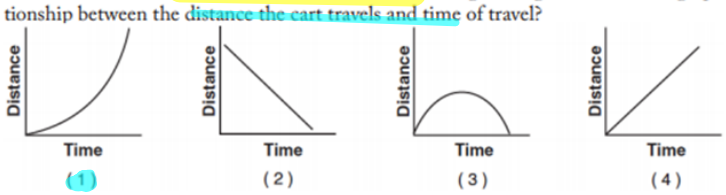
1. A cart travels with a constant nonzero acceleration along a straight line. Which graph best represents the relationship between the distance the cart travels and time of travel?

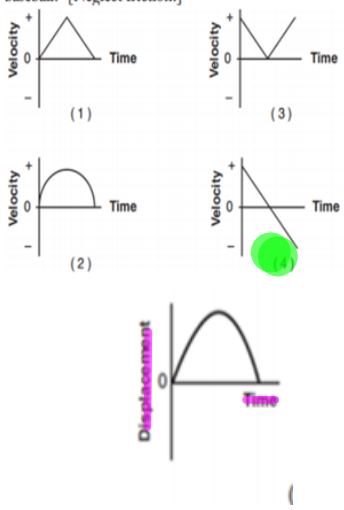


A car on a straight road starts from rest and accelerates at 1.0 meter per second² for 10 seconds. Then the car continues to travel at constant speed for an additional 20 seconds.

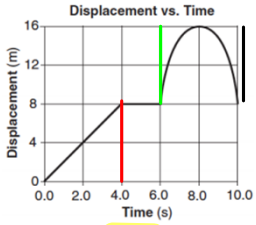
2. Determine the speed of the car at the end of the first 10 seconds.

Speed = at
Speed = (1 m/s^2)(10 s)
Speed = 10 m/s

3. A student throws a baseball vertically upward and then catches it. If vertically upward is considered to be the positive direction, which graph best represents the relationship between velocity and time for the baseball? [Neglect friction.]



4. The graph below represents the displacement of an object moving in a straight line as a function of time.

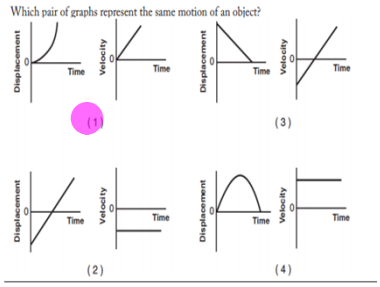


What was the total distance traveled by the object during the 10-second time interval?

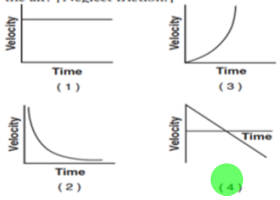
8 + 8 + 8 = 24 m (distance)

displacement = 8 m

5. Which pair of graphs represent the same motion of an object?

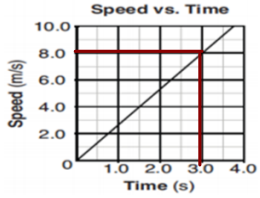


6. Which graph best represents the relationship between the velocity of an object thrown straight upward from Earth's surface and the time that elapses while it is in the air? [Neglect friction.]



oops, no question

7. The graph below shows the relationship between th speed and elapsed time for an object falling freely from rest near the surface of a planet.



What is the magnitude of the acceleration?

a = 8m/s / 3 s = 2.7 m/s^2

8. An observer recorded the following data for the motion of a car undergoing constant acceleration.

Time (s)	Speed (m/s)
3.0	4.0
5.0	7.0
6.0	8.5

2s → 3 m / s

1s → 1.5 m / s

What was the magnitude of the acceleration of the car?

$a = v / t$

$a = 3 \text{ m/s} / 2 \text{ s} = 1.5 \text{ m/s}^2$

$a = 1.5 \text{ m/s} / 1 \text{ s} = 1.5 \text{ m/s}^2$

$a = 4.5 \text{ m/s} / 3 \text{ s} = 1.5 \text{ m/s}^2$

$V = d / t$

$V_f = V_i + a\,t$

$V_f^2 = V_i^2 + 2\,a\,d$

$\bar{V} = (V_i + V_f)/2$

$d = V\,t$

$d = V_i\,t + 1/2\,a\,t^2$

$a = (V_f - V_i) / t$

9. A car traveling on a straight road at 15 meters per second accelerates uniformly to a speed of 21 meters per second in 12 seconds. The total distance traveled by the car in this 12-second time interval is

1. 36 m
2. 180 m
3. 216 m
4. 252 m

$a = v / t = 6 / 12 = .5$

$V_i = 15 \text{ m/s}$

$V_f = 21 \text{ m/s}$

$t = 12 \text{ s}$

$d = ?$

$d = V_i t + 1/2 a t^2$

$d = 15(12) + (.5)(.5)(12^2)$

$d = 216 \text{ m}$

10. A race car starting from rest accelerates uniformly at 4.9 m/s². What is the car's speed after it has traveled 200 meters?

