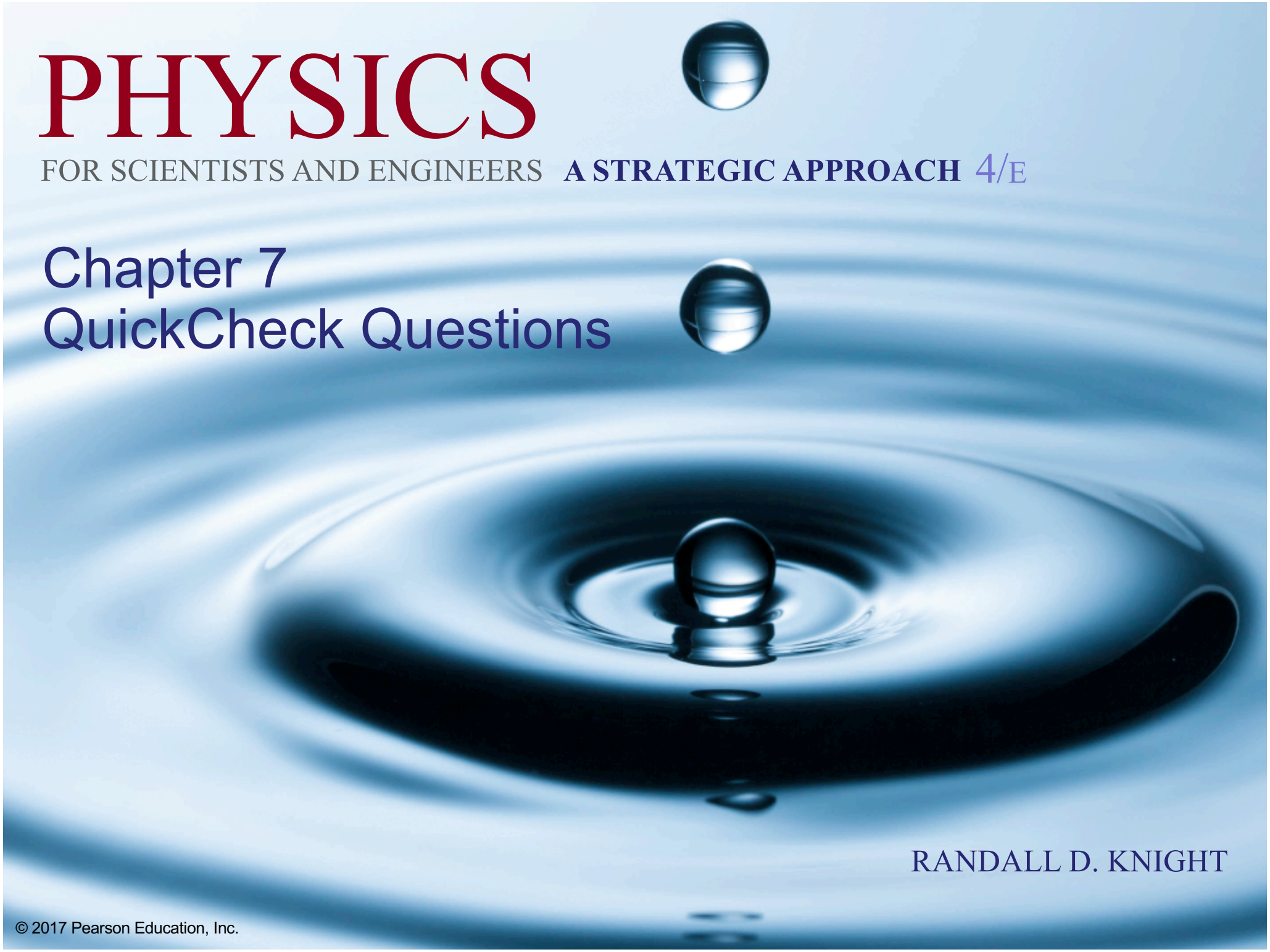

# QuickCheck 7.1

A mosquito runs head-on into a truck. Splat! Which is true during the collision?

A. The mosquito exerts more force on the truck than the truck exerts on the mosquito.
B. The truck exerts more force on the mosquito than the mosquito exerts on the truck.
C. The mosquito exerts the same force on the truck as the truck exerts on the mosquito.
D. The truck exerts a force on the mosquito but the mosquito does not exert a force on the truck.
E. The mosquito exerts a force on the truck but the truck does not exert a force on the mosquito.

