

Practice Tests Set 17 – Paper 2H-3H mark scheme, performance data and suggested grade boundaries

1	3.4 or $\frac{17}{5}$ or $3\frac{2}{5}$ or $3\frac{24}{60}$ or 204 oe		3	B1
	$433.5 \div 3.4$ or $433.5 \div \frac{17}{5}$ or $433.5 \div 3\frac{2}{5}$ or $\frac{433.5}{'204'} \times 60$ oe			M1 for use of speed = distance \div time Allow $433.5 \div 3.24$ (= 133.796...) for this mark only
		127.5		A1 oe allow 128
				Total 3 marks

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2	$0.024 \times 50\,000 (= 1200)$ oe or $1.024 \times 50\,000 (= 51\,200)$ oe or $1.024^2 \times 50\,000 (= 52\,428.8)$ oe or $0.024 \times 50\,000 \times 3 (= 3600)$ oe $0.024 \times 50\,000 \times 3 + 50\,000 (= 53\,600)$ oe		3	M1	M2 for $50\,000 \times 1.024^3$
	$0.024 \times (50\,000 + '1200')$ (= 1228.8) oe and $0.024 \times (50\,000 + '1200' + '1228.8')$ (= 1258.2912) or '1200' + '1228.8' + '1258.2912' (= 3687.(0912)) or $1.024 \times '52\,428.8'$			M1 for completing method to find total amount in the account	
		53 687		A1 accept 53 687 – 53 688	
				accept $(1 + 0.024)$ or $\left(1 + \frac{2.4}{100}\right)$ as equivalent to 1.024 throughout	
				Total 3 marks	

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3	(a)		Pacific	1	B1	Accept 1.357×10^5
	(b)	$1.119 \times 10^5 - 1.797 \times 10^4$		2	M1	Accept 111 900 – 17 970 oe or 93 930 or –93 930
			$9.393(0) \times 10^4$		A1	Accept $(\pm) 9.393(0) \times 10^4$ or $(\pm) 9.39 \times 10^4$ or $(\pm) 9.4 \times 10^4$
						Total 3 marks

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4	$0.5 \times \pi \times 6^2 (= 56.54\dots)$ or $12 \times 6 (= 72)$ or $\pi \times 6^2$ oe		3	M1
	“72” – “56.54...”			M1 dep M1 for a complete method
		15.5		A1 15.4 to 15.5
				Total 3 marks

5	$(5 - 2) \times 180 \div 5 (= 108)$ or $360 \div 5 (= 72)$		5	M1 for method to find an interior or exterior angle of a pentagon
	$(6 - 2) \times 180 \div 6 (= 120)$ or $360 \div 6 (= 60)$			M1 for method to find an interior or exterior angle of a hexagon
	$360 - 108 - 120 (= 132)$ or $60 + 72 (= 132)$ or $(180 - '120') + (180 - '108')$			M1 dep on M2 for a correct method to find angle <i>EDI</i> using correct figures
	$360 - '72' - '60' - '132' (= 96)$			M1 for a complete method to find angle <i>x</i>
		96		A1 dep on correct working
				Note: Angles may be seen on diagram throughout
				Total 5 marks

6	a	$(x =) 270 \div (12 \times 5) (= 4.5)$ oe	3	M1
		$\pi \times '4.5'^2 \times 2 \times '4.5' (= 182.25\pi)$ oe		M1 ft dep on M1
		573		A1 accept 572 – 573
	b	1 000 000	1	B1 or $(1 \times) 10^6$ or (one or 1) million oe
				Total 4 marks

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7	$(11 \times 3) + (8 \times 5) + (6 \times 7) + (5 \times 9) (= 160)$ $(= 33 + 40 + 42 + 45 = 160)$		4	M1 Correct numerical products using midpoints (allowing one error) with intention to add. May be seen in table.
	“160” + $x = 4.25 \times (11 + 8 + 6 + 5 + x)$ oe or $\frac{\text{“160”} + x}{\text{“30”} + x} = 4.25$ or “160” + $x = 4.25 \times \text{“30”} + 4.25x$			M1 dep M1 for correct equation fit <i>their</i> 160.
	“160” – “127.5” = $4.25x - x$ or $32.5 = 3.25x$			M1 Isolating x and number terms
		10		A1 dep 1st M1
				Total 4 marks

