Practice Tests Set 14 – Paper 1H mark scheme, performance data and suggested grade boundaries

Q	Working	Answer	Mark		Notes
1	$20 - 5x \ (= 7 - 3x)$		3	M1	for expansion of bracket
	E.g. $20 - 7 = -3x + 5x$ or $-5x + 3x = 7 - 20$			M1	ft from a 4-term equation for a correct process of isolating terms in x on one side of the equation and numbers on the other side
		6.5 oe		A1	dep on M1 awarded and from correct working

| **2** | $\begin{array}{c\|c\|c\|c\|c\|c\|c} x & -2 & -1 & 0 & 1 & 2 & 3 \\ \hline y & 15 & 11 & 7 & 3 & -1 & -5 \end{array}$

 $(-2, 15) \ (-1, 11) \ (0, 7) \ (1, 3)$
 $(2, -1) \ (3, -5)$ | Correct line between $x = -2$ and $x = 3$ | 3 | B3 | for a correct line between $x = -2$ and $x = 3$

 (B2 for a correct straight line segment through at least 3 of $(-2, 15) \ (-1, 11) \ (0, 7) \ (1, 3) \ (2, -1) \ (3, -5)$

 or

 for all of $(-2, 15) \ (-1, 11) \ (0, 7) \ (1, 3) \ (2, -1) \quad (3, -5)$ plotted but not joined)

 (B1 for at least 2 correct points stated (may be in a table) **or** plotted **or** for a line drawn with a negative gradient through $(0, 7)$ **or** for a line with a gradient of -4) |
| | | | | | **Total 3 marks** |

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3 a		g^{10}	1	B1
b		k^7	1	B1
c		$9c^2d^8$	2	B2 B1 for 2 out of 3 terms correct in a product

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4	**Elimination** E.g. $21x - 6y = 102$ $21x + 35y = -21$ $(-41y = 123)$ or $35x - 10y = 170$ $6x + 10y = -6$ $(41x = 164)$	**Substitution** E.g. $3\left(\dfrac{34 + 2y}{7}\right) + 5y = -3$ or $3x + 5\left(\dfrac{7x - 34}{2}\right) = -3$ or $7\left(\dfrac{-3 - 5y}{3}\right) - 2y = 34$ or $7x - 2\left(\dfrac{-3 - 3x}{5}\right) = 34$		4	M1	for a correct method to eliminate x or y: coefficients of x or y the same **and** correct operation to eliminate selected variable (condone 1 arithmetical error) **or** for correctly writing x or y in terms of the other variable and correctly substituting
				A1	dep on M1 for $x = 4$ or $y = -3$
	E.g. $7x - 2 \times -3 = 34$			M1	dep on M1 for substitution of found variable **or** repeating the steps in first M1 for the second variable
		$x = 4$ $y = -3$		A1	cao A correct answer without working scores no marks
					Total 4 marks

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Q	Working	Answer	Mark	Notes
5	$4x > 2 - 7$ oe			M1	accept as an equation or with wrong inequality sign.
		$x > -1.25$	2	A1	oe allow $(-1.25, (+)\infty)$ Note: award M1A0 for an answer on the answer line of -1.25 with no sign or the incorrect sign eg $x = -1.25$, $x < -1.25$
					Total 2 marks

Q	Working	Answer	Mark	Notes
6				M1	for $y = 3x + c$ oe **or** $y = mx - 2$ oe **or** $3x - 2$ or eg $L = 3x - 2$ **or** $y = 3(x \pm a)$
		$y = 3x - 2$	2	A1	oe eg $y - 4 = 3(x - 2)$ $y - 1 = 3(x - 1)$ $y - a = 3(x - b)$ where (a, b) is any coordinate on the line
					Total 2 marks

Q		Working	Answer	Mark	Notes
7	(a)		2, 4, 6, 12	1	B1	
	(c)			2	M1	for $\frac{a}{14}$ with $a < 14$ **or** $\frac{3}{b}$ with $b > 3$ **or** for 3 and 14 used with incorrect notation e.g. 3 : 14
			$\frac{3}{14}$		A1	for $\frac{3}{14}$ oe **or** $0.214(\ldots)$
						Total 3 marks