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✔ **C. The mosquito exerts the same force on the truck as the truck exerts on the mosquito.**

D. The truck exerts a force on the mosquito but the mosquito does not exert a force on the truck.

E. The mosquito exerts a force on the truck but the truck does not exert a force on the mosquito.

# QuickCheck 7.2

A mosquito runs head-on into a truck. Which is true during the collision?

A. The magnitude of the mosquito's acceleration is larger than that of the truck.
B. The magnitude of the truck's acceleration is larger than that of the mosquito.
C. The magnitude of the mosquito's acceleration is the same as that of the truck.
D. The truck accelerates but the mosquito does not.
E. The mosquito accelerates but the truck does not.

# QuickCheck 7.2

A mosquito runs head-on into a truck. Which is true during the collision?

**A. The magnitude of the mosquito's acceleration is larger than that of the truck.**

B. The magnitude of the truck's acceleration is larger than that of the mosquito.

C. The magnitude of the mosquito's acceleration is the same as that of the truck.

D. The truck accelerates but the mosquito does not.

E. The mosquito accelerates but the truck does not.

Newton's second law: $a = \frac{F}{m}$

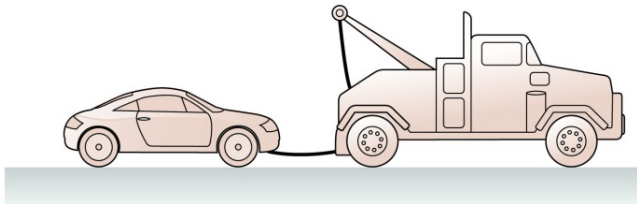
Same for both

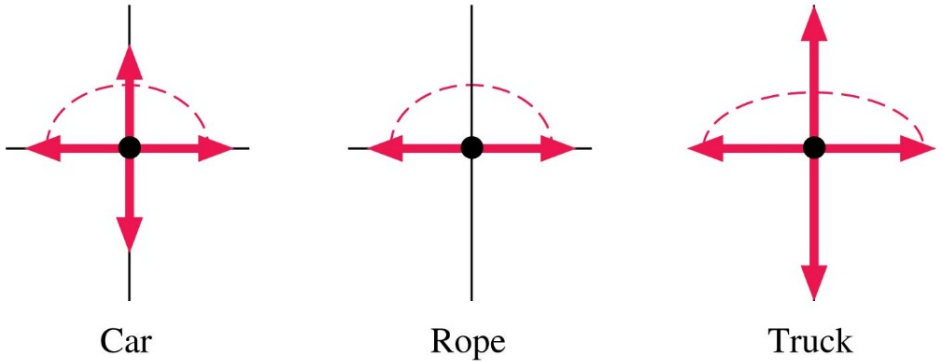
Huge difference

Don't confuse cause and effect! The same force can have very different effects.

# QuickCheck 7.3

What, if anything, is wrong with these free-body diagrams for a truck towing a car at steady speed? The truck is heavier than the car and the rope is massless.

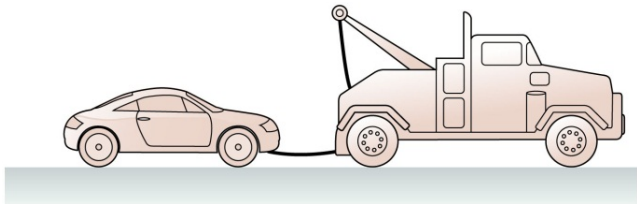


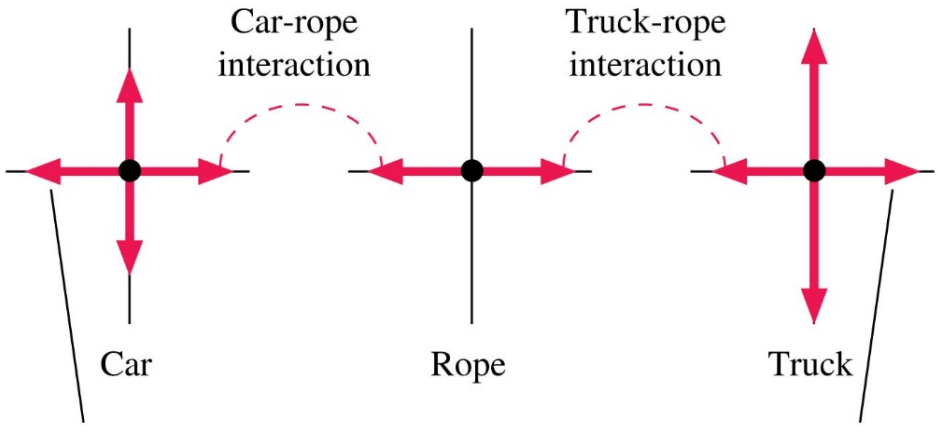



A. Nothing is wrong.
B. One or more forces have the wrong length.
C. One of more forces have the wrong direction.
D. One or more action/reaction pairs are wrong.
E. Both B and D.

