1. A truck, initially traveling at a speed of 22 meters per second, increases speed at a constant rate of 2.4 meters per second ^{2} for 3.2 seconds. What is the total distance traveled by the truck during this 3.2-second time interval?

A) 12 m B) 58 m
C) 70. m **D) 83 m**

2. A car traveling on a straight road at 15.0 meters per second accelerates uniformly to a speed of 21.0 meters per second in 12.0 seconds. The total distance traveled by the car in this 12.0-second time interval is

A) 36.0 m B) 180. m
C) 216 m D) 252 m

3. A baseball player runs 27.4 meters from the batter's box to first base, overruns first base by 3.0 meters, and then returns to first base. Compared to the total distance traveled by the player, the magnitude of the player's total displacement from the batter's box is

A) 3.0 m shorter **B) 6.0 m shorter**
C) 3.0 m longer D) 6.0 m longer

4. A group of bike riders took a 4.0-hour trip. During the first 3.0 hours, they traveled a total of 50. kilometers, but during the last hour they traveled only 10. kilometers. What was the group's average speed for the entire trip?

A) 15 km/hr B) 30. km/hr
C) 40. km/hr D) 60. km/hr

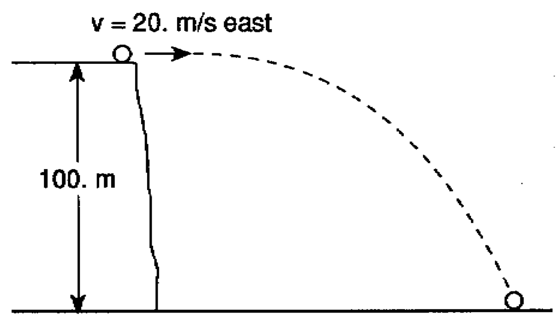
5. An object starts from rest and accelerates uniformly down an incline. If the object reaches a speed of 40 meters per second in 5 seconds, its average speed is

A) 8 m/sec B) 10 m/sec
C) 20 m/sec D) 30 m/sec

6. A rock is dropped from a bridge. What happens to the magnitude of the acceleration and the speed of the rock as it falls? [Neglect friction.]

A) Both acceleration and speed increase.
B) Both acceleration and speed remain the same.
C) Acceleration increases and speed decreases.
D) Acceleration remains the same and speed increases.

7. Base your answer to the following question on the diagram below which shows a ball projected horizontally with an initial velocity of 20. meters per second east, off a cliff 100. meters high. [Neglect air resistance.]



How many seconds does the ball take to reach the ground?

A) 4.5 s B) 20. s C) 9.8 s D) 2.0 s

8. 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.]

A) 15 m B) 30. m
C) 47 m D) 94 m

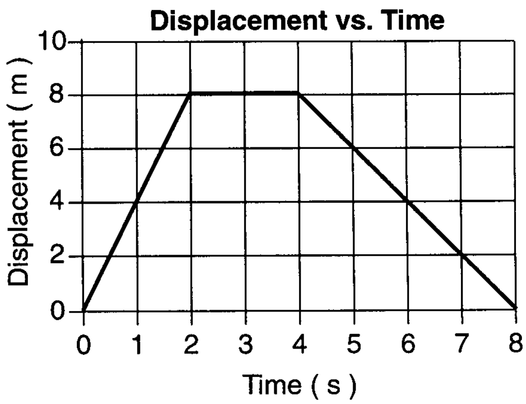
9. A softball is thrown straight up, reaching a maximum height of 20 meters. Neglecting air resistance, what is the ball's approximate vertical speed when it hits the ground?

A) 10 m/sec **B) 20 m/sec**
C) 15 m/sec D) 40 m/sec

10. A rock falls freely from rest near the surface of a planet where the acceleration due to gravity is 4.0 meters per second^{2}. What is the speed of this rock after it falls 32 meters?

A) 8.0 m/s **B) 16 m/s**
C) 25 m/s D) 32 m/s

Base your answers to questions **11** and **12** on the graph below, which represents the relationship between the displacement of an object and its time of travel along a straight line.



