GCSE Mathematics (9–1) Practice Tests Set 8 – Paper 1H mark scheme

Question		Working	Answer	Marks		Notes
1	a		80 000	1	B1	
	b	$0.5 \times 10^{5-8}$ **or** 0.0005 **or** 5×10^{n} **or** 5.0×10^{n}	5×10^{-4}	2	M1	
					A1	for 5×10^{-4} or 5.0×10^{-4}
2	a		y^{14}	1	B1	
	b		$16m^{12}$	2	B2	if not B2 then B1 for am^{12} **or** $16m^{b}$ **or** $2^{4}m^{12}$ $b \neq 0, 12$ $a \neq 1, 16$
	c	$5x + 15 = 3x - 4$ **or** $x + 3 = \frac{3x}{5} - \frac{4}{5}$	$-\frac{19}{2}$ oe	3	M1	for removing bracket in a correct equation or dividing all terms by 5 in a correct equation
		e.g. $5x - 3x = -4 - 15$			M1	ft from $ax + b = cx + d$ for correctly isolating terms in x on one side of equation and constant terms on the other side
					A1	dep on at least M1

Question		Working	Answer	Marks		Notes
3	a (i)		1, 2, 3, 4, 6, 12	1	B1	cao
	(ii)		1, 3, 5, 7, 9, 10, 11	1	B1	cao
4	(a)	$ac = M + bd$ **or** $-ac = -M - bd$ **or** $\frac{M}{c} = a - \frac{bd}{c}$		2	M1	For a correct first stage
			$a = \frac{M + bd}{c}$		A1	oe, eg $a = \frac{M}{c} + \frac{bd}{c}$, $a = \frac{-M - bd}{-c}$ [must have been seen with a = to award accuracy mark]
	(b)	$5x < 39 + 4$ oe		2	M1	Accept as equation or with the wrong inequality sign. Also award M1 for an answer of 8.6 or 8.6 with an = sign or the incorrect inequality sign.
			$x < 8\frac{3}{5}$		A1	Accept $x < \frac{43}{5}$ **or** $x < 8.6$ **or** $[-\infty, 8.6)$
	(c)	eg $6e^2(3f^3 - 2ef)$, eg $2f(9e^2f^2 - 6e^3)$ eg $ef(18ef^2 - 12e^2)$		2	M1	Any correct partially factorised expression with at least 2 terms in the common factor **or** for the correct common factor and a 2 term expression inside the brackets with just one error
			$6e^2f(3f^2 - 2e)$		A1	

Question		Working	Answer	Marks		Notes
5	d (i)		$(x-4)(x+6)$	2	M1	for $(x+a)(x+b)$ where either $ab=-24$ **or** $a+b=+2$ e.g $(x-6)(x+4)$
					A1	
	(ii)		4, − 6	1	B1	cao **or** ft from any $(x+p)(x+q)$
6	a (i)		54	1	B1	cao
	(ii)		angle at centre is twice angle at circumference	1	B1	dep on B1 in (a)(i) accept alternative reasons eg. angle at circumference is half the angle at the centre
	b (i)		27	1	B1	ft from (a)(i) for $\frac{"54"}{2}$
	(ii)		alternate segment theorem	1	B1	dep on B1 in (b)(i) accept alternative reason angle between tangent and radius is 90^o If answer for (b)(i) is ft from (a)(i) then reason must be angle between tangent and radius is 90^o

Question		Working	Answer	Marks		Notes
7	a	Readings from graph at cf 20 and cf 60 eg. readings of 103 and 123	20.5	2	M1 A1	
						for answer in range 19 – 21
	b	Reading from graph from time = 120 (=55) **or** 80 – 55 (=25)	No with correct figures	3	M1	accept reading in range 55 – 56
		0.35 × 80 (=28) **or** e.g. $\frac{80-"55"}{80}\times 100$ oe (=31(.25)) **or** $\frac{"55"}{80}\times 100$ oe (= 68(.75))			M1	accept a value in the range 30 – 31.25 **or** a value in the range 68 – 70 for this mark unless clearly from incorrect working
					A1	eg. No with 28 and 25 **or** No with 31.25% (accept value in range 30% – 31.25%) **or** No with 68.75% and 65% (accept value in range 68% – 70%)