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8	a		8, 23, 40, 68, 101, 120	1	B1
	b			2	M1 ft from table for at least 5 points plotted correctly at end of interval or ft from sensible table for all 6 points plotted consistently within each interval in the freq table at the correct height
			Correct cf graph		A1 accept curve or line segments accept graph that is not joined to (0,0)
	c		17 – 20	1	B1 ft their cf graph
	d	E.g. Reading at 23 minutes (= a) and then $(120 - a) \div 120 \times 100$		2	M1 ft from their cf graph reading off at 23 minutes and a method to work out 120 minus this value as a percentage of 120
			25(%) – 29(%)		A1 ft from their cf graph dep on M1 seen
					Total 6 marks

9	$a = 7$			4	B1
	$\frac{b + \text{their } a}{2} = 8.5$ oe or $b = 10$				M1 ft their value of a or for setting up an equation for b or $b = 10$
	$\frac{\text{their } a + \text{their } a + \text{their } b + c}{4} = 9$ oe or $(c =) 9 \times 4 - (2 \times \text{their } a + \text{their } b)$ oe				M1 for a calculation involving c using their values or for a calculation leading to c using their values
			7, 10, 12		A1
					Total 4 marks

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10 a		Correct number line	2	<p>B2 for a fully correct number line e.g. shaded circle at -2, unshaded circle at 1 and a line drawn between them</p> <p>B1 for a shaded circle at -2 or an unshaded circle at 1 or circles at -2 and 1 with line in between but shading incorrect</p>
b		$-3, -2, -1, 0, 1, 2$	2	<p>B2 fully correct values with no extras</p> <p>B1 for 5 correct values and none incorrect or all 6 correct values with no more than one additional incorrect value</p>
				Total 4 marks

11	$x \times 1.05 = 1.26$ oe eg $(x =) 1.26 \div 1.05$ oe (= 1.2)	or $30 \times 1.26 (=$ 37.80)	or $30 \div 1.05 (=$ 28.57)		3	M1
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	$30 \times "1.2"$	$"37.80" \div 1.05$	$"28.57..." \times 1.26$			M1
				36		A1 cao If no marks awarded, SC B1 for one operation used correctly, even with another incorrect operation. eg $1.26 \times 0.95 \times 30$ oe or $1.26 \times 1.05 \times 30$ oe or $1.26 \div 0.95 \times 30$ oe
						Total 3 marks

12	(a)	$g(3) = -7$ or $f(3 - 10) = (3 - 10)^2 + 6$ or $3^2 - 20 \times 3 + 106$ oe		2	M1
			55		A1
	(b)	$(x - 10)^2 + 6 = x^2 + 6$		3	M1 Using $f(x - 10)$ and setting equal to $x^2 + 6$
		$x^2 - 10x - 10x + 100$ oe			M1 for $(x - 10)^2$ expanded correctly.
			5		A1 dep 1st M1
					Total 5 marks

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13	$7^2 - (10 \div 2)^2 (= 24) \text{ or } \frac{\sin\left(\frac{1}{2}x\right)}{5} = \frac{\sin 90}{7} \text{ oe or}$ $\cos x = \frac{7^2 + 7^2 - 10^2}{2 \times 7 \times 7} \text{ oe or } \sin\left(\frac{1}{2}x\right) = \frac{5}{7} \text{ oe or } \cos y = \frac{5}{7} \text{ oe}$		5	M1 or use of sine rule or cosine rule to find angle (x) of the apex or angle y $\left(= 90 - \frac{1}{2}x\right)$
	$\sqrt{7^2 - (10 \div 2)^2} (= \sqrt{24} = 2\sqrt{6} = 4.898\dots) \text{ or}$ $(x =) 2 \times \sin^{-1}\left(\frac{5 \times \sin 90}{7}\right) (= 91.169\dots) \text{ oe or}$ $(x =) 2 \times \sin^{-1}\left(\frac{5}{7}\right) (= 91.169\dots) \text{ oe or}$ $(x =) \cos^{-1}\left(\frac{7^2 + 7^2 - 10^2}{2 \times 7 \times 7}\right) (= 91.169\dots) \text{ oe or}$ $(x =) 2\left(90 - \cos^{-1}\left(\frac{5}{7}\right)\right) (= 2(90 - 44.415)\dots = 91.169\dots)$			M1 for complete method to find height of triangle or the angle (x) of the apex $\cos^{-1}\left(\frac{5}{7}\right) (= 44.415\dots) \text{ and}$ $5 \times \tan'44.415\dots' (= 4.898\dots) \text{ or}$ $7 \times \sin'44.415\dots' (= 4.898\dots)$ or $\sin^{-1}\left(\frac{5}{7}\right) (= 45.584\dots) \text{ and}$ $\frac{5}{\tan'45.584\dots'} (= 4.898\dots) \text{ or}$ $7 \times \cos'45.584\dots' (= 4.898\dots)$
	E.g. $6 \times 10 + \frac{(10 \div 2) \times \sqrt{24}}{2} \times 2 (= 60 + 10\sqrt{6} = 84.494\dots) \text{ or}$ $5 \times (6 + 6 + \sqrt{24}) (= 60 + 10\sqrt{6} = 84.494\dots) \text{ or}$ $\left(\frac{1}{2} \times 7 \times 7 \times \sin'91.169\dots' + 10 \times 6\right) (= 60 + 10\sqrt{6} = 84.494\dots)$			M1 for method to find the total area of the pentagon allow answers in the range 84.49 – 85
	E.g. $'84.494' \div 16 (= 5.28\dots) \text{ or } (60 + 10\sqrt{6}) \div 16 (= 5.28\dots)$			M1 for method to find the number of tins required using their area
		6		A1 dep on at least M2
Total 5 marks				

