

Dynamics I

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Does the law of inertia pertain to:

- A. Moving objects only
- B. Objects at rest only
- C. Both

The law of inertia states that no force is required to maintain motion. Why do you have to keep peddling to maintain bike's motion?

- A. To accelerate a bike
- B. To overcome friction
- C. The law of inertia does not work for a bike

You are a passenger in a car and not wearing your seat belt. Without increasing or decreasing its speed, the car makes a sharp left turn, and you find yourself colliding with the right-hand door. Which is the correct analysis of the situation?

- A. Before and after the collision, there is a rightward force pushing you into the door.
- B. Starting at the time of collision, the door exerts a leftward force on you.
- C. both of the above
- D. neither of the above

What is the net force acting on an object in equilibrium?

- A. Positive
- B. Negative
- C. Zero
- D. Not enough information

Forces 10 N and 15 N in the same direction act on an object. What is the net force on the object?

- A. 5 N
- B. 25 N
- C. 10 N
- D. 0 N
- E. 15 N

Forces 10 N and 15 N act on an object in the opposite directions. What is the net force on the object?

- A. 5 N
- B. 25 N
- C. 10 N
- D. 0 N
- E. 15 N

2-7

Net force of 10 N applied to an object. The object started to move with an acceleration 2 m/s^2 . This object has a mass

- A. 20 kg
- B. 5 kg
- C. 10 kg

2-8

Two perpendicular forces of 3 N and 4 N applied to a 5 kg object. Find the net force on this object.

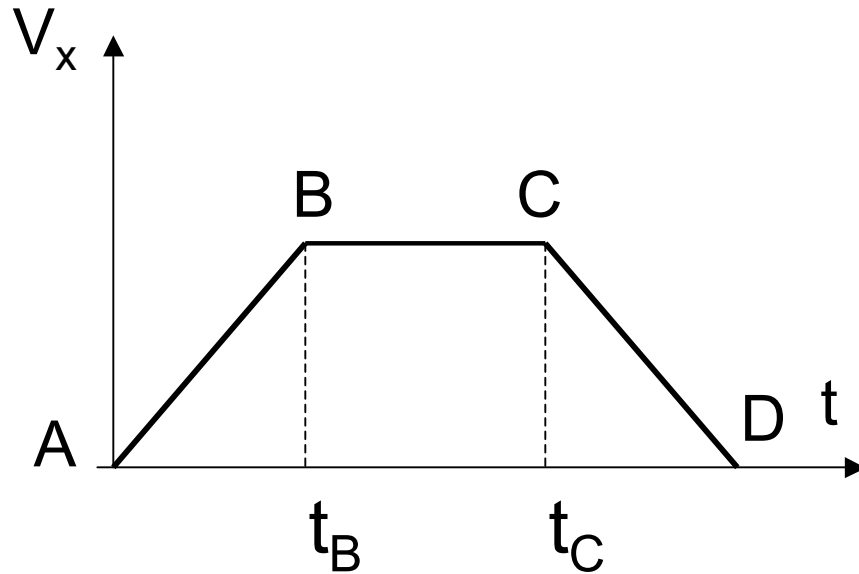
- A. 1 N
- B. 5 N
- C. 7 N
- D. Not enough data

2-9

Two perpendicular forces of 3 N and 4 N applied to a 5 kg object. Find the acceleration of this object.

