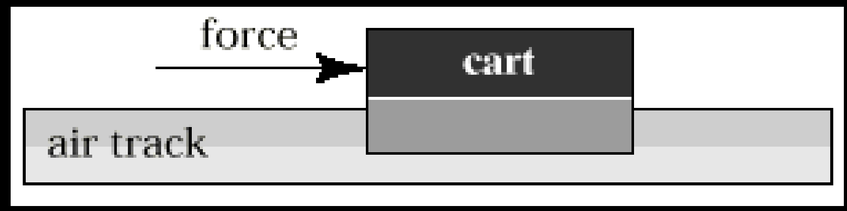
A constant force is exerted on a cart (initially at rest) on an air track. Neglect friction. The force acts for a short time and gives the cart a certain final speed. To reach the same final speed with a force that is only half as big, the force must be exerted on the cart for a time interval . . .

A) four times as long as
B) twice as long as
C) equal to
D) half as long as
... that for the stronger force.

E) Not enough information given



A constant force is exerted for a short time on a cart that is initially at rest on an air track. This force gives the cart a certain final speed.
We repeat the experiment but, instead of starting from rest, the cart is already moving with constant speed in the direction of the force at the moment we applied the force. After we exert the same constant force for the same short time interval, the *increase* in the cart's speed is:

A) two times its initial speed.
B) the square of its initial speed.
C) four times its initial speed.
D) the same as when it started from rest.
E) cannot be determined from the info provided.

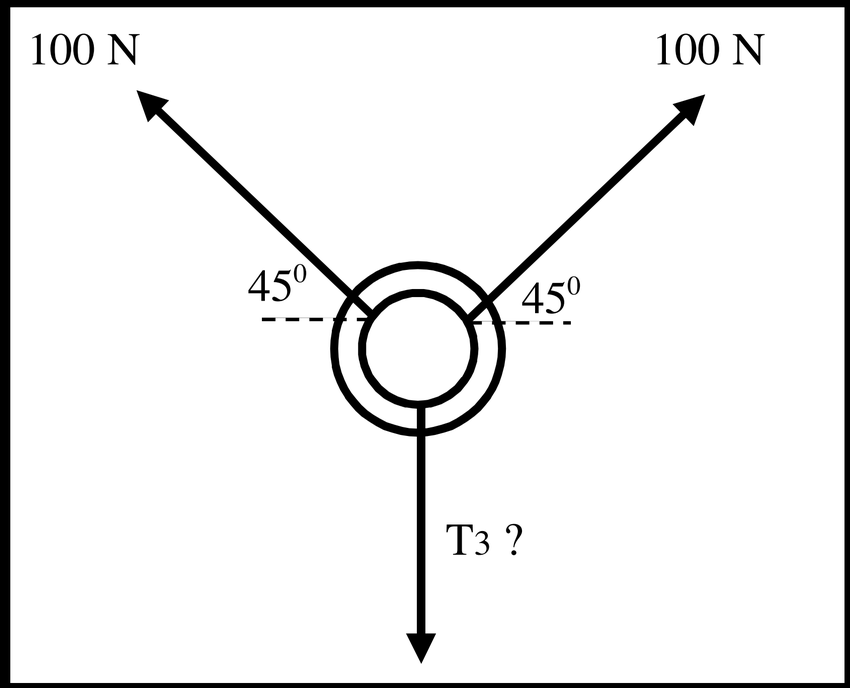
A constant rightward force (F) is exerted for a short time interval (t) on a cart that is initially at rest on an air track. This gives the cart a certain final velocity, v_f.

Suppose we begin with the cart moving with the velocity v_f above, and then we apply a leftward force (-F) for the *same* short time interval (t). What will the cart be doing after time t?

A) Moves forward with 2x initial speed.
B) Moves forward with initial speed.
C) Final speed is 0.
D) Cannot be determined from the info provided.

Three people are pulling on a ring in a "2-D" tug of war.
Shown is a "top view".
No one is winning.

If the pulls are configured as shown, (teams 1 and 2 are each pulling with a force of 100 N)
How hard is team 3 pulling?



