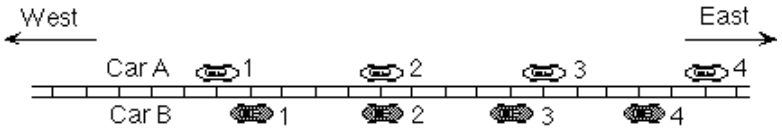
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Because the rate of decreasing speed in that of car Q is constant, it can be calculated that the difference in distance over difference in time from time 2 seconds to time 3 seconds is 10 meters per 1 second, thus at one more second, it would seem likely that the car would be another ten meters away, i.e. 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. at each instance car b is moving from west to east within the reference frame of car a

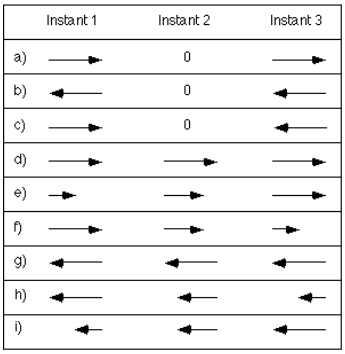
At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. they are both moving with constant velocity so they will both appear to have constant velocity

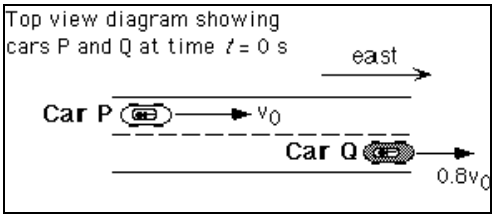
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. in the reference frame of a, car b is always traveling to the west and has a constant velocity which selection g illustrates



II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. because car q is always ahead, it will appear to be slowing down from car p

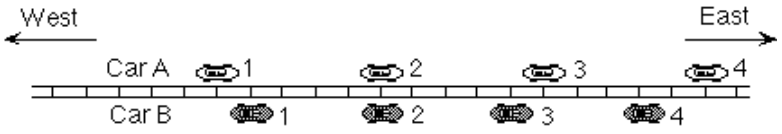
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it is slowing down at a constant rate which means it has constant acceleration so for equal time intervals the car will lose a proportional amount of velocity

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

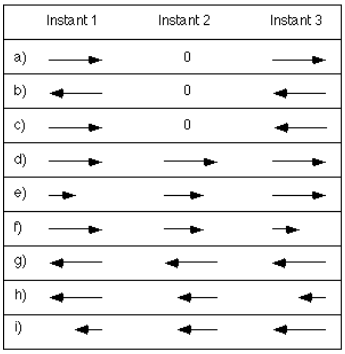
Q8. Explain. since they are moving at constnat velocity, and car b starts out ahead, but ends up last, it is moving slower, thus it would appear to me moving in the oposite direction relative to the reference frame of car a.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. it is moving at a constant speed, and as long as car a moves at a constnat speed, car b will apear to move at a constant velocity, just a slightly slower constant velocity.

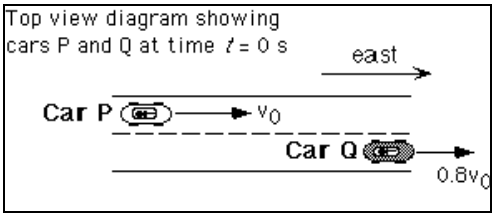
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g



Q14. Explain. with constant velocity, the vectors must point in the opposite direction as the direction of travel as car a, and they must all be equal in length.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. it is slowing down, so the rate that it approaches car p will increase over time.

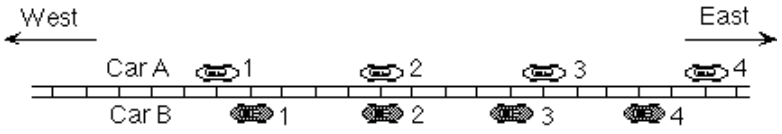
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it is constant acceleration, so the distance will be linear to the time interval.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. in reference frame of car A means setting car A at rest and see what's the motion of car B, for instant 1, car B is in front of car A and moving to the east, for instant 2, they're in the same position, so it seems that car B is at rest and for instant 3, car B is behund car A and from reference frame of car A, car B is moving to the east.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. for instant 1, because car A is behind car B so it seems that car B is moving faster. For instant 2, because they are in the same position, in ref.frame of A, car B has constant speed. For instant 3, in ref frame of car A, car B is behind and it's slower than car A.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: a

Q14. Explain. B is moving with constant speed so at instant 1 and 3, the vectors have the same magnitude, while at instant 2, the vector is zero because in ref frame of A, car B is not moving

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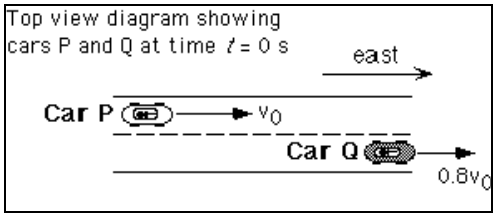
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Because car Q is slowing down at constant speed, then in ref frame of car P, car Q is slowing down

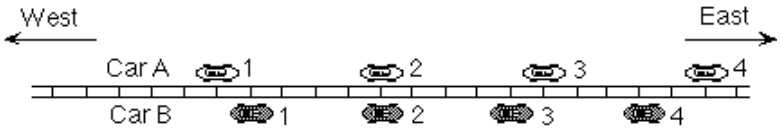
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. because car Q is slowing down at constant speed and car P is moving at constant speed, so the distance between those cars will be constantly decreases, at time t=2s the distance is 50m, at time t=3s, the distance is 40m, so at t=4s the distance is 30m.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. From the reference frame of Car A, Car B appears to be moving to the west because it is moving more slowly than Car A.

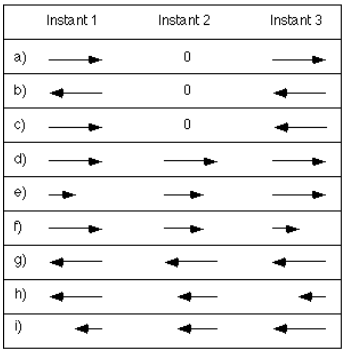
At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Relative to car A, car B is moving to the west at a constant speed. The change in distance between the cars during the interval snapshots remains the same.

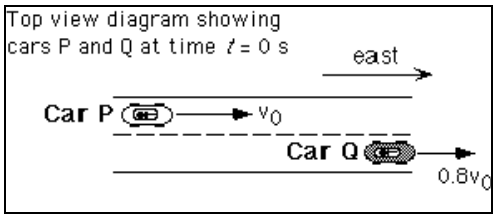
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. The vectors have constant magnitude consistent with my above answer of constant speed. Additionally, they are all pointing to the west.



II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. From Car P, Car Q appears to be speeding up toward Car P.

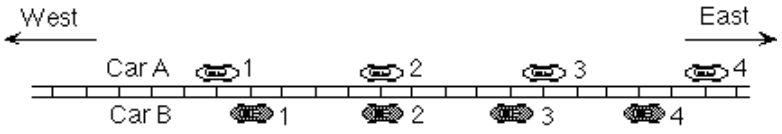
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain. The Car Q appears to be speeding up toward Car P, while is accelerates in the opposite direction of its motion. Therefore, the distance must be greater than 30 meters, because a distance of only 30 meters would account for the Car Q approaching Car A at a constant speed when it is really accelerating.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Since car A is faster it would always apear that car B is moving to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. If the car is moving backwards, it will always apear that the car is slowing down.

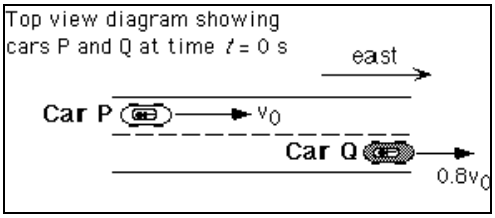
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Car A is moving at a constant velocity, but slower that car B so relative to car A, it is pointing backwards.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Since car p is faster it would always apear that car q is moving to the west.