- A. 0.6 m/s^2
- B. 0.8 m/s^2
- C. 1 m/s^2
- D. 1.4 m/s^2
- E. Not enough data

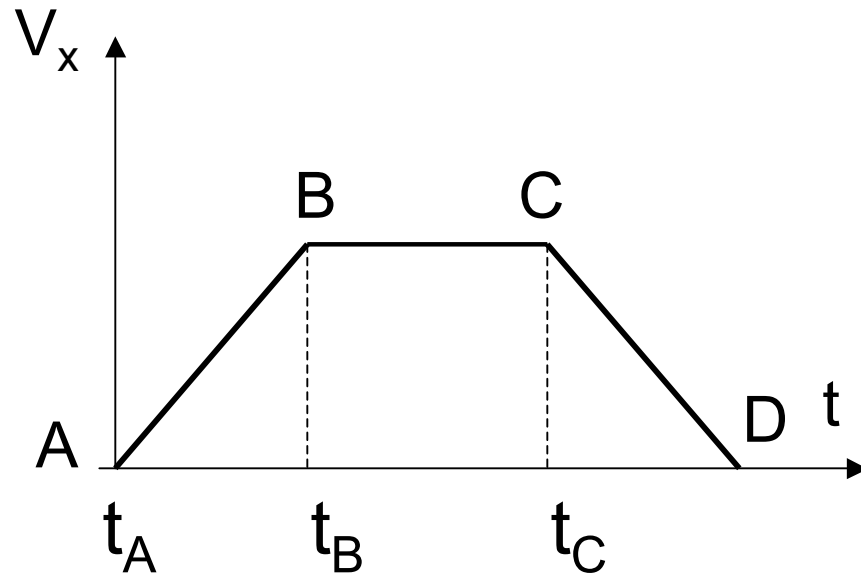
2-10



Net force on the object from the moment t_B to t_C is

- A. Positive
- B. Negative
- C. Zero
- D. Cannot be determined

2-11



Net force on the object from the moment t_A to t_B is

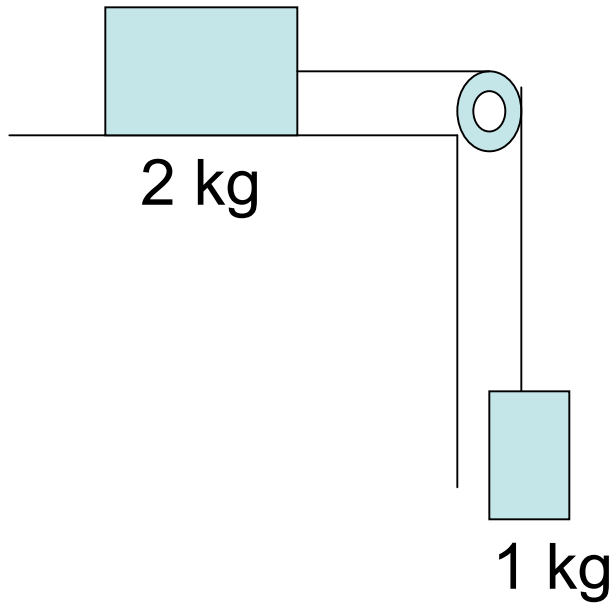
- A. Positive
- B. Negative
- C. Zero
- D. Cannot be determined

2-12

A skydiver reached her terminal velocity and is falling at a constant speed. A force of gravity on a skydiver is 1000 N. What is the air resistance force?

- A. 0 N
- B. 1000 N
- C. 2000 N
- D. Cannot be defined.

2-13



What is the acceleration of this system if tension is negligible?

- A. $a = 9.8 \text{ m/s}^2$
- B. $a = 4.9 \text{ m/s}^2$
- C. $a = 3.3 \text{ m/s}^2$
- D. $a = 0 \text{ m/s}^2$

