

Practice Tests Set 15 – Paper 2H-3H mark scheme, performance data and suggested grade boundaries

Q	Working	Answer	Mark	Notes	
1	for 0.08×1200 oe (= 96) or 1.08×1200 oe (= 1296)	OR 1200×1.08^3	3	M1 for 0.08×1200 oe (= 96) or 1.08×1200 oe (= 1296)	OR M2 for 1200×1.08^3 or 1200×1.08^4 (= 1632.59) (M1 for 1200×1.08^2 (= 1399.68))
				M1 for completing method to find total amount in the account	
	$1.08 \times "1296"$ (= 1399.68) oe $1.08 \times "1399.68"$ (= 1511.6544) oe			A1 accept 1511 – 1512	
		1512		SC: if no other marks gained award M1 for 0.24×1200 oe or 288 or 1488 accept $(1 + 0.08)$ as equivalent to 1.08 throughout	
				Total 3 marks	

2	Use of 2 hrs 42 mins = 2.7 hrs or 162 mins		4	B1	
	e.g. 90×2.7 (= 243) or e.g. $\frac{90}{60} \times 162$ (= 243) or e.g. $\frac{S}{90} = \frac{2.7}{3}$			M1 for use of $D = S \times T$ (accept use of their time e.g. 90×2.42) or for setting up an equation using proportion	
	e.g. "243" $\div 3$ or $(S =) 90 \times \frac{2.7}{3}$			M1 (dep on M1) for their $D \div 3$ or for solving their equation	
		81		A1	
				Total 4 marks	

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3	e.g. $\frac{3}{10} \times 80 (= 24)$ or $\frac{2}{10} \times 80 (= 16)$ or $\frac{5}{10} \times 80 (= 40)$		5	M2 for a complete method to find the number of chocolate cakes or lemon cakes or fruit cakes "10" comes from 3 + 2 + 5 (M1 for correct use of the ratio e.g. $80 \div "10" (= 8)$)
	e.g. "16" $\times \frac{3}{4} \times 1.7(0) (= 20.4(0))$ or "40" $\times \frac{7}{8} \times 2.4(0) (= 84)$			M1 for a method to find the profit for lemon cakes or fruit cakes
	e.g. "24" $\times 2 (= 48)$ and "16" $\times \frac{3}{4} \times 1.7(0) (= 20.4(0))$ and "40" $\times \frac{7}{8} \times 2.4(0) (= 84)$			M1 for a method to find the profit for all 3 cakes
		152.4(0)		A1
				Total 5 marks

4	$8265 - 7500 (= 765)$ or $\frac{8265}{7500} (= 1.102)$		3	M1 8265 – 7500 could be embedded in another calculation.
	$\frac{"765"}{7500} \times 100$ oe or "1.102" $\times 100 - 100$ oe			M1
		10.2		A1 oe

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Q	Working	Answer	Mark	Notes
5	$\pi \times 2.5^2 \times 15$ (= 93.75 π = 294.5243...)		5	M1 for using the formula for volume of cylinder
	$21.5 = \frac{m}{"294.5243"}$			M1 for using $d = \frac{m}{v}$ with <i>their</i> intended volume v
	($m =$) $21.5 \times '294.5243...'$ (= 6332.272692)			M1 for rearranging for $m = d \times v$
	'6332.27269' \div 1000 \times 5 (=31.661...) or '6332.27269' \div 6 \div 1000 (= 1.055...) or '6332.27269' \times 5 and 30×1000 (=30 000) or $30 \div ('6332.27269' \div 1000)$ (= 4.7376...)			M1 for a correct calculation that would enable a conclusion to be made based on mass
		No and correct comparable figure(s)		A1 for No oe and (31.6 to 31.7 or 1.05 to 1.06 or 4.70 to 4.74) seen
				Total 5 marks