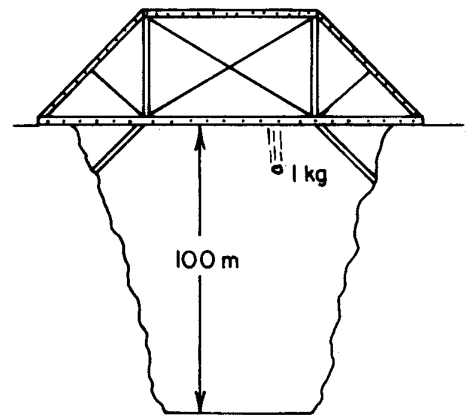
11. What is the magnitude of the object's total displacement after 8.0 seconds?

A) 0 m B) 2 m
C) 8 m D) 16 m

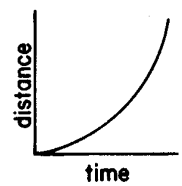
12. What is the average speed of the object during the first 4.0 seconds?

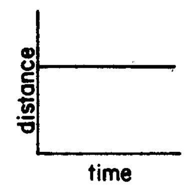
A) 0 m/s **B) 2 m/s**
C) 8 m/s D) 4 m/s

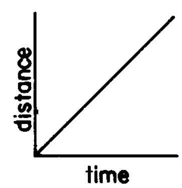
13. Base your answer to the following question on the diagram below which shows a 1-kilogram stone being dropped from rest from a bridge 100 meters above a gorge.

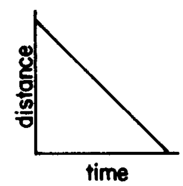


Which graph of distance traveled versus time represents the motion of the freely falling stone?

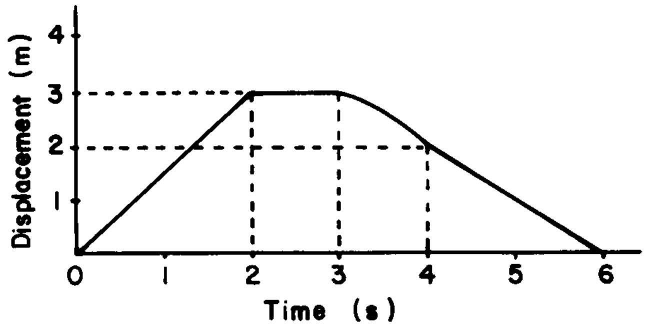
A)


B)


C)


D)


Base your answers to questions **14** through **18** on
the graph below which represents the displacement of an object as a function of time.



14. During which time interval is the object accelerating?

A) 0-2 s B) 2-3 s **C) 3-4 s** D) 4-6 s

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

A) 1.0 m/s B) 2.0 m/s C) 3.0 m/s D) 0 m/s

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

A) 0-2 s **B) 2-3 s** C) 3-4 s D) 4-6 s

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

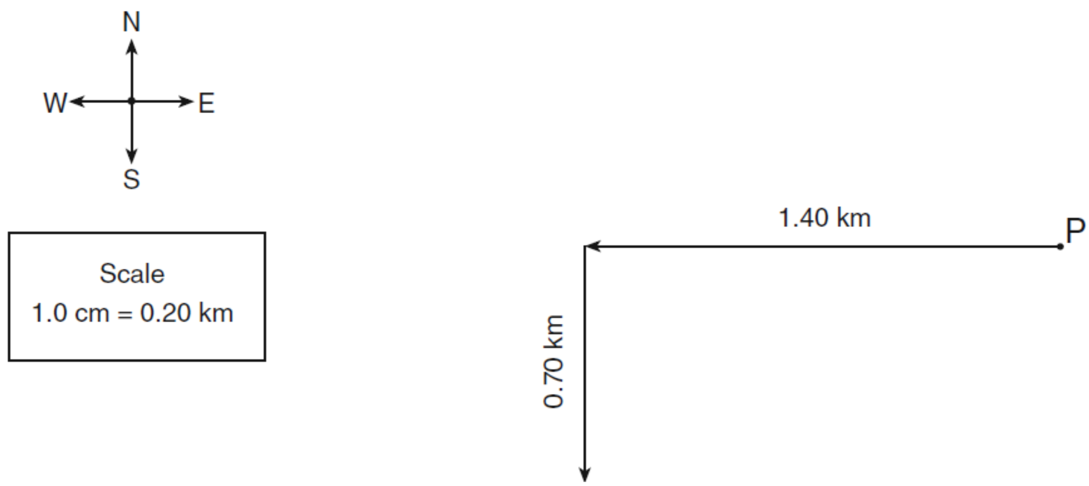
A) 1.0 m/s B) 2.0 m/s C) 3.0 m/s **D) 1.5 m/s**

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

A) 0 m B) 2.0 m **C) 3.0 m** D) 9.0 m

Base your answers to questions **19** through **21** on the information below.

