

Practice Tests Set 17 – Paper 1H mark scheme, performance data and suggested grade boundaries

Q		Working	Answer	Mark	Notes
1	(a)	$5 \times (-2)^2 - (-2)^3 (= 20 - -8)$		2	M1 for correct expression or at least one of 20 or 5×4 or $--8$ or (+) 8
			28		A1
	(b)		$2p(4p - 1)$	2	B2 B1 for $p(8p - 2)$ or $2(4p^2 - p)$ or $2p(4p - 1)$ with two terms inside the bracket with one term correct.
	(c)		$12t^2 - 8t$	2	B2 B1 for $12t^2$ or $-8t$
	(d)	$5x^2 + 20x - 2x - 8$		2	M1 for 4 correct terms (ignoring signs) or 3 correct terms with correct signs. or $5x^2 + 18x + \dots$ or $\dots + 18x - 8$
			$5x^2 + 18x - 8$		A1
					Total 8 marks

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Q	Working	Answer	Mark	Notes
2	eg $(x \pm 20)(x \pm 1)$	$\frac{-(-21) \pm \sqrt{(-21)^2 - 4 \times 1 \times 20}}{2 \times 1}$ or $\left(x - \frac{21}{2}\right)^2 - \left(\frac{21}{2}\right)^2 + 20 = 0$	3	M1 If factorising, allow brackets which expanded give 2 out of 3 terms correct – if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{21 \pm \sqrt{441 - 80}}{2}$ or eg $\left(x - \frac{21}{2}\right)^2 - \frac{361}{4} = 0$ oe
	$(x - 20)(x - 1)$	eg $\frac{21 \pm \sqrt{441 - 80}}{2}$ or $\frac{21 \pm \sqrt{361}}{2}$ or $\frac{21 \pm 19}{2}$ or $x = \pm \sqrt{\frac{361}{4}} + \frac{21}{2}$ oe		M1 dep on M1 for correct factorisation, or a correct expression for x if completing the square. or a correct substitution into quadratic formula with some processing.
		1, 20		A1 for both correct values, dep on 1st M1 with no incorrect working.
				Total 3 marks

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3	eg. $10x + 35y = 85$ $10x + 6y = -2$ with the operation of subtraction or $29y = 87$ or $6x + 21y = 51$ $35x + 21y = -7$ with the operation of subtraction or $29x = -58$ or eg $5\left(\frac{17-7y}{2}\right) + 3y = -1$ or eg $5x + 3\left(\frac{17-2x}{7}\right) = -1$		4	M1 for correct method to eliminate one variable – multiplying one or both equations so the coefficient of x or y is the same in both, with the correct operation to eliminate one variable (condone one arithmetic error) or isolating x or y in one equation and substituting into the other (condone one arithmetic error).
				M1 dep 1st M1 Substitute found value into one equation or correct method to eliminate second unknown.
		$x = -2$ $y = 3$		A1 dep 1st M1 A1
				Total 4 marks

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Q	Working	Answer	Mark	Notes
4	E.g. $x^2 + 4x - 2x - 8 (= x^2 + 2x - 8)$ or $x^2 - 2x + x - 2 (= x^2 - x - 2)$ or $x^2 + 4x + x + 4 (= x^2 + 5x + 4)$		3	M1 for multiplying out two brackets correctly with no more than one error
	E.g. $x^3 + 2x^2 - 8x + x^2 + 2x - 8$ or $x^3 + 4x^2 - 2x^2 - 8x + x^2 + 4x - 2x - 8$ or $x^3 - x^2 - 2x + 4x^2 - 4x - 8$ or $x^3 - 2x^2 + x^2 - 2x + 4x^2 - 8x + 4x - 8$ or $x^3 + 5x^2 + 4x - 2x^2 - 10x - 8$ or $x^3 + 4x^2 + x^2 + 4x - 2x^2 - 8x - 2x - 8$			M1 for at least 3 terms correct out of a maximum of 6 terms or for at least 4 terms correct out of a maximum of 8 terms
		$x^3 + 3x^2 - 6x - 8$		A1
				Total 3 marks

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Q	Working	Answer	Mark	Notes
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5	a	e.g. $A + 5z = \frac{c}{y}$ oe or $Ay = c - 5yz$ oe	2	M1 for a correct first step e.g. add $5z$ to both sides or multiply all terms by y
		$c = y(A + 5z)$		A1 oe
	b	1	1	B1
	c	$(x \pm 3)(x \pm 8)$	2	M1 or for $(x \pm a)(x \pm b)$ where $ab = 24$ or $a + b = -11$
		$(x - 3)(x - 8)$		A1
				Total 5 marks

