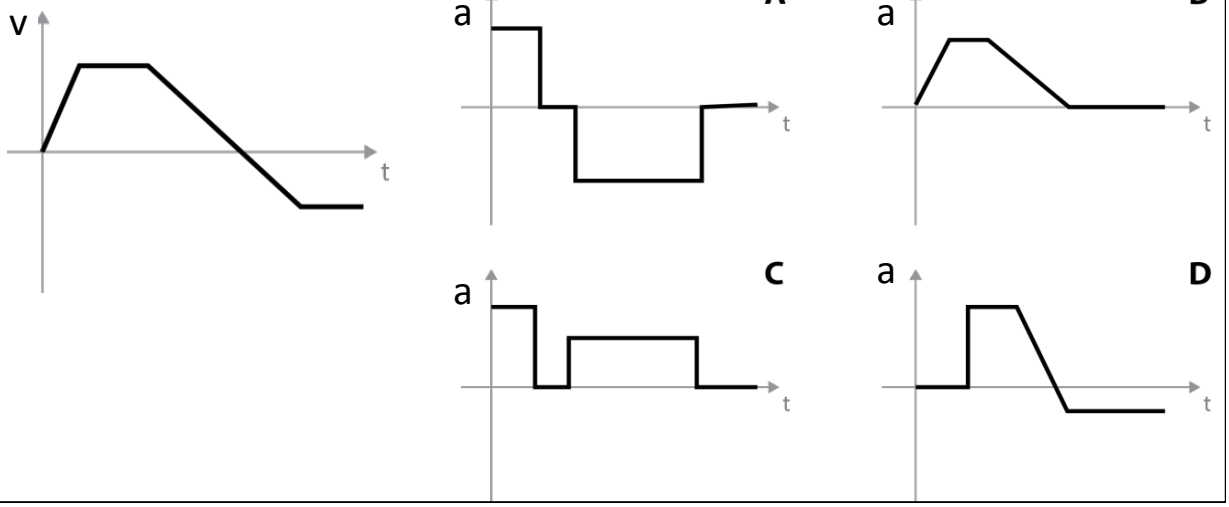
The velocity vs. time of a train is shown at left.
Which acceleration graph best matches?
Remember, the slope on a v vs. t graph represents acceleration.



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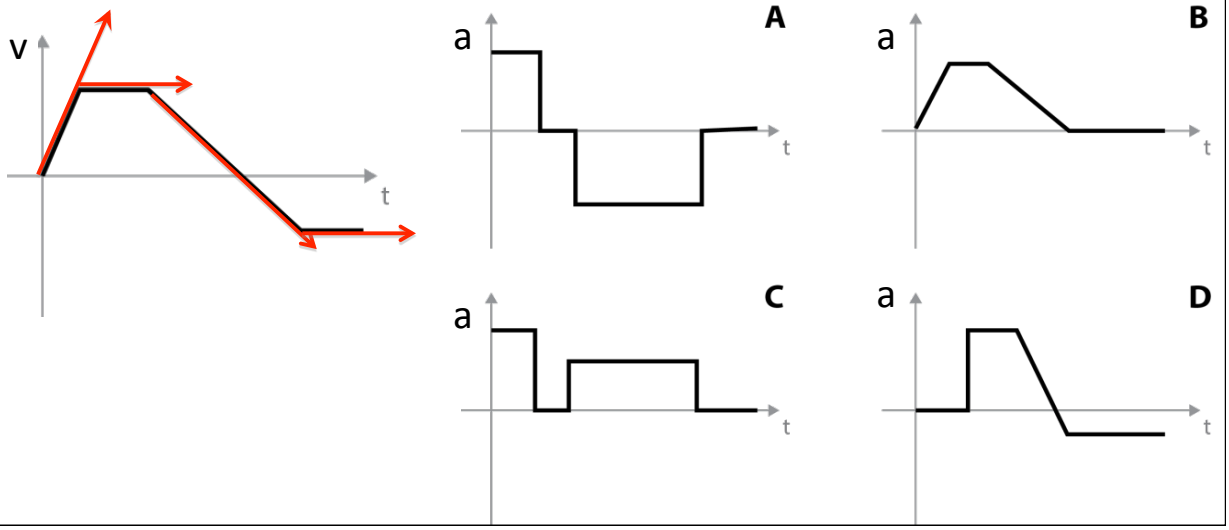


Announcements

- Reading for next time: 3.1-3.4
- **CAPA assignment # 2** is due Tues@11 PM.
- **Written homework # 1** is due TODAY@4 in your TA's mailbox in the brown bin in the Help Room.

3

Last Lecture

Acceleration – non-zero when velocity is changing.

