

GCSE Combined Science: Trilogy

Worksheet: The distance–time relationship

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: The distance–time relationship

NAME

CLASS

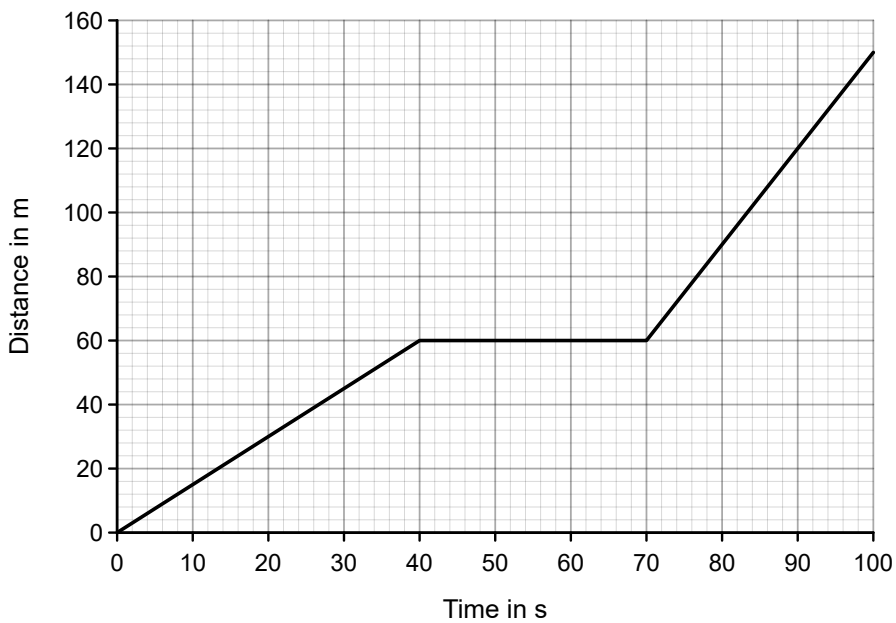
DATE

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

01

Figure 1 shows a distance–time graph for a student walking to a shop.

Figure 1



01.1

Describe the motion of the student between 40 s and 70 s.

[1 mark]

0 1 . 2

Calculate the speed of the student during the first 40 s.
Use the equation:
speed = distance ÷ time

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Speed = m/s

[2 marks]

0 1 . 3

During which part of the journey was the student moving fastest? Give a reason for your answer.

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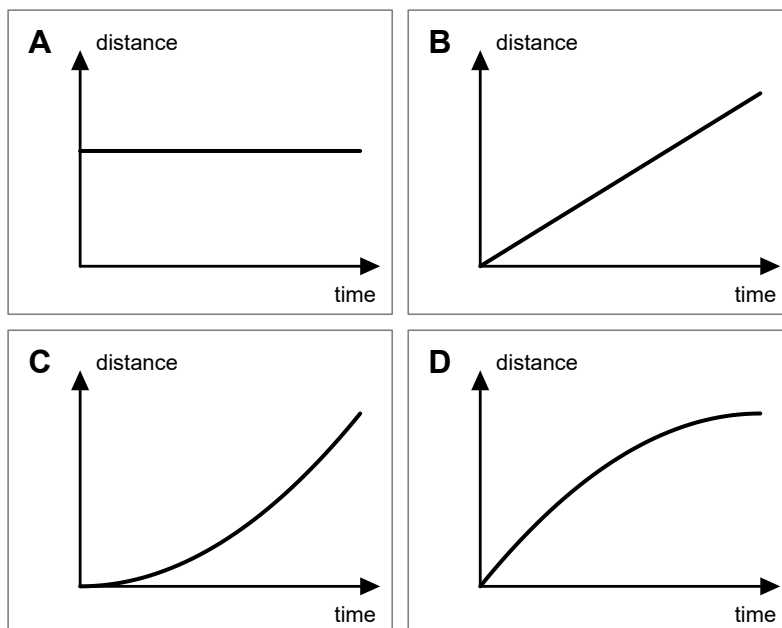
[2 marks]

.....

