4.4 Real Life and Distance Time Graphs: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

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)

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2 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 2 is 1 mark)

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3 A runner moves at a steady speed of 12 km/h, shown on a distance-time graph as a straight line through the origin. Work out the time, in minutes, when the runner reaches 5 km.

(Total for Question 3 is 1 mark)

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4 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 4 is 2 marks)

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5 A student reads a distance-time graph and finds a cyclist's speed is 12 km in 30 minutes. Give the cyclist's speed in km/h.

(Total for Question 5 is 2 marks)

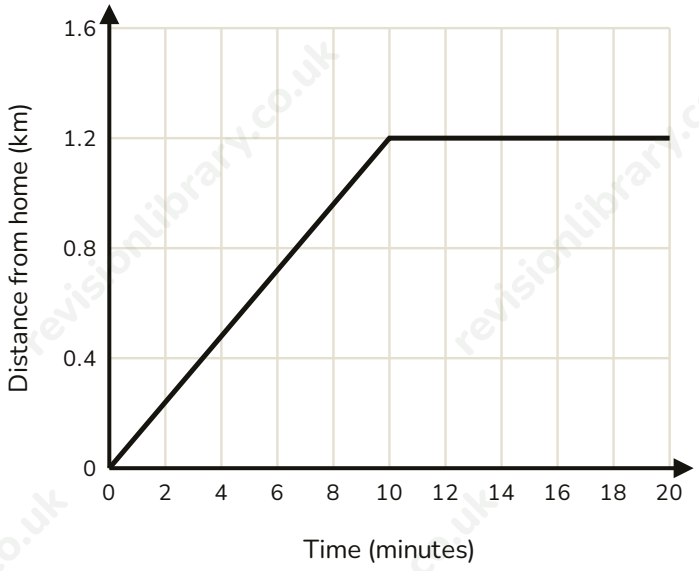
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6 The graph shows Lara walking from home to school along a straight road. The distance is measured from her home in kilometres.

Time (minutes) on the horizontal axis; Distance from home (km) on the vertical axis.

From 0 to 10 minutes the graph is a straight line from (0, 0) to (10, 1.2). From 10 to 20 minutes the graph is horizontal at distance 1.2 km.

Use the graph to answer the questions.



(a) Work out Lara's average speed in km/h between 0 and 10 minutes. **(1)**

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(b) State what the horizontal line from 10 to 20 minutes tells you about Lara's motion. **(1)**

(Total for Question 6 is 2 marks)

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7 Mia cycles 20 km to the viewpoint in 40 minutes. She rests for 15 minutes. She then cycles back the same way in 45 minutes.
Work out her average speed for the whole journey in kilometres per hour.

(Total for Question 7 is 3 marks)

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8 Mia cycles 26 km to the lake in 60 minutes. She rests for 20 minutes. She then cycles back the same way in 50 minutes.
Work out her average speed for the whole journey in kilometres per hour.

(Total for Question 8 is 3 marks)

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9 A coach travels 7 km in 20 minutes.
Work out the average speed in kilometres per hour.

(Total for Question 9 is 2 marks)

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10 Anna leaves home at 09:00 and cycles along a straight road at 15 km/h. Ben leaves the same home at 09:29 and follows her along the same road at 20 km/h.
At what time does Ben catch up with Anna?

(Total for Question 10 is 4 marks)

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11 Two towns A and B are 7 km apart on a straight road. Priya cycles from A towards B at 13 km/h. At the same time Omar cycles from B towards A at 7 km/h.
How far from A are they when they meet?

(Total for Question 11 is 3 marks)

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12 Mia cycles 15 km to the lake in 40 minutes. She rests for 10 minutes. She then cycles back the same way in 40 minutes.
Work out her average speed for the whole journey in kilometres per hour.

(Total for Question 12 is 3 marks)

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13 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. **(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 13 is 6 marks)

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14 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 14 is 3 marks)

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15 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. **(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 15 is 3 marks)

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16 A distance-time graph for a runner is made from three connected straight segments. From $t = 0$ to $t = 8$ seconds the distance is given by $d = 2t$ metres. From $t = 8$ to $t = 20$ seconds the runner slows with speed 1.5 m/s. From $t = 20$ to $t = 28$ seconds the runner rests and distance stays constant.

