

## PreAP Physics Summer 2017 Assignment

Go to the following website for The Physics Classroom:

<http://www.physicsclassroom.com/class>.

Read through the following tutorial on the website: **1-D Kinematics**. You are encouraged to take notes as you answer the questions and read through the tutorials. Be sure to read all the lessons for each tutorial.

After you have reviewed the material, answer the following questions.

Questions with stars must have calculations included for credit.

You will then use this paper to take a pretest during the first week of school.

### One-Dimensional Kinematics Review

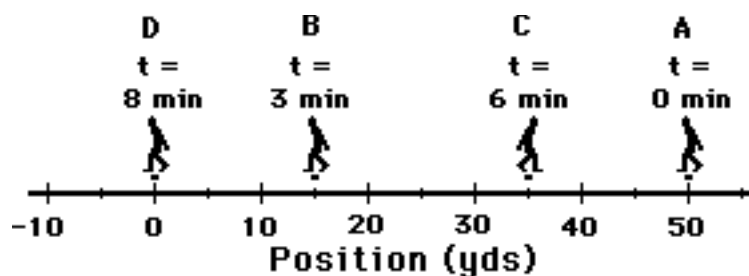
#### Part A: Multiple TRUE/FALSE

1. Which of the following statements about vectors and scalars are TRUE? Circle all that apply.

- A. A vector is a large quantity and a scalar is a small quantity.
- B. A scalar quantity has a magnitude and a vector quantity does not.
- C. A vector quantity is described with a direction and a scalar is not.
- D. Scalar quantities are path dependent quantities and vector quantities are not.
- E. A scalar quantity depends only upon the initial and final values of the quantity; this is not the case for vector quantities.
- F. The quantity 20 m/s, north is a speed and as such is a scalar quantity.
- G. The quantity 9.8 m/s/s is an acceleration value and as such is a vector quantity.

2. Which of the following statements about distance and/or displacement are TRUE? Circle all that apply.

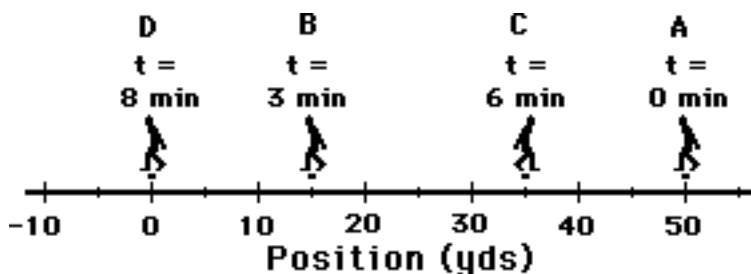
- A. Distance is a vector quantity and displacement is a scalar quantity.
- B. A person makes a round-trip journey, finishing where she started. The displacement for the trip is 0 and the distance is some nonzero value.
- C. A person starts at position A and finishes at position B. The distance for the trip is the length of the segment measured from A to B.
- D. If a person walks in a straight line and never changes direction, then the distance and the displacement will have exactly the same magnitude.
- E. The phrase "20 mi, northwest" likely describes the distance for a motion.
- F. The phrase "20 m, west" likely describes the displacement for a motion.
- G. The diagram below depicts the path of a person walking to and fro from position A to B to C to D. The distance for this motion is 100 yds.
- H. For the same diagram below, the displacement is 50 yds.



3. Which of the following statements about velocity and/or speed are TRUE? Circle all that apply.

- A. Velocity is a vector quantity and speed is a scalar quantity.

- B. Both speed and velocity refer to how fast an object is moving.
- C. Person X moves from location A to location B in 5 seconds. Person Y moves between the same two locations in 10 seconds. Person Y is moving with twice the speed as person X.
- D. The velocity of an object refers to the rate at which the object's position changes.
- E. For any given motion, it is possible that an object could move very fast yet have an abnormally small velocity.
- F. The phrase "30 mi/hr, west" likely refers to a scalar quantity.
- G. The average velocity of an object on a round-trip journey would be 0.
- H. The direction of the velocity vector is dependent upon two factors: the direction the object is moving and whether the object is speeding up or slowing down.
- I. The diagram below depicts the path of a person walking to and fro from position A to B to C to D. The entire motion takes 8 minutes. The average speed for this motion is approximately 11.3 yds/min.
- J. For the same diagram below, the average velocity for this motion is 0 yds/min.



