Motion, Speed, and Acceleration Review Guide ANSWERS IN BOLD

Use this guide to test your understanding of the concepts we covered. The concepts may be described differently on the quiz so make sure you understand the concept and not just the answer. You can always ask yourself “How do I know?”

1. Motion describes a change in _________________________________.
   Motion describes a change of position. Speed describes how quickly the motion changes.

2. To find the speed of an object in motion, what 2 measurements do you need to know?
   You need distance (change in position) and Time (the time required to change position) to calculate speed.

3. What is the formula showing the relationship between speed, time and distance?
   \[ \text{speed} = \frac{\text{distance (change in position)}}{\text{time (time for distance to change)}} \]

4. Draw the speed triangle to help you use the equation even if you know the speed but want to find how far an object will travel or how long it will take to move a certain distance.

5. How do you find the speed of an object using a distance vs. time graph?
   The speed is the slope of a line on a distance vs. time graph. You can find the slope by using rise (change in position) over run (change in time).

6. What does a horizontal (flat) line on a distance vs. time graph mean?
   A flat line on a distance vs. time graph shows a situation when the distance doesn’t change with time so the speed is zero!

7. What’s the difference between speed and velocity? Give an example for each.
   Velocity includes a direction and speed does not. Traveling 45 miles per hour north is a velocity. Traveling 45 miles per hour is a speed.

8. What is change in velocity over time called? Give an example of from your own experience.
   Change in velocity over time is called ACCELERATION. It can be a change in speed or a change in direction. When a car gets rolling after stopping for a red light that is an example of acceleration.

9. Why are initial and final velocity needed to calculate acceleration?
   NOT ON THE QUIZ. We will answer this question AFTER the quiz.

10. What does the graph line on a velocity vs. time graph represent?
    NOT ON THE QUIZ. We will answer this question AFTER the quiz.
11. Zach knows his friend can run 100 meters in 7 seconds. What 2 ways could he use this information to describe the speed of his friend’s motion?

Zach could calculate speed using the speed formula $S = \text{distance/time} = \frac{100 \text{ meters}}{11 \text{ seconds}} = 9.1 \text{ meters/second}$. He could also plot distance and time data and calculate the slope using “rise over run” - the change along the Y axis divided by the change along the x axis.

12. Sydney sits in a moving car. As she looks out the window, she sees Ashlee in a car right next to hers. When she looks again, the other car is still right next to hers. What can you say about the speed of each car?
The speed of the car that Sydney is riding in is EQUAL to the speed of the car that Ashlee is riding in. Their relative motion is zero.

13. Jake walks 200 m in 100 sec. moving at different speeds. Dividing 200 m by 100 sec. gives you Jake’s

If you know that the speed is changing, and you only have the total time and total distance information you can only calculate the AVERAGE speed Jake is traveling.

14. Jeremy is riding a BMX bicycle in a race. He begins to pedal harder. What do you predict will happen to his speed? How do you know?
Jeremy is putting more effort in pedaling the BMX bike; this will cause his speed to increase because he is accelerating in the direction of his motion.

15. If Markus is traveling 15 m/sec, how long will it take him to run 100 meters?
We can use the speed triangle to find out how long it will take Markus to run 100 meters if his speed is 15 m/sec. To find time, you divide the distance by the speed, so it would take 6.67 seconds.

16. What is speed in a specific direction called?
Speed in a specific direction is called velocity.

17. What does acceleration measure?
Acceleration measures change in speed or direction.

18. Alexis is watching a friend run in a race. What does she need to know to find her friend’s speed?
To find speed, Alexis must know the distance traveled by her friend and the time it took to travel that distance.

19. Scott walks 1 mile west. Brock walks one mile east in the same amount of time. What can you say about their velocities?
Scott and Brock have the same speed, but opposite velocities since they are traveling in opposite directions.
20. What is happening to an object if it has zero acceleration?
NOT ON THE QUIZ. We will answer this question AFTER the quiz.

21. How would the graph line look on a velocity vs. time graph if the object had zero acceleration?
NOT ON THE QUIZ. We will answer this question AFTER the quiz.

22. If you subtract an object's initial velocity from its final velocity and divide by the time it took to change velocity, what are they finding?
NOT ON THE QUIZ. We will answer this question AFTER the quiz.

23. For each graph, describe the motion and the speed of the object

Speed is the slope of a distance vs. time graph

\[
S = \frac{\text{rise (change in position)}}{\text{run (change in time)}}, \quad S = \frac{\text{rise (change in position)}}{\text{run (change in time)}}
\]

\[
S = \frac{(39 - 2)}{(12 - 0)} = 3.1 \text{ m/sec} \quad \quad S = \frac{(0 - 10)}{(5 - 0)} = -2 \text{ m/sec}
\]

24. Mariah is at track practice. Since there are lines marked on the track, we were able to collect the data below. Use this data to create a graph on the grid provided that can be used to show speed; label each axis and title the graph.
We will not create graphs for this quiz

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25. For this graph describe whether speed is constant, and how you know.

Since the line is not straight, the speed cannot be constant. This curve shows speed constantly changing.