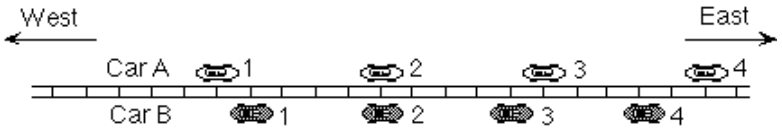
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Because the car is slowing down at a constant rate, it would be at 30 meteres

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

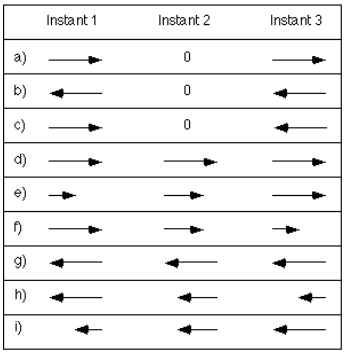
Q8. Explain. It is because Car A is moving faster than carB

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. It is because CarB is pssed by Car A

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: f



Q14. Explain. velocity is always toward East, but Car is slowing down

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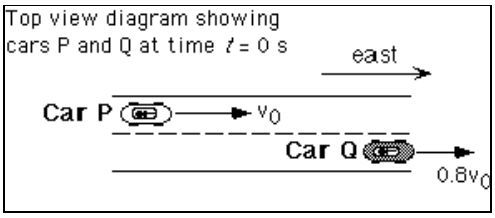
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car P is going faster than CarQ

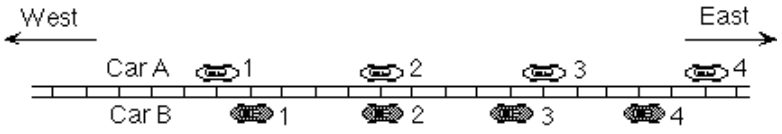
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Distance between carP & Q becomes shorter 10m every 1sec.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

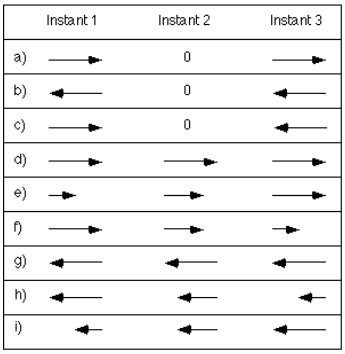
Q8. Explain. Relative to me, the car is moving slowly in the opposit of me. Which is West!

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. It slowly moves at a constant rate to the west.

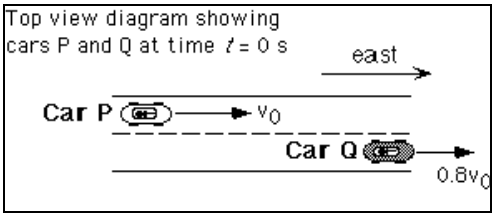
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g



Q14. Explain. The car looks like it is heading west at a constant velocity the whole time.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. The car from my refrence point is speeding up to the west. It was at one point at rest, but it started moving fast to the west

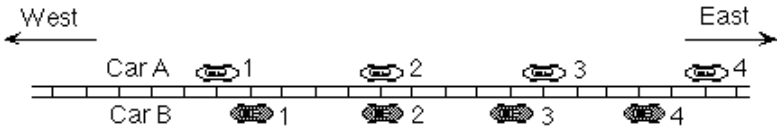
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. It is speeding up to my refrence point so it would cover a larger distance; hence less than 30.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

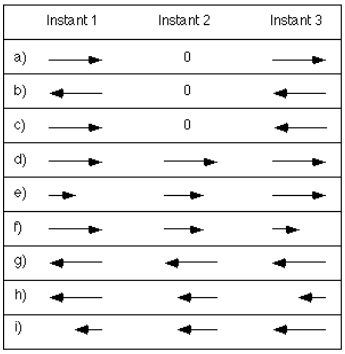
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. Just look at the position of car B compared to car A and see that if your in the reference frame of car A, then car B appears to be moving forward an point 1, at rest at point 2, and moving backward at point 3.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Its stated above that both cars move with constant velocity.

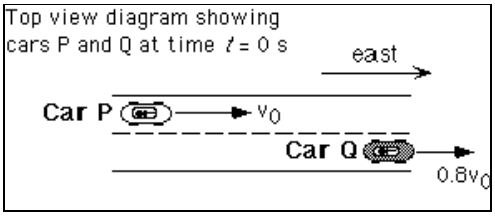


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: d

Q14. Explain. the velocity is constant

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. if you were in car P, you would be able to tell that the car was decelerating.

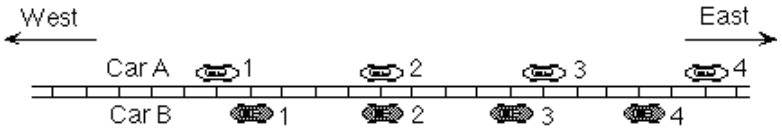
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. constant deceleration

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. In full detail we could see that car B is simply not moving as fast, but in the instants that we can see the only thing we can go off of is the displacement since motion is eliminated.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Both carts are moving at constant speed. It doesn't matter for their view that the are going opposite. Cart B simply looks like it is faster to cart A than it would to another observer.

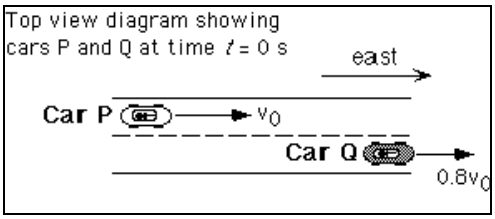
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: h

Q14. Explain. Just because cartA movers doen't mean CartB has to do things that it can't possibly be doing. Yoou can see that it is going the opposite direction you are and the ratio of the speeds in this example is always the same.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. All that cart P is seeing is that Car Q is getting closer faster.

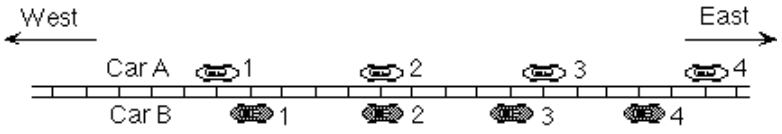
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. He is deaccelerating so his rate of getting closer to Car P is getting larger and thus he must be closer than 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. at each instant car B gets closer and closer to the west relative to A

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. since the speeds of each of the cars are constant, the difference in their speeds must be constant as well.

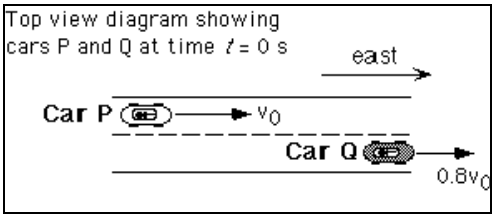
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. these vectors reflect my answers above: moving at a constant speed towards the west, relative to A

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. in the reference frame of car P, the slower car Q is moving, the faster car Q seems to approach car P.

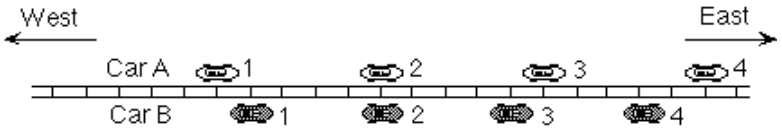
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. since car Q is speeding in the refrence frame of P, the displacement between t=3 and t=4 must be greater than the displacement between t=2 and t=3

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. As the observer in Car A, the Car b is coming closer to me and then passing at each instance. This would give the observation that the car was moving opposite in direction to me.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: unanswered Q11 t_3: moving with constant speed

Q12. Explain. The rate of change of the seperation of the vehicles indicated is consistent, thereby implying that the car is not accelerating.

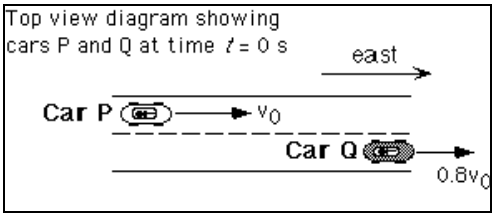
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. The car is moving west with a constant velocity.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. The car q is closer to car p at each successive time interval, indicating that the car is slowing down.

