HIGHER

4.4H Real Life and Distance Time Graphs: Higher Tier Practice

Total Marks

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 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.

Figure (to be drawn): Distance-time graph for Lara: straight line from (0,0) to (10,1.2) then horizontal at 1.2 from 10 to 20.

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

.....

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

(Total for Question 1 is 2 marks)

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2 A cyclist travels on a straight path. Their distance-time graph is a straight line from (0, 0) to (15, 9) minutes and kilometres respectively. After that the cyclist continues at a constant slower speed and reaches 12 km at 30 minutes.

(a) Work out the cyclist's speed in km/h for the first 15 minutes. **(1)**

.....

(b) Find the cyclist's speed in km/h between 15 and 30 minutes. **(2)**

.....

(Total for Question 2 is 3 marks)

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3 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 3 is 4 marks)

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4 The graph of a delivery van is modelled by d(t) where d is distance in kilometres from the depot and t is time in hours. From t = 0 to t = 1 the van travels out so that d(t) = 48t. Then from t = 1 to t = 3 the van moves at constant slower speed reaching d = 72 km at t = 3. After t = 3 the van returns to the depot at a constant speed and arrives at t = 5.

(a) Find the van's speed in km/h between t = 1 and t = 3. **(2)**

.....

(b) Find a formula for d(t) for the return journey for $3 \leq t \leq 5$, and simplify it to the form d(t)=at+b. **(2)**

.....

(c) On the return journey, at what time t (in hours) is the van 24 km from the depot? Give your answer in hours and minutes. **(1)**

.....

(Total for Question 4 is 5 marks)

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Mark scheme · 4.4H Real Life and Distance Time Graphs: Higher Tier Practice

Question 1

- (a) **B1** 1.2 km in 10 minutes -> 1.2*(60/10)=7.2 km/h cao
- **(a) Answer: 7.2 km/h**
- (b) **B1** she is stationary / not moving / stopped between 10 and 20 minutes oe
- **(b) Answer: She is stationary; her distance from home does not change between 10 and 20 minutes.**

Question 2

- (a) **B1** 9 km in 15 minutes -> 9*(60/15)=36 km/h cao
- **(a) Answer: 36 km/h**
- (b) **M1** change in distance 12-9=3 km in 15 minutes -> convert to hours 3*(60/15) or 3*4
- (b) **A1** 12 km/h cao
- **(b) Answer: 12 km/h**

Question 3

- (a) **B1** 16 m cao
- **(a) Answer: 16 m**
- (b) **M1** distance at 8 s plus 12 s at 1.5 m/s -> 16 + 1.5*12
- (b) **A1** 34 m cao
- **(b) Answer: 34 m**
- (c) **B1** speed 0 m/s and horizontal line (distance constant) oe
- **(c) Answer: Speed 0 m/s; the graph is a horizontal line at distance 34 m between t = 20 and 28 s.**

Question 4

- (a) **M1** distance at t=1 is 48 km and at t=3 is 72 km so change is 24 km over 2 hours -> speed = 24/2
- (a) **A1** 12 km/h cao
- **(a) Answer: 12 km/h**
- (b) **M1** find return speed: from 72 to 0 in 2 hours -> change -72 over 2 -> -36 km/h slope
- (b) **A1** d(t)=72-36(t-3) which simplifies to d(t)=180-36t cao
- **(b) Answer: d(t)=180-36t (for $3 \leq t \leq 5$)**
- (c) **B1** solve 180-36t=24 -> 36t=156 -> t=13/3=4.333... hours -> 4 h 20 min cao
- **(c) Answer: 4 hours 20 minutes**

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