

Name: _____

GCSE Further Maths



Displacement-time Graphs Corbettmaths

Ensure you have: Pencil, Ruler, Pen, Calculator

Guidance

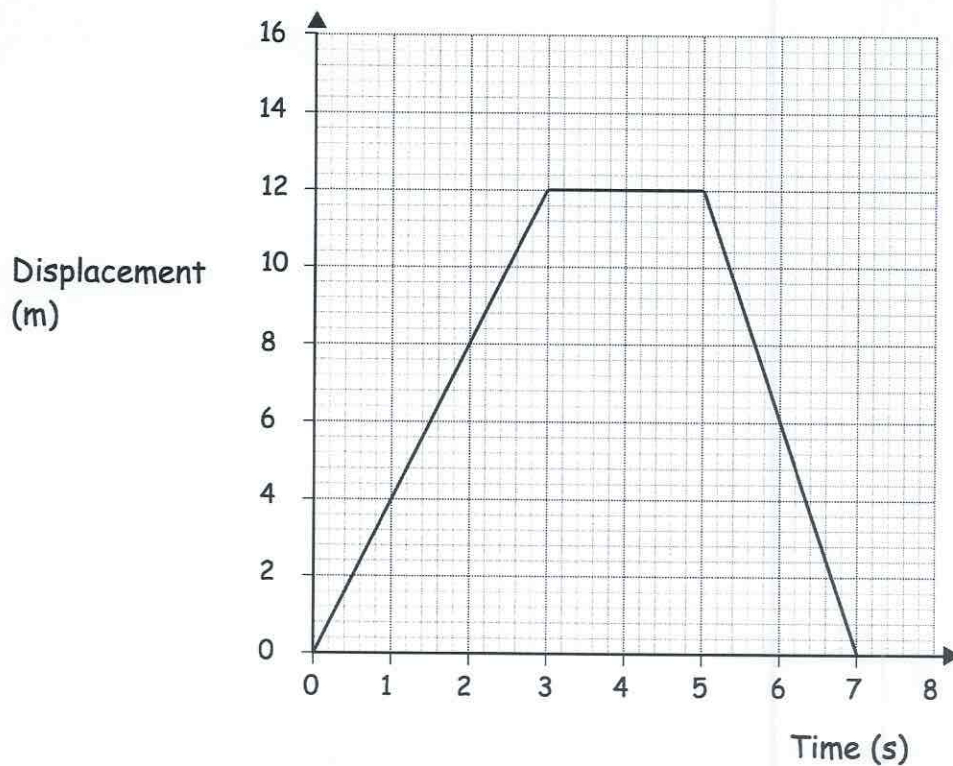
1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/gcse-further-maths

1. Harry walks from his car to a post box in a straight line. He posts a letter and then walks back to his car.

The displacement–time graph shows the displacement of Harry from his car throughout the journey.



- (a) How far is the post box from his car?

12
.....m
(1)

- (b) Work out Harry's speed when walking from the car to the post box.

$$\frac{12}{3} = 4 \text{ m/s}$$

4
.....m/s
(1)

(c) How long was Harry stationary while at the post box?

.....2.....seconds
(1)

(d) Work out Harry's speed when walking from the post box to the car.