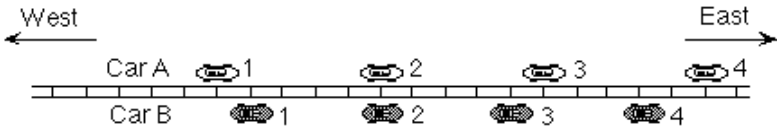
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Car q is decelerating at a constant rate while p is travelling at a constant velocity. Therefore, car p is closing the distance a greater amount during each time interval. If the gap decreased by 10 m during the previous time interval, it would decrease >10 m during the successive time interval. Therefore, the distance would be less than 30 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. because I was imagining what its looks like when you pass a car and when theay re in fron they are traveling in the same direction right next to it doesn't look like anyone is moving and when they are behing you it seems like they are traveling in the opposite direction.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. I used the same reasoning as before.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. they are the vectors that point in the direction of motion or percieved motion

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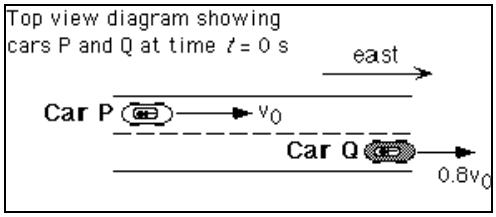
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Because the car is actually slowing down.

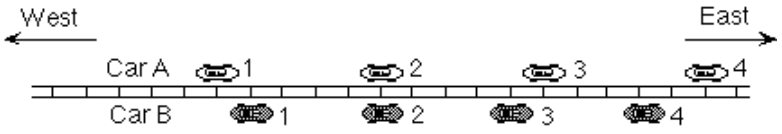
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because that follows the trend of the car loosing distance.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

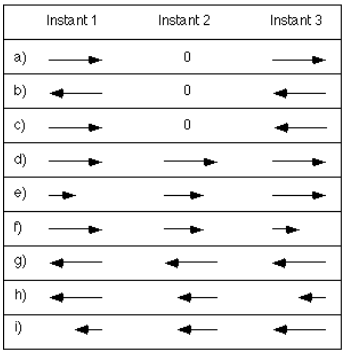
Q8. Explain. Relative to car A, B seems to be moving faster b/c its displacement is greater at instant 1. At instant 2, their displacements are equal, so B is not moving relative to A. At 3, B seems to be moving back b/c its displacement is less than A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. Same reasoning as for questions 5-7.

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

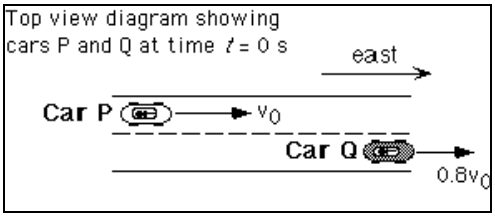


Q14. Explain. Same reasoning as for questions 9-11.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:

Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down



Q17. Explain. The distance between the two cars would decrease, so an observer from P would think that they are catching up to Q. But since P is moving with constant speed, Q must be slowing down.

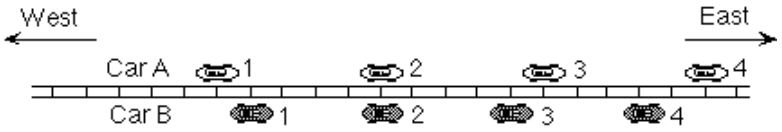
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. As A comes close to B, A sees B as still moving forward. When they are next to each other, they will each seem at rest for an instant, and as A passes B it will seem like B is going the opposite direction.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. B looks like it's speeding up as A gets closer to it, then as B passes A it looks like A is slowing down.

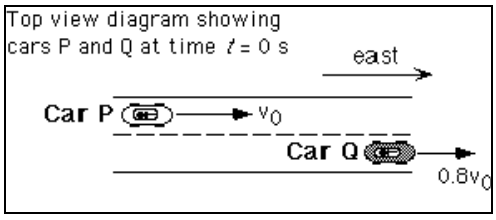
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. The car always looks like it's slowing down since A is always moving fater than B.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. P is always going faster than Q, so it will look like Q is coming closer and closer to P.

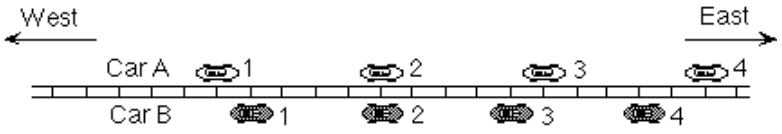
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Since the cars' velocities are constant, the distance will be changing at a constant rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

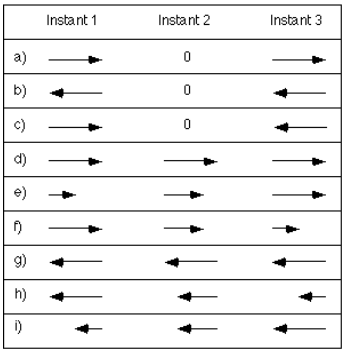
Q8. Explain. If to the person in car A they were at rest, then the direction car B appears to be moving would be dependent upon which direction relative to car A car B is.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. I'm not sure why I said what I did.

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

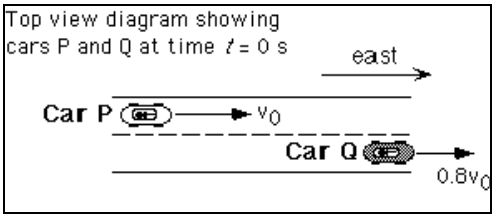


Q14. Explain. constant velocity which is of smaller magnitude than that of car A's

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. to car P, car Q would appear to be coming closer to them which would appear that they would be slowing down

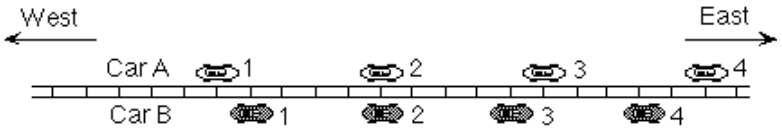
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. if car Q were to continue at a constant velocity travelled at t=3

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

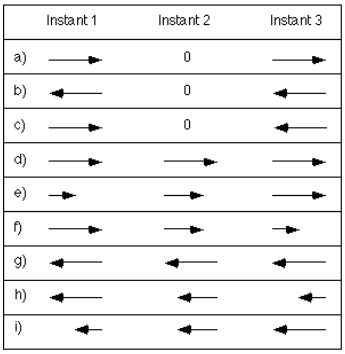
Q8. Explain. looking from that one point, one could tell if car B is either left or right or next to car A

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. it has to do with which direction car b is in referanc to car a

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

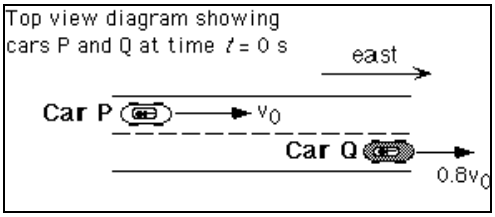


Q14. Explain. it is speeding up then at constant velocity(which is percieved as no movement) then it is slowing down because car a moves ahead of car b

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. car p is always moving closer to car q but from the point of view of p, q is slowing down more dramatically than if one were to look from the side.

