HIGHER

8.7 Velocity Time Graphs: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A car starts from rest and accelerates uniformly at 4 m/s^2 for 4 seconds. It then travels at constant velocity for 10 seconds before decelerating uniformly to rest in 8 seconds. Work out the total distance travelled.

(Total for Question 1 is 5 marks)

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2 The velocity-time graph of a train is made up of straight line segments joining the points (t, v) = (0, 0), (10, 18), (30, 18), (35, 10), (40, 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 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), (20, 20), (40, 14), (50, 0), where t is the time in seconds and v is the velocity in m/s. Work out the deceleration of the car between t = 20 and t = 40.

(Total for Question 3 is 2 marks)

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4 The velocity-time graph of a lift is made up of straight line segments joining the points (t, v) = (0, 0), (5, 12), (13, 4), (18, 0), where t is the time in seconds and v is the velocity in m/s. Between t = 0 and t = 5 the velocity is increasing steadily. Work out the value of t in this interval when the velocity is 7.2 m/s.

(Total for Question 4 is 3 marks)

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5 The velocity-time graph of a cyclist is made up of straight line segments joining the points (t, v) = (0, 0), (8, 18), (16, 18), (26, 4), (31, 0), where t is the time in seconds and v is the velocity in m/s. Work out the acceleration of the cyclist between t = 0 and t = 8.

(Total for Question 5 is 2 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), (20, 24), (40, 24), (45, 22), (65, 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 6 is 4 marks)

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7 The velocity-time graph of a drone is made up of straight line segments joining the points (t, v) = (0, 0), (10, 8), (15, 8), (35, 16), (43, 0), where t is the time in seconds and v is the velocity in m/s. Work out the acceleration of the drone between t = 0 and t = 10.

(Total for Question 7 is 2 marks)

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8 The velocity-time graph of a lift is made up of straight line segments joining the points (t, v) = (0, 0), (5, 16), (10, 16), (15, 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 8 is 4 marks)

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9 The velocity-time graph of a cyclist is made up of straight line segments joining the points (t, v) = (0, 0), (10, 4), (18, 24), (38, 0), where t is the time in seconds and v is the velocity in m/s. Work out the acceleration of the cyclist between t = 10 and t = 18.

(Total for Question 9 is 2 marks)

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10 The velocity-time graph of a cyclist is made up of straight line segments joining the points (t, v) = (0, 0), (5, 14), (13, 14), (33, 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 10 is 4 marks)

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11 The velocity-time graph of a lift is made up of straight line segments joining the points (t, v) = (0, 0), (10, 4), (15, 6), (35, 0), where t is the time in seconds and v is the velocity in m/s. Work out the acceleration of the lift between t = 0 and t = 10.

(Total for Question 11 is 2 marks)

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12 A cyclist starts from rest and accelerates uniformly at 4 m/s^2 for 8 seconds. It then travels at constant velocity for 6 seconds before decelerating uniformly to rest in 5 seconds. Work out the total distance travelled.

(Total for Question 12 is 5 marks)

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13 The velocity-time graph of a train is made up of straight line segments joining the points (t, v) = (0, 0), (4, 18), (9, 18), (13, 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 13 is 4 marks)

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14 The velocity-time graph of a drone is made up of straight line segments joining the points (t, v) = (0, 0), (10, 16), (30, 16), (38, 4), (58, 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 14 is 4 marks)

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Mark scheme · 8.7 Velocity Time Graphs: 1-hour Pack

Question 1

maximum velocity 4 x 4 = 16	M1
distance while accelerating = 1/2 x 16 x 4	M1
distance at constant velocity = 16 x 10	M1
distance while decelerating = 1/2 x 16 x 8	M1
256 m cao	A1

Answer: 256 m

Question 2

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

Answer: 545 m

Question 3

change in velocity / change in time = -6/20	M1
0.3 m/s^2	A1

Answer: 0.3 m/s^2

Question 4

gradient of the segment = 12/5	M1
forms and solves a linear equation	M1
t = 3	A1

Answer: t = 3

Question 5

change in velocity / change in time = 18/8	M1
2.25 m/s^2	A1

Answer: 2.25 m/s^2

Question 6

area of one section calculated	M1
all sections' areas calculated	M1
adds the areas	M1
1055 m cao	A1

Answer: 1055 m

Question 7

change in velocity / change in time = 8/10	M1
0.8 m/s^2	A1

Answer: 0.8 m/s^2

Question 8

area of at least one section found	M1
total distance 160	M1
divides by total time 15	M1
10.7 m/s cao	A1

Answer: 10.7 m/s

Question 9

change in velocity / change in time = 20/8	M1
2.5 m/s^2	A1

Answer: 2.5 m/s^2

Question 10

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

Answer: 287 m

Question 11

change in velocity / change in time = 4/10	M1
0.4 m/s^2	A1

Answer: 0.4 m/s^2

Question 12

maximum velocity 4 x 8 = 32	M1
distance while accelerating = 1/2 x 32 x 8	M1
distance at constant velocity = 32 x 6	M1
distance while decelerating = 1/2 x 32 x 5	M1
400 m cao	A1

Answer: 400 m

Question 13

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

Answer: 162 m

Question 14

area of at least one section found	M1
total distance 520	M1
divides by total time 58	M1
9.0 m/s cao	A1

Answer: 9.0 m/s

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