6	(a)	$81k^8$	2	B2 B1 for 81 or k^8 seen in their final answer.
	(b)	$7m^4n^6$	2	B2 B1 for $7m^4$ or n^6 in a product with no other terms in m or n
				Total 4 marks

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7	E.g. $\frac{3(2x+1)+4(x-2)}{12}$ or $\frac{3(2x+1)}{12} + \frac{4(x-2)}{12}$		3	M1 for expressing both fractions correctly with a common denominator. Allow as two separate fractions.
	E.g. $\frac{6x+3+4x-8}{12}$			M1 for removing brackets correctly in a correct single fraction
		$\frac{10x-5}{12}$		A1 accept $\frac{5(2x-1)}{12}$
				Total 3 marks

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Q	Working	Answer	Mark	Notes
8	e.g. $\frac{16}{5}$ and $\frac{11}{6}$ or $\frac{96}{30}$ and $\frac{55}{30}$		3	M1 for two correct improper fractions
	e.g. $\frac{16^8}{5} \times \frac{11}{6^3}$ or $\frac{176}{30}$ or $\frac{5280}{900}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5} \times \frac{11}{6} = \frac{176}{30} = \frac{88}{15} = 5\frac{13}{15}$ or $\frac{16}{5} \times \frac{11}{6} = \frac{176}{30} = 5\frac{26}{30} = 5\frac{13}{15}$ or $\frac{16^8}{5} \times \frac{11}{6^3} = \frac{88}{15} = 5\frac{13}{15}$ or $\frac{96}{30} \times \frac{55}{30} = \frac{5280}{900} = \frac{88}{15} = 5\frac{13}{15}$ NB: a student can show initially that $5\frac{13}{15} = \frac{88}{15}$ and they need to show that LHS $= \frac{88}{15}$	shown		A1 Dep on M2 for conclusion to $5\frac{13}{15}$ from correct working – either sight of the result of the multiplication e.g. $\frac{176}{30}$ must be seen and equated to $\frac{88}{15}$ or $5\frac{26}{30}$ or correct cancelling prior to the multiplication to $\frac{88}{15}$ NB: use of decimals scores no marks
				Total 3 marks
9		$4e^5f^3$	2	B2 (B1 for 2 out of 3 terms correct in a 3 term product)
				Total 2 marks

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10	eg $(2^3)^2 \times \sqrt[3]{(2^2)^6}$ or $(2^3)^2 \times (4)^{\frac{6}{3}}$ or $4^3 \times 4^2$ or 2^6 or 2^4 seen or $2^6 \times 16$ or 64×4^2 or $8^2 \times 4^2$ or $8^2 \times 16$ or 64×16		3	M1 a correct first stage.
	$2^6 \times (2^{12})^{\frac{1}{3}}$ or 1024 or 32^2 or 4^5 or $2^6 \times 2^4$			M1 dep on 1st M mark.
		2^{10}		A1 dependent on first M1 isw if 2^{10} seen but then 10 given as answer.
				Total 3 marks

11	(a)	vertices at $(-9, 6)$ $(-9, 9)$ $(-3, 9)$ $(-6, 6)$	Shape in correct position	2	B2 B1 for congruent shape in correct orientation but wrong position or quadrilateral with 2 or 3 vertices correct.
	(b)	vertices at $(7, 3)$ $(10, 6)$ $(13, 6)$ $(13, 3)$	Shape in correct position	1	B1
	(c)		enlargement scale factor 2 centre $(-3, 3)$	3	B1 for enlargement, enlarge, etc so long as no mention of rotation, reflection or translation, flip, move etc. B1 SF 2, double, two times etc. B1 $(-3, 3)$ stated. Accept about, from etc. with no mention of line, or column vector.
					Total 6 marks

