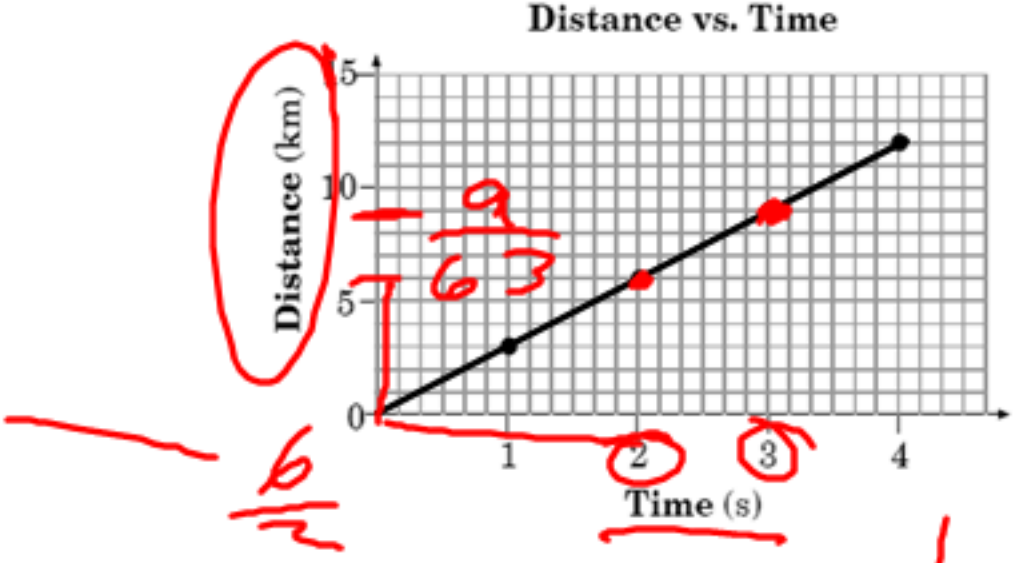
1. After a spacecraft takes off, its distance traveled is measured and is represented in this graph.



What is the average speed of the spacecraft?