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Q	Working	Answer	Mark	Notes
8 (a)		$\dfrac{2}{5},\dfrac{3}{5}$ oe	2	B1 correct probabilities for spinner **A**
		$\dfrac{4}{5},\dfrac{1}{5},\dfrac{4}{5},\dfrac{1}{5}$ oe		B1 correct probabilities for spinner **B**
(b)	$'\dfrac{2}{5}'\times'\dfrac{4}{5}'\left(=\dfrac{8}{25}\right)$ or $'\dfrac{2}{5}'\times'\dfrac{1}{5}'\left(=\dfrac{2}{25}\right)$ or $'\dfrac{3}{5}'\times'\dfrac{4}{5}'\left(=\dfrac{12}{25}\right)$ or $'\dfrac{3}{5}'\times'\dfrac{1}{5}'\left(=\dfrac{3}{25}\right)$ oe		3	M1 ft from (a) provided 0 < probability <1
	$1-'\dfrac{8}{25}'$ or $'\dfrac{2}{25}'+'\dfrac{12}{25}'+'\dfrac{3}{25}'$ or $'\dfrac{2}{25}'+'\dfrac{3}{5}'$ oe			M1 ft from (a) for a complete method
		$\dfrac{17}{25}$		A1 oe
				Total 5 marks

Q	Working	Answer	Mark	Notes
9			2	M1 for any **correct** partial factorisation with at least 2 factors, one of which must be a letter **or** the correct common factor with no more than 1 error inside the bracket
		$8m^2 g^3(2m+3g^2)$		A1

5

Q		Working	Answer	Mark	Notes
10	a		$4e^{10}$	2	B2 (B1 for $4e^k$ **or** ke^{10})
	b	A correct first step eg $$\dfrac{y^{-4}}{2^{-4}} \text{ or } \left(\dfrac{y^4}{16}\right)^{-1} \text{ or } \dfrac{y^{-4}}{0.0625} \text{ or } \left(\dfrac{2}{y}\right)^4 \text{ or } \dfrac{16}{y^4} \text{ or } \left(\dfrac{1}{y/2}\right)^4 \text{ or } \dfrac{1}{\left(y/2\right)^4}$$			M1 or for $16y^p$ where $p \ne -4$
			$16y^{-4}$	2	A1
	c	eg $12 \times \dfrac{4x-2}{3} - 12 \times \dfrac{5-3x}{4} = 12 \times 6$ **or** eg $4(4x-2) - 3(5-3x) = 12 \times 6$ **or** eg $\dfrac{4(4x-2)}{12} - \dfrac{3(5-3x)}{12}(=6)$ **or** eg $\dfrac{4(4x-2)-3(5-3x)}{12}(=6)$ oe			M1 for clear intention to multiply **all** terms by 12 or a multiple of 12 **or** to express LHS as two fractions over 12 or a multiple of 12 or as a single fraction with a denominator of 12 or a multiple of 12 (if expanded numerator, allow one sign error)
		eg $16x - 8 - 15 + 9x = 6 \times 12$			M1 expanding brackets and multiplying both sides by denominator with no more than one sign error
		eg $16x + 9x = 72 + 8 + 15$			M1 for correct rearrangement of a correct equation with terms in x isolated
			3.8	4	A1 oe, award full marks for a correct answer if at least M1 scored
					Total 8 marks

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Q	Working	Answer	Mark	Notes	
11	$xy + 3y = 5 - 2x$ oe			M1	multiplying both sides by $(x + 3)$ and expanding the brackets correctly
	e.g. $xy + 2x = 5 - 3y$			M1	ft dep on 2 terms on left and $(5 - 2x)$ on right, for collecting all x terms on one side and non-x terms on the other side
	eg $x(y + 2) = 5 - 3y$			M1	ft, dep on 2 terms in x, for factorising for x
		$x = \dfrac{5 - 3y}{2 + y}$	4	A1	oe allow $\dfrac{5 - 3y}{2 + y}$ as answer so long as previously seen $x = \dfrac{5 - 3y}{2 + y}$
					Total 4 marks

Q	Working	Answer	Mark	Notes
12	$F = \dfrac{k}{v^2}$ or $Fv^2 = k$ oe		3	M1 (NB. Not for $F = \dfrac{1}{v^2}$) Constant of proportionality must be a symbol such as k M2 for $6.5 = \dfrac{k}{4^2}$ oe
	$6.5 = \dfrac{k}{4^2}$ or $k = 6.5 \times 4^2$ or $k = 104$			M1 For substitution of F and v into a correct formula
		$F = \dfrac{104}{v^2}$		A1 Award 3 marks if $F = \dfrac{k}{v^2}$ is on the answer line and the value of $k = 104$ is found
				Total 3 marks