$$\frac{12}{2} = 6$$

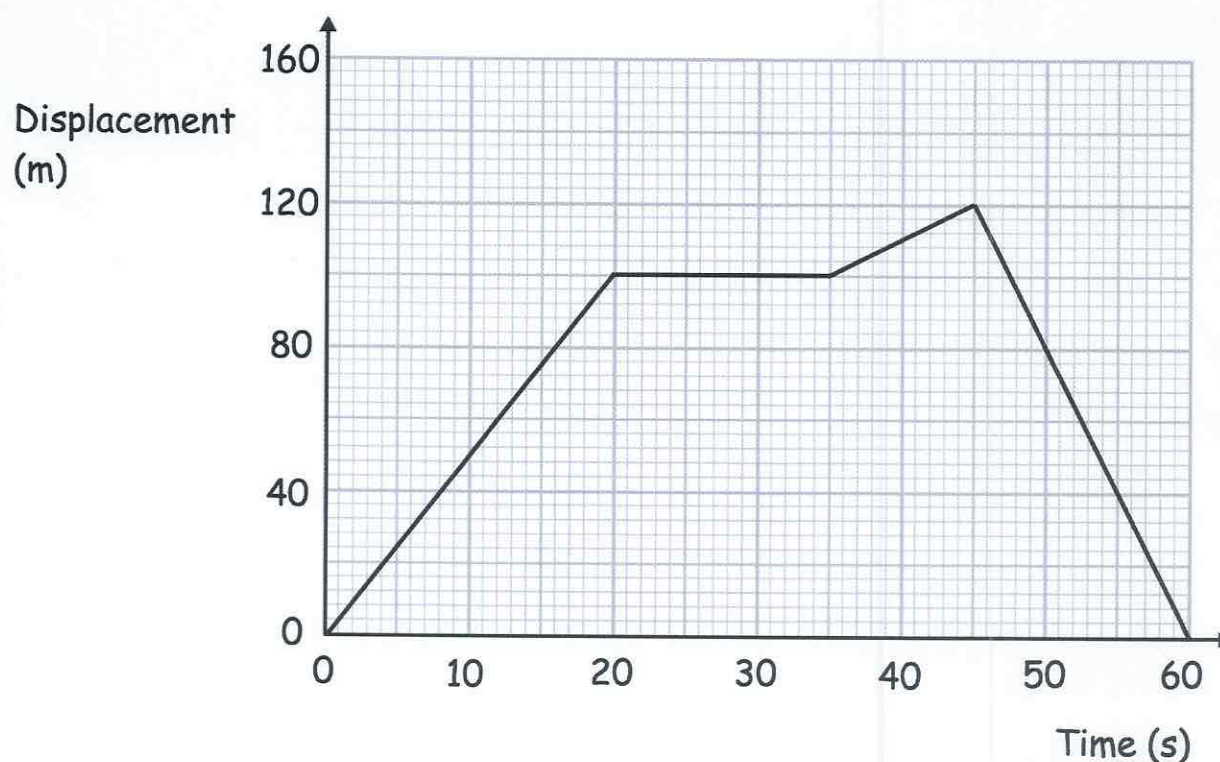
.....6.....m/s
(1)

(e) How far did Harry walk altogether?

.....24.....m
(1)

2. A body is travelling in a straight line.

The displacement–time graph shows the displacement of the body from the starting point throughout the journey.



- (a) Work out the velocity of the body over the first 20 seconds.

$$\frac{100}{20} = 5$$

5
.....m/s
(2)

- (b) How long was the body stationary?

15
.....seconds
(2)

- (c) Work out the velocity of the body over the last 15 seconds of the journey.

$$\frac{-120}{15} =$$

-8
.....m/s
(2)

(d) How far did the body travel in total?