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14	$\sin 23^\circ = \frac{h}{500}$ oe or $\cos 67^\circ = \frac{h}{500}$ oe or $\frac{h}{\sin 23^\circ} = \frac{500}{\sin 90^\circ}$ or $\frac{\sin 23^\circ}{h} = \frac{\sin 90^\circ}{500}$ oe or $\cos 23^\circ = \frac{x}{500}$ oe or $x = 500 \cos 23^\circ$ (= 460.25..) and $h^2 = 500^2 - (460.25\dots)^2$ oe		3	M1 for a correct expression involving "h"
	" h " = 500 × sin 23° oe or $h = \sqrt{500^2 - (460.25\dots)^2}$			M1
		195.4		A1 195 – 195.4
				Total 3 marks

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15	7.75, 7.85, 3.35, 3.45, 13.5, 14.5		3	<p>B1 for sight of a correct upper or lower bound</p> <p>Accept</p> <p>$3.44\dot{9}$ for 3.45 or</p> <p>$7.84\dot{9}$ for 7.85 or</p> <p>$14.4\dot{9}$ for 14.5</p>
	$(k =) \frac{13.5}{7.85 - 3.35}$			<p>M1 for correct substitution into</p> $k = \frac{t_{LB}}{a_{UB} - h_{LB}}$ <p>where $13.5 \leq t_{LB} < 14$ and</p> <p>$7.8 < a_{UB} \leq 7.85$ and</p> <p>$3.35 \leq h_{LB} < 3.4$</p>
		3		A1 accept 3.0
				Total 3 marks

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16	E.g. $28 \div 2 (= 14)$ or $1\text{cm}^2 = 2$ students		5	M1 for method to find the frequency density for the first bar or any correct value on the fd axis or can be implied by a correct frequency (30 or 24 or 36)
	$2 \times 20 (= 40)$ $1 \times 30 (= 30)$ $1 \times 24 (= 24)$ $3 \times 12 (= 36)$ or 40, 30, 24, 36			M1 for method to find the missing frequencies (at least 3 correct)
	$1 \times 28 + 3 \times '40' + 4.5 \times '30' + 5.5 \times '24' + 7.5 \times '36' (= 685)$ or $28 + 120 + 135 + 132 + 270 (= 685)$			M1 (indep ft) for a method to find the total (mid value \times frequency) for at least 4 products using their values in the table (need not be evaluated) Allow consistent use of end points for at least 4 products which must be added
	$'685' \div (28 + '40' + '30' + '24' + '36') (= 4.335\dots)$ or $'685' \div 158 (= 4.335\dots)$			M1 (dep on previous M1)
		4.34		A1 accept 4.33 - 4.34
				Total 5 marks

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17	$360 - 40 (= 320)$ or $\frac{320}{360}$ oe		4	M1
	or $\frac{40}{360} \times 2\pi \times 9 (= 6.28\dots)$			M1
	"320" $\frac{320}{360} \times 2\pi \times 9 (= 16\pi = 50.26\dots)$ or $2\pi \times 9 - "6.28" (= 50.26)$			M1 complete method to find perimeter
	"50.26" + 2×9	68.3		A1 68.2 to 68.3
Total 4 marks				