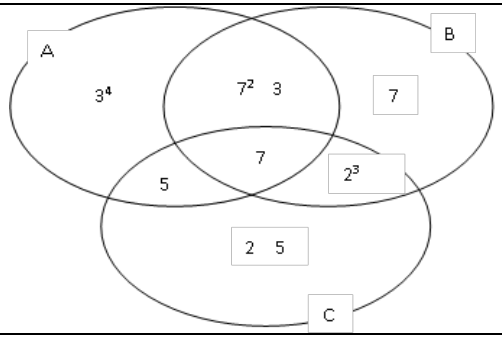
Question		Working	Answer	Marks		Notes
8	(a)		$\frac{4}{9},\frac{4}{9},\frac{1}{9},\frac{5}{9},\frac{3}{9},\frac{1}{9},\frac{5}{9},\frac{4}{9},0$	2	B2	Award B1 for any 3 correct. Decimals must be correct (recurring shown), 0 can be $\frac{0}{9}$ or the branch crossed out or left blank
	(b)			3	M1	Award M1 for one correct product (ft tree diagram)
		$\frac{5}{10}\times\frac{4}{9}+\frac{4}{10}\times\frac{5}{9}+\frac{4}{10}\times\frac{3}{9}$ **or** $\frac{5}{10}\times\frac{4}{9}+\frac{4}{10}\times\frac{8}{9}$ oe **or** $1-\left(\frac{5}{10}\times\frac{4}{9}+\frac{5}{10}\times\frac{1}{9}+\frac{4}{10}\times\frac{1}{9}+\frac{1}{10}\right)$ oe			M1	A fully correct method (ft tree diagram)
			$\frac{52}{90}$		A1	oe decimals 0.577… or 57.7...% rounded or truncated to 2 or more sf
9		$\angle OQT=90^{\circ}$ **and** $\angle OQP=18^{\circ}$ **or** 90 – 18		3	M1	For 90° **and** 18° correctly identified in the working or on the diagram **or** for 90 – 18 **or** for other fully correct method
			72		A1	
		Angle between tangent and radius(or diameter) is 90 degrees			B1	Correct reason for 90° angle [If used alternate segment theorem]

Question		Working	Answer	Marks		Notes
10	a		−6.5 oe	1	B1	
	b	$4y = 3x - 5$ **or** $4x = 3y - 5$	$\frac{4x+5}{3}$ oe	2	M1	
					A1	
	c	$\sqrt{19-3}$ oe **or** f(4) **or** $\frac{3\sqrt{19-3}-5}{4}$ **or** $\frac{3\sqrt{19-x}-5}{4}$ oe	1.75 oe	2	M1	
					A1	for 1.75oe (and no other solution)
11	(a)	$\frac{2^3}{2^7}$ **or** $2^3 \times 2^{-7}$ **or** $\frac{1}{2^4}$ **or** $\frac{1}{16}$ **and** $16 = 2^4$		2	M1	
			–4		A1	Accept 2^{-4}
	(b)	$13^{-24} \times 13^5$		2	M1	for 13^{-24} or for $k = -6 \times 4 + 5$
			–19		A1	Accept 13^{-19}

Question		Working	Answer	Marks		Notes
12	(a)		3, 4	1	B1	
	(b)		see graph at end of mark scheme	3	B3	for correct region identified
						If not B3 then award B2 for $x + y = 4$ drawn (with no additional lines drawn) **and** a region identified that satisfies at least 3 of the 5 given inequalities
						If not B2 then award B1 for line $x + y = 4$ drawn NB. May shade wanted or unwanted regions; lines may be solid or dashed

