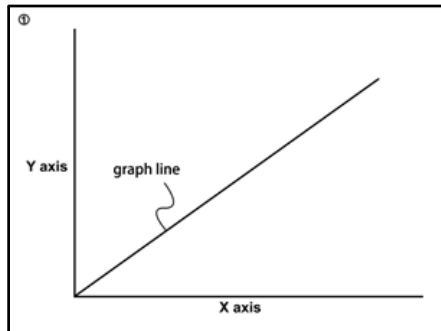
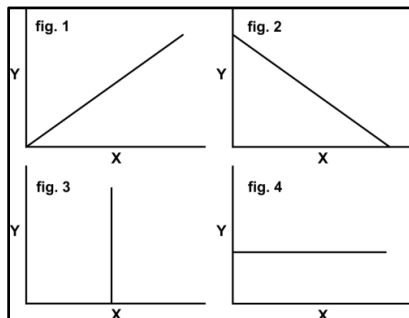


1. In a graph where the X axis is horizontal and the Y axis is vertical, what is the slope of the graph line?



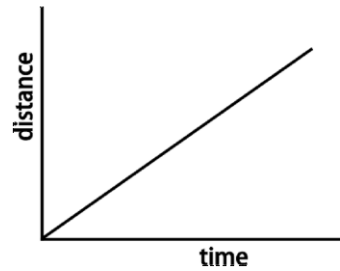
- (A)  $\frac{X}{Y}$
- (B) (X)(Y)
- (C)  $\frac{Y}{X}$
- (D)  $\frac{XY}{X}$
- (E)  $\frac{XY}{Y}$

2. Which figure represents an inverse relationship between X and Y?



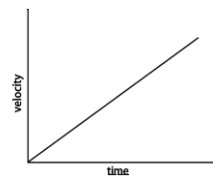
- (A) Figure 1
- (B) Figure 2
- (C) Figure 3
- (D) Figure 4

3. In a graph where time is measured along the X axis and distance along the Y axis, what is velocity?



- (A) distance along the X axis
- (B) area under the graph line
- (C) (X)(Y)
- (D)  $\frac{X}{Y}$
- (E)  $\frac{Y}{X}$

4. In a graph where time is measured along the x axis and velocity along the y axis, what is distance?

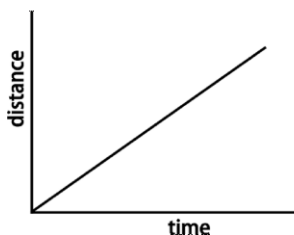


- (A) distance along the X axis
- (B) distance along the Y axis
- (C) area under the graph line
- (D)  $\frac{X}{Y}$
- (E)  $\frac{Y}{X}$

5. In a graph where time is measured along the X axis and velocity along the Y axis, what is acceleration?

- (A) distance along the X axis
- (B) distance along the Y axis
- (C) (X)(Y)
- (D)  $\frac{X}{Y}$
- (E)  $\frac{Y}{X}$

6. In a graph where time is measured along the X axis and distance along the Y axis, the area under the graph line indicates:



- (A) total distance
- (B) velocity
- (C) acceleration
- (D) distance per unit time
- (E) no real meaning

7. What is 30 miles per hour per minute a measure of?

- (A) acceleration
- (B) velocity
- (C) velocity change per unit time
- (D) acceleration change per unit time
- (E) A and C

8. Converting units is done by multiplying by “1.” Which of the following fractions equals one?

- (A)  $\frac{2.56 \text{ inches}}{\text{cm}}$
- (B)  $\frac{1000 \text{ km}}{\text{m}}$
- (C)  $\frac{1 \text{ cm}}{\text{ml}}$
- (D)  $\frac{3600 \text{ sec}}{\text{hr}}$
- (E)  $\frac{103 \text{ m}}{\text{mm}}$
- (F)  $\frac{1\text{mm}^3}{\text{ml}}$

9. A car traveling  $10 \frac{\text{km}}{\text{hr}}$  speeds up to  $20 \frac{\text{km}}{\text{hr}}$  over 1 hour. How far does the car travel in that 1 hour?

- (A) 5 km
- (B) 10 km
- (C) 15 km
- (D) 20 km
- (E) 25 km

10. A car traveling  $15 \frac{\text{km}}{\text{hr}}$  speeds up to  $26 \frac{\text{km}}{\text{hr}}$  over 25 seconds. What is its speed after 16 seconds?