2-14

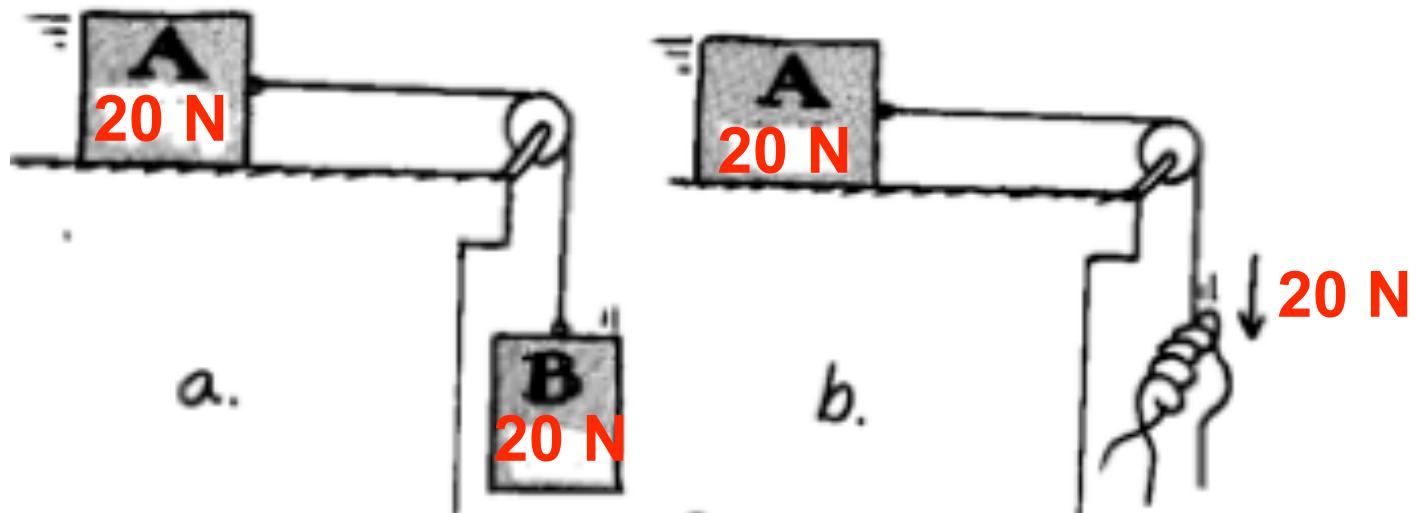
The acceleration of block A is greater in

A. Case *a*

B. Case *b*

C. The same in both cases

D. Cannot be defined



2-18

A tennis ball and a steel ball the same size are dropped at the same time.

Which ball has a greater force acting on it?

- A. The tennis ball
- B. The steel ball
- C. The same force acts on both

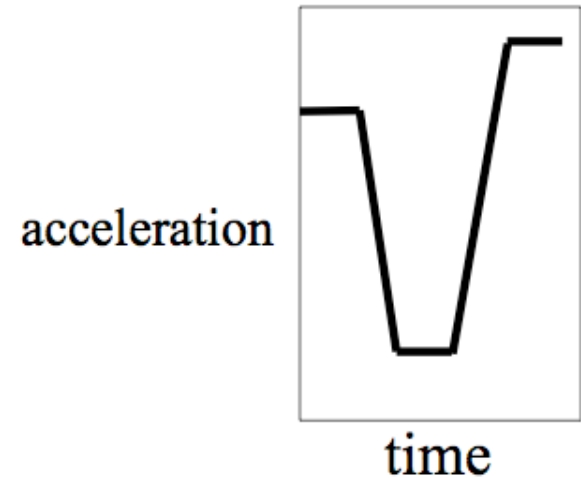
2-19

A tennis ball and a steel ball the same size are dropped at the same time. In the absence of air resistance, which ball has a greater acceleration?