6	15×24 (= 360) or 25×18 (= 450)		3	M1 may be implied by 810 seen
	$\frac{'360'+ '450'}{40}$ ($= \frac{810}{40}$)			M1 dep on M1
		20.25 oe		A1 for 20.25 accept 20.3 (allow 20 from correct working)
				Total 3 marks

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Q	Working	Answer	Mark	Notes
7	$\cos 35^\circ = \frac{15}{AB}$ or $\sin 55^\circ = \frac{15}{AB}$ or $\frac{15}{\sin 55^\circ} = \frac{JB}{\sin 35^\circ}$ and $(AB^2 =) ("10.50")^2 + 15^2$ or $\tan 35^\circ = \frac{JB}{15}$ and $(AB^2 =) ("10.50")^2 + 15^2$		5	M1 oe eg x for AB
	$(AB =) \frac{15}{\cos 35^\circ}$ (=18.3...) or $(AB =) \frac{15}{\sin 55^\circ}$ (=18.3...) or $(AB =) \sqrt{("10.50")^2 + 15^2}$ or $(AB =) \sqrt{(15 \tan 35^\circ)^2 + 15^2}$			M1
	'18.3' \times 4 (= 73.2)			M1 dep 1st M1
	80 – '18.3' \times 4 or 80 – '73.2'			M1 dep 1st M1
		6.75		A1 accept 6.75 – 6.8
				Total 5 marks

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Q	Working	Answer	Mark	Notes
8 (a)		$30 < t \leq 40$	1	B1
(b)	e.g. $5 \times 4 + 15 \times 10 + 25 \times 15 + 35 \times 25 + 45 \times 6 (= 1690)$ or $20 + 150 + 375 + 875 + 270 (= 1690)$		4	M2 For correct products using midpoints (allowing one error) with intention to add. If not M2 then award M1 for products using frequency and a consistent value within the range (allowing one error) with intention to add or correct products using midpoint without addition.
	“1690” \div 60			M1 dep on M1
		28.2		A1 accept 28.1 – 28.2
				Total 5 marks

9	$y = \frac{7-5x}{2}$ or $y = \frac{7}{2} - \frac{5}{2}x$ or $y = 3.5 - 2.5x$ or $2y = 7 - 5x$ oe		2	M1 for making y or $2y$ the subject Allow $y = -\frac{5}{2}x + c$ oe
		-2.5		A1 for $-\frac{5}{2}$ or -2.5
				Total 3 marks

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Q	Working	Answer	Mark	Notes
10	$4.3^2 + 6.4^2$ or 59.45		4	M1 for squaring and adding
	$\sqrt{4.3^2 + 6.4^2}$ or $\sqrt{59.45}$ or 7.71(038...) or 7.7			M1 dep 1st M1 for square rooting
	e.g ('7.71' + 4.3 + 6.4) × 22 or '18.4' × 22 (=404.8) or ('8' + 4.3 + 6.4) × 22 or '18.7' × 22 or '19' × 22 or '20' × 22			M1 dep M2 for a non-rounded perimeter × 22 or 19 × 22 accept 20 × 22 oe
		\$418		A1 cao
				Total 4 marks

11	e.g. 1.5×1.5 (= 2.25 oe)		3	M1 for calculating the area of the square, may be seen embedded within a calculation
	e.g. $34.8 \times "2.25"$			M1 for a complete method to find the force
		78.3		A1 oe
				Total 3 marks

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Q	Working	Answer	Mark	Notes
12			3	M1 for one of - 5 numbers with a median of 8 - 5 numbers with a mode of 5 - 5 numbers with a range of 10 - 5 numbers with a sum of 45
				M1 for two of - 5 numbers with a median of 8 - 5 numbers with a mode of 5 - 5 numbers with a range of 10 - 5 numbers with a sum of 45
		5, 5, 8, 12, 15		A1 Note: The numbers can be in any order SC If no marks awarded, give B1 for 8 in the middle cell, not contradicted.
				Total 3 marks
13	e.g. $31.5(0) \div (1 - 0.3)$		3	M2 for a complete method e.g. $31.5(0) \div (1 - 0.3)$ (M1) for $31.5(0) \div (100 - 30) (= 0.45)$ or e.g. $(1 - 0.3)x = 31.5(0)$
		45		A1
				Total 3 marks