A 12 kilometers per second

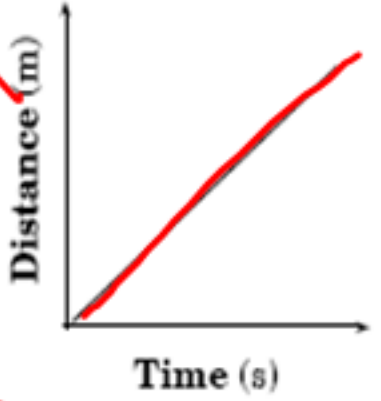
B 5 kilometers per second

C 3 kilometers per second

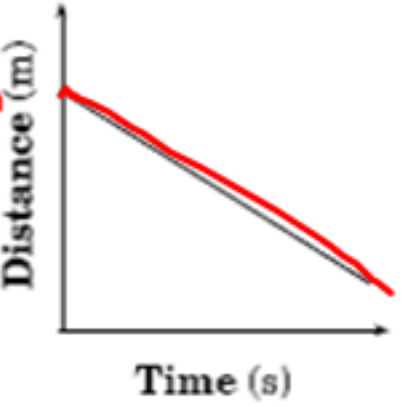
D 1 kilometer per second

2. Which graph represents a car with a positive acceleration?

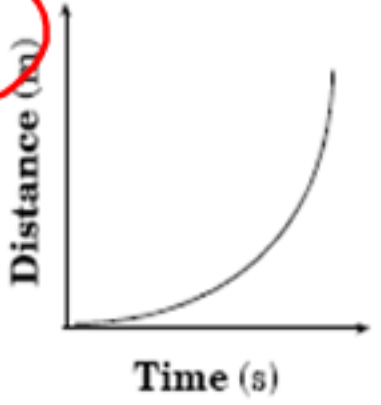
A



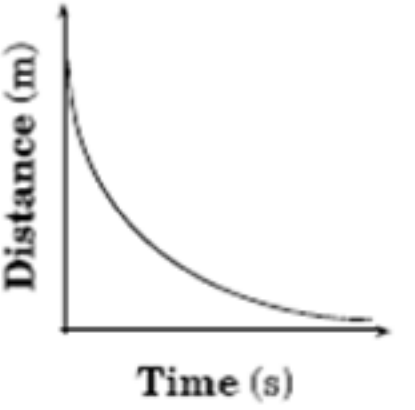
C



B



D



3. A student is a passenger in the front seat of a moving car. Which object is the ***best*** frame of reference for the student to determine how fast the car is moving relative to the ground?

A a person sitting in the backseat of the car

B a truck traveling in the lane next to the car

C the driver sitting next to the student

D a signpost on the side of the road

4. An object rolls east at a steady speed of 12 m/s for 3.0 seconds. What distance did it travel?

4

A 7.0 m

3 B 18 m

C 24 m

D 36 m

$V = 12 \frac{m}{s}$

$t = 3\,s$

$d = ?$

$V = \frac{d}{t}$ +

5. A car's velocity changes from 0 m/s to 40 m/s in 5 seconds. What is the average acceleration of the car?

A 5 m/s/s

B 8 m/s/s

C 35 m/s/s

D 200 m/s/s

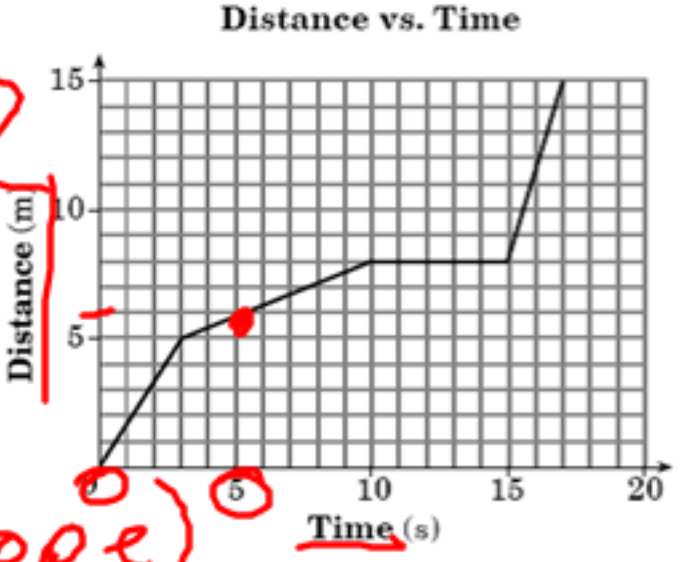
$V_i = 0$ $a = \frac{V_f - V_i}{t}$

$V_f = 40$ $\frac{40 - 0}{5}$

$t = 5s$

$a = ?$

6. This graph represents the motion of an object.



What is the average speed of the object from time = 0 s to time = 5 s?

A 0.8 m/s

B 1.2 m/s

C 5 m/s

D 6 m/s

7. A car starts from rest and accelerates uniformly at 1.7 m/s/s. How long will it take the car to reach a speed of 34 m/s?