0 2

Figure 2 shows four distance–time graphs, A, B, C and D.

Figure 2



0 2 . 1

Which graph shows an object that is stationary?

Tick (✓) **one** box.

A

☐

B

☐

C

☐

D

☐

[1 mark]

0 2 . 2

Which graph shows an object moving at a constant speed?

Tick (✓) **one** box.

A

☐

B

☐

C

☐

D

☐

[1 mark]

0 2 . 3

Which graph shows an object that is speeding up?

Tick (✓) **one** box.

A

☐

B

☐

C

☐

D

☐

[1 mark]

0 2 . 4

Explain how graph D shows that the object is slowing down.

.....

.....

[1 mark]

0 3

0 3 . 1

On a distance–time graph, what does a steeper gradient represent?

Tick (✓) **one** box.

A greater distance

☐

A greater speed

☐

A longer time

☐

A smaller speed

☐

[1 mark]

0 3 . 2

A student walks at a constant speed and covers 350 m in 250 s.

Calculate their speed.

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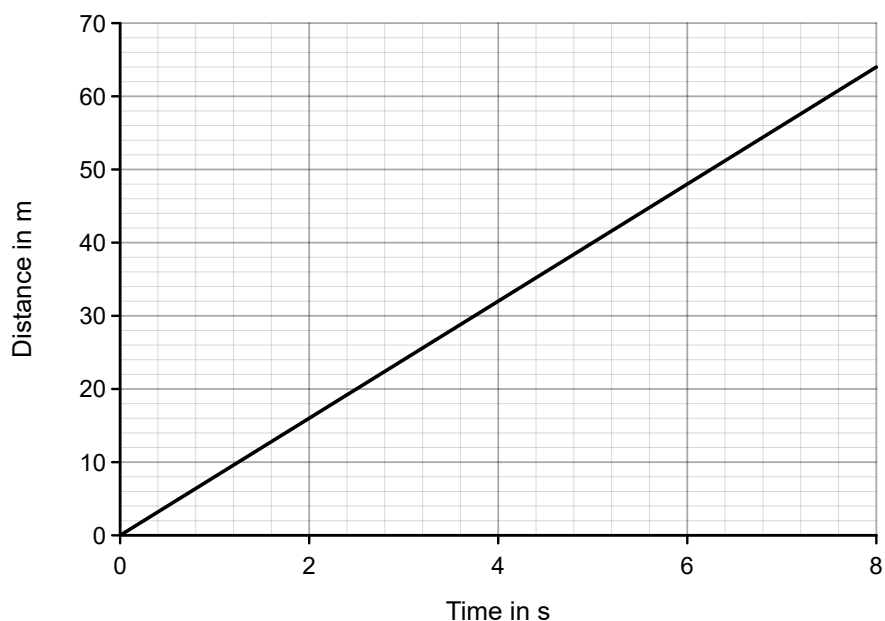
Speed = m/s

[2 marks]

0 4

Figure 3 shows the distance–time graph for a cyclist moving in a straight line.

Figure 3



0 4 . 1

Use Figure 3 to determine the distance travelled by the cyclist in the first 2 s.

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.....

.....

Distance = m

[1 mark]

0 4 . 2

Use Figure 3 to determine the speed of the cyclist.