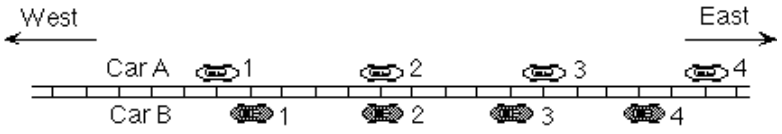
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. p is at a constant velocity while q is at a constant negative acceleration

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. In reference of A B always moves to the west at a constant velocity because A moves faster.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. they both move with constant speed so their relative velocities must be constant

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

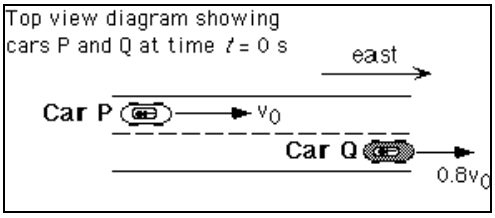
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. B always moves to the left at a constant velocity

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. since Q accelerates to the west and from P it seems that it was already moving that way, Q seems to be speeding up

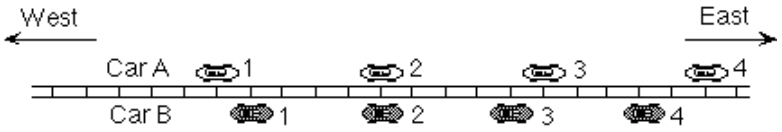
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. if it is accelerating then the distance cannot be equal to the distance of the first interval

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

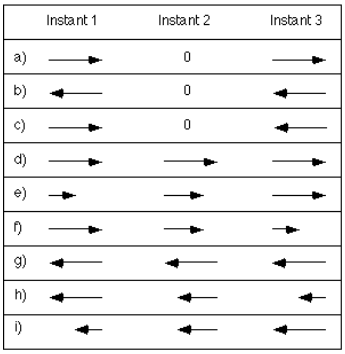
Q8. Explain. A is accelerating, while B is moving at a constant V. Instant 1 B had higher velocity so it appears A is moving to the east. INstant 3 they have the same V so are at rest relative to eachother. From then on A is moving faster and acclerating than B, to the west relativly.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. B moves in equal distance every time interval.

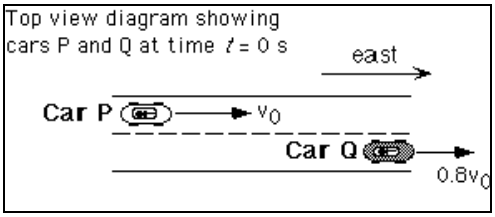
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c



Q14. Explain. A is accelerating, while B is moving at a constant V. Instant 1 B had higher velocity so it appears A is moving to the east. INstant 3 they have the same V so are at rest relative to eachother. From then on A is moving faster and acclerating than B, to the west relativly.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.,* car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. The relative V between te to is VQ-VP the resultant is always negative because Q is deccelerating relative to P.

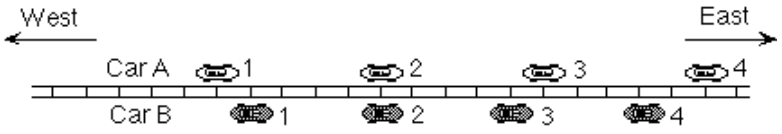
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. P moves at a constant speed while q deccelerates at a constant speed.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

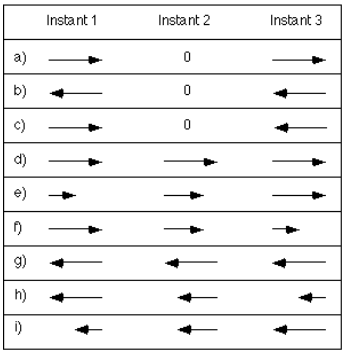
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. I don't know

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. I don't know



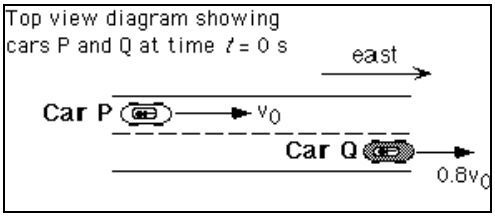
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. I don't know. It is hard for me to tell which way the car is moving in the diagram

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. because it would look like the car is speeding up to CAr Q

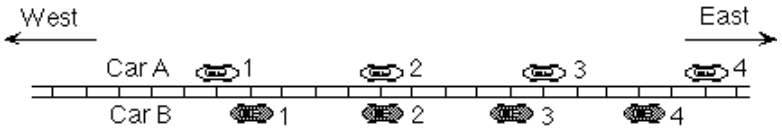
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it went down 10 meters each time

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Since car B is traveling at a lesser velocity than car A, so to car A, car B is moving backwards, or West

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Again, car B is moving at a constant speed relative to car A because the two are independent constant velocities that are different.

	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

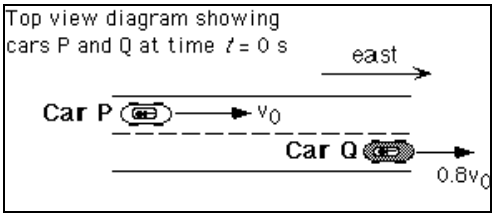
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. same as above: car B seems to move west at a constant velocity

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. car Q is slowing in the reference frame of car P. This is intuitive...

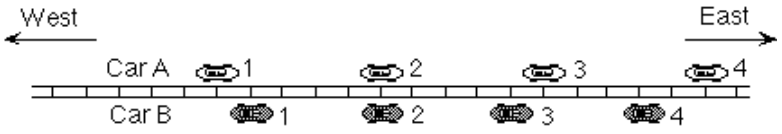
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. As car Q continues to slow down, car P gains on car Q at a greater and greater rate...

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

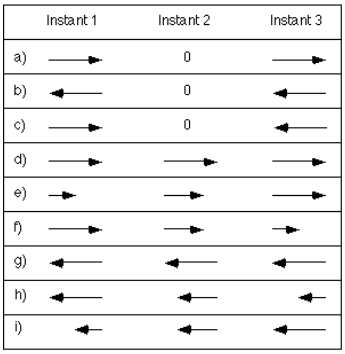
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the east

Q8. Explain. The car looks as though it is going in the same direction as you when it is agead of you; however, when the car is equal to where you are you seem to see is as not moving becasue your speeds cancel each other out. When at position three the car is moving further and further away at a greater and greater speed but and so it is going to the east.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: unanswered Q11 t_3: speeding up

Q12. Explain. When the car is coming toward the car A and going away from car A the distance is changing rapidly and it appears that the car is speeding up becuase it is from the point of reference of car A. When the two cars are at the same place and even, for that split second it seems as though they are moving at a constant speed.

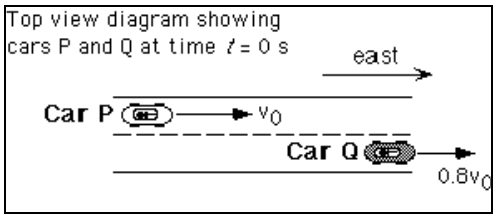


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. The velocity seems as though it is getting larger as it comes toward car A and then it appears equal as it passes car A and is again speeding up as it goes away from car A.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. As the car approaches the Car Q the distance between the two seems to be getting shorter and yet never meeting; therefore the car seems to be slowing down in the reference frame of car P.

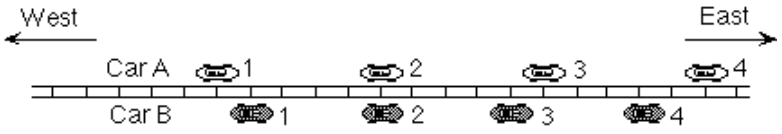
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. The ration that the Car is slowing down is greater than what would take for the car to be above 30meters at t=4seconds. The ratio looks as though it would be somewhere aroung 10seconds instead.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

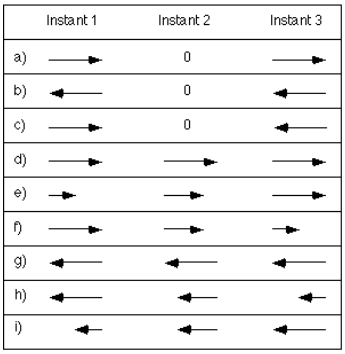
Q8. Explain. Everything is realative to your frame of refrence therefore it is as if car A was not in motion.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. relative to Car A, Car B keeps moving to the west.