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12	$\frac{5}{x+2} + \frac{3}{x(x+2)} (=2)$ $\text{or } \frac{5x}{x^2+2x} + \frac{3}{x^2+2x} (=2)$		5	M1 Factorising $x^2 + 2x$ in correct expression on LHS or for writing the two fractions over a common denominator.
	$\frac{5x+3}{x(x+2)} = 2 \text{ or } \frac{5x+3}{x^2+2x} = 2$ $\text{or } 5x+3 = 2x(x+2) \text{ oe}$ $\text{or } 5x+3 = 2x^2+4x \text{ oe}$			M1 Correct simplified single fraction = 2 or correct equation with no fractions.
	$2x^2 - x - 3 (=0)$			M1 Correct 3 term quadratic
	$(2x-3)(x+1) (=0)$ $\text{or } \frac{- -1 \pm \sqrt{(-1)^2 - 4 \times 2 \times (-3)}}{2 \times 2}$ $\text{or } \left(x - \frac{1}{4}\right)^2 - \frac{1}{16} - \frac{3}{2} = 0 \text{ oe}$			M1ft independent For solving <i>their</i> 3 term quadratic equation using any correct method. If factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{1 \pm \sqrt{1+24}}{4} \text{ or eg } \left(x - \frac{1}{4}\right)^2 = \frac{25}{16} \text{ oe}$
		1.5 and –1		A1 oe dep on M3
				Total 5 marks

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Q	Working	Answer	Mark	Notes
13	E.g. $(x-5)^2 - 5^2 (+40)$ or $(x-5)^2 - 25 (+40)$ $(x^2 + 2ax + a^2 (+b^2))$ $2a = -10$ or $a = -5$		2	M1 for a correct first step or for equating coefficients
		$(x-5)^2 + 15$		A1 accept $a = -5, b = 15$ SC B1 for $(-x+5)^2 + 15$ or $(5-x)^2 + 15$
				Total 5 marks

14	$(n^{\frac{4}{5}} =) \frac{1}{16}$ or 0.0625 oe	eg $\left(n^{\frac{1}{5}}\right)^4 = \left(\frac{1}{2}\right)^4$		4	M1 for sight of $\frac{1}{16}$ oe, even if raised to an incorrect power. or for algebraic approach, separating out the 4, or 5 or -1 in the power
	$(n =) 16^{\frac{5}{4}}$ or $0.0625^{\frac{5}{4}}$ oe $(n =) 2^5$ or $\sqrt[4]{1048576}$ oe or $\frac{1}{0.0625^{\frac{5}{4}}}$ or $\left(\frac{1}{16}\right)^{\frac{5}{4}}$	eg $(n =) \left(\frac{1}{2}\right)^{-5}$			M2 for a correct expression for n (M1 for one correct algebraic stage eg $n^{\frac{1}{5}} = \frac{1}{2}$)
			32		A1
					Total 7 marks

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15	$x = 4.57....$ and $100x = 457.57....$ or $10x = 45.757....$ and $1000x = 4575.7....$ or $x = 0.57....$ and $100x = 57.57....$ or $10x = 5.757....$ and $1000x = 575.7....$		2	M1 for selecting 2 recurring decimals that when subtracted give a whole number or terminating decimal eg 453 or 4530 etc eg $100x = 457.57....$ and $x = 4.57....$ or $1000x = 4575.7....$ and $10x = 45.757....$ with intention to subtract. (If recurring dots not shown then allow $10x = 45.757$, $100x = 457.57$, and $1000x = 4575.7$ to at least 5sf) or $4 + 0.5757$ and eg $x = 0.57....$, $100x = 57.57....$ with intention to subtract.
	E.g. $100x - x = 457.57.... - 4.57.... = 453$ $\frac{453}{99} = \frac{151}{33}$ or $4\frac{19}{33}$ and or $1000x - 10x = 4575.7.... - 45.757....$ $\frac{4530}{990} = \frac{151}{33}$ or $4\frac{19}{33}$ = 4530 and or $100x - x = 57.57.... - 0.57.... = 57$ $\frac{57}{99}$ or $\frac{19}{33}$ (so) $4.\dot{5}\dot{7} = 4\frac{19}{33}$ and $1000x - 10x = 575.7.... - 5.757.... =$ $\frac{570}{990}$ or $\frac{57}{99}$ or $\frac{19}{33}$ (so) 570 and $4.\dot{5}\dot{7} = 4\frac{19}{33}$	Shown		A1 for completion to $\frac{151}{33}$ or $4\frac{19}{33}$
				Total 2 marks