Question		Working	Answer	Marks		Notes
13	a	$\left(\overrightarrow{BC} =\right)\begin{pmatrix}-2\\-7\end{pmatrix}+\begin{pmatrix}10\\11\end{pmatrix}\left(=\begin{pmatrix}8\\4\end{pmatrix}\right)$	(13, 12)	3	M1	or coordinates (5 – 2, 8 – 7) (= (3, 1)) assigned to A (may be seen in vector form) **or** (13, y) or (x, 12) given as coordinates for C
		$\begin{pmatrix}5\\8\end{pmatrix}+"\begin{pmatrix}8\\4\end{pmatrix}"$ **or** $\begin{pmatrix}10\\11\end{pmatrix}+"\begin{pmatrix}3\\1\end{pmatrix}"$			M1	for coordinates (5 – 2 + 10, 8 – 7 + 11) assigned to C
					A1	
	b	e.g. $\begin{pmatrix}63\\211\end{pmatrix}-\begin{pmatrix}5\\8\end{pmatrix}\left(=\begin{pmatrix}58\\203\end{pmatrix}\right)$ **with** e.g. "58" ÷ 2 (=29) **and** "203" ÷ 7 (=29) **OR** e.g. $\begin{pmatrix}63\\211\end{pmatrix}-\begin{pmatrix}3\\1\end{pmatrix}\left(=\begin{pmatrix}60\\210\end{pmatrix}\right)$ **with** e.g. "60" ÷ 2 (=30) **and** "210" ÷ 7 (=30)	Proof	2	M1	may work with A and E, in which case may need to ft for method mark from (a)
					A1	proof with justification eg. $\overrightarrow{BE} = 29\begin{pmatrix}2\\7\end{pmatrix}$ (**or** $\overrightarrow{AE} = 30\begin{pmatrix}2\\7\end{pmatrix}$) with ABE is a straight line **or** 210 ÷ 60 = 3.5 and 7 ÷ 2 = 3.5 so ABE is a straight line

Question		Working	Answer	Marks		Notes
14	(a)	$R = kt^2$ oe		3	M1	Equation consistent with $R \propto t^2$
		eg $10 = k \times 2^2$ **or** $40 = k \times 4^2$ **or** $k = 2½$			M1	Substitute values at any point on the graph or find the value of k. (Implies first M1.) Allow readings from graph for $t \pm 0.1$ and $R \pm 1$
			$R = \frac{5}{2}t^2$		A1	Award for $R = kt^2$ if the value of k is shown clearly in (a) or (b).
	(b)	$\frac{8}{5x} = "\frac{5}{2}t^2"$		2	M1	ft dep on answer of the form $R = kt^2$
			$t = \frac{0.8}{\sqrt{x}}$		A1	ft dep on answer of the form $R = kt^2$ Simplification of constant is not required. eg accept $t = \sqrt{\frac{16}{25}} \times \frac{1}{\sqrt{x}}$ [allow other clear arguments that clearly shows t is inversely proportional to $\sqrt{x}$]