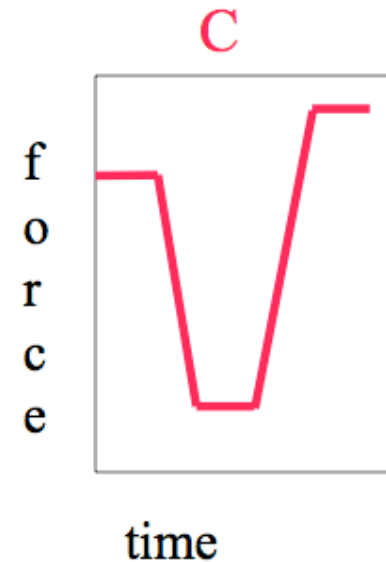
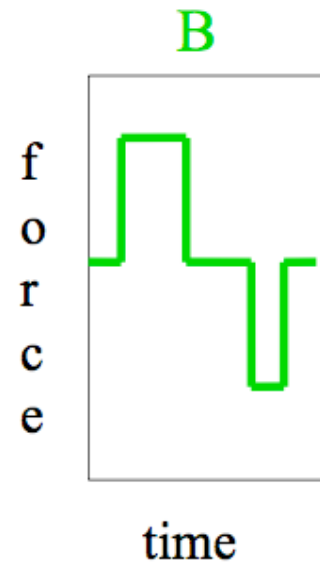
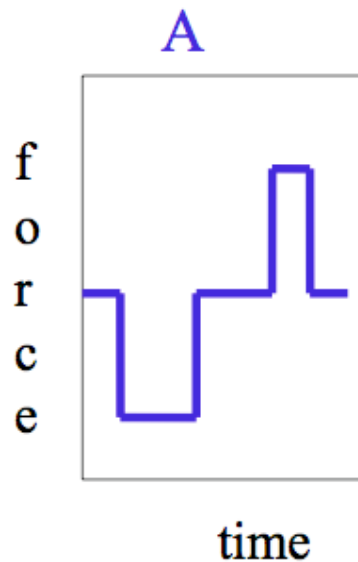
- A. Obviously, a steel one.
- B. No way, a tennis one.
- C. Nonsense. They both have the same.

2-15

A car is traveling along a road. Its acceleration is recorded as a function of time.



Which **Total force-time** graph would best match the scenario?



2-16

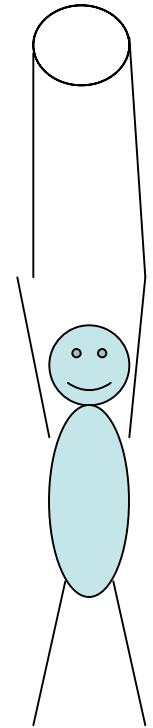
If the force acting on a cart doubles, cart acceleration

- A. Quadruples
- B. Doubles
- C. Halves
- D. Quarters

2-17

A man whose weight is 600 N hangs from a bar supported by two strands of rope. What is the tension in each strand?

- A. 600 N
- B. 400 N
- C. 300 N
- D. 1200 N

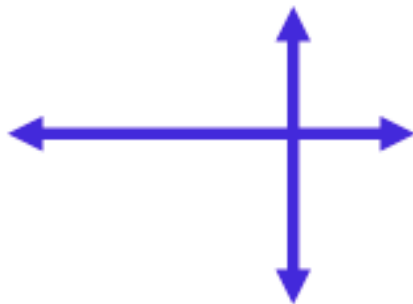


2-20

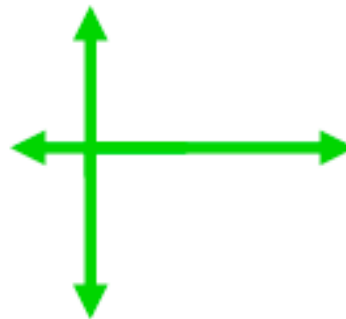
2. A cabinet is speeding up as it slides right across the room. Which of the following is a possible free body diagram?



A



B



C



2-21

A soccer player first kicks a soccer ball and then a bowling ball using the same kick.

Which ball will leave his foot going faster?

- A. The soccer ball because it's lighter.
- B. The bowling ball because it is heavier.
- C. Both the same since he used the same kick.
- D. The soccer ball, but for some other reason.
- E. The bowling ball, but for some other reason.