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Q	Working	Answer	Mark	Notes
14 (a)	35 37 38 39 41 42 43 44 45 47 47		3	M1 Ordering values (allow 1 error) error may include missing a value May be implied by correct values for LQ and UQ.
				M1 LQ = 38 and UQ = 45 identified
				A1
(b)		January and reason using IQR	1	B1 ft from part (a) January as the IQR is lower oe ignore irrelevant statements about the median if given in addition to correct statements about IQR.
				Total 4 marks

15	$\pi \times 12^2 \times \frac{AOC}{360} (= 100)$		4	M1 oe for setting up a correct expression for the area of the sector (or equation)
	$(AOC =) \frac{100 \times 360}{\pi \times 12^2} \left(= \frac{250}{\pi} \right)$			M1 for correctly rearranging for <i>AOC</i>
	$(\text{Angle } ABC =) "79.57747" \div 2 (= 39.7887... \text{ or } \frac{125}{\pi})$			M1 ft dep 1 st M1 and 'x' less than 360 for dividing their ' <i>AOC</i> ' by 2
		39.8		A1 for awrt 39.8 accept $\frac{125}{\pi}$
				Total 4 marks

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Q	Working	Answer	Mark	Notes
16	e.g. $a = (-3 + 47) \div 2 (= 22)$ or $\frac{11+b}{2} = -19$ ($b = -38 - 11 = -49$) or method to add 25 to -3 or method to subtract 25 from 47 or method to subtract 30 from -19 or method to subtract 60 from 11		2	M1 for a correct method to find either coordinate or one coordinate correct. Look for correct method on their diagram, if used.
		$a = 22, b = -49$		A1 both correct
				Total 2 marks

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Q	Working	Answer	Mark	Notes
17	$14 \div 10 (= 1.4)$ or at least two of $(3.2 \times 15 (=48)$ or $3.6 \times 5 (=18)$ or $0.6 \times 10 (=6)$ or $0.2 \times 20 (=4)$ or at least two of (140, 480, 180, 60, 40) or $\frac{14}{140} = \left(\frac{1}{10}\right)$		3	M1 for any one correct frequency density or $1\text{cm}^2 = 2.5$ or association of area with frequency eg one small square = 0.1 (on vertical axis)
	$14 + 3.2 \times 15 + 3.6 \times 5 + 0.6 \times 10 + 0.2 \times 20$ or $14 + 48 + 18 + 6 + 4$ or $(140 + 480 + 180 + 60 + 40) \times \frac{1}{10}$ or $900 \times \frac{1}{10}$			M1 for any correct method Allow one error in their total (error may include missing a total for a bar)
		90		A1 answer from correct working
				Total 3 marks