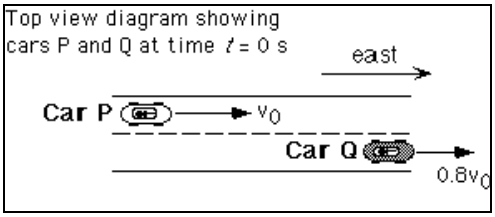
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c



Q14. Explain. at 1 car b is in front of car Aat 2 car b is at same spot as car Aat 3 car b is behind car A

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ speeding up

Q17. Explain. it is as if Car p is not in motion.

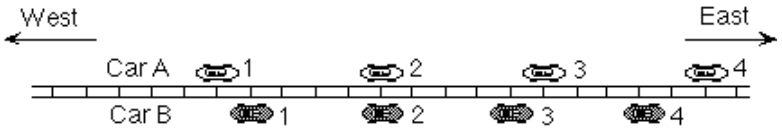
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Car P has constant

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

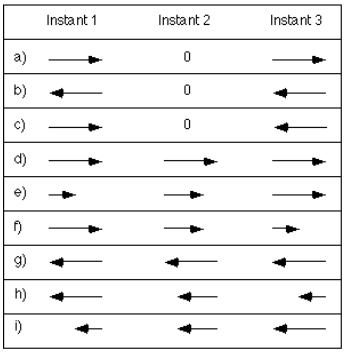
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. In relation to Car A, Car B starts in a East direction then at the same location then to the West.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. At all times, and in between the times shown, Car a is moving at a faster pace than Car B.

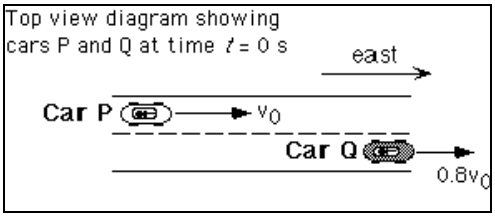


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. In relation to to car A the direction of car B is to the right, then level, then to the left.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car P is always gaining ground on Car Q, so it will apear that Car Q is always slowing down.

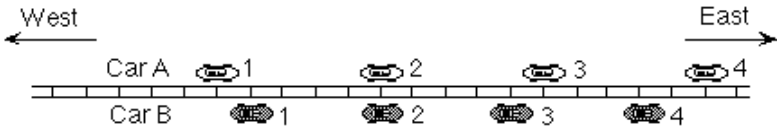
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. They are both moving at a constant speed so the distance intervals will be porportional the time intervals are the same.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

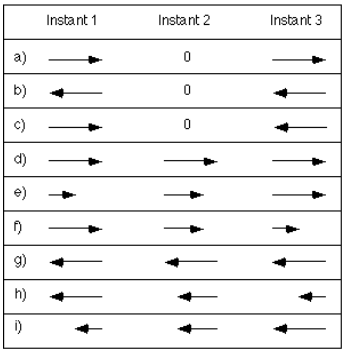
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Because Car B's position from one frame to another moves more and more to the west relative to A at the same moment, it would appear from car A that B is moving west at all three times

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. The closer the cars are to eachother, the greater the acceleration of the other car seems, so at 1 it seems car B is speeding down, at 2 it seems to go at a constant speed, and at 3 it appears to speed up.



Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: i

Q14. Explain. Because the cars become increasingly far apart, and the distance between them increases in an exponential fashion, the velocities seem to increase at progressive instants

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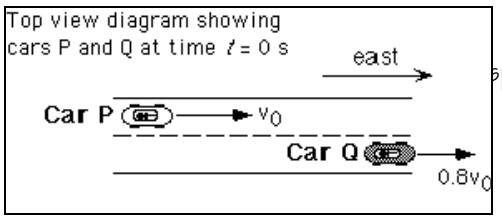
II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed speed

Q17. Explain. Similar to above, the closer the cars become, the greater their relative speeds appear, so by decelerating, this factor is nullified, and they seem to be going at the same speed.

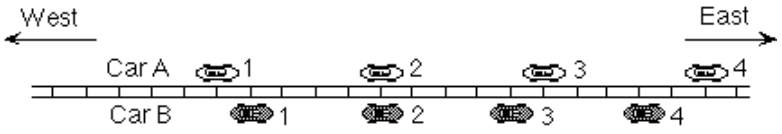
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. The distance between the two can be represented as a square of time, so at time t=4, we have X = X - 2^2 * 10, which is 40, which results in x < 30 (actually around 20).

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

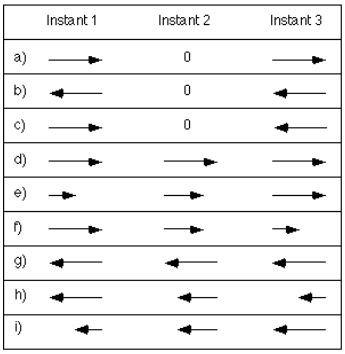
Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. since A is constantly catching up to B, B will seem like it is moving backwards to A

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. When B is ahead of A, passengers in A will think that B is slowing down to match the speed of A. Once A passes B, B will seem like its speed away in reverse

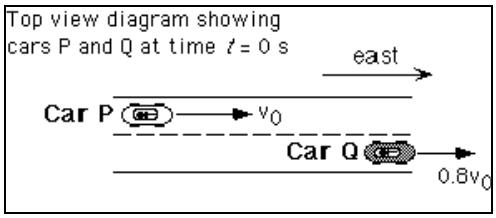


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. When A is behind B, B will seem like its moving backwards towards A, when it matches A's postion, the car will seem as if it is not moving (so long as the passengers in A think that they are at rest). When A passes B, B will seem like its in reverse speeding away.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain.

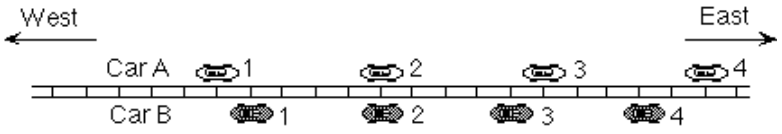
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. in frame 1 b is east of car Ain frame 2 b is in same position as A in frame 3 b is west of A

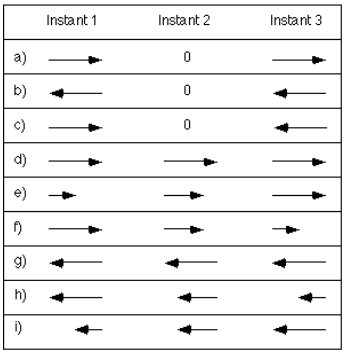
At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. in frame 1 b is east of car Ain frame 2 b is in same position as A in frame 3 b is west of A

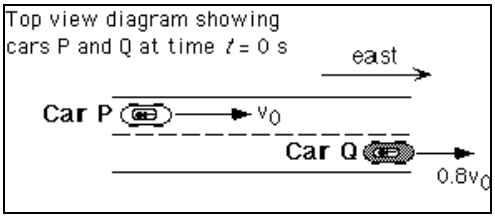
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. in frame 1 b is east of car Ain frame 2 b is in same position as A in frame 3 b is west of A



II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. in reference to car p, car q is slowing down as it moing with less velocity, so in both cases it is slowing down

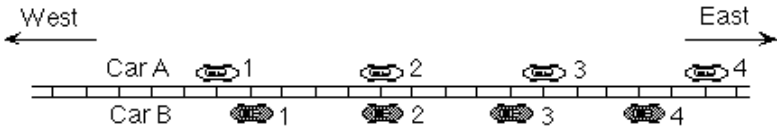
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. P is moving with faster velocity, so over time the distance between the cars with diminish at a faster rate.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Car A is moving faster than car B so in reference frame of car A Car B looks like it is moving to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Car B is moving past Car A at a constant speed because both cars are moving at different constant speeds

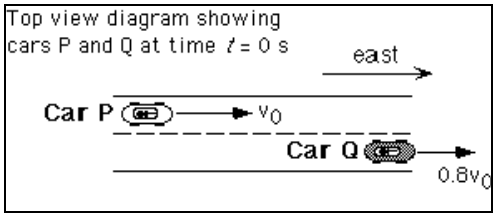
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Car B is moving by car A at a constant speed so all of the velocity vectors should look the same and pointing to the west.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Car Q is constantly slowing down.