2-22

John is applying a horizontal force of 30 N on a right side of a box. A box is not moving. A friction force is

- A. 30 N to the right
- B. 30 N to the left
- C. 0 N
- D. 30 N down
- E. 30 N up

2-23

The same box is sliding with a constant velocity to the left after John increased a force to 50 N. Kinetic friction is

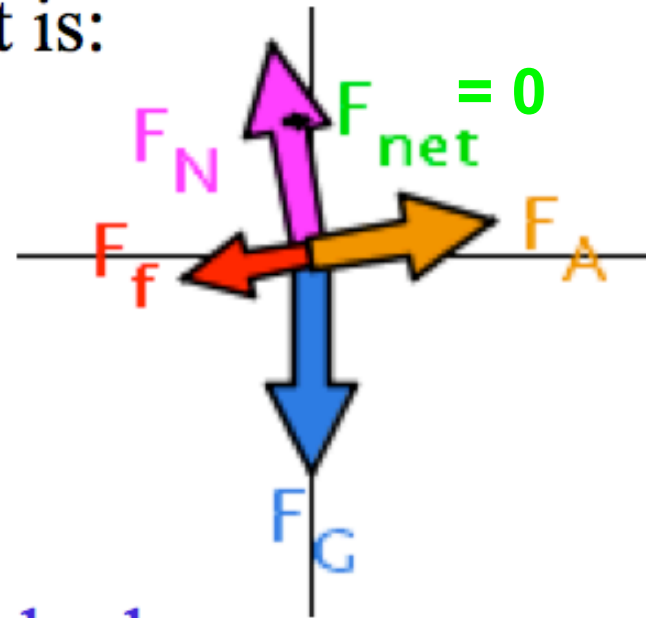
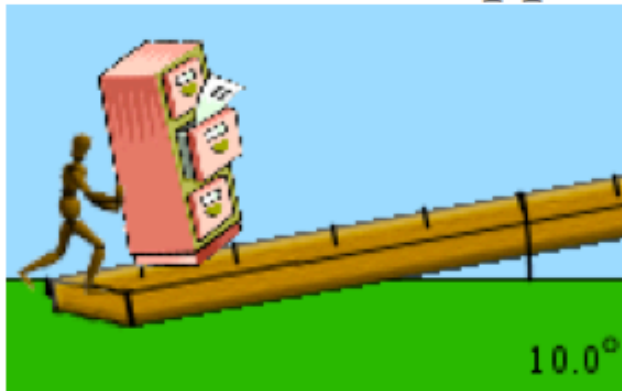
- A. 50 N to the left
- B. 50 N to the right
- C. 50 N down
- D. 0 N

2-24

The same box is sliding with a constant acceleration of 1 m/s^2 to the left after John increased a force to 60 N. Kinetic friction is

- A. 50 N to the left
- B. 50 N to the right
- C. 60 N to the left
- D. 60 N to the right
- E. 0 N

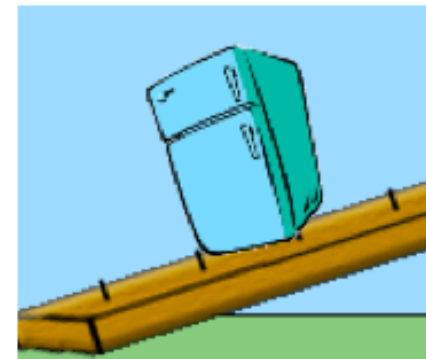
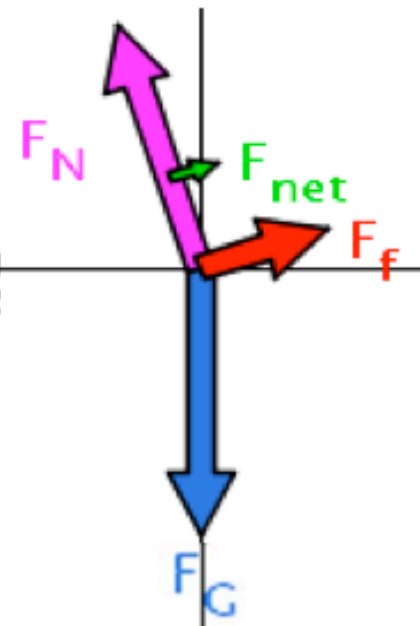
1. If the free body diagram for Betty pushing her file cabinet is:
What will happen?



