

Motion Formulas

THE THREE EQUATIONS OF MOTION — write each equation in the box

Speed / Velocity

v in m/s · s in m · t in s

Acceleration

a in m/s^2 · v, u in m/s · t in s

Mechanics

v, u in m/s · a in m/s^2 · s in m

EXAM-STYLE PRACTICE — show all your working, and watch the units

1 Using $v = s \div t$

[4 marks]



A cyclist travels **3.6 km** along a straight road in **12 minutes**.

Calculate the average speed of the cyclist.

Give your answer in **m/s**, to **2 significant figures**.

Answer = _____

2 Using $a = (v - u) \div t$

[4 marks]



A motorbike speeds up from **5.0 m/s** to **23 m/s** in **400 ms**.

Calculate the acceleration of the motorbike.

Give your answer in **m/s^2** , to **2 significant figures**.

Answer = _____

3 Using $v^2 = u^2 + 2as$

[4 marks]



A train is travelling at **12 m/s**. It then accelerates uniformly at **0.35 m/s^2** over a distance of **2.4 km**.

Calculate the final velocity of the train.

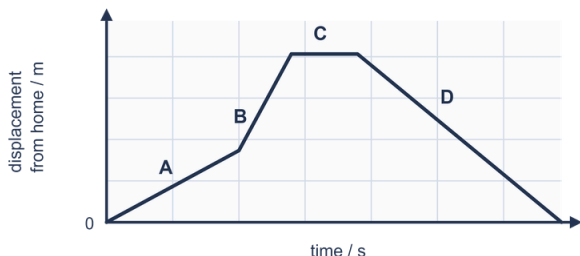
Give your answer in **m/s**, to **2 significant figures**.

Answer = _____

Distance–Time and Velocity–Time Graphs

Displacement–Time Graph

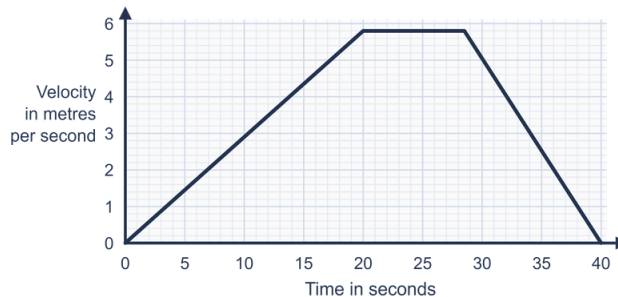
Gradient = speed



- 1 Which part of the journey was the object stationary?
- 2 Which part of the journey was the object moving the fastest?
- 3 Calculate the speed of the object at the fastest part of the journey.
- 4 What is the relevance of the negative gradient in part D?

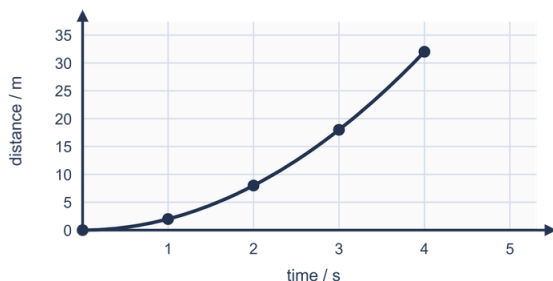
Velocity–Time Graph

Area = distance • Gradient = acceleration



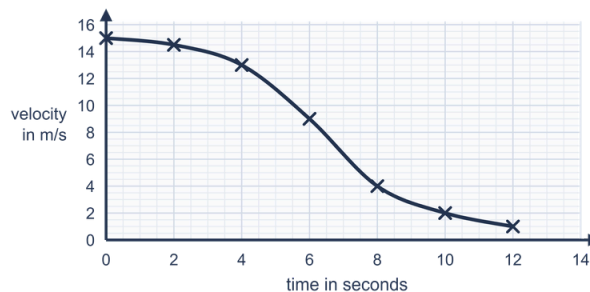
- 7 At which 2 times was this object stationary? _____ and _____
- 8 What is the total distance travelled during the 40 second journey?
- 9 What is the fastest speed during the journey?

Curved Distance–Time Graph



- 5 What is the instantaneous speed of the object at $t = 3$ seconds?
- 6 What is the average speed of the object during the first 3 seconds?

Curved Velocity–Time Graph



- 10 What is the acceleration during the first 12 s of the journey?
- 11 Calculate the instantaneous acceleration at $t = 6$ seconds.