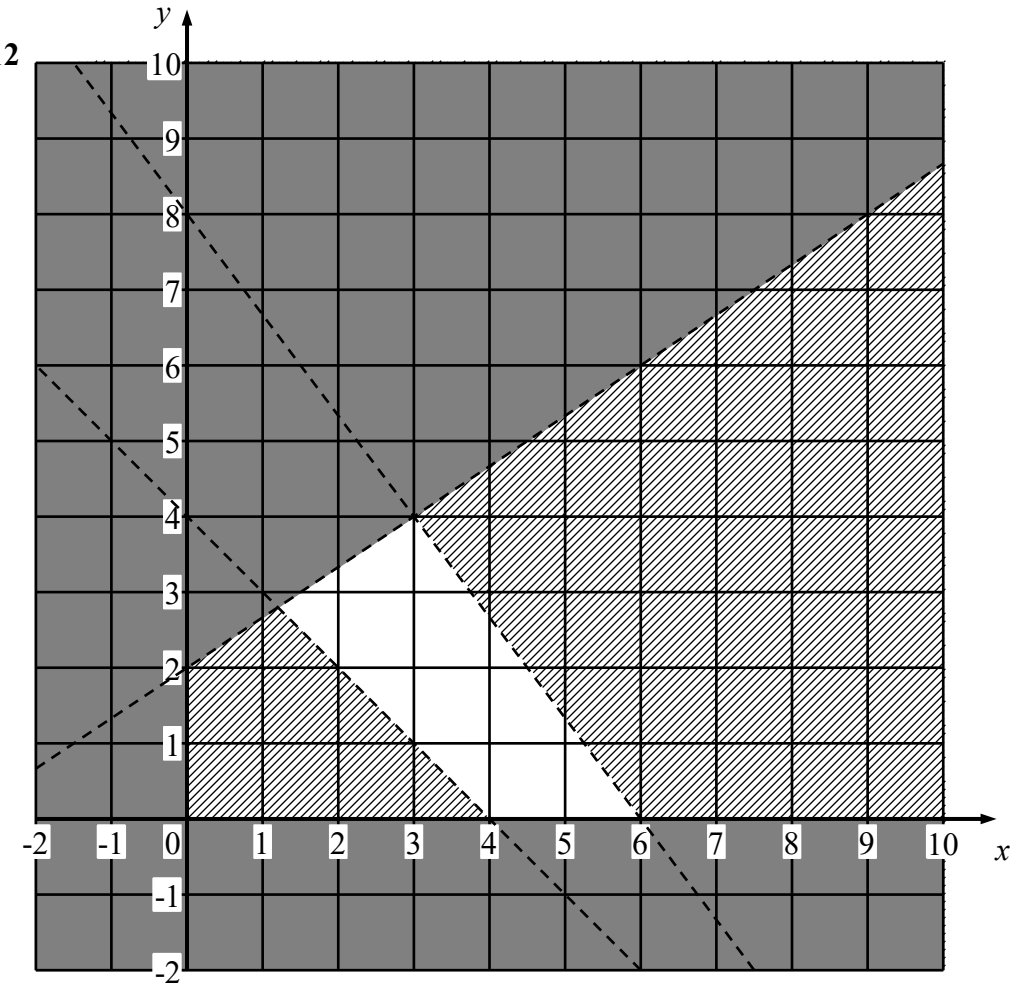
Question		Working	Answer	Marks		Notes
15	a (i)		3×7^3	1	B1	for 3×7^3 oe **or** 1029
	(ii)		$2^3 \times 3^5 \times 5 \times 7^4$	1	B1	for $2^3 \times 3^5 \times 5 \times 7^4$ oe **or** 23 337 720
	b		4, 2, 1	2	M1	for $r = 1$ **or** for $p = 4$ **and** $q = 2$ **or** correct representation of C in terms of prime factors on a Venn diagram
					A1	

Question		Working	Answer	Marks		Notes
16		$\frac{1}{4}\times\frac{2}{5}\left(=\frac{2}{20}\right)$ **or** $\frac{3}{4}\times\frac{3}{5}\left(=\frac{9}{20}\right)$ **or** $\frac{1}{4}\times\frac{3}{5}\left(=\frac{3}{20}\right)$ **or** $\frac{3}{4}\times\frac{2}{5}\left(=\frac{6}{20}\right)$	$\frac{121}{400}$ oe	4	M1	for any one correct probability
		$\frac{1}{4}\times\frac{2}{5}+\frac{3}{4}\times\frac{3}{5}\left(=\frac{11}{20}\right)$ **or** $1-\left(\frac{1}{4}\times\frac{3}{5}+\frac{3}{4}\times\frac{2}{5}\right)\left(=\frac{11}{20}\right)$			M1	for a complete method
		$"\frac{11}{20}"\times"\frac{11}{20}"$ **or** $\left("\frac{2}{20}"+"\frac{9}{20}"\right)^2$			M1	
					A1	for $\frac{121}{400}$ oe **or** 0.3025 **or** 30.25%
17		$\frac{1}{(3x-5)(3x+5)}-\frac{1}{2(3x+5)}$	$\frac{7-3x}{2(3x-5)(3x+5)}$	3	M1	indep for $(3x + 5)(3x – 5)$
		E.g. $\frac{2}{2(3x-5)(3x+5)}-\frac{1(3x-5)}{2(3x-5)(3x+5)}$ **or** $\frac{6x+10}{(9x^2-25)(6x+10)}-\frac{9x^2-25}{(9x^2-25)(6x+10)}$			M1	for two correct fractions with a common denominator if there is any expansion at this stage then it must be correct
					A1	accept equivalents eg. $\frac{7-3x}{18x^2-50}$