- (A)  $18 \frac{\text{km}}{\text{hr}}$
- (B)  $19 \frac{\text{km}}{\text{hr}}$
- (C)  $20 \frac{\text{km}}{\text{hr}}$
- (D)  $21 \frac{\text{km}}{\text{hr}}$
- (E)  $22 \frac{\text{km}}{\text{hr}}$

11. A car starts out from a stop sign and accelerates at a rate of  $10 \frac{km}{hr^2}$ . What is its velocity after 1 minute?

- (A)  $1 \frac{km}{hr}$
- (B)  $0.1 \frac{km}{hr}$
- (C)  $0.6 \frac{km}{hr}$
- (D)  $1/6 \frac{km}{hr}$
- (E)  $1/60 \frac{km}{hr}$

12. A car starts out from a stop sign and accelerates at  $20 \frac{km}{hr}$  per min. How long does it take for the car to go 6 km?

- (A) 3 min
- (B) 6 min
- (C) 9 min
- (D) 12 min
- (E) 16 min

13. A car accelerates from a stop and reaches  $15 \frac{m}{sec}$  at 3 seconds, and  $30 \frac{m}{sec}$  at 6 seconds. How far does the car travel during the 3 second to 6 second interval?

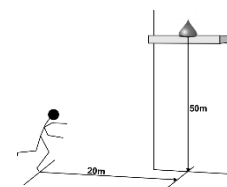
- (A) 45.0 meters
- (B) 50.0 meters

- (C) 55.0 meters
- (D) 60.5 meters
- (E) 67.5 meters

14. If the acceleration of gravity is  $9.8 \text{ meters/sec}^2$ , and you toss a ball upward at a velocity of 19.6 meters/sec, how high will the ball travel above your hand?

- (A) 4.9 m
- (B) 9.8 m
- (C) 19.6 m
- (D) 29.4 m
- (E) 39.2 m

15. How fast does a person have to run to catch a package dropped off a balcony 50 meters high if the person starts out 20 meters away? Give the answer in meters/second and kilometers/hour.



- (A)  $4.3 \frac{m}{sec}$ ,  $15.5 \frac{km}{hr}$
- (B)  $4.8 \frac{m}{sec}$ ,  $17.8 \frac{km}{hr}$
- (C)  $5.3 \frac{m}{sec}$ ,  $19.1 \frac{km}{hr}$
- (D)  $5.8 \frac{m}{sec}$ ,  $20.9 \frac{km}{hr}$
- (E)  $6.3 \frac{m}{sec}$ ,  $22.7 \frac{km}{hr}$

16. A stone is shot straight upward from the ground at a velocity of 73.5 meters/second. How long does it take to reach its peak? How high does the stone reach? In its upward ascent, how long does it take to reach 136 meters above the ground?

	Time to Peak	Peak Distance	Peak Time to 136 meters
(A)	7.0 seconds	250.5 meters	3.5 seconds
(B)	7.4 seconds	265.6 meters	3.6 seconds
(C)	7.8 seconds	270.6 meters	3.5 seconds
(D)	7.5 seconds	275.6 meters	3.7 seconds
(E)	7.3 seconds	266.5 meters	3.4 seconds

17. A car traveling at 60 miles per hour tries to stop and avoid hitting a wall 85 meters away. The car is able to decelerate at 10 miles per hour per second. How close was the car to the wall when it finally came to a halt? (1 mile = 1.6 kilometers)

- (A) car crashes into wall
- (B) 1 meter
- (C) 5 meters
- (D) 7.5 meters
- (E) 10 meters

18. How long does a marble dropped from a building 1472 feet high take to reach the ground? What is its velocity at impact with the ground?

	Time to Reach Ground	Velocity at Impact
(A)	9.2 seconds	255 $\frac{\text{feet}}{\text{sec}}$
(B)	9.6 seconds	307 $\frac{\text{feet}}{\text{sec}}$
(C)	10.4 seconds	298 $\frac{\text{feet}}{\text{sec}}$
(D)	10.8 seconds	322 $\frac{\text{feet}}{\text{sec}}$
(E)	11.1 seconds	314 $\frac{\text{feet}}{\text{sec}}$

19. A rock is dropped off a 1960 meter cliff. 4 seconds later another rock is thrown downward from the cliff. How fast must the second rock be thrown in order to reach the ground at the same times as the first rock?

- (A) 40.1  $\frac{m}{sec}$
- (B) 41.1  $\frac{m}{sec}$
- (C) 42.1  $\frac{m}{sec}$
- (D) 43.1  $\frac{m}{sec}$
- (E) 44.1  $\frac{m}{sec}$