Motion: Speed, Velocity, Acceleration & Graphs

Ages 14–15 · Science

Name _____ Class _____ Date _____

A Key terms: match each term to its meaning

Write the letter of the correct meaning in the box next to each term.

1	**Reference point (origin)**	☐	**A** Displacement divided by the time interval in which it happens.
2	**Distance**	☐	**B** Motion along a circular path at constant speed, in which the direction of velocity keeps changing.
3	**Displacement**	☐	**C** The rate of change of velocity, measured in m/s^2.
4	**Average velocity**	☐	**D** The change in position of an object, with both size and direction.
5	**Acceleration**	☐	**E** A fixed point from which the position of an object is measured.
6	**Kinematic equations**	☐	**F** The total length of the path travelled by an object; it has size but no direction.
7	**Uniform circular motion**	☐	**G** Equations linking u, v, a, s and t for motion in a straight line with constant acceleration.

B Quick quiz

Circle the best answer, write its letter, then explain your choice in a few words.

1 A girl walks 4 m east and then 3 m west. What is her displacement?

a) 7 m east **b)** 1 m east
c) 1 m west **d)** 7 m west

Answer: _____ Why? _____

2 What is 54 km/h in metres per second?

a) 54 m/s **b)** 5.4 m/s
c) 19.4 m/s **d)** 15 m/s

Answer: _____ Why? _____

3 A scooter speeds up from 5 m/s to 15 m/s in 5 s. What is its average acceleration?

a) 2 m/s^2 **b)** 3 m/s^2
c) 10 m/s^2 **d)** 50 m/s^2

Answer: _____ Why? _____

4 A flat horizontal line on a position-time graph shows that the object is:

a) Moving at constant velocity **b)** Speeding up
c) At rest **d)** Moving in a circle

Answer: _____ Why? _____

5 Why is uniform circular motion called accelerated motion?

a) Its speed keeps increasing **b)** Its direction, and so its velocity, keeps changing
c) Its distance is always zero **d)** It always moves in a straight line

Answer: _____ Why? _____

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Answer key for teachers · Ages 14–15 · Science

A Key terms

1	**Reference point (origin)**	**E**	A fixed point from which the position of an object is measured.
2	**Distance**	**F**	The total length of the path travelled by an object; it has size but no direction.
3	**Displacement**	**D**	The change in position of an object, with both size and direction.
4	**Average velocity**	**A**	Displacement divided by the time interval in which it happens.
5	**Acceleration**	**C**	The rate of change of velocity, measured in m/s^2.
6	**Kinematic equations**	**G**	Equations linking u, v, a, s and t for motion in a straight line with constant acceleration.
7	**Uniform circular motion**	**B**	Motion along a circular path at constant speed, in which the direction of velocity keeps changing.

B Quick quiz

1 b) 1 m east

Displacement is the net change in position: 4 m east minus 3 m west leaves her 1 m east of the start. The distance travelled is 7 m.

2 d) 15 m/s

Multiply by 5/18: 54 × 5 ÷ 18 = 15 m/s.

3 a) 2 m/s^2

$a = (v - u) \div t = (15 - 5) \div 5 = 2\ m/s^2$.

4 c) At rest

If the position does not change with time, the object is at rest. A sloping straight line would show constant velocity.

5 b) Its direction, and so its velocity, keeps changing

The speed is constant, but the direction of motion changes at every point. A change in direction is a change in velocity, so the object is accelerating.