4. Which of the following statements about acceleration are TRUE? Circle all that apply.

- A. Acceleration is a vector quantity.
- B. Accelerating objects MUST be changing their speed.
- C. Accelerating objects MUST be changing their velocity.
- D. Acceleration units include the following; m/s<sup>2</sup>, mi/hr/sec, cm/s<sup>2</sup>, km/hr/m.
- E. The direction of the acceleration vector is dependent upon two factors: the direction the object is moving and whether the object is speeding up or slowing down.
- F. An object which is slowing down has an acceleration.
- G. An object which is moving at constant speed in a circle has an acceleration.
- H. Acceleration is the rate at which the velocity changes.
- I. An object that is accelerating is moving fast.
- J. An object that is accelerating will eventually (if given enough time) be moving fast.
- K. An object that is moving rightward has a rightward acceleration.
- L. An object that is moving rightward and speeding up has a rightward acceleration.
- M. An object that is moving upwards and slowing down has an upwards acceleration.

5. Which of the following statements about position-time graphs are TRUE? Circle all that apply.

- A. Position-time graphs cannot be used to represent the motion of objects with accelerated motion.
- B. The slope on a position-time graph is representative of the acceleration of the object.
- C. A straight, diagonal line on a position-time graph is representative of an object with a constant velocity.
- D. If an object is at rest, then the position-time graph will be a horizontal line located on the time-axis.
- E. Accelerated objects are represented on position-time graphs by curved lines.
- F. An object with a positive velocity will be represented on a position-time graph by a line with a positive slope.
- G. An object with a negative velocity will be represented on a position-time graph by a line with a negative slope.
- H. An object with a positive acceleration will be represented on a position-time graph by a line which curves upwards.
- I. An object with a negative acceleration will be represented on a position-time graph by a line which curves downwards.

6. Which of the following statements about velocity-time graphs are TRUE? Circle all that apply.

- A. The slope on a velocity-time graph is representative of the acceleration of the object.
- B. The area on a velocity-time graph is representative of the change in position of the object.

- C. An accelerated object's motion will be represented by a curved line on a velocity-time graph.
- D. Objects with positive acceleration will be represented by upwardly-curved lines on a velocity-time graph.
- E. If an object is at rest, then the velocity-time graph will be a line with zero slope.
- F. A line with zero slope on a velocity-time graph will be representative of an object which is at rest.
- G. A line with a negative slope on a velocity-time graph is representative of an object with negative velocity.
- H. If an object changes its direction, then the line on the velocity-time graph will have a changing slope.
- I. An object which is slowing down is represented by a line on a velocity-time graph which is moving in the downward direction.

7. Which of the following statements about free fall and the acceleration of gravity are TRUE? Circle all that apply.

- A. An object that is free-falling is acted upon by the force of gravity alone.
- B. A falling skydiver which has reached terminal velocity is considered to be in a *state of free fall*.
- C. A ball is thrown upwards and is rising towards its peak. As it rises upwards, it is NOT considered to be in a *state of free fall*.
- D. An object in free fall experiences an acceleration which is independent of the mass of the object.
- E. A ball is thrown upwards, rises to its peak and eventually falls back to the original height. As the ball rises, its acceleration is upwards; as it falls, its acceleration is downwards.
- F. A ball is thrown upwards, rises to its peak and eventually falls back to the original height. The speed at which it is launched equals the speed at which it *lands*. (Assume negligible air resistance.)
- G. A very massive object will free fall at the same rate of acceleration as a less massive object.
- H. The value of **g** on Earth is approximately 9.8 m/s<sup>2</sup>.
- I. The symbol **g** stands for the force of gravity.

### Part B: Multiple Choice

8. If an object has an acceleration of 0 m/s<sup>2</sup>, then one can be sure that the object is not \_\_\_\_.

- a. moving                      b. changing position                      c. changing velocity

9. If car A passes car B, then car A must be \_\_\_\_.

- A. accelerating.
- B. accelerating at a greater rate than car B.
- C. moving faster than car B and accelerating more than car B.
- D. moving faster than car B, but not necessarily accelerating.

10. Which one of the following is NOT consistent with a car which is accelerating?

- A. A car is moving with an increasing speed.
- B. A car is moving with a decreasing speed.
- C. A car is moving with a high speed.
- D. A car is changing direction.

11. A fullback is running down the football field in a straight line. He starts at the 0-yard line at 0 seconds. At 1 second, he is on the 10-yard line; at 2 seconds, he is on the 20-yard line; at 3 seconds, he is on the 30-yard line; and at 4 seconds, he is on the 40-yard line. This is evidence that

- A. he is accelerating
- B. he is covering a greater distance in each consecutive second.
- C. he is moving with a constant speed (on average).

12. A fullback is running down the football field in a straight line. He starts at the 0-yard line at 0 seconds. At 1 second, he is on the 10-yard line; at 2 seconds, he is on the 20-yard line; at 3 seconds, he is on the 30-yard line; and at 4 seconds, he is on the 40-yard line. What is the player's acceleration?