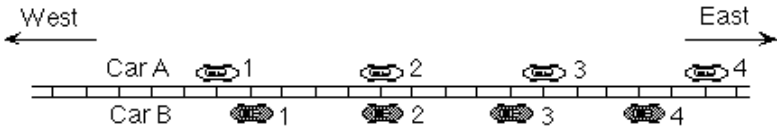
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. At the second interval the difference between the two cars would have a greater difference in speed so the car would be even closer.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

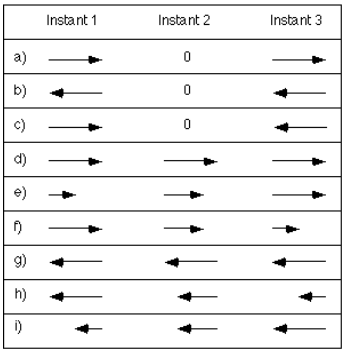
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. because A is going faster than B to A, B seems to be going in the opposite direction of their actual displacement

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Because both are moving with constant speeds then the speed of B to A is A-B which is constant and in the negative direction



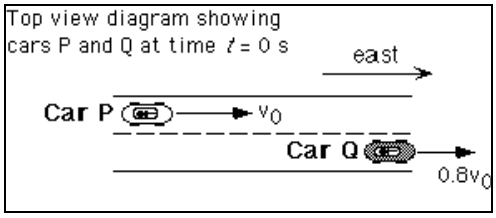
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. because we know that B seems to be going at a negative constant V then they point to the left and are all the same magnitude

---

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. becaue P is going at a constant rate then the negative acceleration appears the same to car P, but the velocity appears to in the opposite direction.

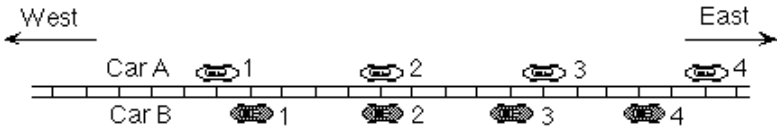
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because Q is decellerating the distance between them decreases faster as more time has passed. It would be 30 meters if Q was going a constant rate less that that of P.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

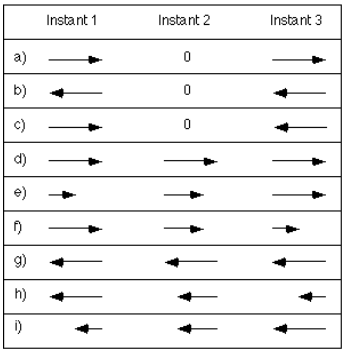
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. By looking at car B from car A, the car is first in front (ahead going east), then next to (at rest), and then behind (going west) because it looks to be slowing down through the instances.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. When the car B is in front of car A it looks like it would be going faster. As car A gets closer to car B in instances 2 and 3 it looks like it would be slowing down.

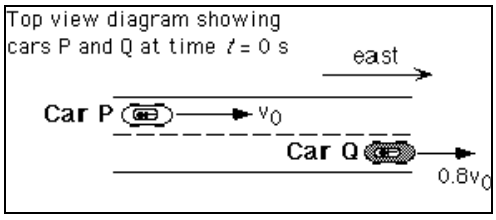


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: f

Q14. Explain. The velocity of car B is always heading to the east, thus the direction of the arrows is east. But the car is slowing down which would be correct by the magnitude of the vectors.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. Even though the diagram doesn't show the position at t=2, the velocity of car Q is slowing down according to the question--so it would look to be slowing down.

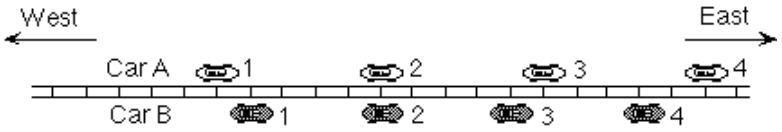
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. At time t=4 car Q is heading with velocity 0.4 of it's original, so it should be less than 30 m.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. car a is moving faster than car b, therefore it appears that car b is moving backwards in perspective with car a

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. car b is moving backwards at constant speed, neither car is accellerating because the time intervals show the same distance changed

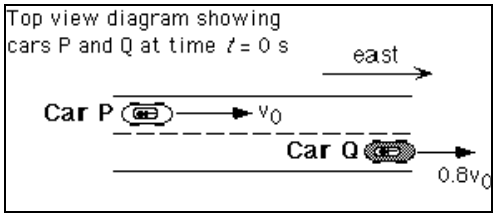
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. car b has constant velocity backwards

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. car q is slowing down

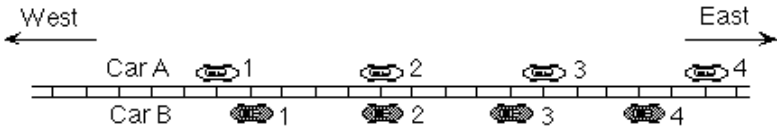
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain. the car is moving at -10m/s/s accelleration

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

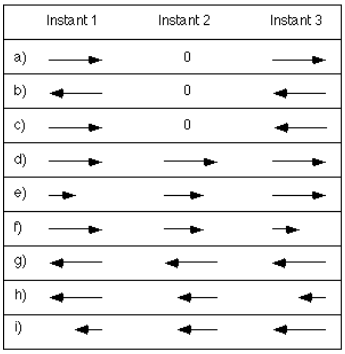
Q8. Explain. from car a, where car b is to it, was the answer

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. the directoin is how fast or slow it is moving

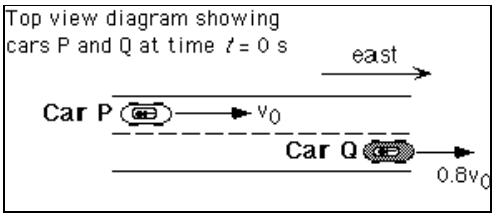
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c



Q14. Explain. speeding up, then zero, then slowing down

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ slowing down

Q17. Explain. from time 1 to time 2, the difference is smallelr theus slowing down

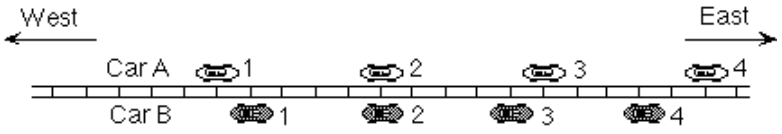
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it seems to be moving at ten meters per second closer

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

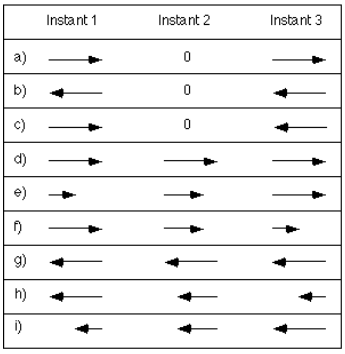
Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. if car b is ahead of car a then to a person in car a it would look like car b is going east and that car a is not going anywhere, etc

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. i'm not sure

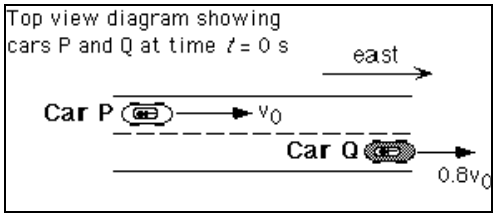


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. not sure

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. car q is slowing down the entire time

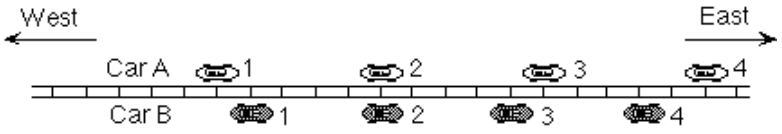
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. CAR Q IS SLOWING DOWN AT A CONSTANT RATE

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. The reference frame of car A gives B a negative velocity (east=+)

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Because neither car A or B are accelerating with reference to the ground, they maintain this aspect with respect to each other.