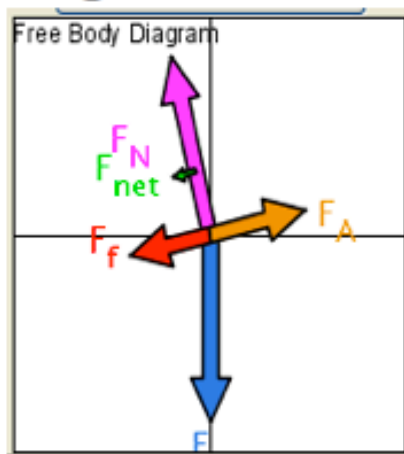
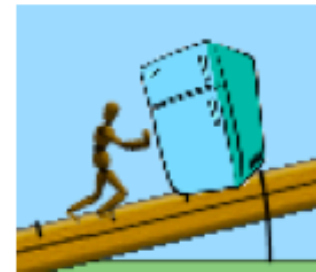
- A. The cabinet will slide down
- B. Betty will push it up the ramp
- C. The cabinet won't move

2. If this is the free body diagram for the fridge, what could be happening

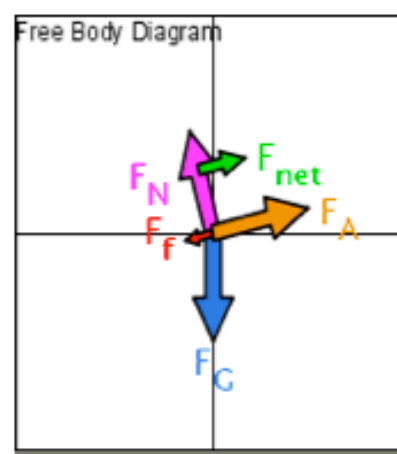
- A. Someone is pushing it up the ramp
- B. It is sliding down the ramp going faster
- C. It is sliding down the ramp going slower
- D. It is sitting still



3. One of these diagrams is for a fridge (175 kg) and the other is for a file cabinet (100 kg). If all the conditions are the same, which is the fridge?