$$120 + 120 = 240$$

or

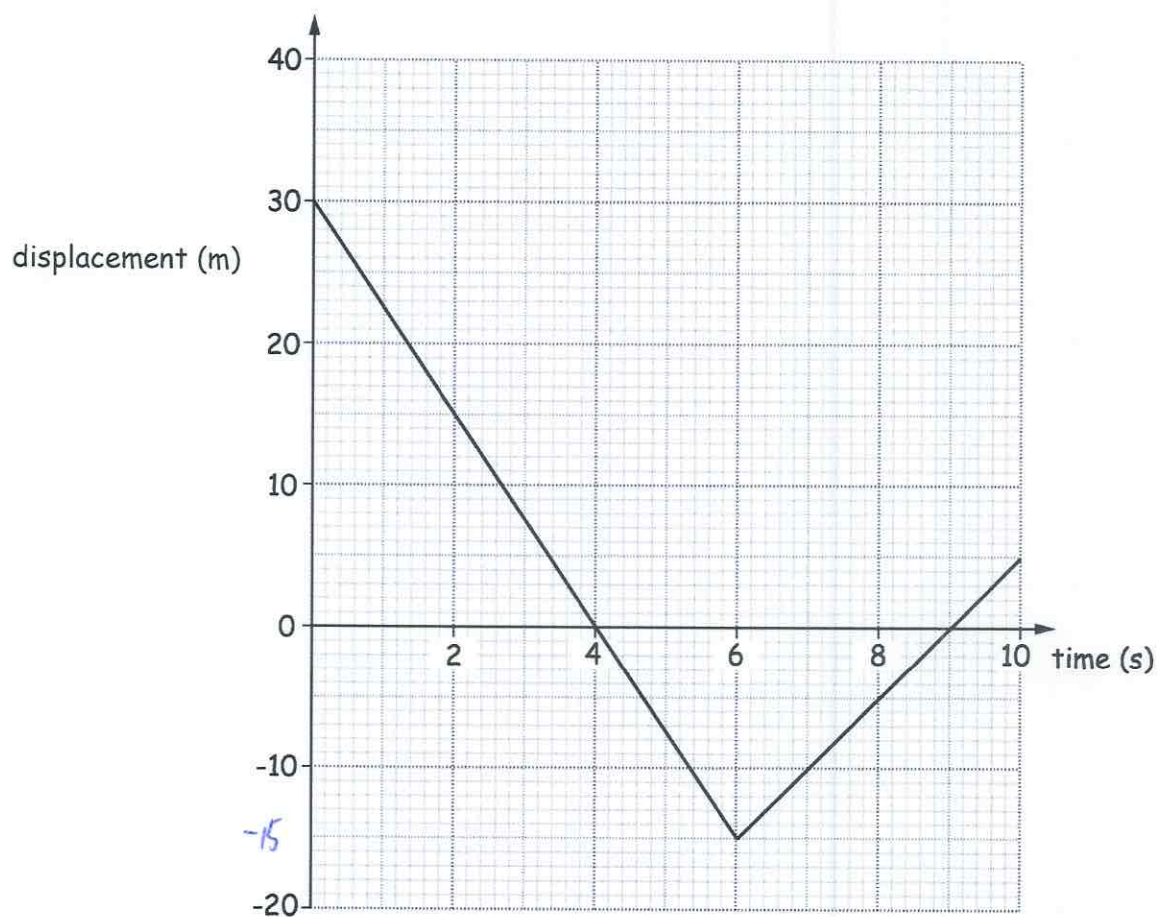
$$100 + 20 + 120 = 240$$

240

.....m
(2)

3. An object is travelling along a straight road.

The displacement-time graph shows the displacement of the object from a line on the road, over a 10 second period.



