



4.4D Real Life and Distance Time Graphs: Fluency and Exam Drill

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Total Marks

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Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A distance-time graph shows Maya walking. At time 0 min she is at 0 km. At 10 min she is at 0.8 km, at 20 min she is at 1.5 km and at 30 min she is at 2.0 km.
Work out Maya's distance from her start after 20 minutes.

(Total for Question 1 is 1 mark)

- 2** A person walks away from home and later returns. Their distance-time data are: 0 min = 0 km, 15 min = 1.2 km, 30 min = 2.0 km, 45 min = 0 km.
How long after the start did they return to their home?

(Total for Question 2 is 1 mark)

- 3** A distance-time graph for a dog walker shows the distance rising from 0 km at 0 min to 1.4 km at 15 min, staying at 1.4 km until 25 min, then increasing again after 25 min.
Write down the interval of time when the dog walker is stationary.

(Total for Question 3 is 1 mark)

- 4** A cyclist's distance from home is shown by a straight line from (time, distance) (0 min, 0 km) to (30 min, 2.0 km).
Work out the cyclist's speed in km/h between 0 and 30 minutes.

(Total for Question 4 is 2 marks)

- 5** A car travels from A to B. Its distance-time graph shows a straight line from (0 s, 0 m) to (20 s, 100 m).

Work out the car's speed in m/s and give your answer in km/h.

(Total for Question 5 is 2 marks)

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- 6** A runner's distance-time graph shows these points: 0 min = 0 m, 5 min = 1000 m, 8 min = 1000 m, 12 min = 3000 m, 14 min = 2000 m.

(a) Work out the runner's speed during the first running section (0 to 5 min) in m/s, correct to 2 decimal places.

(b) Describe what happens to the runner between 12 min and 14 min.

(c) Work out the total distance the runner travelled during the whole 14 minutes.

- (a) Work out the runner's speed during the first running section (0 to 5 min) in m/s, correct to 2 decimal places. (2)

(b) Describe what happens to the runner between 12 min and 14 min. (1)

(c) Work out the total distance the runner travelled during the whole 14 minutes. (1)

(Total for Question 6 is 4 marks)

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- 7** At times 10 min and 25 min a cyclist is at distances 2.0 km and 3.5 km respectively. Show that the cyclist's speed between 10 min and 25 min is 6 km/h. (Show your working.)

(Total for Question 7 is 3 marks)

8 A bus journey has three parts: first leg 10 km in 20 minutes, then a 10 minute stop, then second leg 20 km in 40 minutes.

(a) Work out the speed of the bus during the first leg in km/h.

(b) How long was the bus stopped?

(c) Work out the average speed for the whole journey, including the stop, correct to 2 decimal places.

(a) Work out the speed of the bus during the first leg in km/h. (1)

(b) How long was the bus stopped? (1)

(c) Work out the average speed for the whole journey, including the stop. Give your answer correct to 2 decimal places. (2)

(Total for Question 8 is 4 marks)

9 A toy car's distance-time graph shows it travels 50 m in the first 10 seconds.
Work out the speed in m/s and in km/h.

(Total for Question 9 is 2 marks)

10 A cyclist rides from home to the shop then back. The graph shows: 0 min = 0 km, 20 min = 8 km, 35 min = 8 km (stopped at the shop from 20 to 35 min), 60 min = 0 km.

(a) Work out the cyclist's speed on the way to the shop in km/h and the speed on the way back in km/h.

(b) Work out the total time of the whole journey.

(c) Work out the cyclist's average speed for the whole journey excluding the time at the shop (give your answer to 3 significant figures).

(a) Work out the cyclist's speed on the way to the shop in km/h and the speed on the way back in km/h. (4)

(b) Work out the total time of the whole journey. (1)

(c) Work out the cyclist's average speed for the whole journey excluding the time at the shop. Give your answer to 3 significant figures. (1)

(Total for Question 10 is 6 marks)

11 A recorded distance-time sequence shows: 0 s = 0 m, 6 s = 90 m, 12 s = 150 m, 20 s = 90 m. Between which two recorded times did the person change direction?

(Total for Question 11 is 1 mark)

12 A walker follows this piecewise path: 0 to 10 min increases from 0 km to 2.0 km, 10 to 30 min stays at 2.0 km, 30 to 45 min increases to 5.0 km.