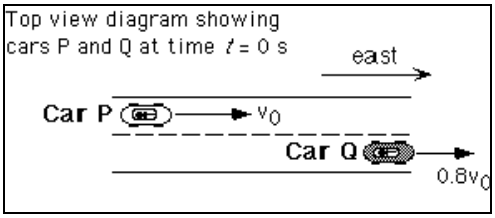
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Because B is moving west with regard to A at all time and is under no acceleration.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: moving with constant speed

Q17. Explain. because car Q is accelerating to the west , toward car P it begins to advance or accelrate toward P.

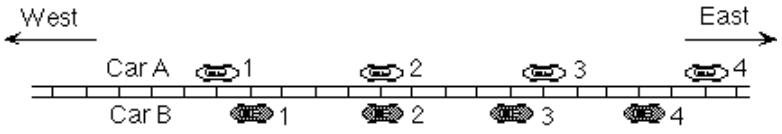
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because of Q's acceleration toward P, dx is increasing as dv decreases.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. car b is always moving to the west with respect to car a. whether they are side by side or infront. this is because car a is moving faster than car b and is passing him.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. both cars are moving at constant speeds. so from car a's reference frame, car b is moving at a constant speed the entire time.

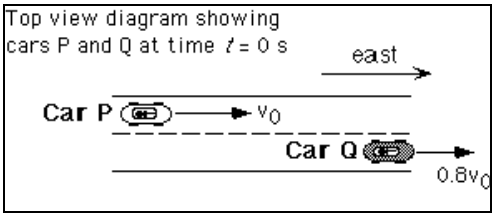
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. same as explanation above

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. car q is accelerating in the negative direcion (from their velocity). if the velocity is 0 (p's reference frame) then car q is speeding up in the negative direction.

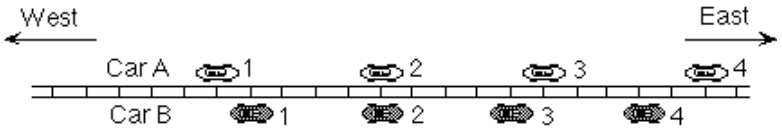
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. the 'negative speed' of car q is greater in the time interval from 3 to 4, than it is in 2 to 3, but has the same acceleration. therefore car q must travel greater distance in the later time interval.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

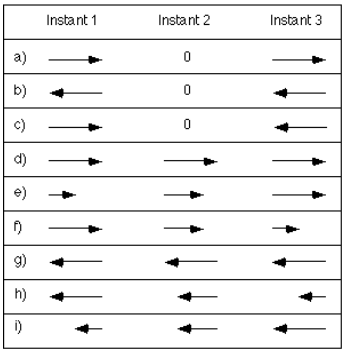
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Since car A and car B are both moving to the east, and car A has a greater velocity than car B, car B is moving to the west in the reference frame of car A.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Since both cars travel with constant velocity, car B is always moving with constant speed in the reference frame of car A.

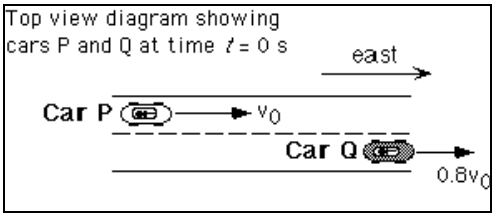


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. In the reference frame of car A, car B is traveling to the west with constant velocity.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Since car P is moving with constant speed and car Q is getting closer to car P with each second, car Q is slowing down in the reference frame of car P.

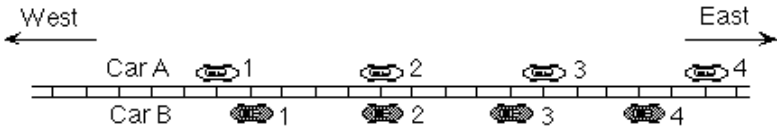
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Since car Q is slowing down with constant acceleration, the distance between P and Q will change an equal amount every second.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. For question 5-7 Car A is passing Car B so in reference from A it looks like Car B is going to the West at all times.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. Car A with each interval is putting one segment displacement each time so Car B has a constant velocity from Reference of A.. It would be a constant to the West

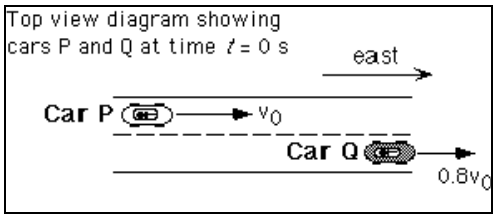
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. Because with each strobe there was a equal amount of change between the two cars so the acceleration between the two was 0 and B in reference to A was going to the West.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. Because Car P is going with constant speed and the differnce in velocity between P and Q is gradually incresing because Q is slowing down so in reference to P car Q is speeding up at t=1 and t=2.

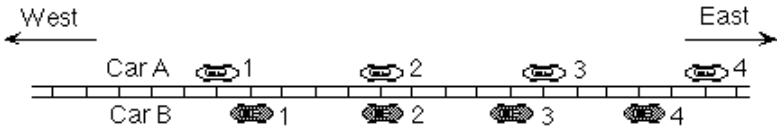
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. This is because Car Q is slowing at a constant rate so the first two seconds will be equal to the third second. The fourth second the car is still moving so we know the acceleration is still the same in it.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

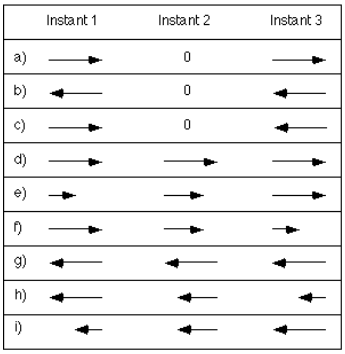
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. Car A is apparently moving to the East for the entire time interval, catching up and passing Car B. This means that, no matter the position of Car B relative to Car A, Car B will always appear to be moving in the opposite direction that A is (in this case, west).

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. If both cars are moving with constant speed and B's speed is less than A's, it will appear to an observer in Car A that B is steadily moving in the opposite direction that Car A is traveling. No acceleration can be apparent from any reference point unless one of the cars (or the observer) is actually accelerating.

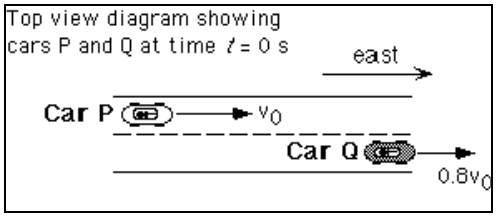


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. From Car A's reference point, Car B is steadily moving backwards (west). Therefore, Car B's three velocity vectors should be equal in magnitude.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: speeding up Q16. $t = 2$ speeding up

Q17. Explain. From the reference frame of Car P, it will appear that Car Q is moving in the opposite direction with greater and greater speed until, when Car Q is in actuality completely stopped, it will appear to an observer in Car P to be moving away from Car P as a speed equal to Car P's. In other words, Car Q appears to speed up as it slows down and the difference between its speed and Car P's grows larger.

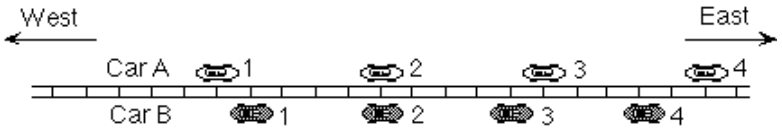
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. If the distance changed by 10 meters in one second and Car Q is continually decelerating, it is reasonable to assume that after two more seconds the distance between the cars will have decreased by more than 20 feet.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

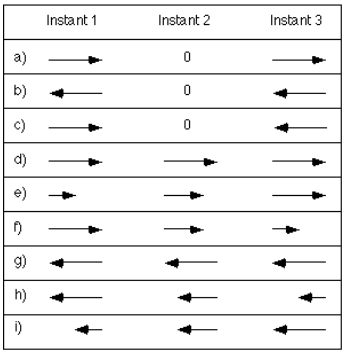
Q8. Explain. at instance, where the car is show where the car is moving toward to,

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. because the car is slowing down

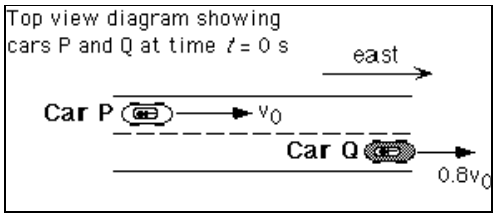
Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: a



Q14. Explain.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain.