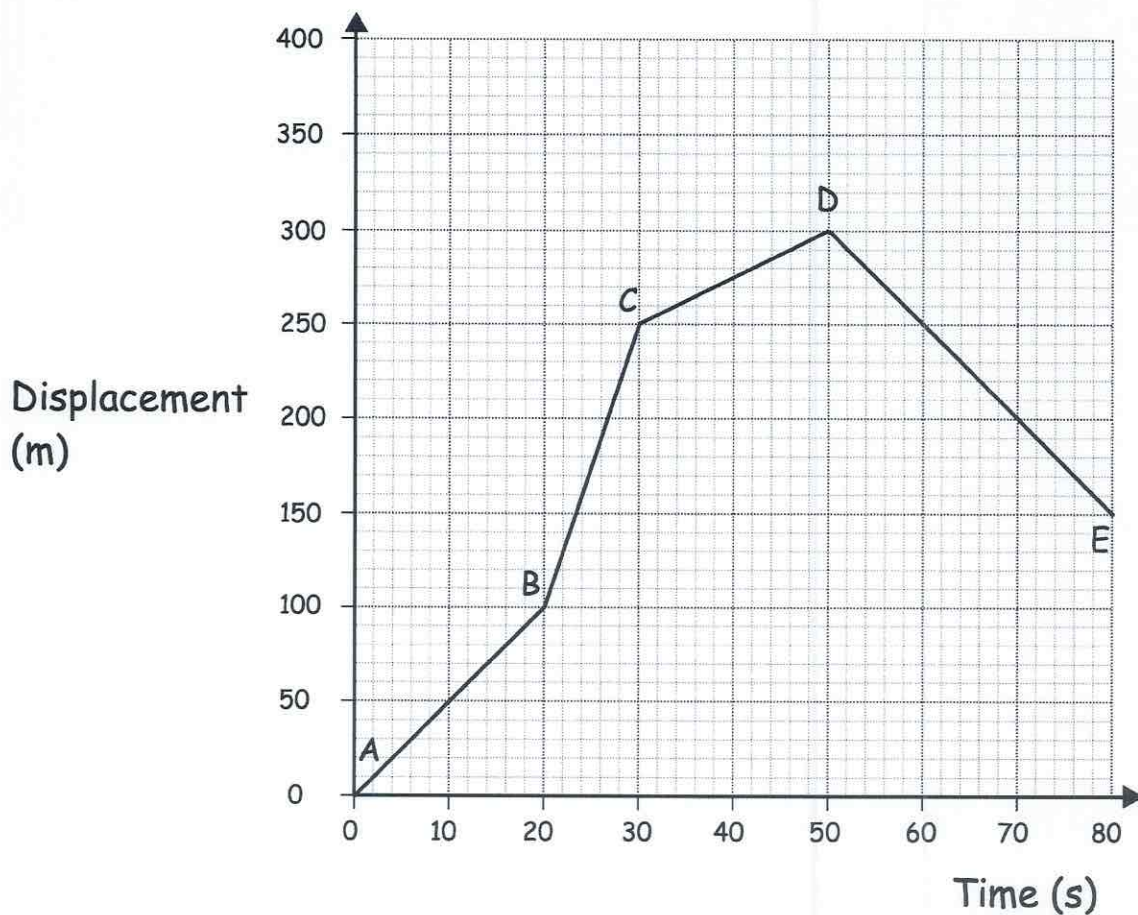
Work out the total distance travelled by the object.

$$45 + 20$$

65

.....m
(1)

4. The displacement–time graph shows the motion of an object along a straight road.



- (a) Between which two points did the object have the slowest speed?
Explain your answer.

$$AB \quad \frac{100}{20} = 5 \text{ m/s}$$

$$BC \quad \frac{150}{10} = 15 \text{ m/s}$$

$$CD \quad \frac{50}{20} = 2.5 \text{ m/s}$$

$$DE \quad \frac{-150}{30} = -5 \text{ m/s (velocity)}$$

5 m/s (speed)

C and D - the line has the smallest gradient

or the speed is 2.5 m/s, which is less than all the others

(2)

(b) Work out the speed of the object between D and E.

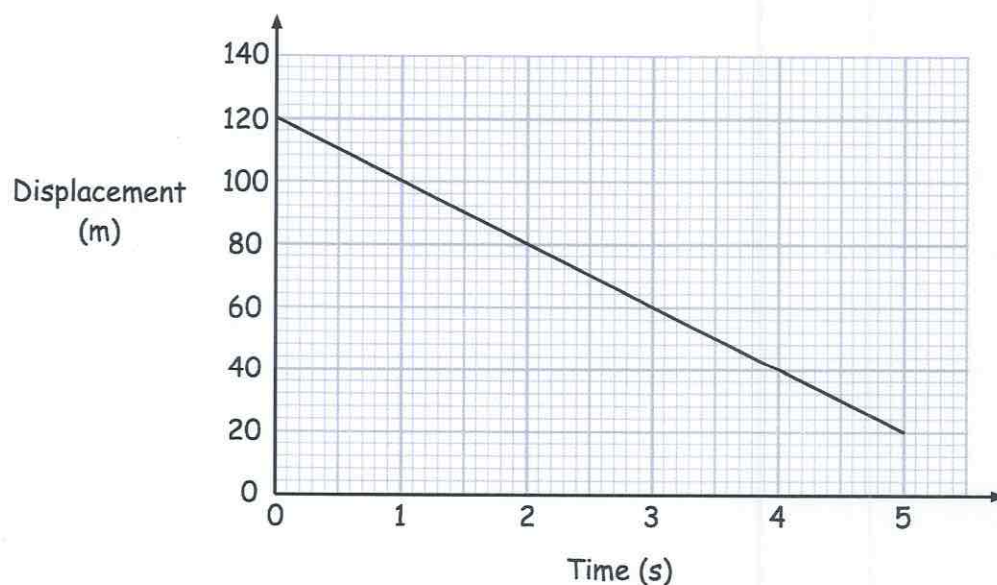
.....5.....m/s
(2)