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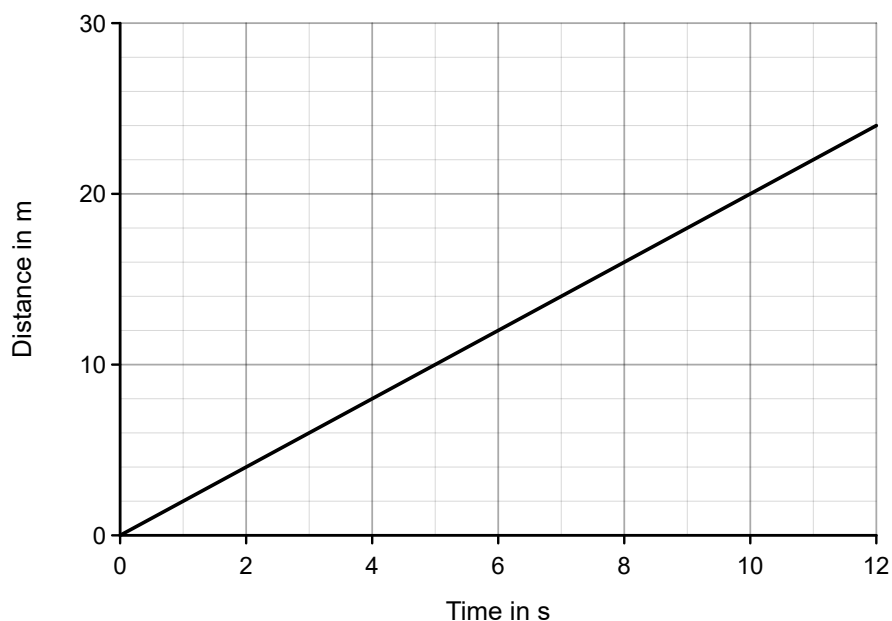
Speed = m/s

[2 marks]

0 5

Figure 4 shows the distance–time graph for a jogger moving in a straight line.

Figure 4



0 5 . 1

Use Figure 4 to determine the distance travelled by the jogger in the first 9 s.

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.....

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Distance = m

[1 mark]

0 5 . 2

Use Figure 4 to determine the speed of the jogger.

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.....

.....

.....

Speed = m/s

[2 marks]

0 6

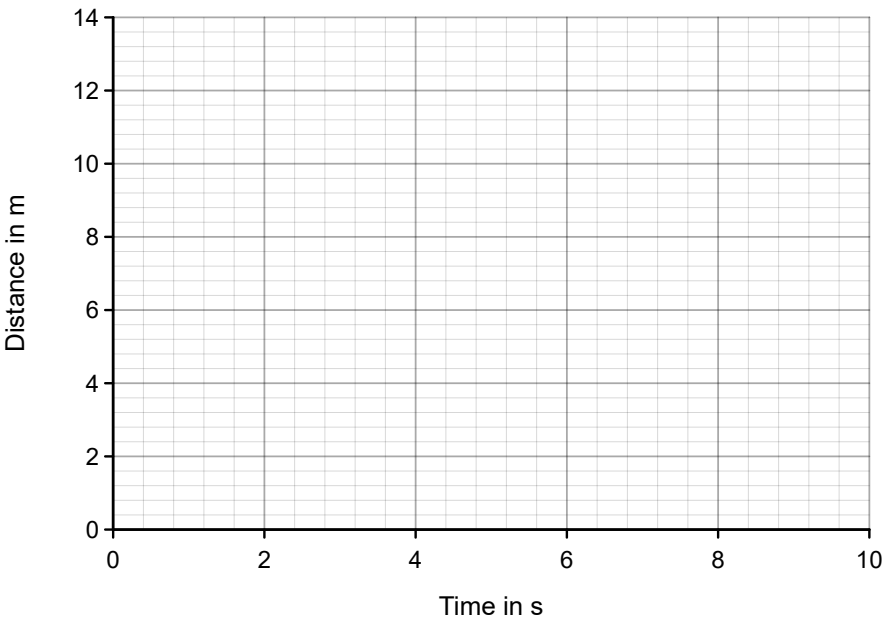
A student recorded the distance travelled by a remote-controlled car every 2 s. Table 1 shows the results.

Table 1

Time in s	Distance in m
0	0
2	3.0
4	6.0
6	9.0
8	10.5
10	12.0

0 6 . 1

Figure 5



Complete Figure 5 by plotting the results from Table 1 and joining the points with straight lines.

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[2 marks]

0 6 . 2

Determine the speed of the car between 0 s and 6 s.

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Speed = m/s

[2 marks]

0 6 . 3

Describe how the speed of the car changed at 6 s. Explain how the graph shows this.