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Q	Working	Answer	Mark	Notes
18	Ext angle of octagon = $360 \div 8 (= 45)$ or Int angle of octagon $(8 - 2) \times 180 \div 8$ oe (= 135)		6	M1 for method to find the size of one exterior or one interior angle of a regular octagon
	e.g. $10 + 2 \times 10 \times \sin 45 (= 10 + 10\sqrt{2}$ or 24.1...) or e.g. $\frac{10 \sin 112.5}{\sin 22.5} (= 24.1...)$			M1 method to find <i>HE</i> or <i>AD</i> 22.5 comes from $(180 - "135") \div 2$ 112.5 comes from "135" – "22.5"
	e.g. $10 \times ("10 + 10\sqrt{2} ") (= 100 + 100\sqrt{2}$ or 241.4...) or $10 \times "24.1..." (= 241.4...)$			M1 area <i>ADEH</i>
	e.g. $10 \times \sin 45^\circ (= 5\sqrt{2}$ or 7.07...) or e.g. $\sqrt{10^2 + 10^2 - 2 \times 10 \times 10 \times \cos "135"} (= 18.4...)$ or $\frac{10 \sin "135"}{\sin 22.5} (= 18.4...)$			M1 finds perpendicular height of triangle <i>ACD</i> (may be found before, but must realise this is also height of triangle) or finds the length of <i>AC</i> 22.5 comes from $(180 - "135") \div 2$
	e.g. $0.5 \times "24.1..." \times "7.07..." (= 85.3...)$ or $0.5 \times 10 \times "18.4..." \times \sin 112.5 (= 85.3...)$			M1 finds the area of triangle <i>ACD</i> 112.5 comes from "135" – "22.5"
		327		A1 accept 326 – 327
	Alternative (splitting octagon into triangles and subtracting trapezium and triangle)			
	Ext angle of octagon = $360 \div 8 (= 45)$ or Int angle of octagon $(8 - 2) \times 180 \div 8$ oe (= 135) or one of 8 angles at centre = $360 \div 8 (= 45)$		6	M1 for method to find the size of one exterior or one interior angle of a regular octagon or method to find one angle at centre of octagon when split into 8 equal triangles
	e.g. $0.5 \times 10 \times 5 \times \tan 67.5 (= 60.35...)$ or $0.5 \times \left(\frac{10 \sin 67.5}{\sin 45} \right)^2 \times \sin 45 (= 60.35...)$ or Octagon = $8 \times "60.35" (= 482.8...)$			M1 Area of one triangle (one-eighth of octagon) or octagon
	e.g. $10 + 2 \times 10 \times \sin 45^\circ (= 10 + 10\sqrt{2} = 24.14...)$			M1 Method to find <i>HE</i>
	$0.5 \times (10 + 10 + 10\sqrt{2}) \times 5\sqrt{2} (= 120.71...)$			M1 Method to find area of trapezium <i>HEGF</i>
	$0.5 \times 10 \times 10 \times \sin 135^\circ (= 35.35...)$			M1 Method to find area of triangle <i>ABC</i>

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19	8.35 or 7.25 or 6.15 or 5.25		3	B1
	$(8.35 \times 7.25) - (6.15 \times 5.25)$			M1 Allow $UB_{AD} \times UB_{DC} - LB_{EH} \times LB_{HG}$ where $8.3 < UB_{AD} \leq 8.35$, $7.2 < UB_{DC} \leq 7.25$ $6.15 \leq LB_{EH} < 6.2$, $5.25 \leq LB_{HG} < 5.3$
		28.25		A1 oe, dep on M1
				Total 3 marks

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20	$\left(\frac{-1+5}{2}, \frac{6-4}{2}\right)$ or $\left(\frac{4}{2}, \frac{2}{2}\right)$ or (2, 1)		6	M1 for finding midpoint
	$\frac{-4-6}{5--1}$ or $\frac{6--4}{-1-5}$ or $-\frac{10}{6}$ or $-\frac{5}{3}$			M1 indep for finding the gradient of PQ
	$\frac{-1}{-\frac{10}{6}}$ or $\frac{6}{10}$ or $\frac{-1}{-\frac{5}{3}}$ or $\frac{3}{5}$ or 0.6			M1 for finding the perpendicular gradient to PQ (ft their stated gradient)
	$1 = \frac{3}{5}(2) + c$ or $c = -\frac{1}{5}$ or $c = -\frac{2}{10}$ or $c = -0.2$			M1 dep on 1st and 3rd M1 for substituting '(2, 1)' into $y = \frac{3}{5}x + c$ or find the value of c oe eg $y - '1' = \frac{3}{5}(x - '2')$
	$y = \frac{3}{5}x - \frac{1}{5}$ or $y = 0.6x - 0.2$ or $5y = 3x - 1$			A1 for a correct equation in any form
		$3x - 5y - 1 = 0$		A1 for $3x - 5y - 1 = 0$ or $5y - 3x + 1 = 0$ or $6x - 10y - 2 = 0$ oe accept in the form $ax + by = -c$ eg $3x - 5y = 1$ or $5y - 3x = -1$ oe
				Total 6 marks