Use these expressions to answer the questions.

(a) Find the distance from the start at $t = 8$ seconds. **(1)**

(b) Work out the distance at $t = 20$ seconds. **(2)**

(c) State the runner's speed between 20 and 28 seconds and explain what the graph looks like on that interval. **(1)**

(Total for Question 16 is 4 marks)

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Mark scheme · 4.4 Real Life and Distance Time Graphs: Test Pack

Question 1

1.5 km cao **B1**

Answer: 1.5 km

Question 2

15 to 25 minutes cao **B1**

Answer: 15 to 25 minutes

Question 3

25 minutes cao **B1**

Answer: 25 minutes

Question 4

calculate speed = 100 m / 20 s = 5 m/s or show conversion to km/h (5 * 3.6) **M1**

5 m/s and 18 km/h cao **A1**

Answer: 5 m/s and 18 km/h

Question 5

convert 30 minutes to hours and compute 12 / 0.5 or 12 x 2 **M1**

24 km/h cao **A1**

Answer: 24 km/h

Question 6

(a) 1.2 km in 10 minutes -> 1.2*(60/10)=7.2 km/h cao **B1**

(a) Answer: 7.2 km/h

(b) she is stationary / not moving / stopped between 10 and 20 minutes oe **B1**

(b) Answer: She is stationary; her distance from home does not change between 10 and 20 minutes.

Question 7

total distance 40 km **M1**

total time 100 minutes = 5/3 hours **M1**

24 km/h **A1**

Answer: 24 km/h

Question 8

total distance 52 km **M1**

total time 130 minutes = 13/6 hours **M1**

24 km/h **A1**

Answer: 24 km/h

Question 9

20 minutes = 1/3 hours or 7 x 60 / 20 **M1**

21 km/h **A1**

Answer: 21 km/h

Question 10

Anna's head start 7.25 km **M1**

closing speed 5 km/h **M1**

time to catch up 87 minutes **M1**

10:56 **A1**

Answer: 10:56

Question 11

closing speed 20 km/h **M1**

time = 7 / 20 hours **M1**

4.55 km **A1**

Answer: 4.55 km

Question 12

total distance 30 km **M1**

total time 90 minutes = 1.5 hours **M1**

20 km/h **A1**

Answer: 20 km/h

Question 13

(a) outbound: 8 km in 20 min, speed = 8/(20/60) = 24 km/h shown **M1**

(a) 24 km/h cao **A1**

(a) return: 8 km in 25 min, speed = 8/(25/60) = 8/(5/12) = 19.2 km/h shown **M1**

(a) 19.2 km/h cao **A1**

(a) Answer: 24 km/h and 19.2 km/h

(b) 60 minutes cao **B1**

(b) Answer: 60 minutes

(c) 21.3 km/h awrt cao **A1**

(c) Answer: 21.3 km/h

Question 14

find delta distance = 3.5 - 2.0 = 1.5 km and delta time = 25 - 10 = 15 min **M1**

compute speed in km/min = 1.5/15 = 0.1 km/min and convert to km/h by multiplying by 60 **M1**

6 km/h cso **A1**

Answer: 6 km/h

Question 15

(a) total distance = 5.0 km; total time = 45 min = 45/60 h; speed = 5 / (45/60) **M1**

(a) 6.67 km/h awrt cao **A1**

(a) Answer: 6.67 km/h

(b) because part of the time the walker was stationary (10 to 30 min), reducing the overall average speed oe **B1**

(b) Answer: Because the walker was stationary from 10 to 30 minutes, this lowers the overall average speed compared with the higher speed during 30 to 45 minutes.

Question 16

(a) 16 m cao **B1**

(a) Answer: 16 m

(b) distance at 8 s plus 12 s at 1.5 m/s -> 16 + 1.5*12 **M1**

(b) 34 m cao **A1**

(b) Answer: 34 m

(c) speed 0 m/s and horizontal line (distance constant) oe **B1**

(c) Answer: Speed 0 m/s; the graph is a horizontal line at distance 34 m between t = 20 and 28 s.

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