# QuickCheck 7.3

What, if anything, is wrong with these free-body diagrams for a truck towing a car at steady speed? The truck is heavier than the car and the rope is massless.






Friction forces – static friction for forward propulsion and rolling friction on the car – are interactions with the ground.

A. Nothing is wrong.
B. One or more forces have the wrong length.
C. One of more forces have the wrong direction.
D. One or more action/reaction pairs are wrong.
✔ **E. Both B and D.**

# QuickCheck 7.4

A car is parked at rest on a horizontal road. The upward force of the road on the car (the normal force) is the same size as the downward pull of gravity

A. Because they are an action/reaction pair.
B. Because of Newton's first law.
C. Both A and B.
D. Neither A nor B. Some other reason.

# QuickCheck 7.4

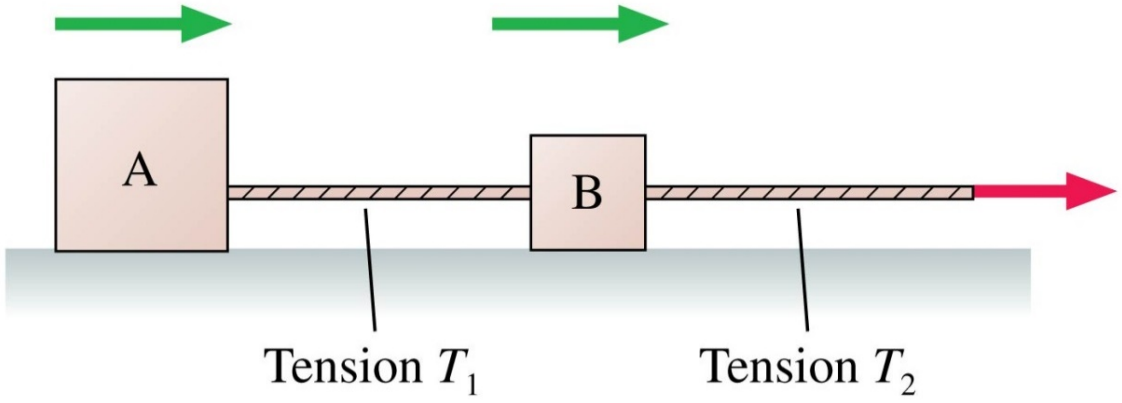
A car is parked at rest on a horizontal road. The upward force of the road on the car (the normal force) is the same size as the downward pull of gravity

A. Because they are an action/reaction pair.
✔ **B. Because of Newton's first law.**
C. Both A and B.
D. Neither A nor B. Some other reason.

# QuickCheck 7.5

Boxes A and B are being pulled to the right on a frictionless surface. Box A has a larger mass than B. How do the two tension forces compare?

A. $T_1 > T_2$
B. $T_1 = T_2$
C. $T_1 < T_2$
D. Not enough information to tell.



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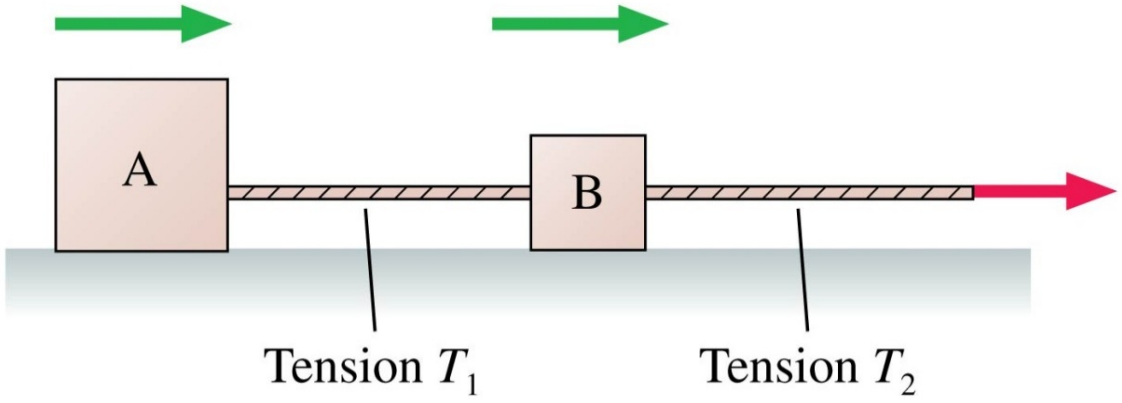


