

You put your book on the (frictionless) bus seat next to you. When the bus stops suddenly, the book slides forward off the seat. Which of the following best explains this? (Take the perspective of an outside observer)

- A) A net force acted on it.
- B) No net force acted on it.
- C) It remained at rest.
- D) It did not move, but only *seemed* to.
- E) Gravity briefly stopped acting on it.





A force F acts on mass m_1 giving acceleration a_1 . The same force acts on a different mass m_2 giving acceleration $a_2 = 2a_1$. $F \coprod m_1 \ a_1$ $F \coprod m_2 \ a_2 = 2a_1$ If m_1 and m_2 are glued together and the same force F acts on this combination, what is the resulting acceleration? $F \coprod m_2 \ m_2 \ m_1 \ a_3 = ??$ A) ${}^3/_4 a_1$ B) ${}^3/_2 a_1$ C) ${}^1/_2 a_1$

- D) $\frac{4}{3}a_1$
- E) $^{2}/_{3}a_{1}$



An object is being lowered on a cord at a speed which is decreasing with time! (Assume the only forces acting are weight and tension) What is the direction of the acceleration?	An object is being lowered on a cord at a speed which is decreasing with time! (Assume the only forces acting are weight and tension) Which equation below is true?
A) Up	A) $T = mg$
B) Down	B) $T > mg$
C) $a = 0$	C) $T < mg$
D) Not enough information	D) Not enough information

A very large truck sits on a frozen lake. Assume there is no friction between the
tires and the ice. A fly suddenly smashes against the front window. Describe the
truck's motion a few seconds later.

- A) It is too heavy, so it just sits there
- B) It is moving backward at constant speed
- C) It is accelerating backward
- D) It is moving forward at constant speed
- E) It is accelerating forward

If I bring the hammer down, which string will break?
A) Upper
B) Lower
C) It depends on how you bring the hammer down!

If I bring the hammer down quickly (meaning the magnitude of the acceleration will be LARGE), which string will break? Hint: Use a FBD and NII to relate the two tension forces. The string with more tension will break first!	
A) Upper	
B) Lower	
C) It will be random	

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If I bring the hammer down slowly, which string will break?	
A) Upper	
B) Lower	
C) It will be random	













You are pushing a heavy box across a rough floor. When you are initially pushing the box and it is accelerating...

A) the box exerts a force on you, but you do not exert a force on the box.

B) you exert a force on the box, but the box does not exert a force on you.

C) the force you exert on the box is greater than the force the box exerts on you.

D) the force the box exerts on you is greater than the force you exert on the box.

E) the force you exert on the box is equal to the force the box exerts on you.

A moving van collides with a sports car in a high-speed head-on collision (don't worry, everyone survives). During the impact, the van exerts a force F_{van} on the car and the car exerts a force F_{car} on the van. Which statement about these forces is true?



A) $F_{\text{van}} = F_{\text{car}}$

B) $F_{\text{van}} > F_{\text{car}}$

C) $F_{\text{van}} < F_{\text{car}}$

D) Not enough information





A book sits on a table. Everything is at rest. The normal force from the table on the book equals (in magnitude) the weight of the book. Are the normal force and the weight force members of an "action-reaction" force pair from Newton's 3rd Law?



A) Yes

B) No



In the 1600's, Otto Van Güricke, a physicist in Magdeburg, fitted two hollow bronze hemispheres together and removed the air from the resulting sphere with a pump. Two 8-horse teams couldn't pull the spheres apart, even though the hemispheres fell apart when air was re-admitted. Suppose von Güricke had tied both teams of horses to one side and bolted the other side to a heavy tree trunk. The tension in the rope tied to the tree would be...



- A) Double the previous tension.
- B) unchanged.
- C) Half the previous tension.

If you push with force F on either the heavy box (m_1) or the light box (m_2) , in which of the two cases below is the contact force between the two boxes larger?

- A) Case A
- B) Case B
- C) Same in both cases

