

GCSE Physics B (Twenty First Century Science)
J259/02 Depth in physics (Foundation Tier)

Question Set 15

1 A delivery company uses GPS tracker devices to monitor the position and the speed of their vans.

(a) The distance against time graph of one van travelling along a straight road is shown in **Fig. 1.1**.

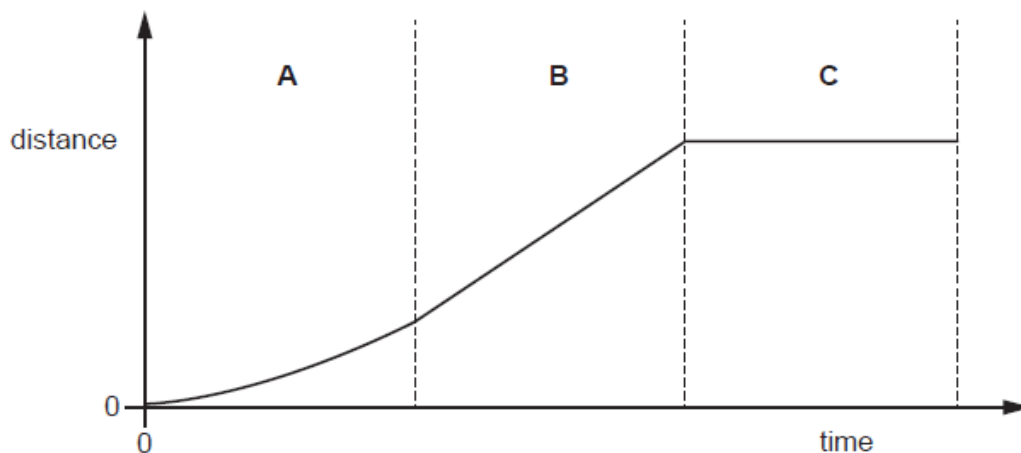


Fig. 1.1

Fig. 1.1 has been divided into three sections **A**, **B**, and **C**.

Complete the table by matching each section, **A**, **B**, or **C**, with the correct type of motion.

Tick (✓) **one** box in each row.

Type of motion	Section A	Section B	Section C
Stationary			✓
Constant		✓	
Accelerating	✓		

[3]

(b) The velocity against time graph of another van is shown in Fig. 1.2.

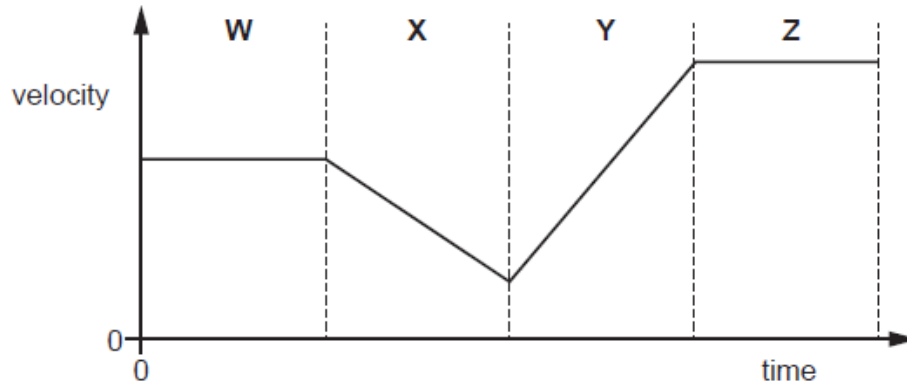


Fig. 1.2

Fig. 1.2 has been divided into four sections W, X, Y, and Z.

(i) Identify which section shows the van speeding up.

Explain your answer. *Y, as velocity is increasing.* [2]

(ii) Identify which section shows the van slowing down.

Explain your answer. *X, as velocity is decreasing.* [2]

(c) Data from the GPS tracker device can be used to calculate a van's average acceleration over the entire journey:

- initial speed = 8.5 m/s
- final speed = 36.5 m/s
- time for acceleration = 5.0 s

Use this information to calculate the average **acceleration** of the van.

Use the equation: acceleration = change in speed ÷ time taken

Give the **correct units** for your answer.

$$a = \frac{30.5 - 8.5}{5} = \frac{28}{5} = 5.6 \text{ m/s}^2$$

Acceleration = *5.6* Units *m/s²* [3]

(d) (i) Estimate the mass of the van, in kilograms (kg).

Mass = *1000* kg

(ii) Estimate the average force acting on the van.

Use your answers from (c) and (d)(i) to answer the question.

$F = ma = 1000 \times 5.6 = 5600 \text{ N}$
Force = *5600* N [3]

Total Marks for Question Set 15: 14

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