A) 100N B) 200 N C) 141 N D) 71 N E) 0 N

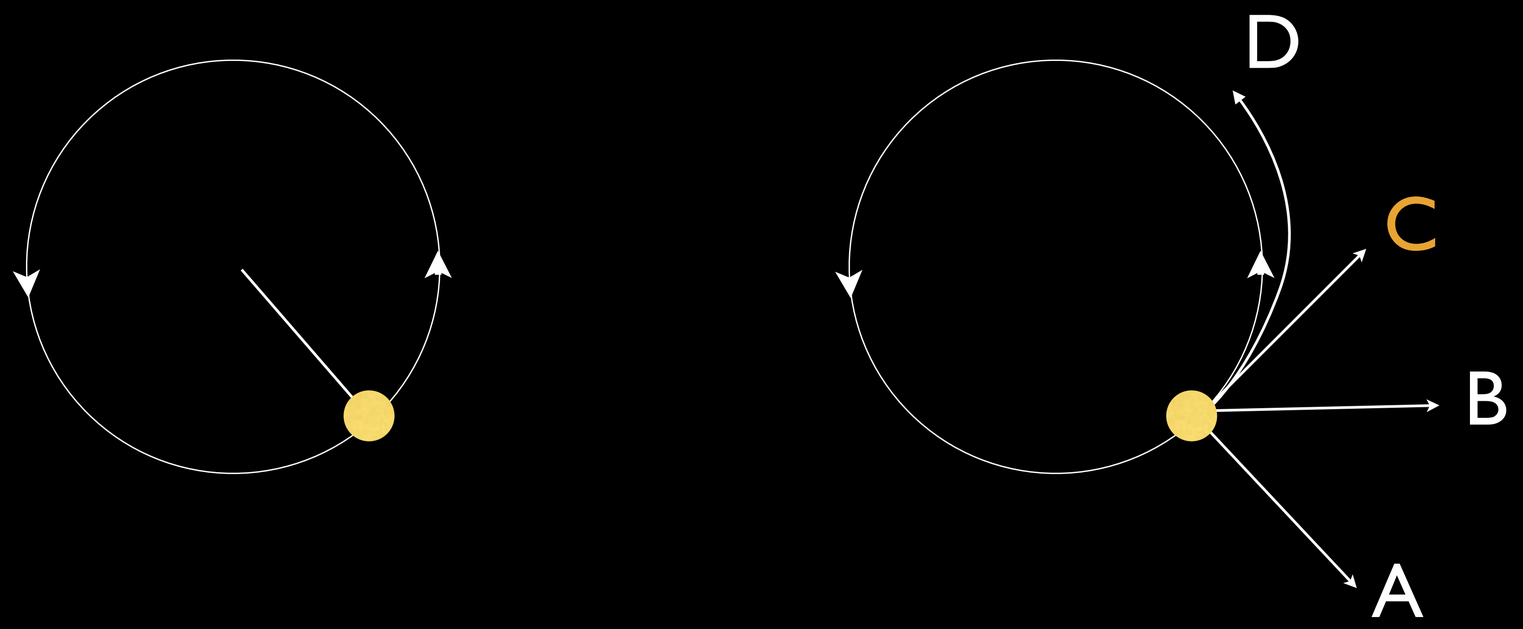
Hint: sin(45) = cos(45) = 0.707

Consider a person standing in an elevator that is moving upward with constant velocity. The upward normal force N exerted by the elevator floor on the person is

A) larger than
B) identical to
C) smaller than

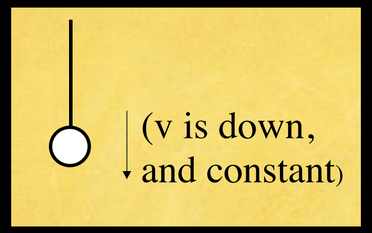
the downward force (m g) on the person.

An astronaut in intergalactic space is twirling a rock on a string. Suddenly the string breaks when the rock is at the point shown.



Which path (A, B, C, or D) does the rock follow after the string breaks?

An object is lowered by a rope at a constant speed.



The net force on the object is

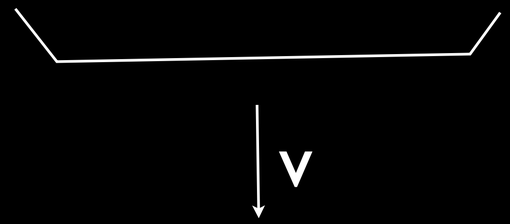
A) upward
B) downward
C) zero
D) not enough information given.

What is the direction of the acceleration of the object?
A) up B) down C) a=0

How does the tension T in the string compare with the weight "mg" of the object?

