

Practice Tests Set 16 – Paper 2H-3H mark scheme, performance data and suggested grade boundaries

Q	Working	Answer	Mark	Notes
1	$8^2 + 15^2 (= 289)$	167	5	M1
	$\sqrt{8^2 + 15^2} (= 17)$			M1
	$\pi \times \left( \frac{17}{2} \right)^2 (= 226.98\dots)$ <b>or</b> $0.5 \times 15 \times 8 (= 60)$			M1
	$\pi \times \left( \frac{17}{2} \right)^2 - 0.5 \times 15 \times 8$ (“226.98” – “60”)			M1
				A1 Accept answers which round to 167
				<b>Total 5 marks</b>

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Q	Working	Answer	Mark	Notes
2 (a)		$70 < s \leq 80$	1	B1
(b)	$10 \times 45 + 16 \times 55 + 19 \times 65 + 23 \times 75 + 12 \times 85$ or $450 + 880 + 1235 + 1725 + 1020 (= 5310)$		4	M2 $f \times d$ for at least 4 products with correct mid-interval values and intention to add.  If not M2 then award M1  for $d$ used consistently for at least 4 products within interval (including end points) and intention to add  or  for at least 4 correct products with correct mid-interval values with no intention to add
	"5310" $\div$ 80			M1 dep on at least M1 allow division by their $\sum f$ provided addition or total under column seen
		66.4		A1 accept 66.37 – 66.4
				<b>Total 5 marks</b>

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Q	Working	Answer	Mark	Notes
3	(a)	$520 - 465 (= 55)$ or $\frac{520}{465} (= 1.118\dots)$	3	M1
		$\frac{55}{465} \times 100$ or $100 \times ("1.118" - 1)$ oe		M1
				A1 11.8 or better (11.827956...)
	(b)	$0.12 \times 550$ oe (= 66)	3	M1 oe M2 for
		$550 - "66"$		M1 0.88 $\times 550$ oe
		A1		
		484		<b>Total 6 marks</b>

4	6 hrs 39 mins = 6.65 (hrs) or $6\frac{39}{60}$ or $6\frac{13}{20}$ or $\frac{133}{20}$ or 399(mins)	3	B1
	Average speed = $\frac{429}{6.65}$ oe eg $\frac{429}{399} \times 60$		M1 Use of $S = D \div T$ (use of their time in hours) [allow $429 \div 6.39$ if B0 awarded]
			A1 Awrt 64.5
		64.5	

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Q	Working	Answer	Mark	Notes	
5 (a)	for $0.035 \times 40\,000$ oe (= 1400) or $1.035 \times 40\,000$ oe (= 41 400)	OR $40\,000 \times 1.035^3$	3	M1 for finding 3.5% or 103.5% of 40 000	OR M2 for $40\,000 \times 1.035^3$ or $40\,000 \times 1.035^4$ (= 45 900.92)  (M1 for $40\,000 \times 1.035^2$ (= 42 849))
			M1 for completing method to find total amount in the account		
	$1.035 \times$ “41 400” oe (= 42 849) $1.035 \times$ “42 849” oe (= 44 348.72)		44 349	A1 accept 44 348 – 44 349	
				SC: if no other marks gained award M1 for $0.105 \times 40\,000$ oe or 4200 or 44 200  accept $(1 + 0.035)$ as equivalent to 1.035 throughout	
(b)	e.g. $30\,481 \div (1 - 0.065)$ or $30\,481 \div 0.935$		3	M2 for a complete method  (M1) for $30\,481 \div (100 - 6.5)$ (= 326) or $(100 - 6.5)\% = 30\,481$ or $93.5\% = 30\,481$ or e.g. $(1 - 0.065)x = 30\,481$	
			32 600	A1	
				<b>Total 6 marks</b>	

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<b>Q</b>	<b>Working</b>	<b>Answer</b>	<b>Mark</b>	<b>Notes</b>	
<b>6</b>	e.g. $0.7 \times 20\,160$ oe (= 14 112) or $0.3 \times 20\,160$ oe (= 6048)		4	M1	
	e.g. “14 112” $\div (9 + 5 + 2)$ (= 882) or $(20\,160 - \text{“6048”}) \div (9 + 5 + 2)$ (= 882)			M1	M2 for $\frac{9-2}{9+5+2} \times \text{“14 112”}$ oe
	e.g. $9 \times \text{“882”} - 2 \times \text{“882”}$			M1	
		6174		A1	
				<b>Total 4 marks</b>	