(c) Calculate the average speed of the object over the journey from A to E.

average speed = $\frac{\text{distance travelled}}{\text{time taken}}$ $\leftarrow 300 + 150$
 $= \frac{450}{80}$ 5.625.....m/s
(2)

5. Rosa cycles along a straight road for 5 seconds.

The displacement-time graph shows information about her journey.



Rosa says that her speed was -20m/s .

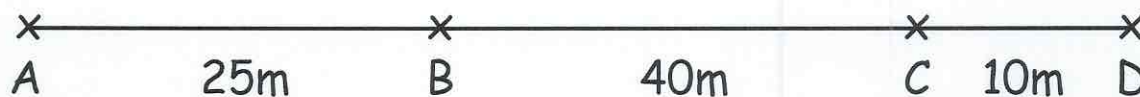
$$v = \frac{-100}{5} = -20\text{m/s}$$

Explain why Rosa is incorrect

The velocity is -20m/s , but the speed is 20m/s

(1)

6. A particle travels along a straight line, ABCD.



The particle starts at A and travels to C, at a constant speed, over 20 seconds.

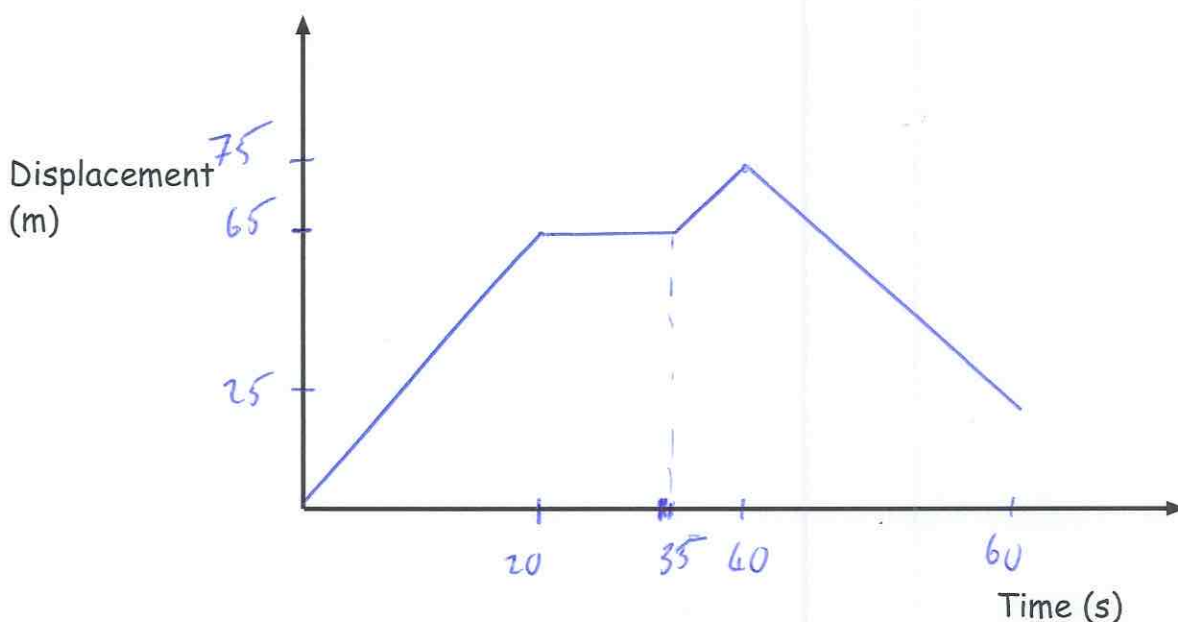
The particle stops for 15 seconds and then travels to D at a speed of 2m/s.