A 200 s

B 58 s

C 20 s

D 2 s

$V_i = 0$

$a = 1.7 m/s^2$

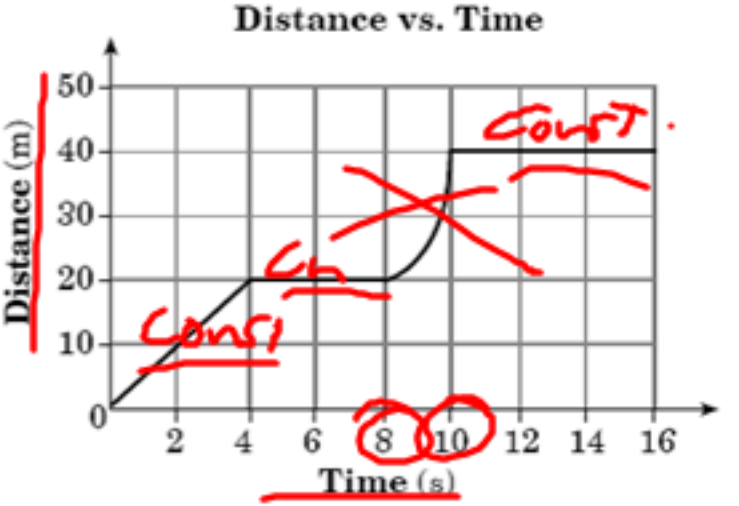
$t = ?$

$V_f = 34 s$

$a = \frac{V_f}{t}$

$\frac{34}{1.7}$

8. This graph shows the motion of a person riding a bicycle.



Which time period shows the acceleration of the bicycle?

A 0–4 s

B 4–8 s

C 8–10 s

D 10–16 s

9. A 200-kg load is suspended from a cable on a crane. The load is moved upward at a constant velocity 20 m to the top of the building. What would be true of the force on the cable as it moved upward?

A The force on the cable decreased.

B The force on the cable increased.

C The force on the cable remained the same.

D The force on the cable depended upon the energy of the crane.

10. A student uses two identical balls to perform an investigation. The student throws ball A with a horizontal velocity from a height of 10 meters. At the same time, another student drops ball B from the same height without any horizontal velocity. Neglecting air resistance, which best describes the results?

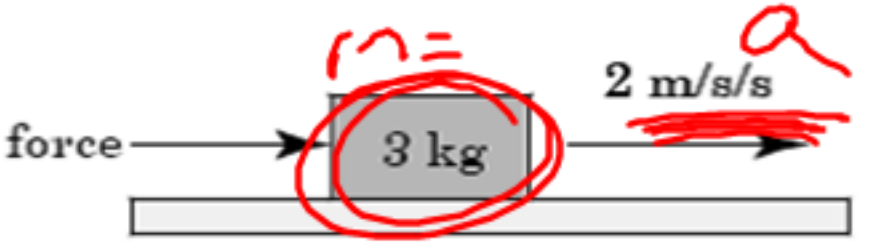
A Ball A will hit the ground first.

B Ball B will hit the ground first.

C Both balls will hit the ground at the same time.

D Ball A will take twice as long to hit the ground.

11. This diagram shows an object being pushed along a frictionless surface. The object accelerates at 2 m/s/s.



What force was applied to the object?

A 1 N

B 1.5 N

C 5 N

D 6 N

$F = ma$

$3(2)$

12. How much force is needed to accelerate a 500.0-kg car at a rate of 4.000 m/s/s?

A 125.0 N

B 250.0 N

C 2,000. N

D 4,000. N

$m = 500 kg$

$a = 4 m/s^2$

$F = ?$

$F = ma$

13. Two equal forces act at the same time on the same stationary object but in opposite directions. Which statement describes the object's motion?

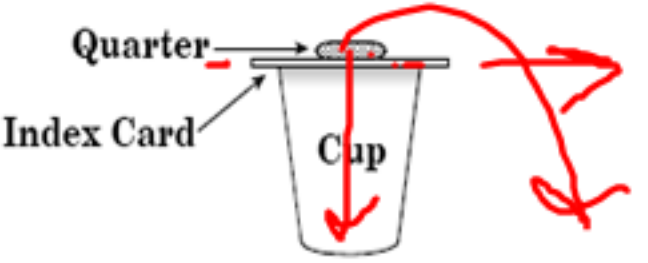
A It remains stationary.

B It moves at a constant speed.

C It accelerates.

D It decelerates.

14. A quarter is resting on top of an index card, which has been placed across the top of a small cup.



When the card is given a hard horizontal push to the right, what will happen?

A The card and quarter will move to the right, off of the cup, and land together.