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Q	Working	Answer	Mark	Notes
16	e.g. $\begin{pmatrix} 5 \\ 3 \end{pmatrix} - \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ or $\begin{pmatrix} 5 \\ 3 \end{pmatrix} + \begin{pmatrix} 2 \\ -4 \end{pmatrix}$		2	M1 or for $\begin{pmatrix} 7 \\ a \end{pmatrix}$ where $a \neq -1$ or $\begin{pmatrix} b \\ -1 \end{pmatrix}$ where $b \neq 7$
		$\begin{pmatrix} 7 \\ -1 \end{pmatrix}$		A1
				Total 2 marks

17		$y \geq 1$ oe $x \leq 3$ oe $y \leq 3x - 2$ oe	3	B1 Allow $1 \leq y \leq 7$ B1 Allow $1 \leq x \leq 3$ B1 Condone < and > in place of $\leq$ and $\geq$ throughout. SC B1 if no marks awarded, recognition of lines $x = 3$ and $y = 1$. Allow incorrect inequality and condone use of equals signs eg $y < 1, x = 3$ may be seen on diagram.
				Total 3 marks

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Q	Working	Answer	Mark	Notes
18 a		$2^6 \times 3 \times 11^4$	2	B2 oe, accept 2 811 072 B1 for $2^a \times 3^b \times 11^c$ oe where two of a , b and c are correct
b		$2^9 \times 3^5 \times 11^8$	2	B2 cao B1 for $2^a \times 3^b \times 11^c$ oe where two of a , b and c are correct or $2.666... \times 10^{13}$ or an equivalent expression for e.g. $2^2 \times 2^7 \times 3^5 \times 11^3 \times 11^5$
				Total 4 marks

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Q	Working	Answer	Mark	Notes
19	$y(6y + 5) - 2y^2 = 6$	$x\left(\frac{x-5}{6}\right) - 2\left(\frac{x-5}{6}\right)^2 = 6$	5	M1 for substitution of linear equation into quadratic or multiplying linear equation by y e.g. $xy - 6y^2 = 5y$ and intention to subtract the two equations
	E.g. $4y^2 + 5y - 6 (= 0)$ oe $4y^2 + 5y = 6$	E.g. $4x^2 - 10x - 266 (= 0)$ oe $4x^2 - 10x = 266$		A1 (dep on M1) writing the correct quadratic expression in form $ax^2 + bx + c (= 0)$ allow $ax^2 + bx = c$
	E.g. $(4y - 3)(y + 2) (= 0)$ $(y =) \frac{-5 \pm \sqrt{5^2 - 4 \times 4 \times -6}}{2 \times 4}$ $4\left[\left(y + \frac{5}{8}\right)^2 - \left(\frac{5}{8}\right)^2\right] = 6$ oe	E.g. $(2x - 19)(x + 7) (= 0)$ $(x =) \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times (-133)}}{2 \times 2}$ $4\left[\left(x - \frac{10}{8}\right)^2 - \left(\frac{10}{8}\right)^2\right] = 266$ oe		M1 (dep on M1) for a complete method to solve their 3-term quadratic equation (allow one sign error and some simplification – allow as far as $\frac{-5 \pm \sqrt{25 + 96}}{8}$ or $\frac{5 \pm \sqrt{25 + 1064}}{4}$)
	$(y =) \frac{3}{4}$ and $(y =) -2$	$(x =) \frac{19}{2}$ and $(x =) -7$		A1 Dep on first M1 for having two correct x values or two correct y values
		$x = \frac{19}{2}, y = \frac{3}{4}$ $x = -7, y = -2$		A1 Dep on first M1 Must be paired and labelled correctly
				Total 5 marks

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Q	Working	Answer	Mark	Notes
20	$(4^{k+3} =)(2^2)^{k+3}$ oe or $(16 =)2^4$ $(16 =)4^2$ or $(2^k =)\left(4^{\frac{1}{2}}\right)^k$ oe $(4^{k+3} =)\left(16^{\frac{1}{4}}\right)^{k+3}$ oe or $(2^k =)\left(16^{\frac{1}{4}}\right)^k$ oe		4	M1 for $(2^2)^{k+3}$ oe or 2^4 or 4^2 or $\left(4^{\frac{1}{2}}\right)^k$ oe or $\left(16^{\frac{1}{4}}\right)^{k+3}$ oe or $\left(16^{\frac{1}{4}}\right)^k$ oe
	$(4^{k+3} =)(2^2)^{k+3}$ oe and $(16 =)2^4$ $(16 =)4^2$ and $(2^k =)\left(4^{\frac{1}{2}}\right)^k$ oe $(4^{k+3} =)\left(16^{\frac{1}{4}}\right)^{k+3}$ oe and $(2^k =)\left(16^{\frac{1}{4}}\right)^k$ oe			M1 for $(2^2)^{k+3}$ oe and 2^4 or 4^2 and $\left(4^{\frac{1}{2}}\right)^k$ oe or $\left(16^{\frac{1}{4}}\right)^{k+3}$ oe and $\left(16^{\frac{1}{4}}\right)^k$ oe
	E.g. $2k + 6 = 4 + k$ or $k + 3 = 2 + \frac{1}{2}k$ or $\frac{1}{2}(k + 3) = 1 + \frac{1}{4}k$			M1 for a correct linear equation in k
		-2		A1 dep on at least M2
Total 9 marks				

