Speed, acceleration, friction, inertia, force, gravity

11/20/15

Helium balloon

- Another way to think about it is Density

Would Dear Demi still have won if the Owner rode her? (Assume he's as skilled as the Jockey.)

A. NO

B. YES

C. Maybe

Jockey, Owner, Trainer

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What is the same if the Owner rides?

What is different if the Owner rides?

Precise language

- **Force** is what the horse exerts
- **Mass** is how much stuff which tells us about **inertia**
- **Acceleration** is the result – change in speed

What do forces do?

They cause acceleration

acceleration = Force/mass

Acceleration = change in speed per time

What if you put the same engine in a big truck and in a little car?

Which will accelerate more?

A. Car

B. Truck

C. Both the same

- Engine provides the **Force**

acceleration = Force/mass

What if you put the same engine in a big truck and in a little car?

Which will accelerate more?

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B. Truck

C. Both the same

Equal forces

If you push Vin Diesel and this baby, which will accelerate more?

A. Vin Diesel
B. Baby
C. Both same
D. Not enough info

Different mass = different acceleration

If you push Vin Diesel and this baby, which will accelerate more?

A. Vin Diesel
B. Baby
C. Both same
D. Not enough info

Cause and Effect

Force is the Cause

Acceleration is the Effect

Despite a very strong wind, a tennis player manages to hit a tennis ball with her racquet so that the ball passes over the net and lands in her opponent's court.

Consider the following forces:

1. A downward force of gravity.
2. A force by the "hit".
3. A force exerted by the air.

Which of the above forces is (are) acting on the tennis ball after it has left contact with the racquet and before it touches the ground?

A. 1 only.
B. 1 and 2.
C. 1 and 3
D. 2 and 3
E. 1, 2, and 3.

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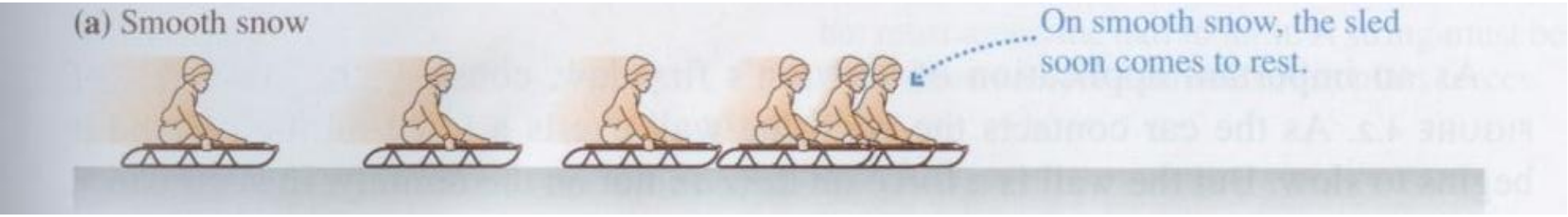
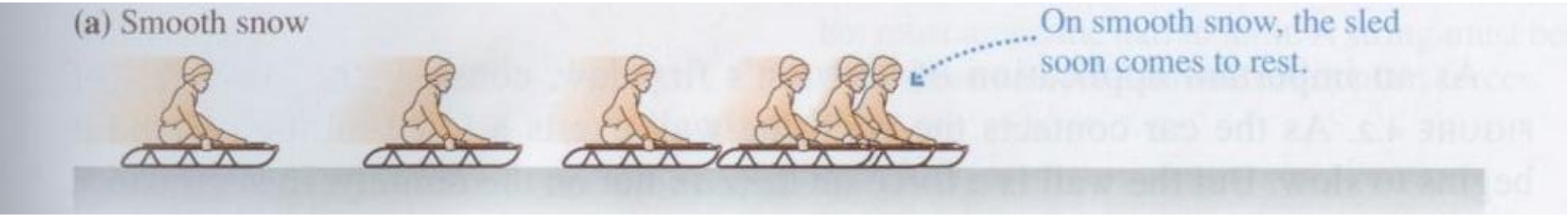


A person is sitting on a sled moving at a constant speed. The sled hits some dry snow and begins to slow down.

If friction slows the sled, what slows the person on the sled down?

A. Person is holding on
B. Friction between the person and the sled
C. A or B
D. It's natural to slow down, nothing has to slow the person



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Will it hit an asteroid or other planet?

Why doesn’t it deteriorate like it would on earth?

Will it still send photos?

How is there no friction?

