

1. A baseball pitcher throws a fastball at 42 meters per second. If the batter is 18 meters from the pitcher, approximately how much time does it take for the ball to reach the batter?

- (1) 1.9 s $V = \frac{d}{t}$ (3) 0.86 s
(2) 2.3 s $42 \frac{m}{s} = \frac{18m}{t}$ (4) 0.43 s

2. What is the average velocity of a car that travels 30. kilometers due west in 0.50 hour?

- (1) 15 km/hr $V = \frac{d}{t}$ (3) 15 km/hr west
(2) 60. km/hr $= \frac{30km}{.5h}$ (4) 60. km/hr west

3. A car moving at a speed of 8.0 meters per second enters a highway and accelerates at 3.0 meters per second². How fast will the car be moving after it has accelerated for 56 meters?

- (1) 24 m/s $V_f^2 = V_i^2 + 2ad$ (3) 18 m/s
(2) 20. m/s $V_f^2 = 8^2 + (2)(3)(56)$ (4) 4.0 m/s
 $V_f = \sqrt{400} = 20$

4. A cart moving across a level surface accelerates uniformly at 1.0 meter per second² for 2.0 seconds. What additional information is required to determine the distance traveled by the cart during this 2.0-second interval?

- (1) coefficient of friction between the cart and the surface
(2) mass of the cart
(3) net force acting on the cart & initial velocity of the cart
(4) initial velocity of the cart

5. Oil drips at 0.4-second intervals from a car that has an oil leak. Which pattern best represents the spacing of oil drops as the car accelerates uniformly from rest?

(1)

(2)

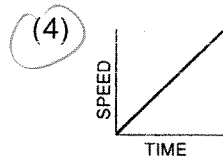
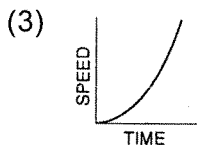
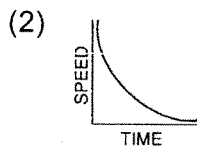
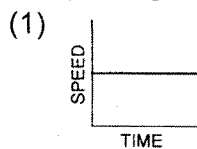
(3)

(4)

6. Acceleration is a vector quantity that represents the time-rate of change in

- (1) momentum (3) distance
(2) velocity (4) energy

7. Which graph best represents the motion of a freely falling body near the Earth's surface?



$\text{slope} = a = \frac{\Delta v}{t}$

8. A student drops an object from the top of a building which is 19.6 meters from the ground. How long does it take the object to fall to the ground?

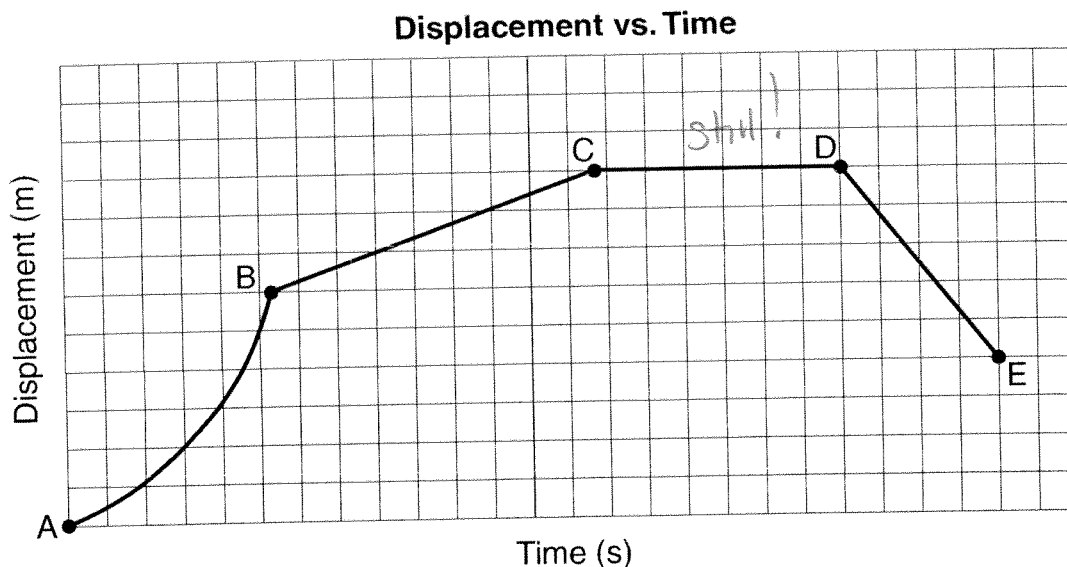
- (1) 19.6 seconds (3) 3.00 seconds
(2) 2.00 seconds (4) 4.00 seconds

$d = \frac{1}{2} at^2$

$-19.6m = (\frac{1}{2})(-9.8m/s^2)(t)^2$

$t = \sqrt{3.92} = 2s$

9. The displacement-time graph below represents the motion of a cart initially moving forward along a straight line.

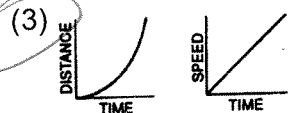
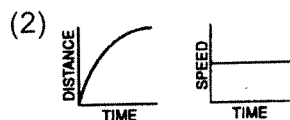
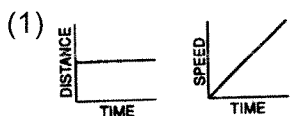


During which interval is the cart moving forward at constant speed?