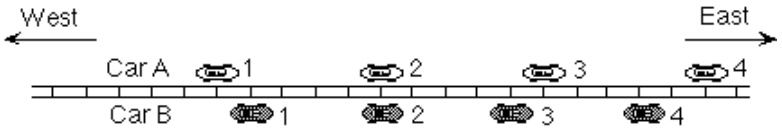
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. because the speed of car Q is continuesly decreasing, which the distance will be must be shorter than the distance between t=2 and t=3.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

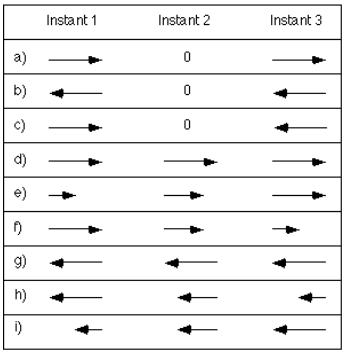
Q5. t_1: moving to the west Q6. t_2: moving to the west Q7. t_3: moving to the west

Q8. Explain. First A sees B in front but and moving to the west. Then, A and B are even so B appears not to be moving *for that instant*, but it's direction of motion is west (I'm unclear on what the question expects in terms of *instantaneous* motion). Finally, A sees B behind and moving away (to the west).

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: moving with constant speed Q10 t_2: moving with constant speed Q11 t_3: moving with constant speed

Q12. Explain. B seems ot be moving to the west the same distance for every time interval.

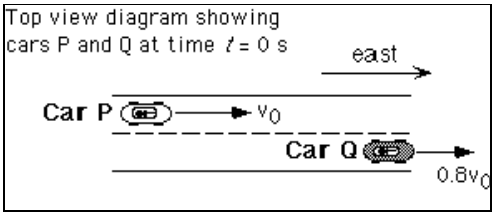


Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: g

Q14. Explain. same direction and speed for all three.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. From P, Q seems to be approaching and slowing down.

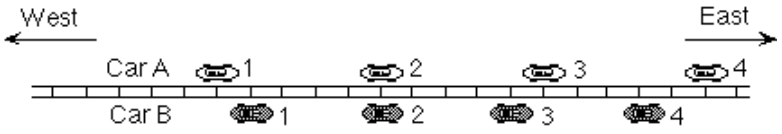
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: greater than 30 meters

Q19. Explain. Average accel. gives a difference of 10 m over 1 sec, so a (lower) average accel. will give a gr

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the west Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. If car A is going East, then car B is moving west. In question 6, it may be at rest since the cars are next to each other.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: speeding up

Q12. Explain. It is speeding up because car B is passing Car A, or car A can be passing car B in the other direction.

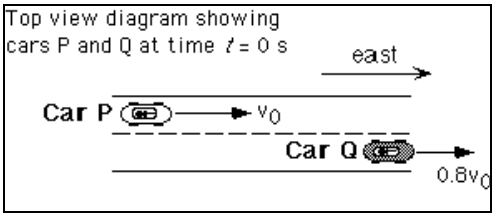
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. if the velocity and acceleration vectors were in the same direction, it is speeding up.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. car P can see that car Q is slowing down even if car Q is ahead of car P.

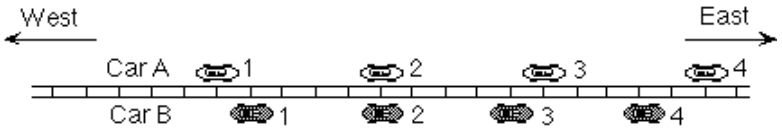
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. Every second, the cars distance decreases by 10 meters.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. At instant 1, Car B is ahead, so from Car A, it looks like Car B is moving to the east. At instant 2, both cars have the same x-coordinate, so in Car A's reference frame, Car B is at rest. At instant 3, Car A is ahead, so from Car A, it looks like Car B is moving to the west.

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: slowing down Q10 t_2: slowing down Q11 t_3: slowing down

Q12. Explain. During this entire situation, Car A's acceleration is greater than that of Car B. At instant 1 Car A is catching up; instant 2 is where Car A does catch up; instant 3 is where Car A pulls ahead. During all three instances, from Car A, Car B is slowing down.

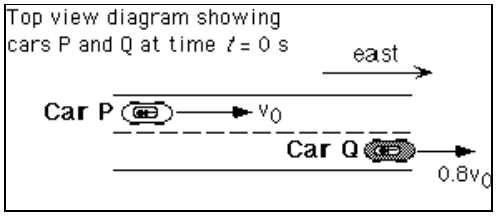
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: b

Q14. Explain. This is the only set of vectors that is consistent with the answers to the previous questions.

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. During this entire situation, Car A's acceleration is greater than that of Car B. At instant 1 Car A is catching up; instant 2 is where Car A does catch up; instant 3 is where Car A pulls ahead. During all three instances, from Car A, Car B is slowing down.

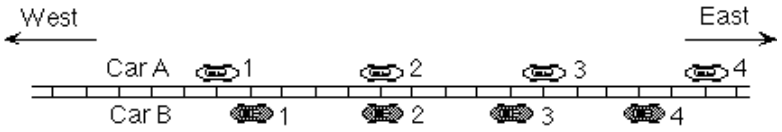
Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: less than 30 meters

Q19. Explain. Car Q is decelerating at a constant rate, and Car P has a constant velocity.

End of response

I: Two cars move with constant velocity along a straight road. The diagram shows their locations at instants 1-4, separated by equal time intervals. Ignore the north-south separation.

An observer in car A records the position of car B relative to car A at various instants.



At the instants below, in the reference frame of car A car B is:

Q5. t_1: moving to the east Q6. t_2: at rest Q7. t_3: moving to the west

Q8. Explain. It depends on frame of reference, in this case being A, it's like if car A wasn't moving at all and B was traveling at the velocity of the difference of the previous velocities

At the instants below, in the reference frame of car A, car B is:

Q9 t_1: speeding up Q10 t_2: moving with constant speed Q11 t_3: slowing down

Q12. Explain. just like my previous answer, it all depends on the frame of reference.

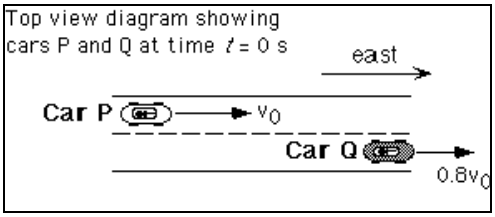
	Instant 1	Instant 2	Instant 3
a)	→	0	→
b)	←	0	←
c)	→	0	←
d)	→	→	→
e)	→	→	→
f)	→	→	→
g)	←	←	←
h)	←	←	←
i)	←	←	←

Q13. Which set of vectors best represents the velocity of car B in the reference frame of car A at instants 1, 2, and 3?: c

Q14. Explain. Because I ignored A as a moving object

II: Car P moves with constant speed v_o to the east. Car Q moves to the east on the same road while slowing down at a constant rate. The speed of car Q is $0.8v_o$ at $t = 0$ s, and $0.4v_o$ at $t = 4$ s. For the entire interval from $t = 0$ s to $t = 4$ s, car Q is ahead of car P (*i.e.*, car Q is to the east of car P).

At the instants below, in the reference frame of car P, car Q is:



Q15. $t = 1$: slowing down Q16. $t = 2$ slowing down

Q17. Explain. Since P is at a constant speed and Car Q is getting closer

Q18. The distance between the cars is 50 meters at $t = 2$ s and 40 meters at t = 3 s. At t = 4 s, the distance between car P and car Q is: equal to 30 meters

Q19. Explain. it's slowing down at a constant rate

End of response