13	e.g. $x = 0.68\dot{1}$ and $100x = 68.\dot{1}\dot{8}$ or $10x = 6.\dot{8}\dot{1}$ and $1000x = 681.\dot{8}\dot{1}$			M1 e.g. two decimals that when subtracted give a finite decimal (must show understanding of recurring figures by 'dot' or at least 2 lots of 18 or 81 after the decimal point). Algebra required, use of any letter.
	$99x = 67.5,\ x = \dfrac{67.5}{99} = \dfrac{15}{22}$ or $990x = 675,\ x = \dfrac{675}{990} = \dfrac{15}{22}$ oe	show	2	A1 dep for completing the 'show that' arriving at given answer from correct working.
				Total 2 marks

Q	Working	Answer	Mark	Notes
14 (a)(i)		122	1	B1
(a)(ii)		reason	1	B1 (dep on a correct answer or a correct method seen for (i)) <u>Opposite angles</u> in a <u>cyclic quadrilateral</u> sum to 180º
(b)	$360 - 2 \times 58$ or $2 \times$ '122'		2	M1 ft from (a)
		244		A1
				Total 4 marks

Q	Working	Answer	Mark	Notes
15	$\dfrac{6}{3-\sqrt{7}} \times \dfrac{3+\sqrt{7}}{3+\sqrt{7}}$ or $\dfrac{6}{3-\sqrt{7}} \times \dfrac{-3-\sqrt{7}}{-3-\sqrt{7}}$			M1
	$\dfrac{6(3+\sqrt{7})}{3^2-7}$ **or** $\dfrac{6(3+\sqrt{7})}{2}$ **or** $\dfrac{6(-3-\sqrt{7})}{-3^2+7}$ **or** $\dfrac{6(-3-\sqrt{7})}{-2}$			M1 (numerator may be expanded or denominator may be 4 terms which need to be all correct)
		$9+3\sqrt{7}$	3	A1 dep on M2 for $9+3\sqrt{7}$ **or** $3(3+\sqrt{7})$ from correct working
				Total 3 marks

9

Q	Working	Answer	Mark	Notes
16	$3y(2y+1) - y^2 = 8$ **or** $x = \dfrac{8+y^2}{3y} \rightarrow \dfrac{8+y^2}{3y} - 2y = 1$ **or** $3xy - y^2 = 8$ $3xy - 3y \times 2y = 3y \times 1$ oe	$3x\left(\dfrac{x-1}{2}\right) - \left(\dfrac{x-1}{2}\right)^2 = 8$ oe		M1	correct first step eg substitution by eg $x = 1 + 2y$ or $y = \dfrac{x-1}{2}$ to get an equation in a single variable **or** writing 2nd equation with x the subject and substituting into 1st **or** multiplying 2nd equation by $3y$ and subtracting from 1st oe
	eg $5y^2 + 3y - 8 \ (= 0)$	eg $5x^2 - 4x - 33 \ (= 0)$		A1	for a correct simplified quadratic
	$(5y + 8)(y - 1) \ (= 0)$ or $\dfrac{-3 \pm \sqrt{3^2 - 4 \times 5 \times (-8)}}{2 \times 5}$	$(5x + 11)(x - 3) \ (= 0)$ or $\dfrac{4 \pm \sqrt{(-4)^2 - 4 \times 5 \times (-33)}}{2 \times 5}$		M1ft	dep on M1 for solving their 3 term quadratic equation using any correct method (allow one sign error and some simplification – allow as far as $\dfrac{-3 \pm \sqrt{9 + 160}}{10}$) or if factorising, allow brackets which expanded give 2 out of 3 terms correct)
	$y = -\dfrac{8}{5}$ and $y = 1$ (both)	$x = -\dfrac{11}{5}$ and $x = 3$ (both)		A1	dep on first M1
			$x = -\dfrac{11}{5}, y = -\dfrac{8}{5}$ $x = 3, y = 1$	5	A1	oe dep on first M1 Must be paired correctly
						Total 5 marks

Q	Working		Answer	Mark		Notes
17	$3^4 = \dfrac{3^x}{9^{3x}}$ **or** $81 = \dfrac{3^x}{(3^2)^{3x}}$	$9^2 = \dfrac{3^x}{9^{3x}}$ **or** $81 = \dfrac{(9^{0.5})^x}{9^{3x}}$			M1	replacing 81 with 3^4 **or** 9^{3x} with $(3^2)^{3x}$ (or 3^{6x}) **or** replacing 81 with 9^2 **or** 3^x with $(9^{0.5})^x$ (in an equation)
	eg $4 + 6x = x$ or $4 = x - 2(3x)$ oe	eg $2 = 0.5x - 3x$ oe			M1	a correct equation using powers
			−0.8	3	A1	oe, dep on at least M1
						Total 3 marks