Recall: $\bar{v} = \dfrac{\Delta x}{\Delta t} = \dfrac{\text{displacement}}{\text{elapsed time}}$ = slope of an *x* vs. *t plot*

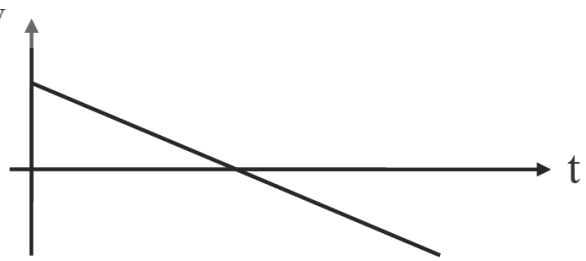
Similarly: $\bar{a} = \dfrac{\Delta v}{\Delta t} = \dfrac{\text{change in velocity}}{\text{elapsed time}}$ = slope of a *v* vs. *t plot*

Possible confusion: **sign of acceleration.**

The sign of acceleration is not necessarily the same as the sign of velocity!

4

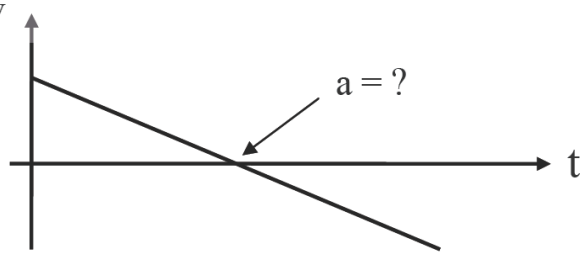
Consider this graph of v versus t:



Which situation could cause this motion?

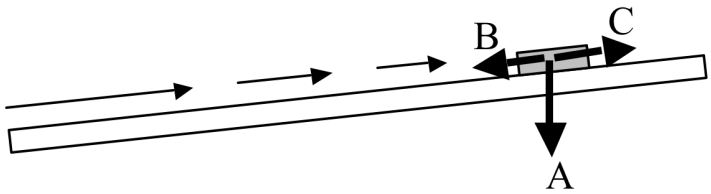
A) A rock is thrown straight up.
B) A rock is dropped from rest.
C) A rock is thrown straight down.
D) A book slides along a table and comes to rest
E) None of these, or more than one.

Consider this graph of v versus t:



What is the sign of the acceleration at the instant when v=0?

A) 0
B) Positive
C) Negative
D) It's ambiguous/not sure/other/…



A glider on a tilted air track is given a brief push uphill. The glider coasts up to near the top end, stops, and then slides back down. When the glider is at the highest point of its path, its acceleration is..

A) Straight down
B) down along the track
C) up along the track
D) No direction (accel = 0 there)

Suppose you are asked the following physics puzzle:
"You are driving your car with an initial velocity of +20 m/s.
Suddenly, you cause the car to have a uniform acceleration of - 4 m/s^2.
Its velocity 1 sec later will be… ?"

Which equation would you use?

A) $v = v_0 + at$

B) $x = x_0 + v_0t + at^2/2$

C) $v^2 = v_0^2 + 2a(x-x_0)$

D) $x = x_0 + \bar{v}\,t$

E) $\bar{v} = (v_0 + v_f)/2$

Suppose you are asked the following physics puzzle:
"A car is moving to the right with a constant velocity of v = + 15 m/s. Suddenly the brakes are applied, and the car slows to a stop in 3 secs. What is the average acceleration *a* of the car?"

Which equation would you use?

A) $v = v_0 + at$

B) $x = x_0 + v_0 t + at^2/2$

C) $v^2 = v_0^2 + 2a(x-x_0)$

D) $x = x_0 + \bar{v}\, t$

E) $\bar{v} = (v_0 + v_f)/2$

Suppose you are asked the following physics puzzle:
"A ball is thrown vertically upwards with an initial speed of 21 m/s. Neglecting air resistance, what is the greatest height reached by the ball?"

Which equation would you use?

A) $v = v_0 + at$

B) $x = x_0 + v_0 t + at^2/2$

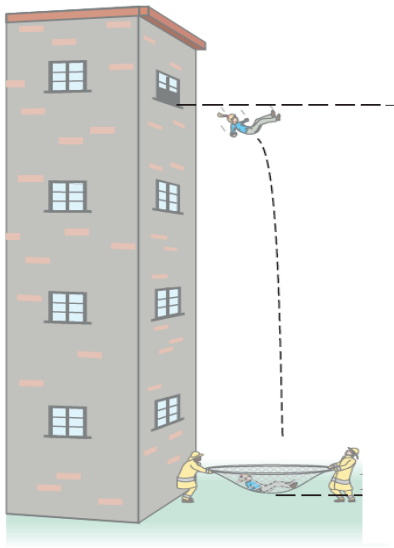
C) $v^2 = v_0^2 + 2a(x-x_0)$

D) $x = x_0 + \bar{v}\, t$

E) $\bar{v} = (v_0 + v_f)/2$

Example: A person drops from a 4th story window and falls 15 m to a net.

What is her velocity on impact?



$x_0 = 15\ m$
$x = 0\ m$
$a = -g = -9.8\ m/s^2$
$v_0 = 0$
$v(x=0) = ?$

Which equation would you use?

A) $v = v_0 + at$

B) $x = x_0 + v_0 t + at^2/2$

C) $v^2 = v_0^2 + 2a(x-x_0)$

D) $x = x_0 + \bar{v}\, t$

E) $\bar{v} = (v_0 + v_f)/2$