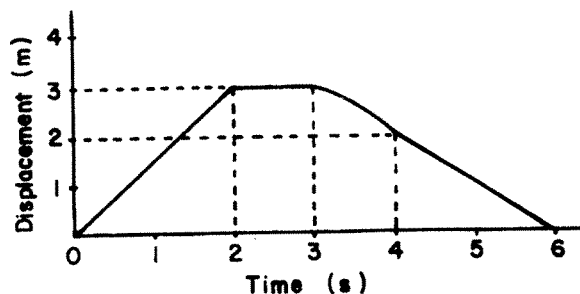
- (1) AB (2) BC (3) CD (4) DE

= slope is const

10. Which pair of graphs represent the same motion?



Base your answers to questions 11 through 15 on the graph below which represents the displacement of an object as a function of time.



11. How far is the object from the starting point at the end of 3 seconds?

- (1) 0 m (2) 2.0 m (3) 3.0 m (4) 9.0 m

read graph

12. What is the velocity of the object at $t = 1$ second?

- (1) 1.0 m/s (2) 2.0 m/s (3) 3.0 m/s (4) 1.5 m/s

slope = $\frac{3-0}{2-0}$

13. During which time interval is the object at rest?

- (1) 0-2 s (2) 2-3 s (3) 3-4 s (4) 4-6 s

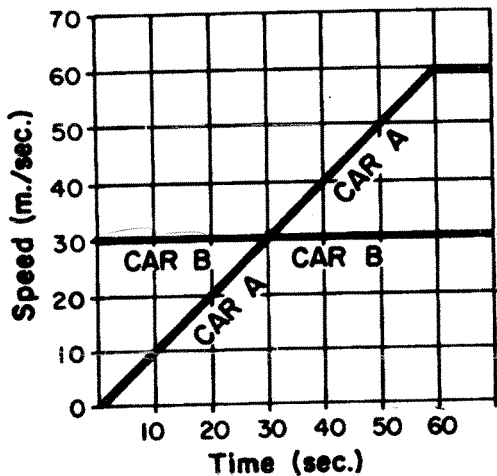
14. What is the average velocity of the object from $t = 0$ to $t = 3$ seconds?

- (1) 1.0 m/s $\bar{v} = \frac{d}{t}$ (3) 3.0 m/s
 (2) 2.0 m/s (4) 0 m/s

15. During which time interval is the object accelerating?

- (1) 0-2 s (3) 3-4 s *Neg a*
 (2) 2-3 s (4) 4-6 s

Base your answers to questions 16 through 19 on the graph below, which represents the motion of cars A and B on a straight track. Car B passes car A at the same instant that car A starts from rest at $t = 0$ seconds.



16. How far did car A travel in the interval between $t = 0$ and $t = 60$?

- (1) 30 m. $d = \text{area} = \frac{1}{2}(60)(60)$ (3) 1,800 m.
 (2) 360 m. (4) 3,600 m.

17. How long after $t = 0$ did it take car A to catch up to car B?

- (1) 10 sec. *equal areas.* (3) 30 sec.
 (2) 20 sec. *same d* (4) 60 sec.

18. During the time intervals given below, which car traveled the greatest distance?

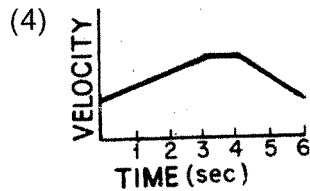
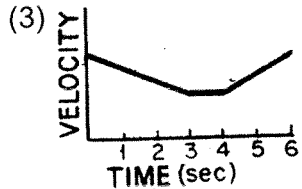
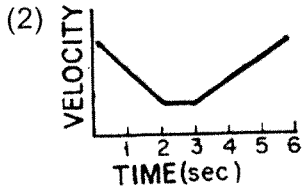
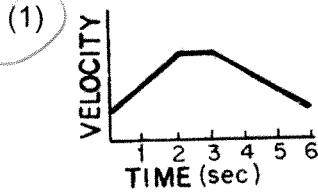
- (1) car A from $t = 0$ to $t = 30$
 (2) car A from $t = 30$ to $t = 60$ *area under v vs $t = d$*
 (3) car B from $t = 0$ to $t = 30$
 (4) car B from $t = 30$ to $t = 60$

19. Which distance-time graph best represents the motion of car B during the time interval between $t = 0$ and $t = 60$?

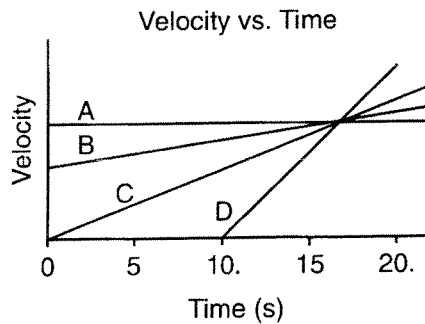
- (1) *Const slope = const speed.*
 (2)
 (3)
 (4)



20. Which graph best represents the relationship between velocity and time for an object which accelerates uniformly for 2 seconds, then moves at a constant velocity for 1 second, and finally decelerates for 3 seconds?



21. The diagram below represents the relationship between velocity and time of travel for four cars, A, B, C, and D, in straight-line motion.

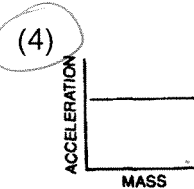
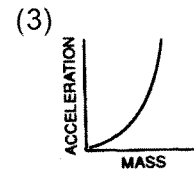
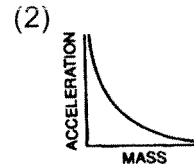
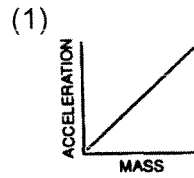


steepest slope

Which car has the greatest acceleration during the time interval 10. seconds to 15 seconds?

- (1) A (3) C
 (2) B (4) D

22. Which graph best represents the relationship between mass and acceleration due to gravity for objects near the surface of the Earth? [Neglect air resistance.]



$a = g = \text{Const. value!}$