# QuickCheck 7.6

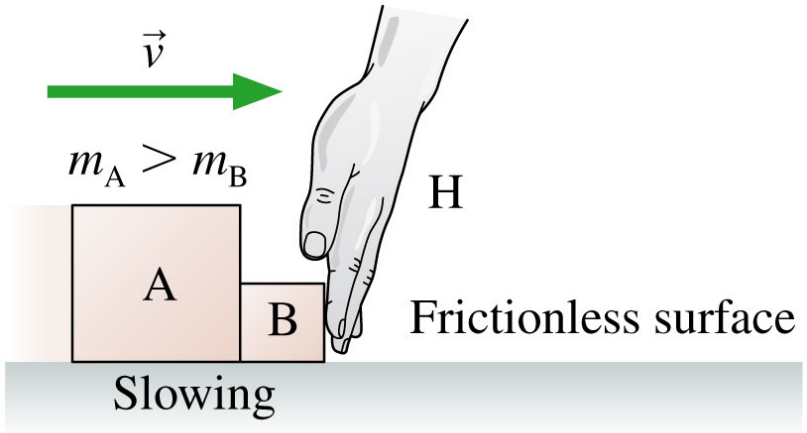
Boxes A and B are sliding to the right on a frictionless surface. Hand H is slowing them. Box A has a larger mass than B. Considering only the *horizontal* forces,

A. $F_{\text{B on H}} = F_{\text{H on B}} = F_{\text{A on B}} = F_{\text{B on A}}$

B. $F_{\text{B on H}} = F_{\text{H on B}} > F_{\text{A on B}} = F_{\text{B on A}}$

C. $F_{\text{B on H}} = F_{\text{H on B}} < F_{\text{A on B}} = F_{\text{B on A}}$

D. $F_{\text{H on B}} = F_{\text{H on A}} > F_{\text{A on B}}$



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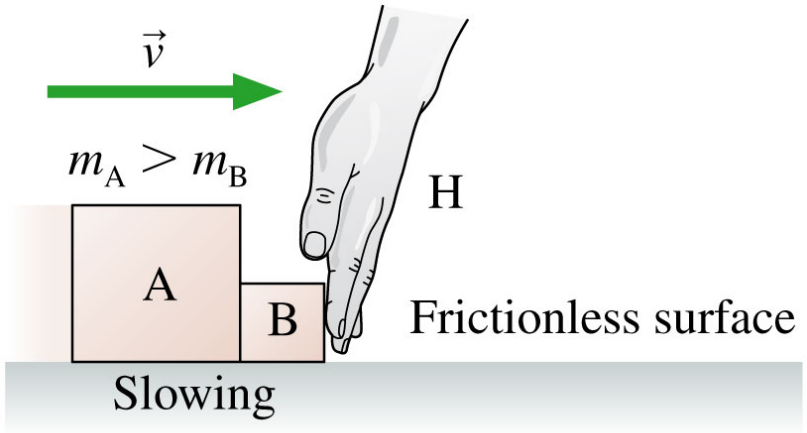
A. $F_{\text{B on H}} = F_{\text{H on B}} = F_{\text{A on B}} = F_{\text{B on A}}$

✔ **B.** $\boldsymbol{F_{\text{B on H}} = F_{\text{H on B}} > F_{\text{A on B}} = F_{\text{B on A}}}$