Q	Working	Answer	Mark		Notes
18	$\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ or $\overrightarrow{BA} = \mathbf{a} - \mathbf{b}$			M1	Correct diagram (condone missing vector labels or arrows – with C on line segment OA and D on line segment OB) **OR** for finding $\overrightarrow{AB}$ or $\overrightarrow{BA}$ - may be seen as part of later working
	$\overrightarrow{CD} = \dfrac{1}{3}(-\mathbf{a} + \mathbf{b})$ or $\overrightarrow{DC} = \dfrac{1}{3}(\mathbf{a} - \mathbf{b})$oe			M1	Method to find $\overrightarrow{CD}$ or $\overrightarrow{DC}$
		Correct vectors and conclusion including <u>parallel</u> and <u>trapezium</u>	3	A1	eg $\overrightarrow{AB}$ (AB) and $\overrightarrow{CD}$ (CD) are parallel therefore $ABDC$ is a trapezium
					Total 3 marks

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19	$(3x + 2)(2x – 4) < 3x + 27$ oe eg $6x^2 – 8x – 8 < 3x + 27$			M1	condone incorrect symbol
	eg $6x^2 – 11x – 35 < 0$			M1	expanding and rearranging to get a correct 3 term quadratic, condone incorrect symbol
	$(2x – 7)(3x + 5) \ (= 0)$ or $\dfrac{11 \pm \sqrt{(-11)^2 - 4 \times 6 \times (-35)}}{2 \times 6}$			M1	first step to find the critical values dep on M1 for solving their 3 term quadratic using any correct method (allow one sign error and some simplification – allow as far as the equivalent of $\dfrac{11 \pm \sqrt{121 + 840}}{12}$) or if factorising, allow brackets which expanded give 2 out of 3 terms correct)
	$-\dfrac{5}{3}, \dfrac{7}{2}$			A1	oe the positive critical value only or both critical values (if both they must be correct)
		$2 < x < \dfrac{7}{2}$	5	A1	accept $2 \leq x < \dfrac{7}{2}$ may be seen as two separate inequalities $x > 2 \ (x \leq 2)$ **and** $x < \dfrac{7}{2}$
					Total 5 marks

12

Q	Working	Answer	Mark	Notes
20	$\left(\dfrac{9x^2-4}{3x^2-13x-10}=\right)\dfrac{(3x+2)(3x-2)}{(3x+2)(x-5)}$			**M1** for either $(3x+2)(3x-2)$ **or** $(3x+2)(x-5)$ **M2** for $\dfrac{9x^2-4}{(9x^2-4)(x-5)}=\dfrac{1}{(x-5)}$
	$\left(\dfrac{9x^2-4}{3x^2-13x-10}=\right)\dfrac{(3x+2)(3x-2)}{(3x+2)(x-5)}$			**M1** for $(3x+2)(3x-2)$ **and** $(3x+2)(x-5)$
	E.g. of denominators $(3x-2)(3x^2-13x-10)(x-1)$ **or** $(3x-2)(3x+2)(x-5)(x-1)$ **or** $9x^4-54x^3+41x^2+24x-20$ **or** $(3x+2)(x-5)(x-1)$ **or** $3x^3-16x^2+3x+10$ **or** $(3x-2)(x-5)(x-1)$ **or** $3x^3-20x^2+27x-10$ **or** $(x-5)(x-1)$ **or** x^2-6x+5			**M1** (indep) ft their fractions for use of a correct common denominator for 2 fractions with **algebraic** denominators NB: fractions need not be simplified
	$\dfrac{x-1-7(x-5)}{(x-5)(x-1)}$ **or** $\dfrac{x-1-7x+35}{(x-5)(x-1)}$ **or** $\dfrac{x-1-7(x-5)}{x^2-6x+5}$ **or** $\dfrac{x-1-7x+35}{x^2-6x+5}$ oe			**M1** for a **correct** fraction with a **correct quadratic** denominator – may or may not be expanded which leads to a correct answer
		$\dfrac{2(17-3x)}{(x-5)(x-1)}$	5	**A1** accept $\dfrac{34-6x}{(x-5)(x-1)}$ oe; if denominator is expanded then it must be correct
				Total 5 marks