The particle then travels to B at a constant speed.

$$10 \div 2 = 5$$

The entire journey lasts 60 seconds.

- (a) Draw a displacement–time graph for this journey.



(2)

- (b) Work out the average speed of the particle for the entire journey.

$$\text{average speed} = \frac{\text{total distance travel}}{\text{time}}$$

$$= \frac{65 + 10 + 50}{60}$$

$$= \frac{125}{60}$$

$$= 2.08\bar{3} \text{ m/s}$$

$$2.08\bar{3} \dots \text{m/s}$$

(2)

7. The points O and A are on a straight line.

A particle travels from O to A, at a constant velocity.

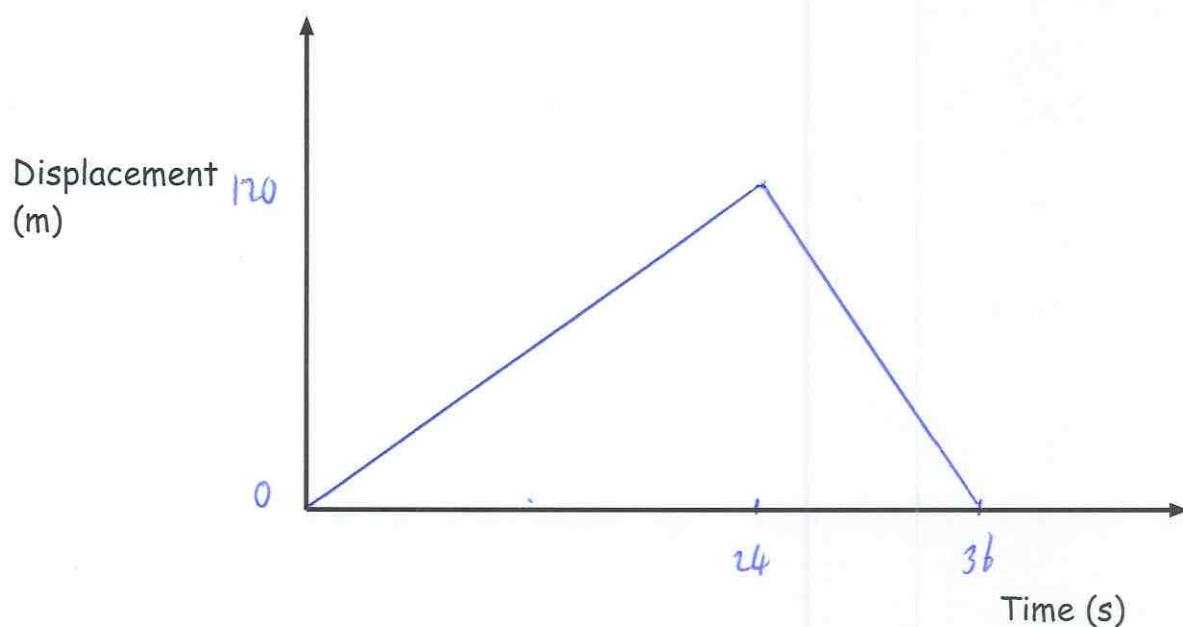
The particle then travels from A back to O, at a constant velocity.

The journey from O to A takes twice as long as the journey from A to O.

The entire journey lasted 36 seconds and the particle travelled a total distance of 240m.

$$240 \div 2 = 120$$

Draw a displacement–time graph for this journey.