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Q	Working	Answer	Mark	Notes
7	e.g. $\sin 65 = \frac{16}{AB}$ <b>or</b> $\cos 25 = \frac{16}{AB}$ <b>or</b> $\frac{AB}{\sin 90} = \frac{16}{\sin 65}$ <b>or</b> $\tan 65 = \frac{16}{AD}$ <b>or</b> $\tan 25 = \frac{AD}{16}$ <b>or</b> $\frac{AD}{\sin 25} = \frac{16}{\sin 65}$		4	M1 for a correct trig ratio for <i>AB</i> <b>or</b> <i>AD</i> accept 180 – 90 – 65 for 25
	e.g. $(AB =) \frac{16}{\sin 65} (= 17.654\dots)$ <b>or</b> $(AB =) \frac{16}{\cos 25} (= 17.654\dots)$ <b>or</b> $(AB =) \frac{16 \sin 90}{\sin 65} (= 17.654\dots)$ <b>and</b> $(AD =) \frac{16}{\tan 65} (= 7.460\dots)$ <b>or</b> $(AD) = 16 \times \tan 25 (= 7.460\dots)$ <b>or</b> $(AD =) \frac{16 \sin 25}{\sin 65} (= 7.460\dots)$			M1 for finding <i>AB</i> <b>and</b> <i>AD</i> Allow use of Pythagoras $(AD =) \sqrt{17.654\dots^2 - 16^2} (= 7.460\dots)$ or $(AB =) \sqrt{7.460\dots^2 + 16^2} (= 17.654\dots)$
	$(“17.654\dots” \times 2) + (“7.460\dots” \times 2)$ oe			M1 for a complete method to find the perimeter
		50.2		A1 accept 49.6 – 50.6
				<b>Total 4 marks</b>

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<b>Q</b>	<b>Working</b>	<b>Answer</b>	<b>Mark</b>	<b>Notes</b>
<b>8</b>	$5 \times 398 (= 1990)$ or $6 \times 401 (= 2406)$		3	M1 Correct total for 5 or for 6 cocoa pods
	“2406” – “1990”			M1 (M2 for $398 + 6 \times 3$ or $401 + 5 \times 3$ )
		416		A1
				<b>Total 3 marks</b>

<b>9</b> (a)			2	M1 for use of cf at 45
		146		A1 accept in the range 145 – 147
(b)	$93.75 \div 3.75 (= 25)$		3	M1
	Using cf diagram at 90 – “25” (= 65)			M1 for use of cf at “65”
		151		A1 accept in the range 150 – 152
				<b>Total 5 marks</b>

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Q	Working	Answer	Mark	Notes
10	eg $20 \times \frac{9a-7}{5} - 20 \times \frac{3a-7}{4} = 20 \times 4.55 (= 91)$ or eg $4(9a-7) - 5(3a-7) = 20 \times 4.55$ or eg $\frac{4(9a-7)}{20} - \frac{5(3a-7)}{20} (= 4.55)$ or eg $\frac{4(9a-7) - 5(3a-7)}{20} (= 4.55)$		3	M1 For clear intention to multiply all terms by 20 (or $4 \times 5$ ) or a multiple of 20 oe or to express LHS as two fractions over 20 (or $4 \times 5$ ) or a multiple of 20 oe or as a single fraction with a denominator of 20 (or $4 \times 5$ ) or a multiple of 20 oe  if expanded numerator, allow one error
	eg $36a - 28 - 15a + 35 = 20 \times 4.55$ or $21a = 84$ oe			M1 Expanding brackets and multiplying by denominator with no more than one sign error
		4		A1 dep on M1

11	(a) (i)		62	3	B1
	(a) (ii)		118		B1ft 180 – their (a)(i)
	(b)		62		B1
					<b>Total 3 marks</b>