(a) Calculate the walker's average speed over the whole 45 minutes in km/h. Give your answer to 2 decimal places.

(b) Explain briefly why the average speed over the whole 45 minutes is less than the speed during the last section (30 to 45 min).

(a) Calculate the walker's average speed over the whole 45 minutes in km/h. Give your answer to 2 decimal places. (2)

(b) Explain briefly why the average speed over the whole 45 minutes is less than the speed during the last section (30 to 45 min). (1)

(Total for Question 12 is 3 marks)

Mark scheme · 4.4D Real Life and Distance Time Graphs: Fluency and Exam Drill

Question 1

- **B1** 1.5 km cao
- **Answer: 1.5 km**

Question 2

- **B1** 45 minutes cao
- **Answer: 45 minutes**

Question 3

- **B1** 15 to 25 minutes cao
- **Answer: 15 to 25 minutes**

Question 4

- **M1** calculate gradient: $2.0 \text{ km} / 30 \text{ min}$ and convert to km/h , e.g. $(2.0/30) \times 60$ oe
- **A1** 4 km/h cao
- **Answer: 4 km/h**

Question 5

- **M1** calculate speed = $100 \text{ m} / 20 \text{ s} = 5 \text{ m/s}$ or show conversion to km/h (5×3.6)
- **A1** 5 m/s and 18 km/h cao
- **Answer: 5 m/s and 18 km/h**

Question 6

- (a) **M1** use speed = distance / time: $1000 \text{ m} / (5 \times 60) \text{ s}$ or show $1000/300$
- (a) **A1** 3.33 m/s awrt cao
- (a) **Answer: 3.33 m/s**
- (b) **B1** runner returns towards the start (distance decreases) or turns back oe
- (b) **Answer: The runner turns and runs back towards the start; the distance decreases.**
- (c) **A1** 4000 m cao
- (c) **Answer: 4000 m**

Question 7

- **M1** find delta distance = $3.5 - 2.0 = 1.5 \text{ km}$ and delta time = $25 - 10 = 15 \text{ min}$
- **M1** compute speed in $\text{km/min} = 1.5/15 = 0.1 \text{ km/min}$ and convert to km/h by multiplying by 60
- **A1** 6 km/h cso
- **Answer: 6 km/h**

Question 8

- (a) **B1** 30 km/h cao
- (a) **Answer: 30 km/h**
- (b) **B1** 10 minutes cao
- (b) **Answer: 10 minutes**
- (c) **M1** total distance = $10 + 20 = 30 \text{ km}$; total time = $20 + 10 + 40 = 70 \text{ min} = 70/60 \text{ h}$; use speed = distance/time
- (c) **A1** 25.71 km/h awrt cao
- (c) **Answer: 25.71 km/h**

Question 9

- **M1** calculate $50/10 = 5 \text{ m/s}$
- **A1** 5 m/s and 18 km/h **cao**
- **Answer: 5 m/s and 18 km/h**

Question 10

- (a) **M1** outbound: 8 km in 20 min , speed = $8/(20/60) = 24 \text{ km/h}$ shown
- (a) **A1** 24 km/h **cao**
- (a) **M1** return: 8 km in 25 min , speed = $8/(25/60) = 8/(5/12) = 19.2 \text{ km/h}$ shown
- (a) **A1** 19.2 km/h **cao**
- (a) **Answer: 24 km/h and 19.2 km/h**
- (b) **B1** 60 minutes **cao**
- (b) **Answer: 60 minutes**
- (c) **A1** 21.3 km/h **awrt** **cao**
- (c) **Answer: 21.3 km/h**

Question 11

- **B1** between 12 s and 20 s **cao**
- **Answer: Between 12 s and 20 s**

Question 12

- (a) **M1** total distance = 5.0 km ; total time = $45 \text{ min} = 45/60 \text{ h}$; speed = $5 / (45/60)$
- (a) **A1** 6.67 km/h **awrt** **cao**
- (a) **Answer: 6.67 km/h**
- (b) **B1** because part of the time the walker was stationary ($10 \text{ to } 30 \text{ min}$), reducing the overall average speed
- (b) **Answer: Because the walker was stationary from $10 \text{ to } 30 \text{ minutes}$, this lowers the overall average speed compared with the higher speed during $30 \text{ to } 45 \text{ minutes}$.**