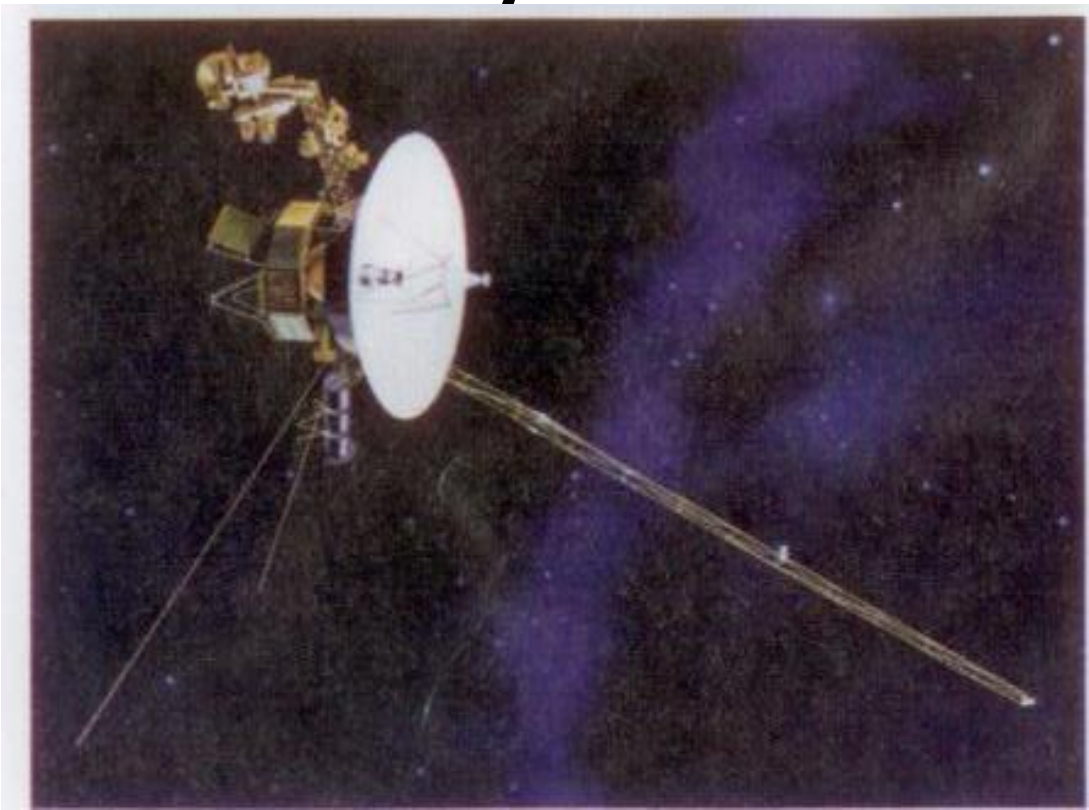
Will it hit an asteroid or other planet? **It could**

Why doesn't it deteriorate like it would on earth? **No oxygen or weather**

Will it still send photos? **Yes, still sending data. Nuclear power source – currently at 55%**

How is there no friction?

No air in space



A book is resting on your desk. Consider the following forces:

1. A downward force of gravity.
2. An upward force exerted by the surface.

Which of the above forces are acting on the book?

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither

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A bowling ball is rolling across the floor, the main force(s) acting on the ball is (are)

A. A downward force of gravity
B. A downward force of gravity, and a force in the direction of motion.
C. A downward force of gravity, an upward force exerted by the surface, and a force in the direction of motion.
D. A downward force of gravity, an upward force exerted by the surface.

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D. **A downward force of gravity, an upward force exerted by the surface.**

A large box is pulled with a constant horizontal force. As a result, the box moves across a level floor at a constant speed.

The pull:

A. has the same magnitude as the weight of the box.
B. is greater than the weight of the box.
C. has the same magnitude as the total force which resists the motion of the box.
D. is greater than the total force which resists the motion of the box.
E. is greater than either the weight of the box or the total force which resists its motion.

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Natural motion so Zero net Force

If the pulling suddenly stops, then the box will:

A. Immediately come to a stop
B. Continue moving at a constant speed for awhile and then slow to a stop.
C. Immediately start slowing to a stop.
D. Continue at a constant speed.

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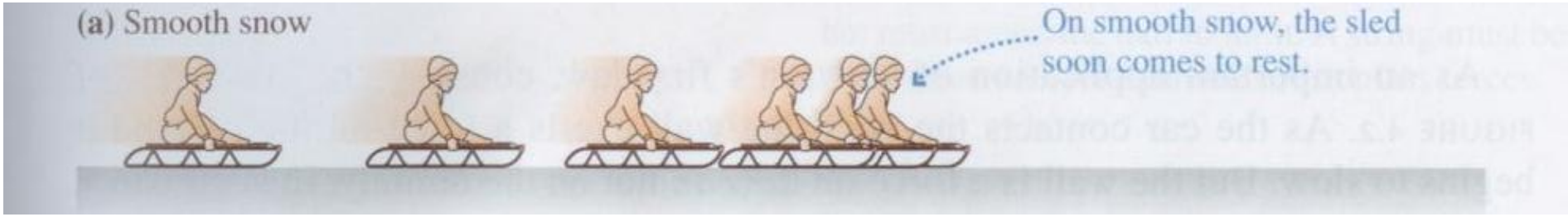

If, *instead,* the horizontal force pulling the box is doubled. The box's speed:

A. Continuously increases
B. Will be double the speed but still constant.
C. Is greater and constant, but not necessarily twice as great.
D. Is greater and constant for awhile and increases thereafter.
E. Increases for awhile and constant thereafter.

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