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Q	Working	Answer	Mark	Notes
12	9.55 or 9.65 or 3.75 or 3.85 or 1.835 or 1.845		3	B1 accept 9.649̇ for 9.65, 3.849̇ for 3.85, 1.8449̇ for 1.845
	$a = \frac{UB_v - LB_u}{LB_l}$ e.g. $a = \frac{9.65 - 3.75}{1.835} (= 3.2152\dots)$			M1 for correct substitution of 9.6 < UB <sub>v</sub> □ 9.65 <b>and</b> 3.75 □ LB <sub>u</sub> < 3.8 <b>and</b> 1.835 □ LB <sub>l</sub> < 1.84
		3.22		A1 accept 3.21 – 3.22 from correct working
				<b>Total 3 marks</b>

13	$2 \times \pi \times 7 (= 43.982\dots \text{ or } 14\pi)$ <b>or</b> $(2 \times \pi \times 7) \div 2 (= 21.991\dots \text{ or } 7\pi)$ <b>or</b> $2 \times \pi \times 9 (= 56.548\dots \text{ or } 18\pi)$ <b>or</b> $(2 \times \pi \times 9) \div 2 (= 28.274\dots \text{ or } 9\pi)$		3	M1 for finding the circumference of either the full circle or the length of the arc for either semicircle
	e.g. “21.991” + “28.274” (= 50.26...) <b>or</b> “7π” + “9π” (=16π) <b>or</b> “21.991” + “28.274” + 2 (= 52.26...) <b>or</b> “7π” + “9π” + 2 (= 52.26...) <b>or</b> “21.991” + “28.274” + 2 + 2 <b>or</b> “7π” + “9π” + 2 + 2			M1 for a method to find the length of the two arcs with intention to add
		54.3		A1 accept 54.2 – 54.3
				<b>Total 3 marks</b>

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Q	Working	Answer	Mark	Notes
14	eg $\frac{4}{5} \times \frac{3}{7} (= \frac{12}{35})$ oe or $0.24 \times \frac{4}{7} (= \frac{96}{700})$ oe or eg $\frac{4}{5} \times 3 (= \frac{12}{5} = 2.4)$ and $0.24 \times 4 (= \frac{24}{25} = 0.96)$ (or 3.36) or eg $\frac{4}{5} \times 300 (= 240)$ and $0.24 \times 400 (= 96)$ (or 336)		3	M1
	eg " $\frac{12}{35}$ " + " $\frac{96}{700}$ " " $(= \frac{336}{700})$ " oe or " $2.4$ " + " $0.96$ " " $(= \frac{3.36}{7})$ " oe or eg " $240$ " + " $96$ " " $(= \frac{336}{700})$ " oe			M1 or 0.48 or 48% or correct unsimplified fraction eg $\frac{84}{175}$
			$\frac{12}{25}$	A1 cao
				<b>Total 3 marks</b>

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Q	Working	Answer	Mark	Notes
15	e.g. $30 \times 20 \times 125 (= 75\,000)$ or $85 \times 40 \times 125 (= 425\,000)$ or $(60 \times 30 + (85 - 30) \times 40) \times 125 (= 500\,000)$ oe		4	M1 for a method to find the volume of water already pumped out <b>or</b> the volume of water left <b>or</b> the total volume of the container
	“75 000” $\div$ 1.5 (= 50 000) or “75 000” $\div$ 90 (= 833.3... or $\frac{2500}{3}$ ) or “425000” $\div$ “75000” (= 5.66... or $\frac{17}{3}$ ) or “500000” $\div$ “75000” (= 6.66... or $\frac{20}{3}$ )			M1 M2 for $\frac{\text{"425000"}}{\text{"75000"}} \times 1.5$ oe (= 8.5) or $\frac{\text{"500000"}}{\text{"75000"}} \times 1.5$ oe (= 10)
	“425 000” $\div$ “50 000” (= 8.5) or “425 000” $\div$ (“833.3...” $\times$ 60) oe (= 8.5) or “5.66...” $\times$ 1.5 (= 8.5) <b>or</b> “6.66...” $\times$ 1.5 (= 10)			M1
		20 30		A1 Allow 8 30 (pm)
				<b>Total 4 marks</b>

