Mark scheme

Speed-time graphs

Physics 0625 · Questions from Paper 3 and Paper 4

Total marks

71

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
5	5	6	7	7	7	8	8	9	9	**71**

Question 1 [5]

1(a)	(constant) acceleration **OR** accelerating **OR** increasing speed	**B1**
1(b)	zero	**B1**
1(c)	60 (m)	**A3**
	½ × 6(.0) × 20	(C2)
	distance = area under (speed–time) graph **OR** ½ × *b* × *h*	(C1)

Question 2 [5]

2(a)	(acceleration) increases	**B1**
2(b)	tangent drawn at 25 s	**M1**
	78 to 82 m / s^2	**A1**
2(c)	(distance =) area under graph (stated or correct area clearly shown on graph) OR (400 x 10) / 2 OR (b x h) ÷ 2	**C1**
	2000 m	**A1**

Question 3 [6]

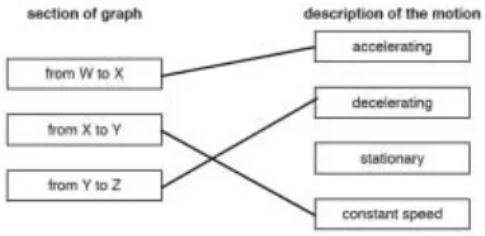
3(a)	speed **OR** velocity on y-axis **AND** time x-axis	**B1**
3(b)	A to B	**B1**
3(c)	area under graph	**C1**
	0.5 × 5 × 5 (+ (3 × 5))	**C1**
	27.5 (m)	**A1**
3(d)	correctly placed continuous single thin straight line from A to E drawn using a rule	**B1**
	Total:	**6**

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Question 4 [7]

4(a)	A – accelerates (from rest)	**B1**
	B – constant speed (of 2 m / s)	**B1**
	C – accelerates at faster rate / higher acceleration than previously	**B1**
	D – faster constant speed (of 10 m / s)	**B1**
4(b)	2 minutes = 120 s	**C1**
	area under the graph OR $d = s \times t$ OR 2×120	**C1**
	240 (m)	**A1**

Question 5 [7]

5(a)	 1 mark for each correct line. 2 or more lines from any section loses the mark.	**3**
5(b)	(distance travelled) = area under graph OR ½ × base × height	**1**
	½ × 40 × 20	**1**
	400 (m)	**1**
5(c)	1st section/WX/from 0 s to 30 s has greater gradient than last (section)/YZ/from 60 s to 100 s	**1**

Question 6 [7]

6 **(a)** **(i)** horizontal line at 10 m / s B1

(ii) straight line from origin to (5.0, 25) B1

(b) **(i)** 50 m B1

(ii) area of triangle OR ½ × 25 × 5.0 C1

62.5 m OR 63 m A1

(iii) when areas under graphs are equal C1
4.0 s A1

[Total: 7]

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Question 7 [8]

7(a)(i)	constant gradient OR straight line	**B1**
7(a)(ii)	calculation of gradient (a = 4 / 2 =) 2.0 m / s^2	**C1** **A1**
7(a)(iii)	decreases / becomes zero	**B1**
7(b)	area or s = (av)v x t use of any triangle or trapezium (total distance =) 54–66 (m) (total distance =) 58–62 m	**C1** **C1** **C1** **A1**

Question 8 [8]

8 **(a)** suitable scales (more than half each scale used, no products of 3 s, 7 s etc.) B1
2 straight line sections, continuous 0 to 120 s, 1st section positive gradient,
2nd section negative gradient B1
section 1 straight line, from(0, 0) to (30, 900) B1
section 2 straight line from end of section 1 to (120, 0) B1 [4]

(b) **(i)** use of $a = \Delta v / t$ or $\Delta v / t$ in any form words, symbols or numbers C1
(a = 900 / 30 =) 30 m / s^2 A1 [2]
e.c.f. from graph

(ii) use of s = area under graph (accept valid equation(s)) C1
(distance = 0.5 × 900 × 120 =) 54 000 m A1 [2]
e.c.f. from <u>continuous</u> graph, if curves working must be clear
no e.c.f. from graph if it's a single rectangle

[Total: 8]

Question 9 [9]

9(a)(i)	9.3 (m / s)	**A2**
	any indication on graph or in working of vertical line from 10.0 s	**(C1)**
9(a)(ii)	(car) A (has greater acceleration)	**M1**
	(speed-time graph/line) has greater gradient OR is steeper	**A1**
9(b)(i)	<u>speed</u> (of car) is steady OR <u>speed</u> is constant	**B1**
	(at) 16 <u>m / s</u>	**B1**
9(b)(ii)	240 (m)	**A3**
	(distance =) ½ × 16 × 30	**(C2)**
	distance travelled = area under graph OR (d =)speed × time OR ½ × b × h	**(C1)**

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Question 10 [9]

10(a)(i)	3(.0) (m / s)	**A2**
	any indication on graph or in working of vertical / horizontal line from 6.0 s	C1
10(a)(ii)	16 (m / s)	**B1**
10(b)(i)	(constant) accelerating / speed increasing	**B1**
10(b)(ii)	greater acceleration	**B1**
	line is steeper / greater gradient	**B1**
10(c)	25 (m)	**A3**
	½ × 5 × 10	(C2)
	(distance =) area under graph OR ½ × *b* × *h* OR (distance =) speed × time	(C1)

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