C. $F_{\text{B on H}} = F_{\text{H on B}} < F_{\text{A on B}} = F_{\text{B on A}}$

D. $F_{\text{H on B}} = F_{\text{H on A}} > F_{\text{A on B}}$



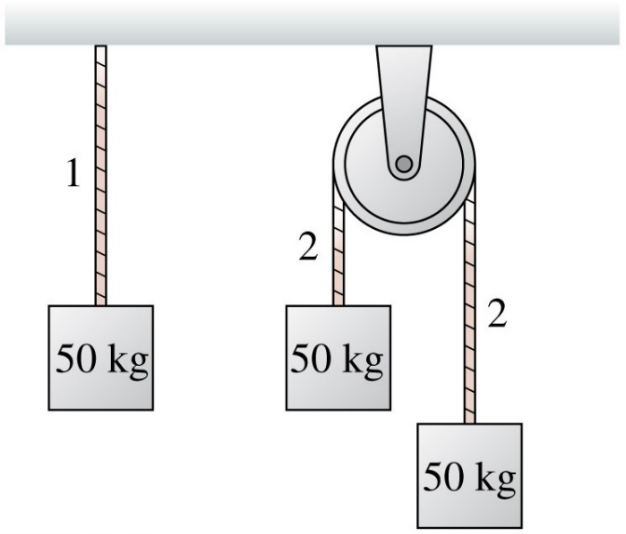
# QuickCheck 7.7

All three 50-kg blocks are at rest.
The tension in rope 2 is

A. greater than the tension in rope 1.

B. equal to the tension in rope 1.

C. less than the tension in rope 1.



# QuickCheck 7.7

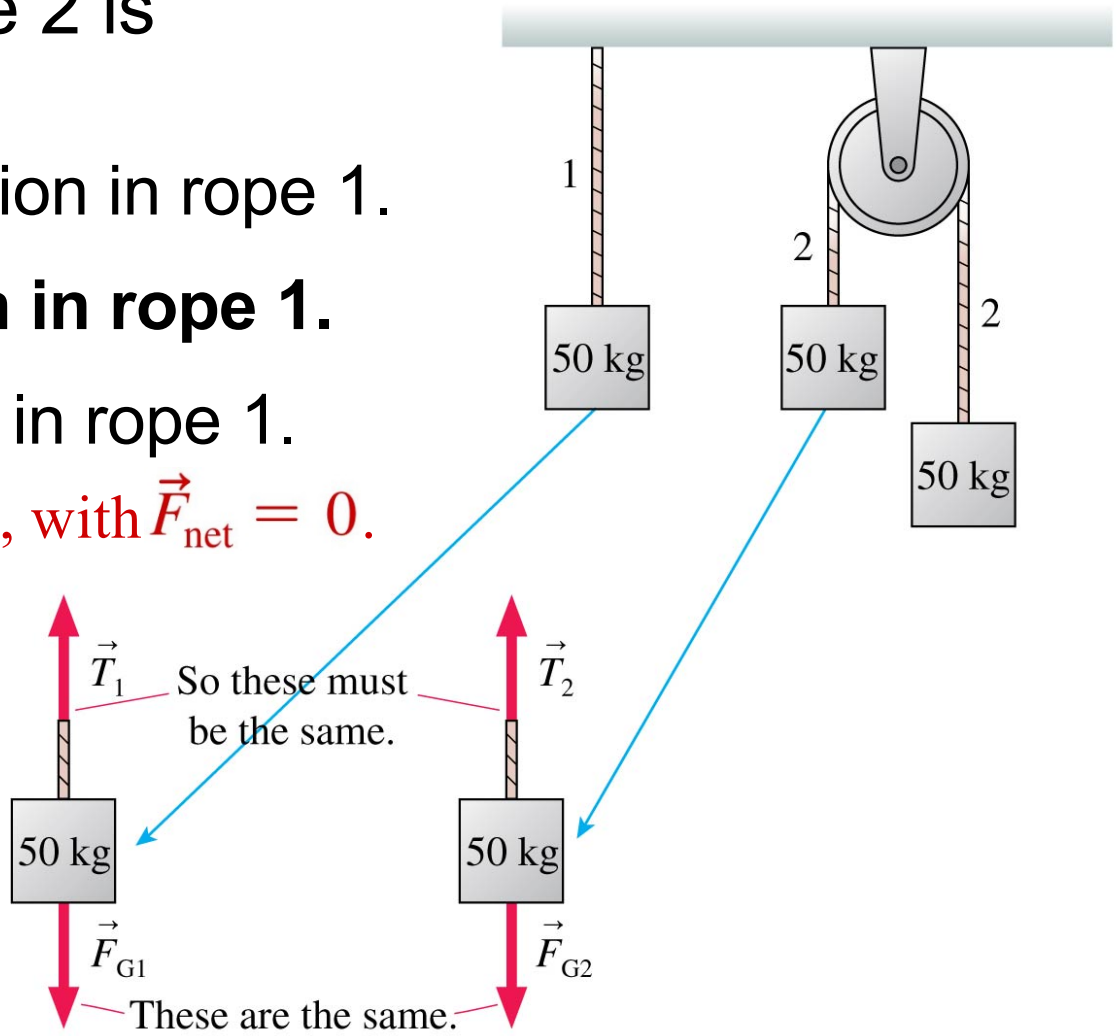
All three 50-kg blocks are at rest. The tension in rope 2 is

