HIGHER

8.7 Velocity Time Graphs: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A vehicle's velocity-time graph is as follows: from t = 0 to 4 s the velocity increases uniformly from 0 m/s to 8 m/s; from t = 4 s to 10 s the velocity is constant at 8 m/s. Work out the total distance travelled in the first 10 seconds.

(Total for Question 1 is 3 marks)

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2 A car starts from rest and accelerates uniformly at 2 m/s^2 for 6 seconds. It then brakes uniformly at -3 m/s^2 until it stops. Work out the total distance the car travels from the start until it stops.

(Total for Question 2 is 4 marks)

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3 The velocity-time graph of a car is made up of straight line segments joining the points (t, v) = (0, 0), (4, 20), (24, 20), (32, 14), (36, 0), where t is the time in seconds and v is the velocity in m/s. Work out the total distance travelled.

(Total for Question 3 is 4 marks)

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4 The velocity-time graph of a train is made up of straight line segments joining the points (t, v) = (0, 0), (8, 14), (28, 18), (33, 0), where t is the time in seconds and v is the velocity in m/s. Work out the average speed over the whole journey. Give your answer correct to 1 decimal place.

(Total for Question 4 is 4 marks)

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5 The velocity-time graph of a train is made up of straight line segments joining the points (t, v) = (0, 0), (20, 10), (30, 10), (50, 0), where t is the time in seconds and v is the velocity in m/s. Between t = 30 and t = 50 the velocity is decreasing steadily. Work out the value of t in this interval when the velocity is 5.5 m/s.

(Total for Question 5 is 3 marks)

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6 The velocity-time graph of a lift is made up of straight line segments joining the points (t, v) = (0, 0), (8, 18), (16, 14), (20, 0), where t is the time in seconds and v is the velocity in m/s. Work out the deceleration of the lift between t = 16 and t = 20.

(Total for Question 6 is 2 marks)

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7 The table gives the velocity v (m/s) of a cyclist at different times t (seconds). t = 0: v = 17, t = 2: v = 10, t = 4: v = 10, t = 6: v = 7, t = 8: v = 11. Use trapeziums to estimate the distance travelled between t = 0 and t = 8.

(Total for Question 7 is 4 marks)

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Mark scheme · 8.7 Velocity Time Graphs: 30-minute Pack

Question 1

area of triangle 0.5 * 4 * 8 = 16 or equivalent method for first 4 s	**M1**
area of rectangle 6 * 8 = 48 for next 6 s	**M1**
64 m cao	**A1**

Answer: 64 m

Question 2

distance during acceleration = 0.5 * 2 * 6^2 = 36 or equivalent	**M1**
speed at end of acceleration v = 0 + 2 * 6 = 12 m/s, then braking time = 12 / 3 = 4 s	**M1**
distance during braking = 12 * 4 - 0.5 * 3 * 4^2 = 24 or equivalent	**M1**
60 m cao	**A1**

Answer: 60 m

Question 3

area of one section calculated	**M1**
all sections' areas calculated	**M1**
adds the areas	**M1**
604 m cao	**A1**

Answer: 604 m

Question 4

area of at least one section found	**M1**
total distance 421	**M1**
divides by total time 33	**M1**
12.8 m/s cao	**A1**

Answer: 12.8 m/s

Question 5

gradient of the segment = -10/20	**M1**
forms and solves a linear equation	**M1**
t = 39	**A1**

Answer: t = 39

Question 6

change in velocity / change in time = -14/4	**M1**
3.5 m/s^2	**A1**

Answer: 3.5 m/s^2

Question 7

strip width 2	**B1**
area of a trapezium (a + b)h/2 used	**M1**
all trapezium areas added	**M1**
82 m cao	**A1**

Answer: 82 m

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