OCR
Oxford Cambridge and RSA

Gateway Science Physics A

J249/01 Physics A P1-P4 and P9 (Foundation Tier)

Question Set 17

17 Two students study the motion of a model train on a track.

They need distance and time measurements to calculate speed.

(a) Write down an instrument they could use to measure the following.

(i) Distance: tape measure **[1]**

(ii) Time: stop watch **[1]**

(b) The train travels for 45 seconds with a speed of 2 m / s.

Calculate the distance travelled by the train.

Show your working.

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$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{speed} \times \text{time} = \text{distance}$$

$$45 \times 2 = 90\text{ m}$$

Answer = 90 m **[4]**

(c) The maximum speed of the train is 5 m / s.

Its maximum velocity is also 5 m / s.

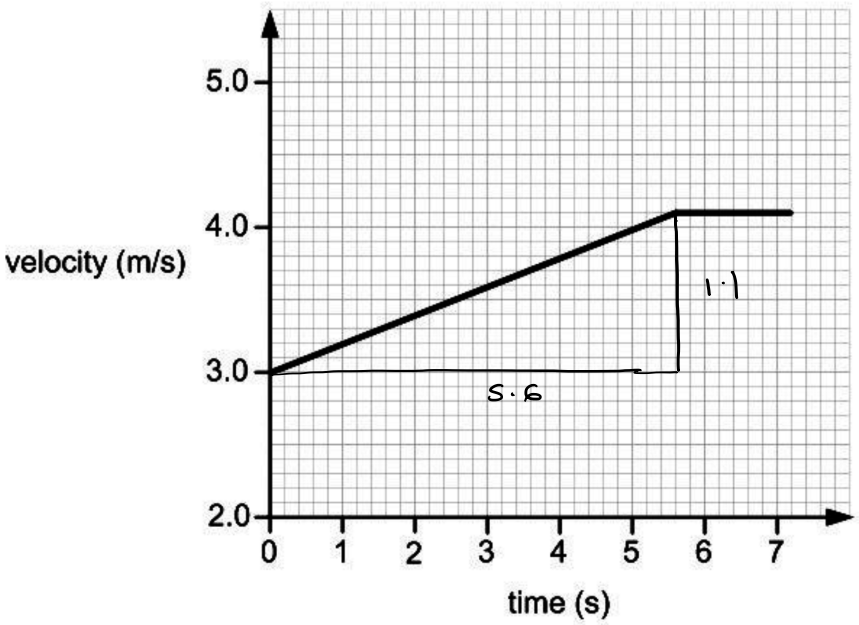
(i) What is the same about the maximum speed and velocity?

They both have same ✓ magnitude **[1]**

(ii) What may be different about the maximum speed and velocity?

Velocity includes direction as well but speed doesn't (magnitude only) **[1]**

(d) The train accelerates and its journey is shown in the graph below.



Use data from the graph to calculate the acceleration.

Show your working.

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$$\text{acceleration} = \frac{\text{velocity}}{\text{time}} = \frac{4.1 - 3}{5.6} = \frac{1.1}{5.6} = 0.1964\ldots$$

$$= 0.196 \quad (3\ \text{s.f.})$$

Answer = 0.196 ..... m/s^2

[4]

Total Marks for Question Set 17: 12