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Q	Working	Answer	Mark	Notes
16	$(BC^2 =) 150^2 + 275^2 - (2 \times 150 \times 275 \times \cos 120) (= 139\,375)$		5	M1 for correct substitution into the cosine rule
	$(BC =) \sqrt{150^2 + 275^2 + 41250}$ oe or $\sqrt{139375}$ or $25\sqrt{223}$ or 373....			M1 for correct order of operations and square root
	e.g. $\frac{\sin ABC}{275} = \frac{\sin 120}{"373..."}$ or $275^2 = 150^2 + "373..."^2 - (2 \times 150 \times "373..." \times \cos ABC)$ or $\cos ABC = \frac{150^2 + "373..."^2 - 275^2}{2 \times 150 \times "373..."}$ or $\frac{\sin ACB}{150} = \frac{\sin 120}{"373..."}$ or $150^2 = 275^2 + "373..."^2 - (2 \times 275 \times "373..." \times \cos ACB)$ or $\cos ACB = \frac{275^2 + "373..."^2 - 150^2}{2 \times 275 \times "373..."}$			M1 (dep on 1 <sup>st</sup> M1) ft 373...  for a correct trig statement involving angle <i>ABC</i> or angle <i>ACB</i>
	$(ABC =) \sin^{-1} \left( \frac{\sin 120}{"373..."} \times 275 \right) (= 39.6...)$ or $(ABC =) \cos^{-1} \left( \frac{150^2 + "373..."^2 - 275^2}{2 \times 150 \times "373..."} \right) (= 39.6...)$ or $(ACB =) \sin^{-1} \left( \frac{\sin 120}{"373..."} \times 150 \right) (= 20.3...)$ or $(ACB =) \cos^{-1} \left( \frac{275^2 + "373..."^2 - 150^2}{2 \times 275 \times "373..."} \right) (= 20.3...)$			M1 for a complete method to find angle <i>ABC</i> or angle <i>ACB</i>
			140	A1 accept 140 – 140.4
				<b>Total 5 marks</b>

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<b>Q</b>	<b>Working</b>	<b>Answer</b>	<b>Mark</b>	<b>Notes</b>
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**Practice Tests Set 16 – Paper 2H-3H mark scheme, performance data and suggested grade boundaries**

Q	Working	Answer	Mark	Notes	
17	(a)	$63 \div 1.5 (= 42)$ <b>or</b> a correct value written on FD scale (10 small squares = FD 10) <b>or</b> 10 squares = 1 parcel or 1 big square = 2.5 parcels oe  eg area = $18 \times 5 + 15 \times 42 + 10 \times 24 + 10 \times 30 + 20 \times 8 (= 1420)$ $3.6 \times 1 + 3 \times 8.4 + 2 \times 4.8 + 2 \times 6 + 4 \times 1.6 (= 56.8)$ (at least 3 bars correct for any method of summing area)		3	M1 For use of area related to frequency eg showing a correct unambiguous value on the frequency density scale or calculating the area in some form
		$0.5 \times 18 + 63 + 1 \times 24 + 1 \times 30 + 2 \times 8$ (9 + 63 + 24 + 30 + 16) oe  eg “1420” $\div 10$ or “56.8” $\times 2.5$ oe			M1 Total of 5 frequencies with just one error or Area of bars with just one error, with correct calculation to give frequency
			142		A1
17	(b)	$0.75 \times 24 (= 18) + 30 + 16 (= 64)$ oe Eg “their (a)” – $(9 + 63 + 0.25 \times 24) (= 64)$ (ft figures from (a) dep on M1 for (a))		3	M1ft (dep on M1 in (a))if working with small squares they may get eg $\frac{640}{1420}$
		$\frac{"64"}{142} \times \frac{"63"}{141}$ (ft their value of 142 from (a))			M1 64 must come from correct working allow $\frac{"64"}{142} \times \frac{"64"}{142}$ (ft their value of 142 from (a))
			$\frac{672}{3337}$		A1 0.201 or better (0.20137...)
					<b>Total 6 marks</b>

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Q	Working	Answer	Mark	Notes
18	$\sqrt[3]{\frac{4352}{1836}}$ or $\frac{4}{3}$ or 1.33(33...) or 4:3 or $\sqrt[3]{\frac{1836}{4352}}$ or $\frac{3}{4}$ or 0.75 or 3:4		3	M1 for a correct length scale factor or a correct length ratio
	e.g. $1120 \div \left(\frac{4}{3}\right)^2$ oe or $1120 \times \left(\frac{3}{4}\right)^2$ oe			M1 (dep on M1) for a correct method to work out the surface area of A
		630		A1
				<b>Total 3 marks</b>