(2)



$$OA \rightarrow 2t$$

$$AO \rightarrow t$$

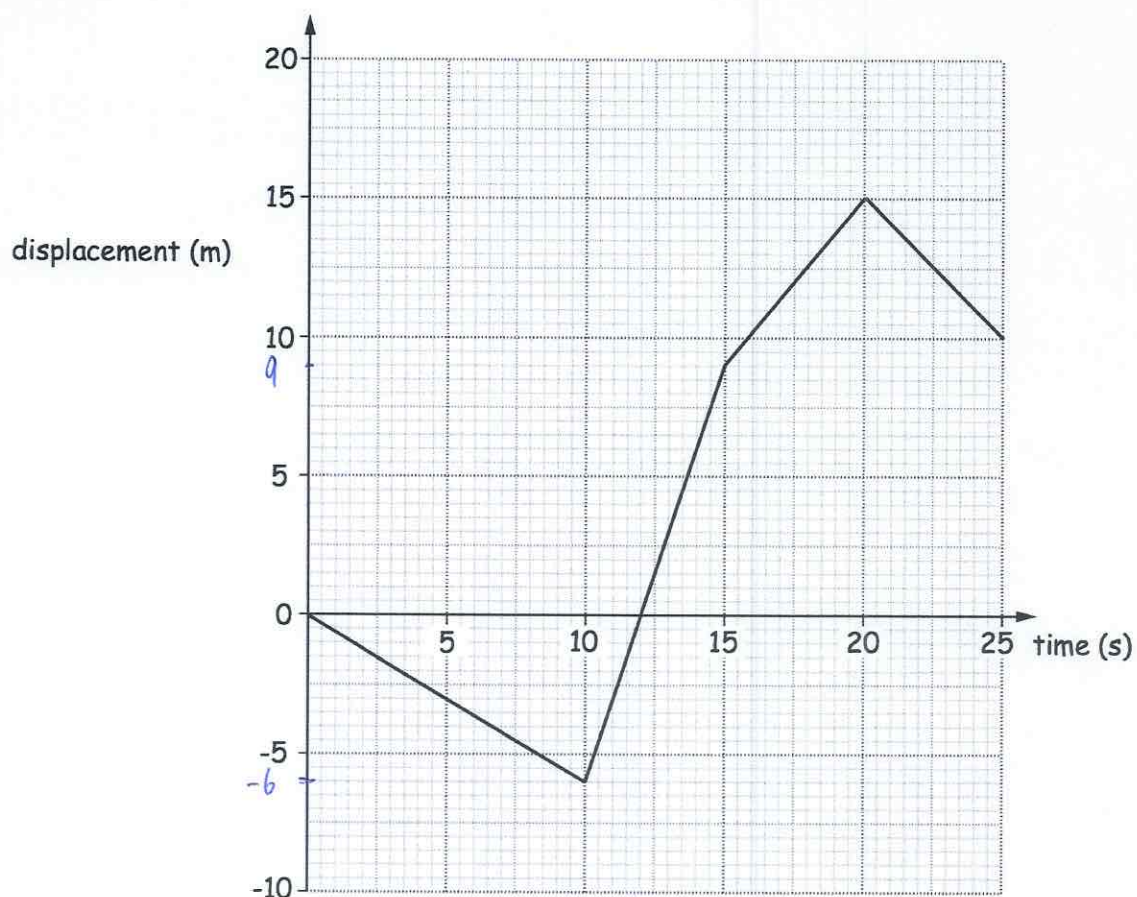
$$\text{total} \rightarrow 3t$$

$$36 \div 3 = 12$$

$$t = 12$$

8. A remote control car travels along a straight track.

This displacement-time graph shows information about its journey over 25 seconds.



- (a) Work out the average speed of the remote control car for the entire journey.

$$6 + 6 + 9 + 6 + 5 = 32 \quad \frac{32}{25} = 1.28$$

or

$$6 + 6 + 15 + 5 = 32$$

1.28 m/s
(3)

- (b) Work out the average velocity of the remote control car for the entire journey.

average velocity = $\frac{\text{displacement from starting point}}{\text{time taken}}$

$$= \frac{10}{25} = 0.4 \text{ m/s}$$

0.4 m/s
(1)