18	$BFD = 39^\circ$	$BED = 39^\circ$		4	B1
	$BDE = 180 - (18 + 39)$	$EBD = 18^\circ$ and $BDE = 180 - (18 + 39)$			M1
			123		A1
					B1 dep on M1 for all correct circle theorems relevant for their method e.g. <u>alternate segment theorem and opposite angles</u> in a <u>cyclic quadrilateral</u> sum to 180° or <u>alternate segment theorem and angles in same segment</u> are equal
Total 4 marks					

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19	$0.85 \times x^2 = 1.0285$ or $85 \times x^2 = 102.85$ oe or $(x^2 =) 1.0285 \div 0.85$ or $(x^2 =) 102.85 \div 85$ oe or 1.21 oe		4	M2 for a correct equation using their chosen letter or value in place of letter, or a correct division or 1.21 seen otherwise: (M1 for either 0.85 or 1.0285 seen)
	$(x =) \sqrt{1.0285 \div 0.85}$ or $(x =) \sqrt{102.85 \div 85}$ oe or $(x =) 1.1(0)$			M1 for a correct expression or value for x
		10		A1
				Total 4 marks

20	$75 \times 2 (=150)$		5	M1 “150” for <i>AOC</i> may be seen on diagram.
	$\frac{"150" \times \pi r^2}{360}$ oe ($= 1.309r^2$ or $\frac{5\pi}{12}r^2$)			M1 dep 1st M1
	$0.5 \times \sin("150") \times r^2$ oe ($= 0.25r^2$)			M1 dep 1st M1 a complete method to find the area of triangle <i>OAC</i> in terms of r
	eg $\frac{150\pi}{360}r^2 - 0.5\sin(150)r^2 = 200$ oe or $(1.309... - 0.25)r^2 = 200$			M1 correct equation in r^2 or rearranged to make r^2 or r the subject.
		13.7		A1 accept 13.7 – 13.8
				Total 5 marks

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Qn	Mean score	Max score	Mean %	Edexcel averages: scores of candidates who achieved grade:								
				ALL	9	8	7	6	5	4	3	U
1	2.74	3	91	2.74	2.99	2.97	2.83	2.63	2.23	1.65	0.70	0.57
2	2.56	3	85	2.56	2.92	2.79	2.68	2.19	1.66	1.16	0.57	0.29
3	2.63	3	88	2.63	2.90	2.73	2.60	2.42	2.22	2.02	1.50	0.86
4	2.51	3	84	2.51	2.97	2.84	2.53	2.21	1.62	0.75	0.18	0.00
5	3.94	5	79	3.94	4.87	4.66	4.03	3.39	1.89	1.00	0.22	0.00
6	3.09	4	77	3.09	3.82	3.49	3.11	2.58	1.96	0.67	0.17	0.14
7	2.99	4	75	2.99	3.94	3.66	3.00	1.74	0.85	0.31	0.23	0.00
8	4.37	6	73	4.37	5.48	4.86	4.11	3.50	2.10	1.46	0.78	0.14
9	2.87	4	72	2.87	3.78	3.28	2.73	2.06	1.27	0.47	0.13	0.14
10	2.86	4	72	2.86	3.56	3.07	2.61	2.42	1.83	1.31	1.04	0.00
11	2.05	3	68	2.05	2.66	2.20	1.84	1.50	1.11	0.88	0.50	0.29
12	3.41	5	70	3.41	4.80	4.11	2.97	1.50	0.91	0.48	0.14	0.00
13	3.17	5	63	3.17	4.51	3.79	2.76	1.91	1.08	0.20	0.00	0.00
14	1.78	3	59	1.78	2.53	2.00	1.63	0.86	0.44	0.23	0.14	0.00
15	1.76	3	59	1.76	2.59	1.98	1.48	0.81	0.36	0.20	0.04	0.00
16	3.02	5	60	3.02	4.48	3.53	2.36	1.39	0.65	0.55	0.00	0.00
17	2.20	4	55	2.20	3.35	2.31	1.53	1.05	0.42	0.31	0.27	0.14
18	2.06	4	52	2.06	3.27	2.30	1.49	0.74	0.30	0.36	0.13	0.00
19	1.47	4	37	1.47	2.83	1.14	0.47	0.26	0.19	0.23	0.00	0.00
20	1.64	5	33	1.64	3.33	1.24	0.43	0.17	0.04	0.06	0.00	0.00
	53.12	80	66	53.12	71.58	58.95	47.19	35.33	23.13	14.30	6.74	2.57

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	65	53	41	29	19	10	5