Question		Working	Answer	Marks		Notes
18	(a)	$\sqrt{9\times5}$ **and** $\sqrt{4\times5}$		2	M1	**or** for $45 = 3 \times 3 \times 5$ **and** $20 = 2 \times 2 \times 5$
			$5\sqrt{5}$ shown		A1	dep on M1 cao with sight of $3\sqrt{5}+2\sqrt{5}$ but we must see where these come from
	(b)	$\frac{2}{\sqrt{3}-1}\times\frac{\sqrt{3}+1}{\sqrt{3}+1}$ or $\frac{2(\sqrt{3}+1)}{3-1}$ or $\frac{2\sqrt{3}+2}{2}$		2	M1	Rationalise denominator – award for seeing multiplication by $\frac{\sqrt{3}+1}{\sqrt{3}+1}$ or $\frac{-\sqrt{3}-1}{-\sqrt{3}-1}$
			$1+\sqrt{3}$		A1	dep on M1
	(c)	$(x+3\sqrt{2})^2-(3\sqrt{2})^2-1$		2	M1	or $(x+3\sqrt{2})^2-18-1$ **or** for $a = 3\sqrt{2}$ **or** $b = -19$
			$(x+3\sqrt{2})^2-19$		A1	

Question		Working	Answer	Marks		Notes
19		$y = \frac{2}{3}x\left(+\frac{12}{3}\right)$ **or** $y = \frac{2x+12}{3}$ **or** gradient = $\frac{2}{3}$	$3x + 2y = 86$	5	M1	
		(gradient of perpendicular line =) $-\frac{3}{2}$ oe **or** $\frac{-1}{"\frac{2}{3}"}$ oe			M1	ft from their gradient
		$37 = "-\frac{3}{2}" \times 4 + c$ **or** $c = 43$			M1	(dep on previous M1) and ft from their gradient
		$y = -\frac{3}{2}x + 43$			A1	correct equation (equation in any form)
					A1	for $3x + 2y = 86$ oe for a simplified equation with integer coefficients e.g. $3x = 86 - 2y$