19	eg $(AD =) \sqrt{6^2 + 6^2 - 2 \times 6 \times 6 \times \cos(50)}$ (= 5.07...) or $2 \times 6 \sin 25$ (=5.07...) or $\frac{6 \sin 50}{\sin 65}$ (= 5.07...) oe		6	M1 Correct expression for $AD$ ie $AD = \dots$ or $x =$ oe
	eg $6 + 6 + \sqrt{6^2 + 6^2 - 2 \times 6 \times 6 \times \cos(50)}$ or $12 + "5.07..."$ (=17.0)7... or 17.1)			M1 A <b>correct</b> statement of perimeter of triangle $OAD$
	eg $(\text{arc } BC =) \frac{50}{360} \times \pi \times 2 \times (6 + x)$ oe			M1 A correct statement for arc $BC$ (condone missing brackets around $(6 + x)$ for this mark only)
	eg $2 \times "17.1" = 12 + 2x + \frac{50}{360} \times \pi \times 2 \times (6 + x)$ oe			M1 dep on M3 for a correct equation for $x$
	eg $2 \times 17.1 - 12 - \frac{30}{18} \pi = 2x + \frac{5x}{18} \pi$			M1 isolating terms in $x$ in a correct equation
		5.89		A1 5.88 – 5.89
				<b>Total 6 marks</b>

## Practice Tests Set 16 – Paper 2H-3H mark scheme, performance data and suggested grade boundaries

Qn	Paper	Question	Mean score	Max score	Mean %	Edexcel averages: scores of candidates who achieved grade:								
						ALL	9	8	7	6	5	4	3	U
1	2H	Q08	3.83	5	77	3.83	4.90	4.77	4.59	4.14	3.07	1.33	0.49	0.29
2	1H	Q02	3.98	5	80	3.98	4.92	4.76	4.50	4.09	3.39	2.41	1.42	0.38
3	2H	Q03	4.93	6	82	4.93	5.78	5.44	5.37	5.02	4.48	3.95	2.56	1.05
4	2H	Q01	2.34	3	78	2.34	2.97	2.81	2.60	2.41	1.85	1.40	0.62	0.37
5	1H	Q07	4.37	6	73	4.37	5.79	5.45	5.08	4.26	3.10	2.18	1.29	0.44
6	1H	Q01	2.99	4	75	2.99	3.80	3.67	3.34	2.96	2.52	1.74	0.66	0.36
7	1H	Q10	2.58	4	65	2.58	3.79	3.53	3.21	2.53	1.30	0.38	0.14	0.00
8	2H	Q07	1.89	3	63	1.89	2.92	2.56	2.21	1.55	0.96	0.42	0.24	0.07
9	1H	Q11	3.29	5	66	3.29	4.54	3.98	3.53	3.04	2.31	1.87	1.16	0.65
10	2H	Q14a	1.91	3	64	1.91	2.89	2.61	2.10	1.66	1.06	0.46	0.30	0.03
11	2H	Q13	1.88	3	63	1.88	2.77	2.44	2.01	1.61	1.19	0.83	0.27	0.20
12	1H	Q15	1.77	3	59	1.77	2.92	2.59	1.98	1.36	0.66	0.22	0.11	0.00
13	1H	Q08	1.36	3	45	1.36	2.51	1.84	1.41	0.89	0.40	0.25	0.05	0.00
14	2H	Q10	1.41	3	47	1.41	2.55	1.94	1.39	0.92	0.53	0.29	0.08	0.01
15	1H	Q03	1.63	4	41	1.63	3.01	2.08	1.73	1.09	0.67	0.26	0.05	0.00
16	1H	Q16	2.23	5	45	2.23	4.48	3.53	1.84	1.04	0.41	0.09	0.03	0.08
17	2H	Q15	2.10	6	35	2.10	4.08	3.09	2.09	1.20	0.39	0.14	0.04	0.01
18	1H	Q20	1.24	3	41	1.24	2.70	1.95	0.97	0.40	0.10	0.02	0.00	0.00
19	2H	Q22	1.45	6	24	1.45	3.53	1.89	0.93	0.49	0.18	0.04	0.00	0.00
			<b>47.18</b>	<b>80</b>		<b>47.18</b>	<b>70.85</b>	<b>60.93</b>	<b>50.88</b>	<b>40.66</b>	<b>28.57</b>	<b>18.28</b>	<b>9.51</b>	<b>3.94</b>

### Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	71	66	55	35	23	14	7