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.....

.....

[2 marks]

0 6 . 4

Calculate the average speed of the car over the 10 s.

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.....

.....

Average speed = m/s

[1 mark]

.....

0 7

Table 2 shows a runner's total distance and total time at four checkpoints in a race. The runner starts at time 0 s.

Table 2

Checkpoint	Total distance in km	Total time in s
1	5	1500
2	10	3100
3	15	4750
4	20	6500

0 7 . 1

Calculate the runner's average speed for the whole 20 km.

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.....

Average speed = m/s

[3 marks]

0 7 . 2

Determine, with calculations, during which 5 km section of the race the runner's average speed was greatest.

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.....

.....

[2 marks]

0 7 . 3

A distance–time graph is drawn for the runner, with straight lines joining the points.

Describe how the gradient of the graph changes from one section to the next, and explain what this shows.

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.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: The distance–time relationship · 32 marks

Question 1 (5 marks)

01.1 [1 mark]

Answer: The student is stationary.

- stationary / not moving (1)
-

01.2 [2 marks]

Answer: 1.5 m/s

- speed = $60 \div 40$ (1)
 - 1.5 (m/s) (1)
-

01.3 [2 marks]

Answer: Between 70 s and 100 s, where the graph is steepest.

- between 70 s and 100 s (1)
 - the gradient (slope) of the graph is steepest (1)
-

Question 2 (4 marks)

02.1 [1 mark]

Correct: A

02.2 [1 mark]

Correct: B

02.3 [1 mark]

Correct: C

02.4 [1 mark]

Answer: The gradient (slope) is decreasing.

- the gradient (slope) of the graph decreases (1)
-

Question 3 (3 marks)

03.1 [1 mark]

Correct: A greater speed

03.2 [2 marks]

Answer: 1.4 m/s

- $v = 350 \div 250$ (1)
 - 1.4 (m/s) (1)
-

Question 4 (3 marks)

04.1 [1 mark]

Answer: 16 m

- 16 (m) (1)
-

04.2 [2 marks]

Answer: 8 m/s

- gradient = $64 \div 8$ (or any correct pair of values) (1)
 - 8 (m/s) (1)
-

Question 5 (3 marks)

05.1 [1 mark]

Answer: 18 m

- 18 (m) (1)
-

05.2 [2 marks]

Answer: 2 m/s

- gradient = $24 \div 12$ (or any correct pair of values) (1)
 - 2 (m/s) (1)
-

Question 6 (7 marks)

06.1 [2 marks]

Answer: Points plotted; a straight line from (0, 0) to (6, 9.0) and a less steep straight line from (6, 9.0) to (10, 12.0).

- all six points plotted correctly (to within half a small square) (1)
- straight line from 0 s to 6 s and a straight line from 6 s to 10 s (1)

06.2 [2 marks]

Answer: 1.5 m/s

- speed = $9.0 \div 6$ (1)
- 1.5 (m/s) (1)

06.3 [2 marks]

Answer: The car slowed down (to 0.75 m/s); the gradient of the graph decreased.

- the car slowed down / its speed decreased (to 0.75 m/s) (1)
- the gradient of the graph decreased (1)

06.4 [1 mark]

Answer: 1.2 m/s

- $12.0 \div 10 = 1.2$ (m/s) (1)

Question 7 (7 marks)

07.1 [3 marks]

Answer: 3.08 m/s

- total distance = 20 km = 20 000 (m) (1)
- average speed = $20\,000 \div 6500$ (1)
- 3.08 (m/s) (1)

07.2 [2 marks]

Answer: The first section, start to checkpoint 1 (3.33 m/s).

- average speed calculated for each section: 3.33, 3.13, 3.03 and 2.86 (m/s) (1)
- the first section (from the start to checkpoint 1) (1)

07.3 [2 marks]

Answer: The gradient decreases section by section, showing the runner's speed decreases.

- the gradient decreases (the graph becomes less steep) in each later section (1)
 - the gradient represents the speed, so the runner slows down during the race (1)
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