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21	e.g. $\frac{3}{x+7} \times \frac{2}{x+6} + \frac{4}{x+7} \times \frac{3}{x+6} + \frac{x}{x+7} \times \frac{x-1}{x+6} (= \frac{3}{8})$ or e.g. $\frac{3}{N} \times \frac{2}{N-1} + \frac{4}{N} \times \frac{3}{N-1} + \frac{N-7}{N} \times \frac{N-8}{N-1} (= \frac{3}{8})$ oe		4	M2 for all correct products and intention to add (M1 for one correct product)
	$5x^2 - 47x + 18 = 0$ oe ($x = 9$) or $5N^2 - 117N + 592 = 0$			M1 Correct quadratic equation
		16		A1 dep on M3
				Total 4 marks

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Q		Working			Answer	Mark	Notes					
Qn	Skill tested	Mean score	Max score	Mean %	ALL	9	8	7	6	5	4	3
1	Percentages	2.59	3	86	2.59	2.92	2.83	2.75	2.53	1.96	1.86	0.33
2	Measures	3.29	4	82	3.29	3.90	3.87	3.61	3.17	1.83	1.29	0.56
3	Ratio and proportion	4.00	5	80	4.00	4.85	4.77	4.20	3.23	2.96	1.18	0.22
4	Percentages	2.35	3	78	2.35	2.77	2.71	2.46	2.00	1.63	1.36	0.44
5	Measures	3.59	5	72	3.59	4.84	4.42	3.98	2.70	1.06	0.64	0.11
6	Statistical measures	2.17	3	72	2.17	2.88	2.61	2.38	1.47	1.12	0.25	0.00
7	Trigonometry	3.58	5	72	3.58	4.85	4.46	3.92	2.43	1.39	0.25	0.00
8	Statistical measures	3.82	5	76	3.82	4.90	4.55	3.63	3.59	2.41	0.65	0.00
9	Algebraic manipulation	1.36	2	68	1.36	1.97	1.77	1.45	0.66	0.37	0.04	0.00
10	Trigonometry	2.66	4	67	2.66	3.37	2.85	2.84	2.57	1.73	0.46	0.56
11	Measures	2.03	3	68	2.03	2.74	2.56	2.08	1.55	0.87	0.25	0.00
12	Probability	2.04	3	68	2.04	2.82	2.40	2.04	1.28	1.04	0.54	0.22
13	Percentages	2.04	3	68	2.04	2.86	2.54	1.90	1.40	0.87	0.43	0.00
14	Statistical measures	2.28	4	57	2.28	3.47	2.72	1.99	1.13	0.90	0.39	0.33
15	Mensuration of 2D shapes	2.24	4	56	2.24	3.84	2.98	1.80	0.49	0.20	0.00	0.00
16	Graphs	1.14	2	57	1.14	1.82	1.52	0.88	0.57	0.23	0.07	0.00
17	Graphical representation of data	1.58	3	53	1.58	2.59	2.01	1.30	0.64	0.25	0.04	0.00
18	Polygons	2.78	6	46	2.78	5.21	3.23	1.96	0.53	0.15	0.04	0.00
19	Degree of accuracy	1.49	3	50	1.49	2.75	1.82	0.95	0.30	0.17	0.04	0.00
20	Linear equations	2.13	6	36	2.13	4.38	2.05	0.99	0.51	0.24	0.07	0.11
21	Probability	1.37	4	34	1.37	3.13	1.25	0.35	0.11	0.00	0.00	0.00
		50.53	80	63	50.53	72.86	59.92	47.46	32.86	21.38	9.85	2.88

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	66	54	40	27	16	8	2