A) T=mg B) T > mg C) T < mg
D) Not enough information given.

A coffee filter floats down gently, at some constant ("terminal") velocity v.



The net force on the coffee filter is:

A) upwards

B) downwards

C) zero

A car rounds a curve while maintaining a constant speed.
Is there a net force on the car as it rounds the curve?

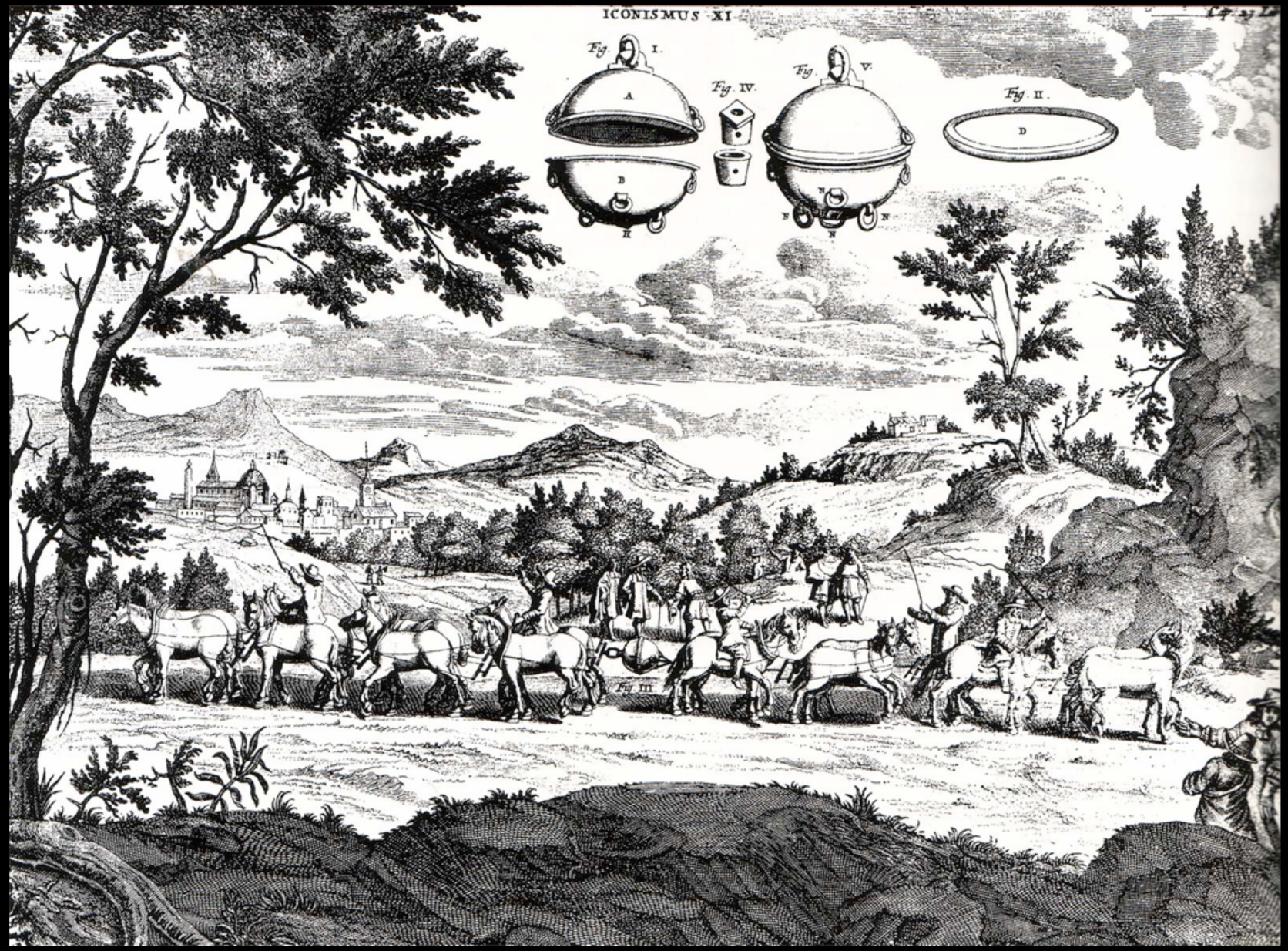
A) Yes
B) No
C) Depends

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) During the turn, there is a rightward force pushing you into the door.
B) During the turn, the door exerts a leftward force on you.
C) both of the above
D) neither of the above

In the 17th century, Otto von Güricke, a physicist in Magdeburg, fitted two hollow bronze hemispheres together and removed the air from the resulting sphere with a pump. Two eight-horse teams could not pull the halves apart even though the hemispheres fell apart when air was readmitted.