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21	$\left(\frac{-1+2}{2}, \frac{5+10}{2}\right)$ or (0.5, 7.5) oe		5	M1
	$\frac{10-5}{2-(-1)}\left(=\frac{5}{3}\right)$ oe			M1
	$m \times \frac{5}{3} = -1$ oe or $m = -\frac{3}{5}$ oe			M1 ft their gradient for use of $m_1 \times m_2 = -1$
	'7.5' = $-\frac{3}{5}$ × '0.5' + c or $c = 7.8$ oe or $y - '7.5' = -\frac{3}{5}(x - '0.5')$			M1 ft dep on first M1 and third M1
		$5y + 3x = 39$		A1 oe where p, q and r must be integers
Total 5 marks				

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Q	Working	Answer	Mark	Notes
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				Edexcel averages: scores of candidates who achieved grade:								
Qn	Mean score	Max score	Mean %	ALL	9	8	7	6	5	4	3	U
1	7.34	8	92	7.34	7.93	7.71	7.69	7.25	6.42	4.52	2.46	0.72
2	2.49	3	83	2.49	2.91	2.80	2.69	2.07	1.65	0.62	0.18	0.00
3	3.40	4	85	3.40	3.96	3.90	3.53	3.26	2.31	0.92	0.09	0.00
4	2.47	3	82	2.47	2.95	2.84	2.61	2.09	1.47	0.96	0.13	0.00
5	4.02	5	80	4.02	4.86	4.56	4.08	3.45	2.70	1.42	0.61	0.14
6	3.27	4	82	3.27	3.79	3.57	3.25	2.78	2.08	1.62	0.77	0.14
7	2.39	3	80	2.39	2.86	2.57	2.39	1.95	1.68	1.15	0.22	0.00
8	2.27	3	76	2.27	2.63	2.46	2.32	2.16	1.45	1.24	0.87	0.29
9	1.60	2	80	1.60	1.94	1.81	1.52	1.31	0.85	0.58	0.22	0.00
10	2.29	3	76	2.29	2.94	2.68	1.99	1.57	1.08	0.27	0.23	0.29
11	3.98	6	66	3.98	5.30	4.54	3.34	2.83	2.27	1.46	0.60	0.43
12	3.12	5	62	3.12	4.55	3.62	2.60	1.55	1.00	0.15	0.09	0.00
13	1.30	2	65	1.30	1.90	1.57	0.99	0.67	0.20	0.13	0.00	0.00
14	2.51	4	63	2.51	3.75	2.66	1.93	1.45	0.74	0.31	0.18	0.14
15	1.16	2	58	1.16	1.65	1.32	0.93	0.50	0.35	0.07	0.00	0.00
16	1.20	2	60	1.20	1.86	1.28	0.91	0.57	0.32	0.11	0.04	0.00
17	1.82	3	61	1.82	2.68	2.14	1.36	0.64	0.39	0.13	0.05	0.00
18	2.35	4	59	2.35	3.39	2.39	1.79	1.33	0.78	0.51	0.00	0.00
19	2.94	5	59	2.94	4.56	3.49	2.06	1.15	0.61	0.15	0.00	0.29
20	2.33	4	58	2.33	3.79	2.56	1.20	0.96	0.22	0.11	0.00	0.00
21	2.20	5	44	2.20	3.97	2.19	0.84	0.57	0.22	0.29	0.22	0.00
	56.45	80	71	56.45	74.17	62.66	50.02	40.11	28.79	16.72	6.96	2.44

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Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	68	56	45	34	23	12	5