Q	Working	Answer	Mark	Notes
21 a	$5 - (x \pm q)^2 + 9$ oe **or** $p - (x - 3)^2$ oe **or** $p - q^2 + 2qx - x^2$ and one of $2q = 6$ **or** $p - q^2 = 5$		M1	may be seen in working eg $-[(x - 3)^2 - 9 - 5]$ **or** expanding $p - (x - q)^2$ correctly and equating one of the coefficient of x or the constant term
		$14 - (x - 3)^2$	2 A1	fully correct SCB1 for $(x - 3)^2 - 14$
b	e.g. $(x - 3)^2 = 14 - y$ [or $(y - 3)^2 = 14 - x$]		M1	correct steps to isolate their bracket ft from (a) dep on expression in form $\pm p \pm (x - q)^2$
	$x = 3 \pm \sqrt{14 - y}$ [or $y = 3 \pm \sqrt{14 - x}$]		M1	complete method to find y in terms of x or x in terms of y. Condone + for $\pm$ ft from (a) dep on expression in form $\pm p \pm (x - q)^2$
	$(f^{-1}(x) =) 3 - \sqrt{14 - x}$		M1	for the correct inverse
			M1	method to solve $0 < 3 - \sqrt{14 - x}$ or a lower bound of 5 clearly shown, eg $x > 5$ as part of the answer
		$5 < x \le 14$	5 A1	cao
				Total 7 marks

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Q	Working	Answer	Mark	Notes

						Edexcel averages: scores of candidates who achieved grade:						
Qn	Skill tested	Mean score	Max score	Mean %	ALL	9	8	7	6	5	4	3
1	Linear equations	12.65	3	88	2.65	2.99	2.93	2.88	2.74	2.58	2.29	1.63
2	Graphs	2.42	3	81	2.42	2.94	2.85	2.76	2.60	2.34	1.76	0.70
3	Use of symbols	3.26	4	82	3.26	3.94	3.83	3.63	3.26	2.96	2.41	1.84
4	Simultaneous linear equations	2.89	4	72	2.89	3.94	3.76	3.40	3.06	2.27	1.35	0.49
5	Inequalities	1.53	2	77	1.53	1.92	1.83	1.70	1.58	1.42	1.05	0.66
6	Graphs	1.19	2	60	1.19	1.92	1.82	1.55	1.06	0.52	0.24	0.05
7	Set language and notation	2.04	3	68	2.04	2.65	2.44	2.28	2.01	1.69	1.40	1.01
8	Probability	3.17	5	63	3.17	4.69	4.25	3.64	3.02	2.15	1.47	0.78
9	Algebraic manipulation	1.16	2	58	1.16	1.76	1.56	1.31	1.09	0.81	0.48	0.12
10	Linear equations	4.59	8	57	4.59	7.43	6.34	5.12	3.62	2.92	1.67	0.77
11	Expressions and formulae	2.09	4	52	2.09	3.76	3.25	2.41	1.40	0.88	0.25	0.12
12	Ratio and proportion	1.56	3	52	1.56	2.79	2.31	1.78	1.22	0.67	0.29	0.00
13	Decimals	0.80	2	40	0.80	1.52	1.23	0.85	0.52	0.27	0.12	0.02
14	Circle properties	1.55	4	39	1.55	2.87	2.19	1.68	1.10	0.67	0.38	0.23
15	Powers and roots	1.19	3	40	1.19	2.65	1.89	1.11	0.49	0.28	0.11	0.02
16	Quadratic equations	1.73	5	35	1.73	4.16	2.43	1.42	0.74	0.32	0.11	0.06
17	Powers and roots	1.03	3	34	1.03	2.55	1.48	0.82	0.31	0.18	0.04	0.01
18	Vectors	0.94	3	31	0.94	2.21	1.34	0.77	0.47	0.20	0.08	0.06
19	Inequalities	1.37	5	27	1.37	3.11	1.93	1.12	0.81	0.35	0.13	0.03
20	Algebraic manipulation	1.41	5	28	1.41	3.54	2.09	1.02	0.47	0.24	0.10	0.01
21	Function notation	0.81	7	12	0.81	2.57	0.91	0.35	0.14	0.04	0.01	0.00
	TOTAL	49.38	80	62	39.38	74.91	60.66	48.60	37.71	28.76	19.74	11.61

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	68	55	43	33	25	16	9