A girl rides her bicycle 1.40 kilometers west, 0.70 kilometer south, and 0.30 kilometer east in 12 minutes. The vector diagram below represents the girl's fist two displacements in sequence from point *P*. The scale used in the diagram is 1.0 centimeter = 0.20 kilometer.



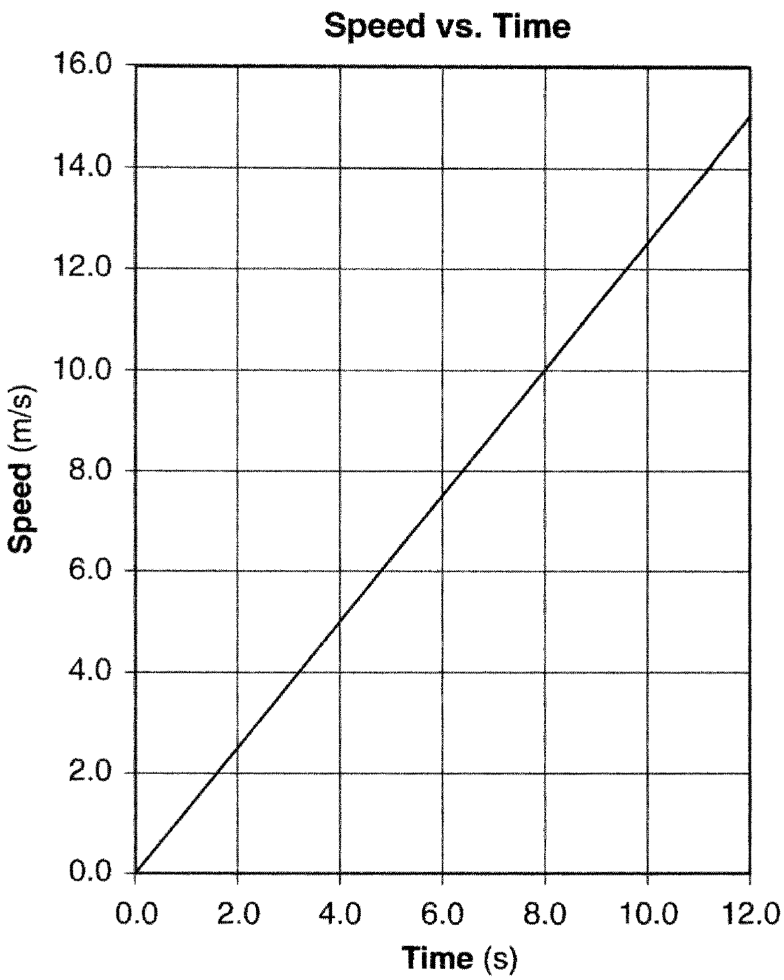
19. Determine the measure of the angle, in degrees, between the resultant and the 1.40-kilometer displacement vector.

20. Determine the magnitude of the girl's resultant displacement for the entire bicycle trip, in kilometers.

21. Calculate the girl's average speed for the entire bicycle trip. [Show all work, including the equation and substitution with units.]

Base your answers to questions **22** and **23** on the information and graph below.

The graph below shows the relationship between speed and elapsed time for a car moving in a straight line.