A. greater than the tension in rope 1.

✔ **B. equal to the tension in rope 1.**

C. less than the tension in rope 1.

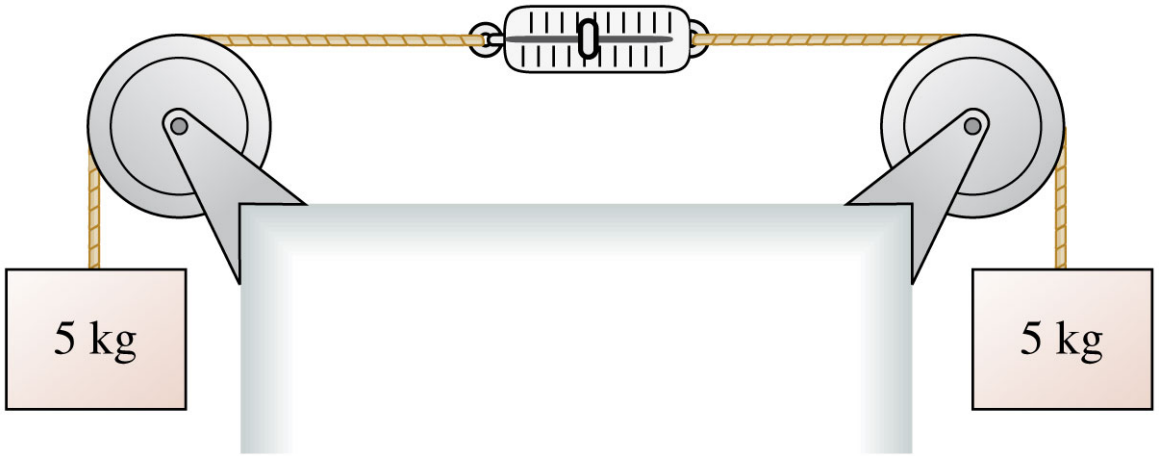
Each block is in static equilibrium, with $\vec{F}_{\text{net}} = 0$.



# QuickCheck 7.8

The two masses are at rest. The pulleys are frictionless. The scale is in kg. The scale reads

A. 0 kg.
B. 5 kg.
C. 10 kg.



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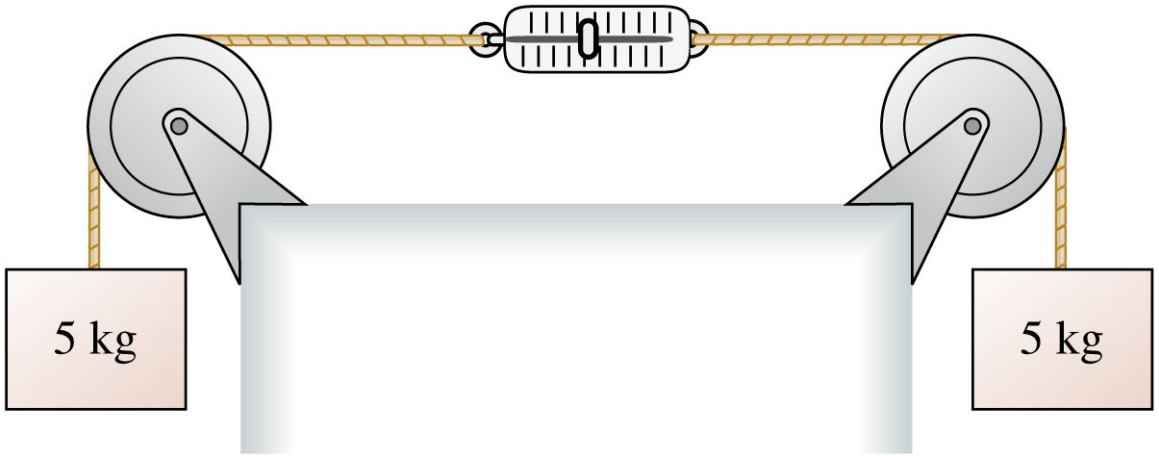