B The card and quarter will move to the right and land on the table, but the quarter will travel farther.

C The card will fall off the cup, but the quarter will fall directly into the cup.

D The card and quarter will flip off the cup and land upside down on the table.

15. This chart represents information about four different carts and the force applied to each cart.

Cart Masses and Forces Applied

Cart	Mass (kg)	Force (N)
W	5	3
X	5	6
Y	5	4
Z	5	1

Which cart will have the greatest amount of acceleration?

A W

B X

C Y

D Z

16. A 100-N force causes an object to accelerate at 2 m/s/s. What is the mass of the object?

A 0.02 kg

B 50 kg

C 102 kg

D 200 kg

$F = 100\ N$

$a = 2\ m/s^2$

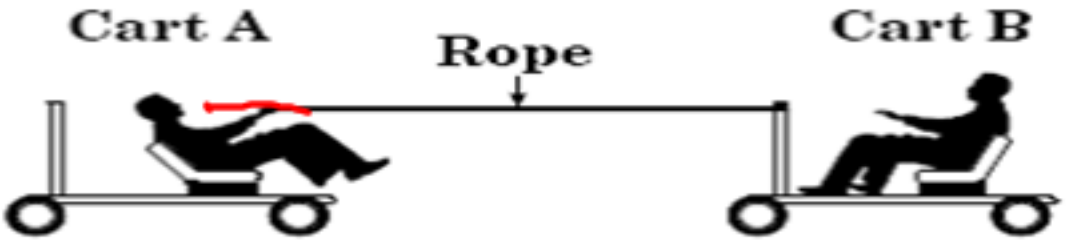
$m = ?$

$F = ma$

$\frac{F}{m} = a$

$\frac{100}{2}$

17. Carts A and B have the same mass. Both students have a mass of 80 kg.



If the student in cart A pulls the rope, what will result?

A Cart A will move toward a stationary Cart B.

B Cart B will move toward a stationary Cart A.

C Both carts will move toward each other.

D Cart B will move faster than Cart A.

18. A chair exerts a force of 20 N on a floor. What is the force that the floor exerts on the chair?

A 10 N

B 20 N

C 21 N

D 40 N

19. A student in a boat decided to go for a swim. He dove off the back of the boat, as shown in the diagram. The boat moved in the direction shown by the arrow.

Which statement ***best*** explains why the boat moved in the direction shown?

A A body in motion tends to remain in motion.

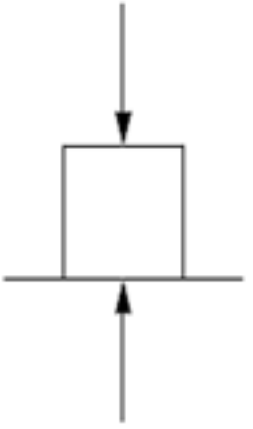
B The acceleration of a body is directly proportional to the force applied.

C For every action there is an equal and opposite reaction.

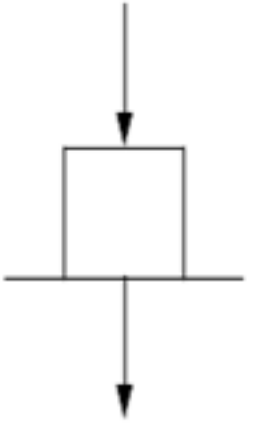
D Friction on the bottom of the boat was reduced because of the lake water.

20. Which diagram ***best*** shows forces acting on an object that is sitting at rest on a table?

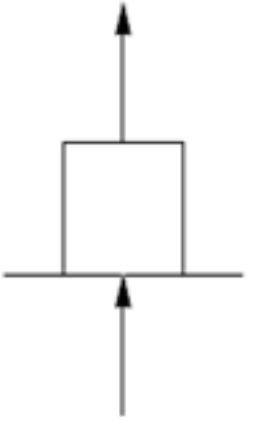
A



B



C



D