

Reading motion graphs and acceleration

Grade 8 science (Year 9 · Class 8) · Test answers (mark scheme)

The model answers show how to read the graphs and how to calculate. Marks are given for the method as well as for the answer, so check that you showed the gradient or area you used and the correct units.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS2-2

Question 1 Meaning of the gradient (2 marks)

- a. The speed.
- b. The acceleration.

Marking: 1 mark each.

Question 2 Mei's walk (4 marks)

- a. **30 m.**
- b. $30 \div 20 = \mathbf{1.5 \text{ m/s.}}$
- c. From 20 s to 50 s: **30 s.**
- d. $(90 - 30) \div 20 = \mathbf{3.0 \text{ m/s.}}$

Marking: 1 mark per part.

Question 3 A lorry journey (4 marks)

- a. $a = 10 \div 10 = \mathbf{1.0 \text{ m/s}^2}.$
- b. $a = 10 \div 5 = \mathbf{2.0 \text{ m/s}^2}.$
- c. Areas: $\frac{1}{2} \times 10 \times 10 = 50 \text{ m}$; $10 \times 20 = 200 \text{ m}$; $\frac{1}{2} \times 5 \times 10 = 25 \text{ m}$. Total = **275 m.**

Marking: Part a: 1 mark. Part b: 1 mark. Part c: 1 mark for the method with three areas, 1 mark for 275 m.

Question 4 A cyclist speeds up (2 marks)

$$a = (v - u) \div t = (9.0 - 3.0) \div 4.0 = \mathbf{1.5 \text{ m/s}^2}.$$

Marking: 1 mark for the formula and substitution, 1 mark for the answer with unit.

Question 5 Describe the graph (2 marks)

- a. The object moves at **constant speed** (zero acceleration).

- b. The object is **stationary**.

Marking: 1 mark each.

Question 6 Average speed (3 marks)

- a. 2400 m and 1200 s.
b. $2400 \div 1200 = \mathbf{2.0 \text{ m/s}}$.
c. $2.0 \times 3.6 = \mathbf{7.2 \text{ km/h}}$.

Marking: 1 mark per part.

Question 7 Braking (2 marks)

$a = (0 - 25) \div 5.0 = -5.0 \text{ m/s}^2$, so a deceleration of **5.0 m/s²**.

Marking: 1 mark for the method, 1 mark for the answer.

Question 8 Speed and velocity (1 mark)

Velocity has a **direction** as well as a size; speed has size only.

Marking: 1 mark for direction.