# QuickCheck 7.9

The acceleration constraint here is

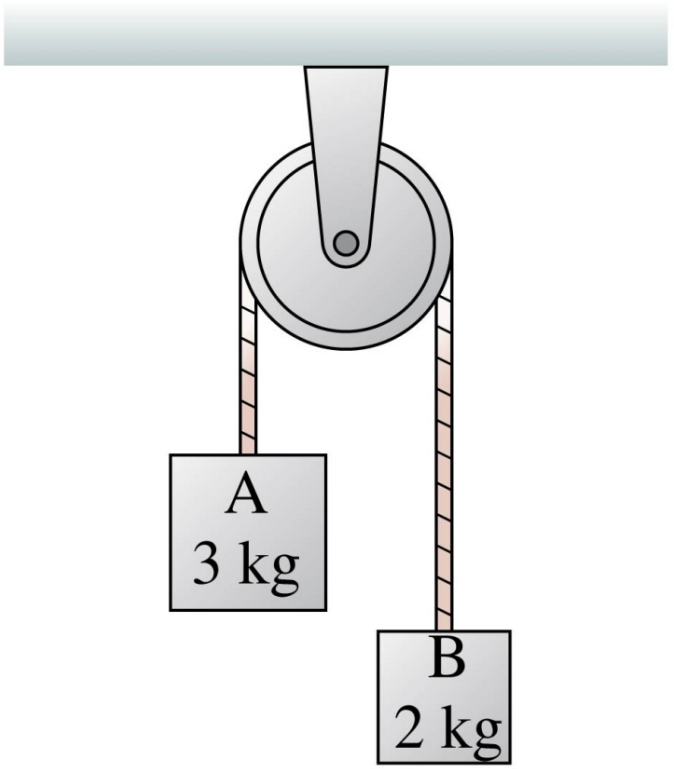
A. $a_{Ay} = a_{By}$

B. $-a_{Ay} = -a_{By}$

C. $a_{Ay} = -a_{By}$

D. $a_{By} = -a_{Ay}$

E. Either C or D.



# QuickCheck 7.9

The acceleration constraint here is

A. $a_{Ay} = a_{By}$

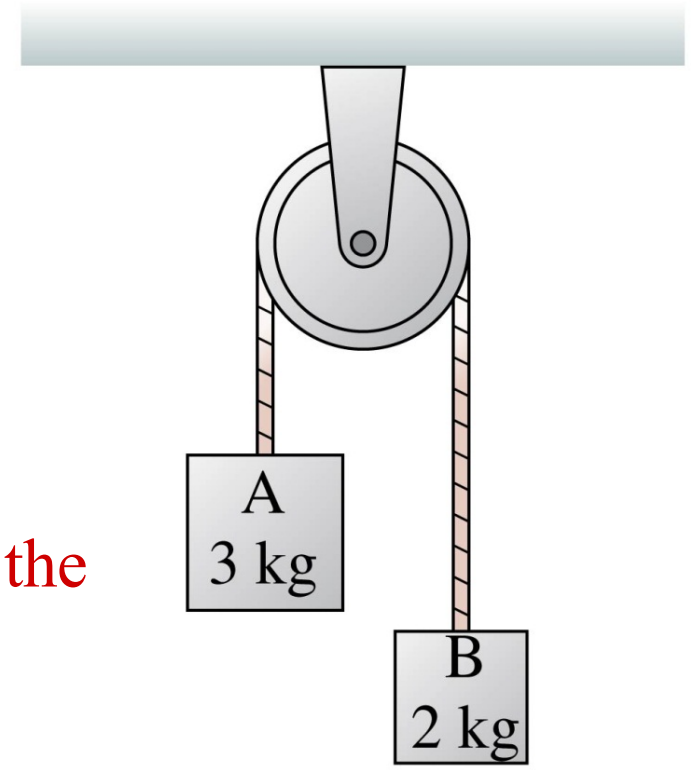
B. $-a_{Ay} = -a_{By}$

C. $a_{Ay} = -a_{By}$

D. $a_{By} = -a_{Ay}$

✔ E. **Either C or D.**

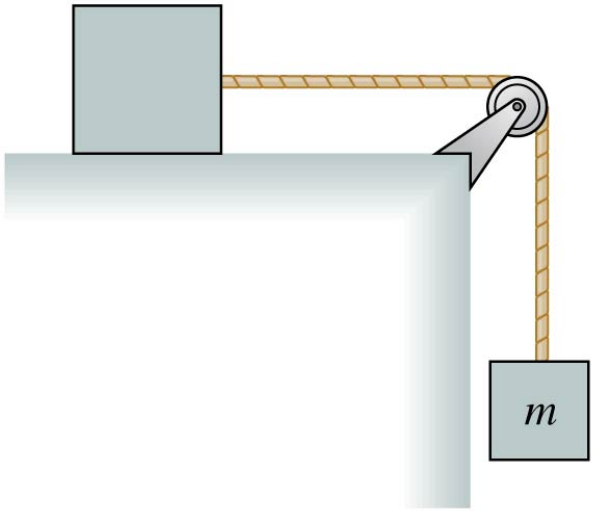
Either says that the acceleration vectors point in opposite directions.