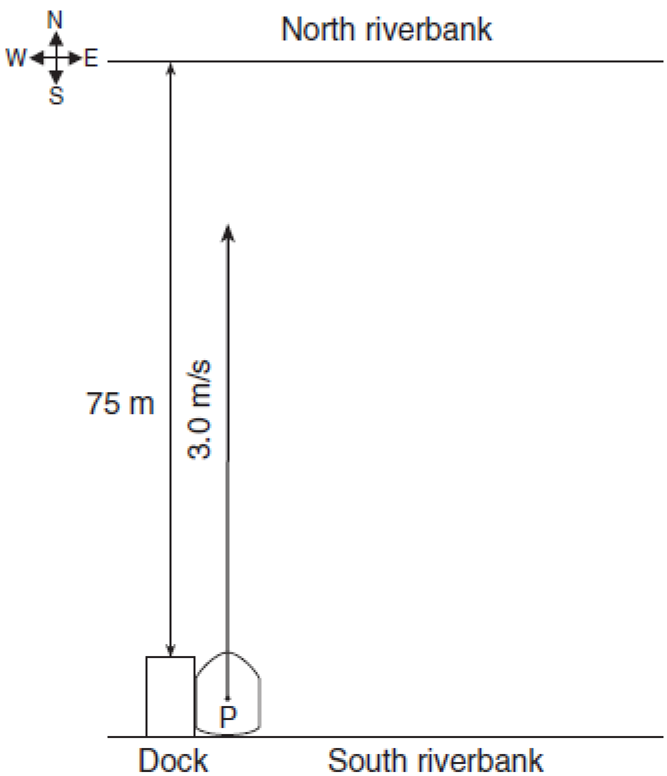


22. Calculate the total distance the car traveled during the time interval 4.0 seconds to 8.0 seconds. [Show all work, including the equation and substitution with units.]

23. Determine the magnitude of the acceleration of the car.

Base your answers to questions **24** and **25** on the information below.

A river has a current flowing with a velocity of 2.0 meters per second due east. A boat is 75 meters from the north riverbank. It travels at 3.0 meters per second relative to the river and is headed due north. In the diagram below, the vector starting at point *P* represents the velocity of the boat relative to the river water.



24. Calculate *or* find graphically the magnitude of the resultant velocity of the boat. [Show all work, including the equation and substitution with units *or* construct the resultant velocity vector for the graph, using a scale of 1.0 centimeter = 0.50 meter per second. The value of the magnitude must be written below]

25. Calculate the time required for the boat to cross the river. [Show all work, including the equation and substitution with units.]

26. A person walks 150. meters due east and then walks 30. meters due west. The entire trip takes the person 10. minutes. Determine the magnitude and the direction of the person's total displacement.

Base your answers to questions **27** and **28** on the information below.

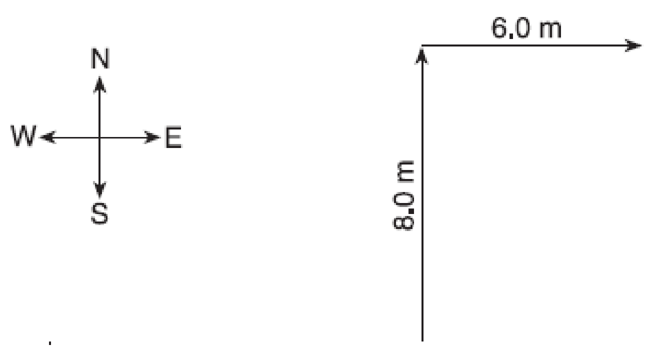
A kicked soccer ball has an initial velocity of 25 meters per second at an angle of 40º above the horizontal, level ground. [Neglect friction.]

27. Calculate the maximum height the ball reaches above its initial position. [Show all work, including the equation and substitution with units.]

28. Calculate the magnitude of the vertical component of the ball's initial velocity [Show all work, including the equation and substitution with units.]

29. Base your answer to the following question on the information and vector diagram below.

A dog walks 8.0 meters due north and then 6.0 meters due east.



Determine the magnitude of the dog's total displacement.

30. Base your answer to the following question on the information below.

A 747 jet, traveling at a velocity of 70. meters per second north, touches down on a runway. The jet slows to rest at the rate of 2.0 meters per second^2.

Calculate the total distance the jet travels on the runway as it is brought to rest. [Show all work, including the equation and substitution with units.]

Answer Key
Quarter 1 - Review

1. **D**
2. **C**
3. **B**
4. **A**
5. **C**
6. **D**
7. **A**
8. **C**
9. **B**
10. **B**
11. **A**
12. **B**
13. **A**
14. **C**
15. **A**
16. **B**
17. **D**
18. **C**
19. 32º ± 2º
20. 1.3 km ± 0.2 km
21. v = 0.20 km/min *or* v = 3.3 m/s
22. d = 30. m
23. 1.25 m/s^2 ± 0.05 m/s^2
24. c = 3.6 m/s *or* hypotenuse = 3.6 m/s *or* R = 3.6 m/s
25. t = 25 s
26. a magnitude of 120m in a direction of east
27. 13 m
28. 16 m/s
29. 10 m ± 0.4 m
30. $v_f^2 = v_i^2 + 2ad$

$$d = \frac{v_f^2 - v_i^2}{2a}$$

$$d = \frac{(0\text{ m/s})^2 - (70.\text{ m/s})^2}{2(-2.0\text{ m/s}^2)}$$

$$d = 1200\text{ m}$$