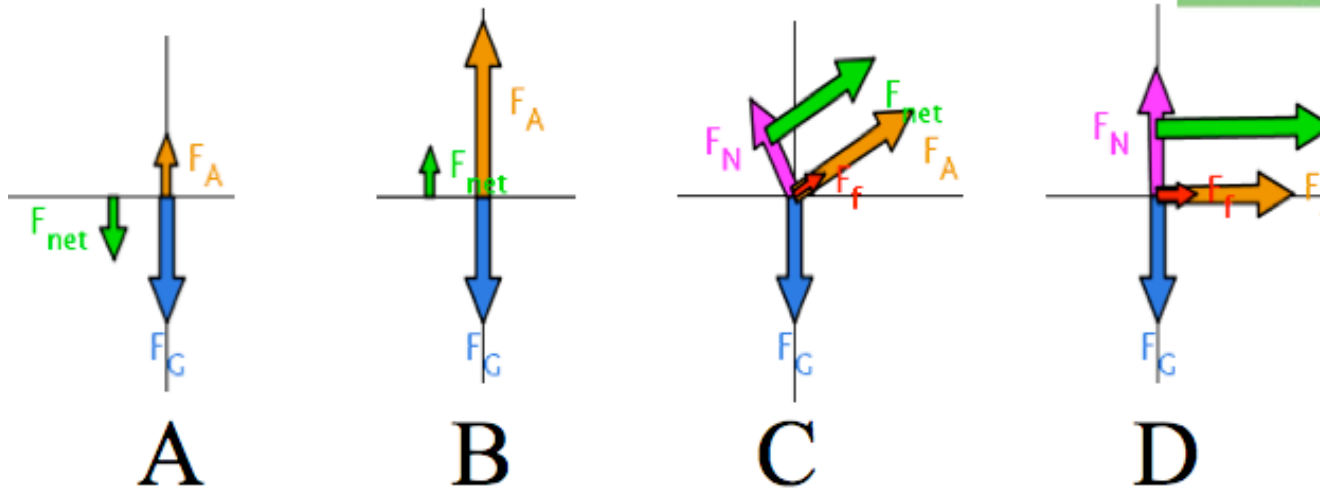
A



B

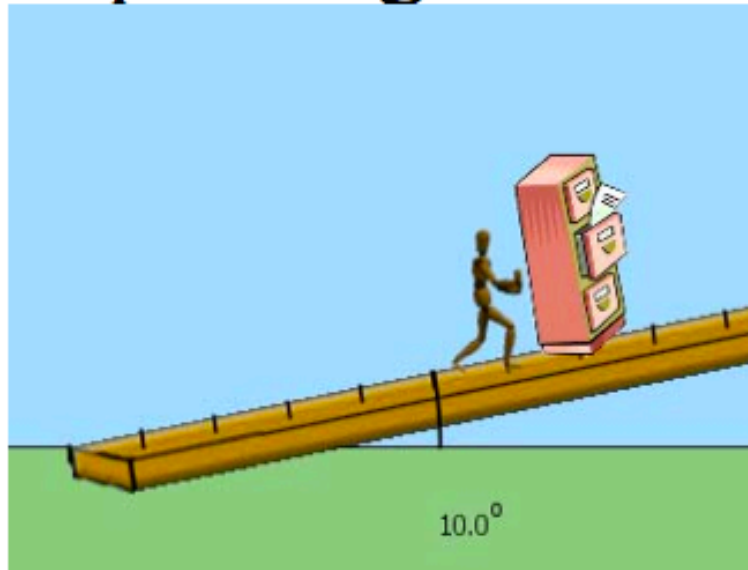
C no way to tell

4. Which diagram could show a box of books being lifted straight up?

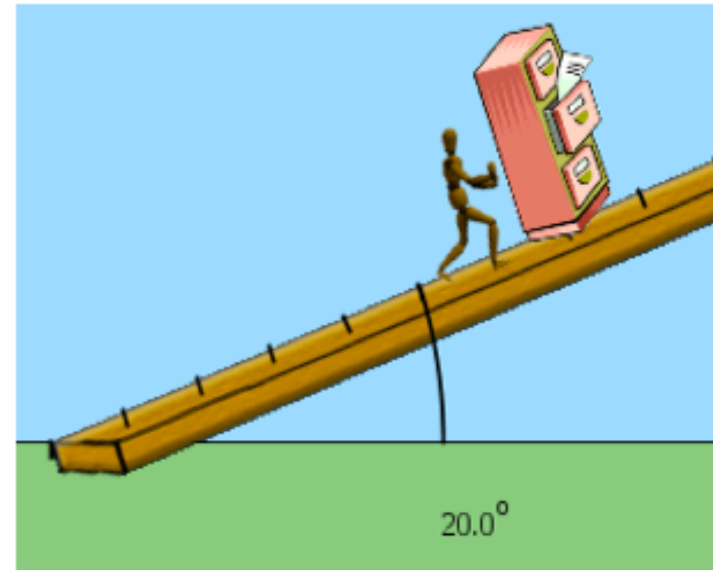


E no way to tell

5. Which would require less pushing force?



A

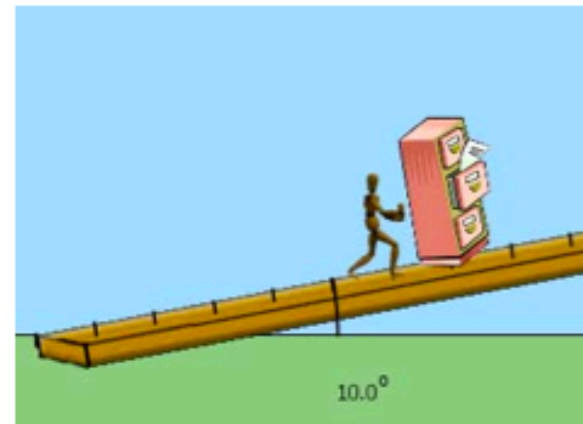
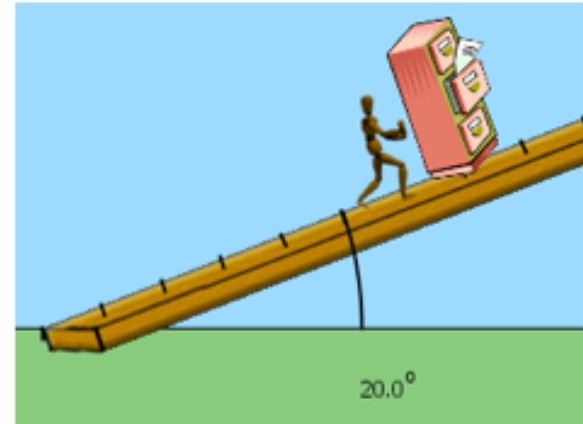


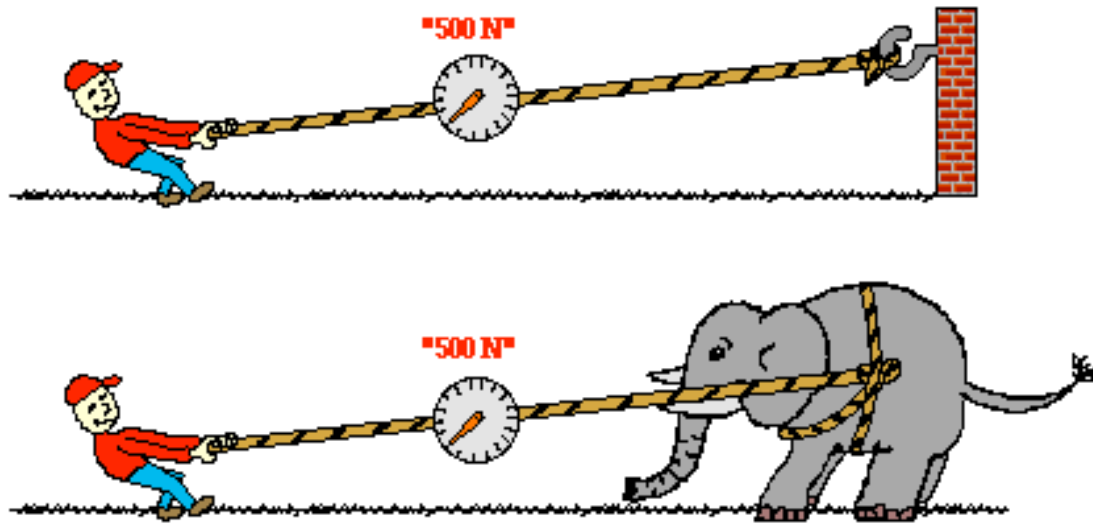
B

C no way to tell

6. Less pushing force is needed on the 10° ramp, because

- A. The friction force is less
- B. The cabinet weighs less
- C. It is easier to plant your feet





In each case, the force scale reads 500 Newtons. Kent is pulling ...

- A. with more force when the rope is attached to the wall.
- B. with more force when the rope is attached to the elephant.
- C. the same force in each case.

A woman weighting 500 N sits on the floor. She exerts a force on the floor of

- A. 1000 N
- B. 500 N
- C. 250 N
- D. 0 N

A woman weighting 500 N sits on the floor. The floor exerts a force on her of

- A. 1000 N
- B. 500 N
- C. 250 N
- D. 0 N

An unfortunate bug splatters against the windshield of a moving car.

Compared to deceleration of the car, the deceleration of the bug is

- A. Larger
- B. Smaller
- C. The same
- D. Depends on the bug

Many people are familiar with the fact that a rifle recoils when fired. The acceleration of the recoiling rifle is ...

- A. greater than the acceleration of the bullet.
- B. smaller than the acceleration of the bullet.
- C. the same size as the acceleration of the bullet.
- D. It depends on a construction of the rifle