# QuickCheck 7.10

The top block is accelerated across a frictionless table by the falling mass $m$. The string is massless, and the pulley is both massless and frictionless. The tension in the string is

A. $T < mg$
B. $T = mg$
C. $T > mg$



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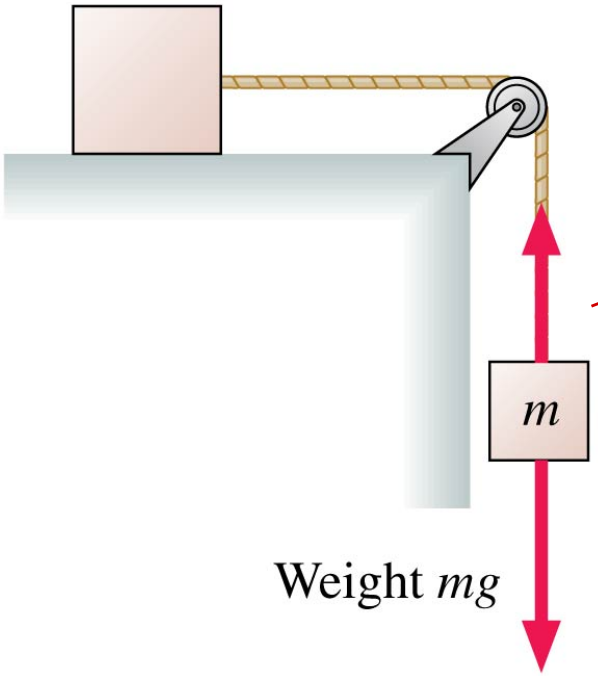
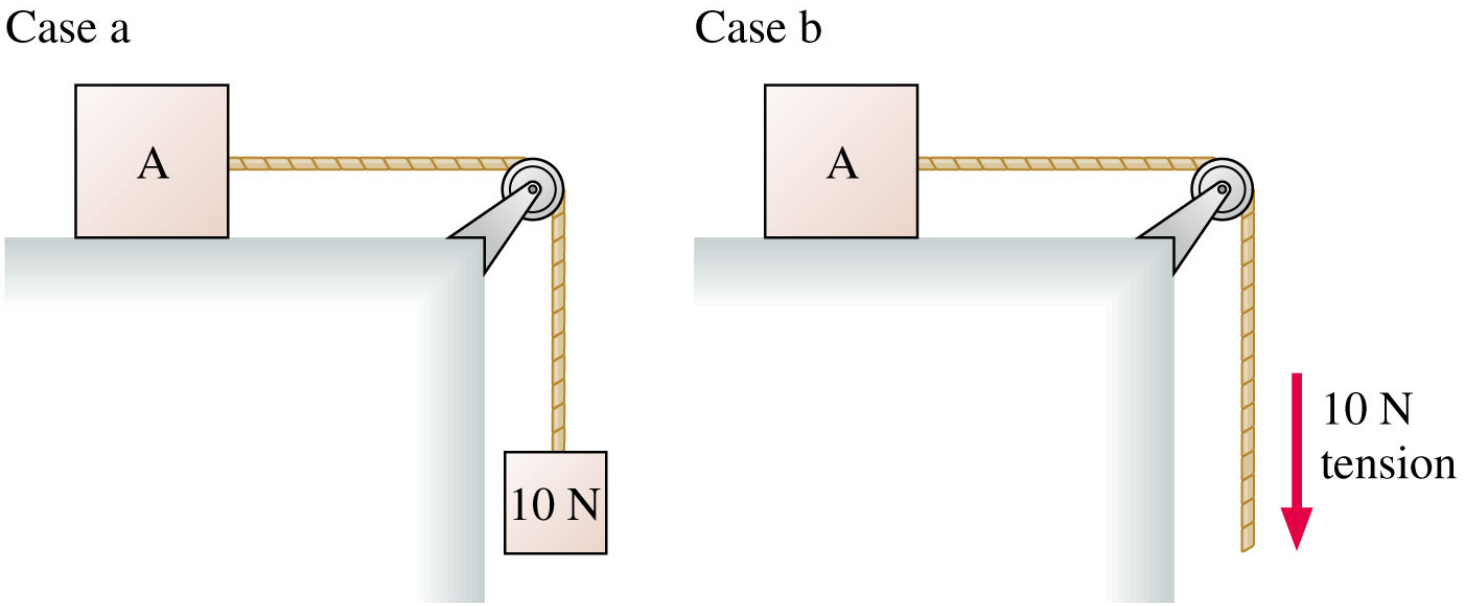



Tension has to be less than $mg$ for the block to have a downward acceleration.

# QuickCheck 7.11

Block A is accelerated across a frictionless table. The string is massless, and the pulley is both massless and frictionless. Which is true?

A. Block A accelerates faster in case a than in case b.
B. Block A has the same acceleration in case a and case b.
C. Block A accelerates slower in case a than in case b.



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✔ **C. Block A accelerates slower in case a than in case b.**