1. 1960 m/s
2. 62.6 m/s
3. 44.3 m/s
4. 31.3 m/s

$V_i = 0 \text{ m/s}$

$a = 4.9 \text{ m/s}^2$

$d = 200 \text{ m}$

$V_f = ?$

$V = d / t$

$V_f = V_i + a\,t$

$V_f^2 = V_i^2 + 2\,a\,d$

$\bar{V} = (V_i + V_f)/2$

$d = V\,t$

$d = V_i\,t + 1/2\,a\,t^2$

$a = (V_f - V_i) / t$

$V_f^2 = V_i^2 + 2ad$

$V_f^2 = 0 + 2\,(4.9 \text{ m/s}^2)(200 \text{ m})$

$V_f^2 = 1960 = \sqrt{1960} = 44.27 \text{ m/s}$

11. A car initially traveling at a speed of 16 meters per second accelerates uniformly to a speed of 20 meters per second over a distance of 36 meters. What is the magnitude of the car's acceleration?

$V_i = 16 \text{ m/s}$

$V_f = 20 \text{ m/s}$

$d = 36 \text{ m}$

$a = ?$

$V_f^2 = V_i^2 + 2\,a\,d$

$V_f^2 - V_i^2 = 2ad$

$a = V_f^2 - V_i^2 / 2d$

$a = (20)^2 - (16)^2 / 2(36)$

$a = 400 - 256 / 72$

$a = 2 \text{ m/s/s}$

12. A ball is thrown straight downward with a speed of 0.50 meter per second from a height of 4.0 meters. What is the speed of the ball 0.70 second after it is released? [Neglect friction.]

1. 0.50 m/s
2. 7.4 m/s
3. 9.8 m/s
4. 15 m/s

$V_i = 0.5$ m/s

$a = \sim 10$ m/s/s

$t = 0.7$ s

$V_f =$

$a = g = \sim 10$ m/s/s

$V_f = V_i + a\,t$

$V_f = .5$ m/s + (10 m/s/s)(0.7 s)

$V_f = 7.5$ m/s

$V = d / t$

$V_f = V_i + a\,t$

$V_f^2 = V_i^2 + 2\,a\,d$

$\bar{V} = (V_i + V_f)/2$

$d = V\,t$

$d = Vi\,t + 1/2\,a\,t2$

$a = (V_f - V_i) / t$

13. How far will a brick starting from rest fall freely in 3.0 seconds?

$V_i = 0$ m/s

$a = \sim 10$ m/s/s

$t = 3$ s

$d =$

$a = g = \sim 10$ m/s/s

$d = V_i t + 1/2 a t^2$

$d = 0 + .5(10)(3^2)$

$d = 45$ m

14. A baseball dropped from the roof of a tall building takes 3.1 seconds to hit the ground. How tall is the building? [Neglect friction.]

1. 15 m
2. 30 m
3. 47 m
4. 94 m

$V_i = 0$m/s

$a = \sim 10$ m/s/s

$t = 3.1$ s

$d =$

$a = g = \sim 10$ m/s/s

$d = V_i t + 1/2 a t^2$

$d = 0 + .5(10)(3.1^2)$

$d = 48.05$ m

$V = d / t$

$V_f = V_i + a\,t$

$V_f^2 = V_i^2 + 2\,a\,d$

$\bar{V} = (V_i + V_f)/2$

$d = V\,t$

$d = Vi\,t + 1/2\,a\,t2$

$a = (V_f - V_i) / t$

15. A 1.0-kilogram ball is dropped from the roof of a building 40 meters tall. What is the approximate time of fall? [Neglect air resistance.]

1. 2.9 s
2. 2.0 s
3. 4.1 s
4. 8.2 s

$V_i = 0$m/s

$a = \sim 10$ m/s/s

$d = 40$ m

$t =$

$a = g = \sim 10$ m/s/s

$d = V_i\,t + 1/2\,a\,t^2$

$40 = 0 + .5\,(10)t^2$

$t^2 = 40 / 5 = 8$

$\sqrt{t^2} = \sqrt{8} = 2.8$ s

16. A rock falls from rest off a high cliff. How far has the rock fallen when its speed is 39.2 meters per second? [Neglect friction.]
1. 19.6 m
2. 44.1 m
3. 78.3 m
4. 123 m

V_i = 0m/s

a = ~10 m/s/s

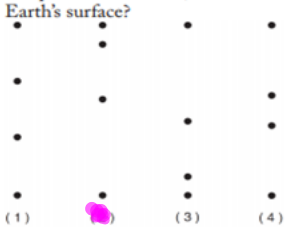
V_f = 39.2 m/s

d =

a = g = ~10 m/s/s

$V_f^2 = V_i^2 + 2ad$
$V_f^2 - V_i^2 = 2ad$
$d = V_f^2 - V_i^2 / 2a$
$d = 1536.64 / 20$
$d = 76.83$ m

17. Which diagram best represents the position of a ball, at equal time intervals, as it falls freely from rest near Earth's surface?



$V = d / t$

$V_f = V_i + a\ t$

$V_f^2 = V_i^2 + 2\ a\ d$

$\overline{V} = (V_i + V_f)/2$

$d = V\ t$

$d = Vi\ t + 1/2\ a\ t2$

$a = (V_f - V_i) / t$