Suppose von Güricke had tied both teams of horses to *one* side and bolted the other side to a heavy tree trunk. In this case, the tension on the hemispheres would be:



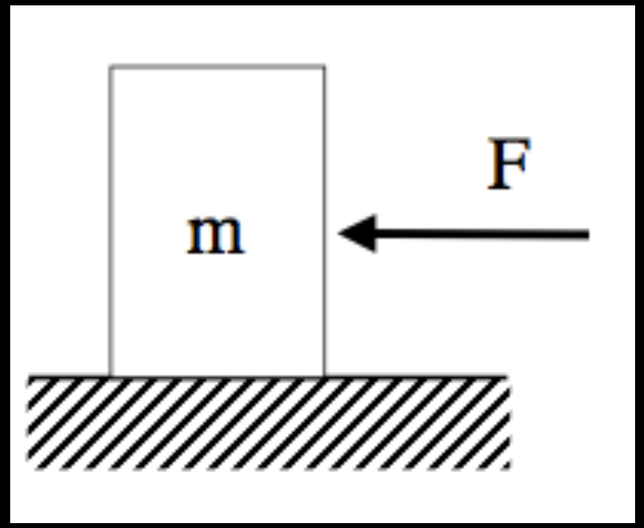
A) Twice

B) exactly the same

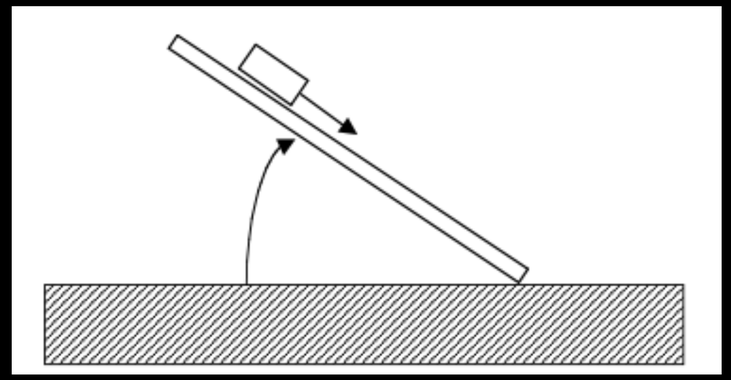
C) half

I push (with force F_{ext}) on a block (mass m) which sits on a table. The block is not moving, because there is static friction (coefficient μ_s). What can you say for sure about the frictional force f (frictional force of the table on the block)?

A) $f = \mu_s mg$
B) $f = F_{ext}$
C) $f < F_{ext}$
D) $f > F_{ext}$
E) None of the above



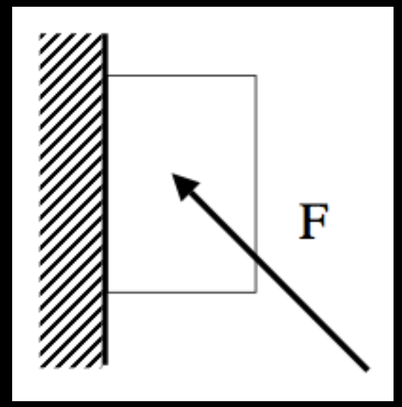
A block on a rough inclined plane is stationary. The plane is slowly tilted more, until the block just starts to slide.



After the block begins to slide, its acceleration is:

A) zero (it slides with constant velocity)
B) non-zero (and it slides faster and faster)
C) non-zero (and it slides slower and slower)
D) Not enough info to decide.

A person holds a block against a vertical wall with force F at a known angle. (The weight of the block is mg, the coefficient of static friction is μ_s.)



Which of the following is the correct analysis of the friction force between the block and the wall?

A: Friction force = (mg) x (μ_s).
B: Friction force = (component of F perpendicular to the wall) x (μ_s)
C: There is no friction, because gravity is parallel to the wall.
D: Not enough information / none of the above

A rider in a "barrel of fun" finds herself stuck with her back to the wall. Which diagram correctly shows the forces acting on her?