13. Olympic gold medalist Michael Johnson runs one time around the track - 400 meters - in 38 seconds. What is his displacement? \_\_\_\_\_ What is his average velocity? \_\_\_\_\_

14. If an object is moving eastward and slowing down, then the direction of its velocity vector is \_\_\_\_.

- a. eastward      b. westward      c. neither      d. not enough info to tell

15. If an object is moving eastward and slowing down, then the direction of its acceleration vector is \_\_\_\_.

- a. eastward      b. westward      c. neither      d. not enough info to tell

16. Which one of the following quantities is NOT a vector?

- a. 10 mi/hr, east      b. 10 mi/hr/sec, west      c. 35 m/s, north      d. 20 m/s

17. Which one of the following quantities is NOT a speed?

- a. 10 mi/hr      b. 10 mi/hr/sec      c. 35 m/s      d. 20 m/s

18. Which one of the following statements is NOT true of a free-falling object? An object in a state of free fall \_\_\_\_.

- A. falls with a constant speed of -10 m/s.
- B. falls with an acceleration of -10 m/s/s.
- C. falls under the sole influence of gravity.
- D. falls with downward acceleration which has a constant magnitude.

19. \*The average speed of an object which moves 10 kilometers (km) in 30 minutes is \_\_\_\_.

- a. 10 km/hr      b. 20 km/hr      c. 30 km/hr      d. more than 30 km/hr

20. \*What is the acceleration of a car that maintains a constant velocity of 55 mi/hr for 10.0 seconds?

- a. 0      b. 5.5 mi /hr/s      c. 5.5 mi /s/s      d. 550 mi/hr/s

21. As an object freely falls, its \_\_\_\_.

- a. speed increases      b. acceleration increases  
c. both of these      d. none of these

22. A speedometer is placed upon a free-falling object in order to measure its instantaneous speed during the course of its fall. Its speed reading (neglecting air resistance) would increase each second by \_\_\_\_.

- a. about 5 m/s                      b. about 10 m/s                      c. about 15 m/s  
 d. a variable amount              e. depends on its initial speed.

23. \*Ten seconds after being dropped from rest, a free-falling object will be moving with a speed of \_\_\_\_.

- a. about 10 m/s.      b. about 50 m/s.      c. about 100 m/s.      d. more than 100 m/s.

24. \*A baseball pitcher delivers a fast ball. During the throw, the speed of the ball increases from 0 to 30.0 m/s over a time of 0.100 seconds. The average acceleration of the baseball is \_\_\_\_ m/s<sup>2</sup>.

- a. 3.00      b. 30.0      c. 300.      d. 3000      e. none of these

25. \*On takeoff, a rocket accelerates from rest at a rate of 50.0 m/s<sup>2</sup> for exactly 1 minute. The rocket's speed after this minute of steady acceleration will be \_\_\_\_ m/s.

- a. 50.0      b. 500.      c. 3.00 x 10<sup>3</sup>      d. 3.60 x 10<sup>3</sup>      e. none of these

26. When a rock is dropped, it will accelerate downward at a rate of 9.8 m/s<sup>2</sup>. If the same rock is thrown downward (instead of being dropped from rest), its acceleration will be \_\_\_\_\_. (Ignore air resistance effects.)

- a. less than 9.8 m/s<sup>2</sup>                      b. 9.8 m/s<sup>2</sup>                      c. more than 9.8 m/s<sup>2</sup>

27. Consider drops of water that leak from a dripping faucet at a constant rate. As the drops fall they \_\_\_\_.

- a. get closer together                      b. get farther apart  
 c. remain at a relatively fixed distance from one another

28. Renatta Oyle is again found driving her '86 Yugo down Lake Avenue, leaving the following trail of oil drops on the pavement.



If her car is moving from right to left, then ...

- A. her velocity has a rightward direction and her acceleration has a rightward direction.  
 B. her velocity has a rightward direction and her acceleration has a leftward direction.  
 C. her velocity has a leftward direction and her acceleration has a rightward direction.  
 D. her velocity has a leftward direction and her acceleration has a leftward direction.

29. Determine the acceleration (in m/s<sup>2</sup>) of an object which ... .

- A. moves in a straight line with a constant speed of 20.0 m/s for 12.0 seconds  
 B. changes its velocity from 12.1 m/s to 23.5 m/s in 7.81 seconds  
 C. changes its velocity from 0.0 mi/hr to 60.0 mi/hr in 4.20 seconds  
 D. accelerates from 33.4 m/s to 18.9 m/s over a distance of 109 m