

PAPER 1

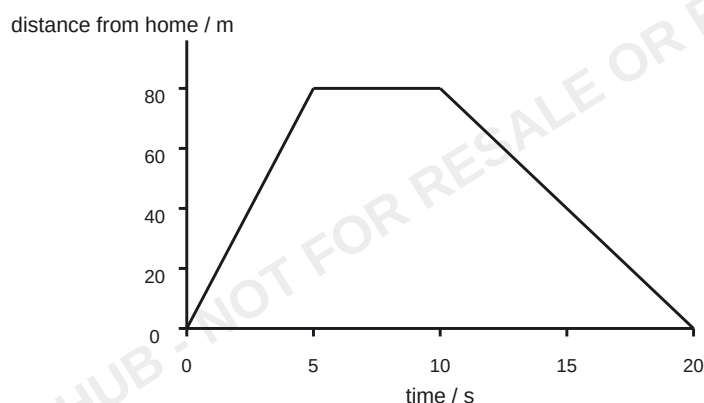
40 marks · Questions 1 – 40 · multiple choice (A – D) · 1 h

Answer ALL questions. For each question from 1 to 40, four options are given. One of them is the correct answer. Make your choice (A, B, C or D). Each question carries 1 mark. Questions 1 – 20 are on Physics and questions 21 – 40 are on Chemistry.

1. Convert 3.2 mg to kg. [1 mark]

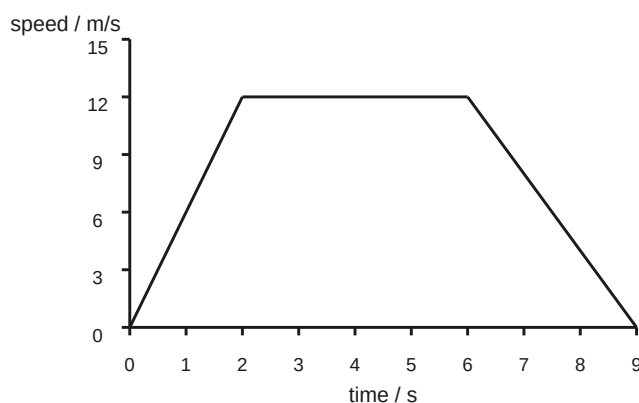
- A 3.2×10^{-6} kg
- B 3.2×10^{-7} kg
- C 3.2×10^6 kg
- D 3.2×10^{-9} kg

2. The graph shows the journey of a pupil who leaves home, stops, then returns. What is the speed on the way back, in m/s? [1 mark]



- A 0.125 m/s
- B 4 m/s
- C 8 m/s
- D 90 m/s

3. The graph shows the motion of an object. What is its acceleration during the first 2 s? [1 mark]



- A 2 m/s^2
- B 6 m/s^2
- C 12 m/s^2
- D 24 m/s^2

THE WORKED ANSWERS TO THOSE 3 QUESTIONS

1. Convert 3.2 mg to kg. [1 mark] [Physical quantities, units and measurement]

Correct answer: A — $3.2 \times 10^{-6} \text{ kg}$

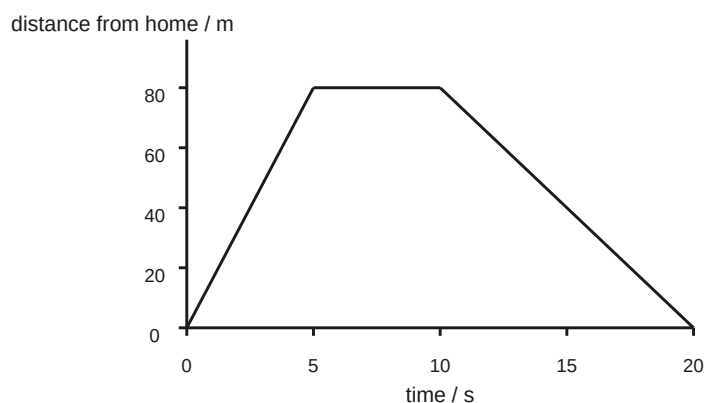
- $1 \text{ mg} = 10^{-6} \text{ kg}$.
- $3.2 \text{ mg} = 3.2 \times 10^{-6} \text{ kg}$.
- Why the other options are wrong:
 - B ($3.2 \times 10^{-7} \text{ kg}$): a factor of ten is too many
 - C ($3.2 \times 10^6 \text{ kg}$): the power of ten has the wrong sign
 - D ($3.2 \times 10^{-9} \text{ kg}$): the wrong prefix size was used

LOS: Measurement · Physical quantities, units and measurement

KEY TAKEAWAY

Prefixes: n 10^{-9} , μ 10^{-6} , m 10^{-3} , c 10^{-2} , k 10^3 , M 10^6 , G 10^9 : replace the prefix by its power of ten.

2. The graph shows the journey of a pupil who leaves home, stops, then returns. What is the speed on the way back, in m/s? [1 mark] [Kinematics]



Correct answer: C — 8 m/s

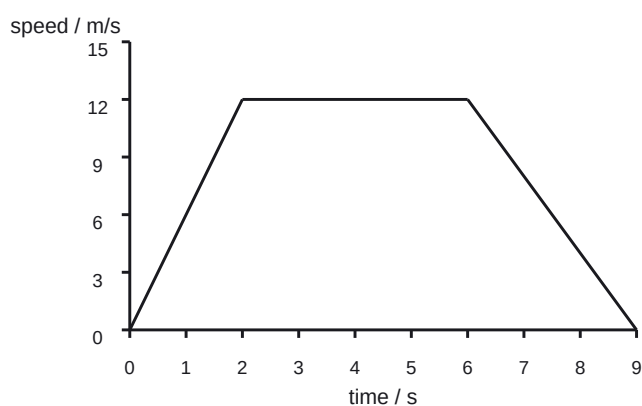
- Speed = size of the gradient of the distance–time graph.
- On the way back the distance changes by 80 m in 10 s, so speed = $80 \div 10 = 8 \text{ m/s}$.
- Why the other options are wrong:
- A (0.125 m/s): time $\div$ distance is upside down
- B (4 m/s): the whole journey time was used
- D (90 m/s): distance and time were added

LOS: Newtonian Mechanics · Kinematics

KEY TAKEAWAY

On a distance–time graph the gradient is the speed and a horizontal line means at rest.

3. The graph shows the motion of an object. What is its acceleration during the first 2 s? [1 mark] [Kinematics]



Correct answer: B — 6 m/s²

- Acceleration = gradient of the speed–time graph.
- During the first 2 s the speed rises from 0 to 12 m/s, so $a = 12 \div 2 = 6 \text{ m/s}^2$.
- Why the other options are wrong:
- A (2 m/s²): the wrong time interval was used

- C (12 m/s^2): the area was calculated
- D (24 m/s^2): speed $\times$ time is the area, not the gradient

LOS: Newtonian Mechanics · Kinematics

KEY TAKEAWAY

The gradient of a speed–time graph is the acceleration.

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