Question 12



Practice Tests Set 8 – Paper 1H

					Edexcel averages:	Mean score of students achieving grade						
Question	**Skills tested**	**Mean score**	**Max score**	**Mean %**	**ALL**	**9**	**8**	**7**	**6**	**5**	**4**	**3**
1a	Standard form	0.98	1	98	0.98	0.99	0.99	0.99	0.98	0.97	0.95	0.94
1b	Standard form	1.88	2	94	1.88	1.96	1.93	1.90	1.86	1.81	1.70	1.52
2a	Algebraic manipulation	0.98	1	98	0.98	0.99	0.99	0.98	0.98	0.96	0.95	0.89
2b	Algebraic manipulation	1.51	2	76	1.51	1.90	1.67	1.41	1.20	1.05	0.88	0.82
2c	Linear equations	2.76	3	92	2.76	2.95	2.89	2.82	2.73	2.53	2.09	1.62
3a	Set language and notation	0.92	1	92	0.92	0.98	0.97	0.94	0.89	0.81	0.73	0.60
3b	Set language and notation	0.73	1	73	0.73	0.94	0.85	0.71	0.57	0.43	0.29	0.21
4a	Algebraic manipulation	1.64	2	82	1.64	1.95	1.86	1.72	1.48	1.11	0.71	0.33
4b	Inequalities	1.73	2	87	1.73	1.93	1.85	1.76	1.64	1.47	1.12	0.77
4c	Algebraic manipulation	1.34	2	67	1.34	1.83	1.57	1.27	0.97	0.71	0.47	0.32
5a	Quadratic equations	1.76	2	88	1.76	1.98	1.95	1.88	1.66	1.35	0.86	0.56
5b	Quadratic equations	0.76	1	76	0.76	0.99	0.95	0.81	0.56	0.34	0.13	0.07
6ai	Circle properties	0.55	1	55	0.55	0.78	0.60	0.49	0.39	0.29	0.22	0.12
6aii	Circle properties	0.44	1	44	0.44	0.72	0.50	0.36	0.26	0.15	0.11	0.04
6bi	Circle properties	0.62	1	62	0.62	0.82	0.73	0.60	0.45	0.33	0.25	0.15
6bii	Circle properties	0.33	1	33	0.33	0.62	0.39	0.21	0.10	0.05	0.01	0.00
7a	Statistical measures	1.41	2	71	1.41	1.84	1.65	1.38	1.11	0.79	0.47	0.24
7b	Graphical representation of data	2.32	3	77	2.32	2.79	2.57	2.30	2.05	1.69	1.30	0.81
8a	Probability	1.78	2	89	1.78	1.97	1.94	1.86	1.72	1.45	1.05	0.61
8b	Probability	2.03	3	68	2.03	2.73	2.48	2.09	1.48	0.82	0.34	0.12
9	Circle properties	2.04	3	68	2.04	2.62	2.33	2.02	1.64	1.24	0.84	0.45
10a	Function notation	0.88	1	88	0.88	0.97	0.95	0.92	0.84	0.71	0.55	0.38
10b	Function notation	1.16	2	58	1.16	1.90	1.56	0.98	0.43	0.15	0.05	0.01
10c	Function notation	1.54	2	77	1.54	1.92	1.84	1.62	1.21	0.82	0.53	0.36

					Edexcel averages:	Mean score of students achieving grade						
Question	**Skills tested**	**Mean score**	**Max score**	**Mean %**	**ALL**	**9**	**8**	**7**	**6**	**5**	**4**	**3**
11a	Powers and roots	1.32	2	66	1.32	1.92	1.62	1.22	0.85	0.47	0.28	0.17
11b	Powers and roots	1.42	2	71	1.42	1.89	1.63	1.35	1.05	0.82	0.53	0.45
12a	Simultaneous linear equations	0.80	1	80	0.80	0.99	0.94	0.81	0.67	0.48	0.32	0.24
12b	Graphs	1.59	3	53	1.59	2.71	2.04	1.19	0.59	0.32	0.15	0.09
13a	Vectors	2.14	3	71	2.14	2.87	2.59	2.12	1.54	1.02	0.54	0.19
13b	Vectors	0.52	2	26	0.52	1.21	0.52	0.19	0.06	0.02	0.00	0.00
14a	Proportion	2.03	3	68	2.03	2.90	2.60	2.06	1.19	0.57	0.19	0.07
14b	Proportion	0.53	2	27	0.53	1.19	0.55	0.21	0.06	0.01	0.00	0.01
15ai	Powers and roots	0.66	1	66	0.66	0.95	0.81	0.61	0.42	0.26	0.12	0.08
15aii	Powers and roots	0.46	1	46	0.46	0.84	0.54	0.31	0.17	0.08	0.04	0.04
15b	Powers and roots	1.01	2	51	1.01	1.65	1.18	0.80	0.50	0.34	0.20	0.17
16	Probability	1.83	4	46	1.83	3.05	2.18	1.47	0.87	0.46	0.20	0.08
17	Algebraic manipulation	0.89	3	30	0.89	1.85	0.90	0.51	0.24	0.11	0.04	0.03
18a	Applying number	1.00	2	50	1.00	1.68	1.27	0.81	0.41	0.19	0.10	0.05
18b	Applying number	0.82	2	41	0.82	1.65	0.98	0.46	0.18	0.08	0.02	0.01
19	Graphs	1.36	5	27	1.36	3.37	1.16	0.41	0.13	0.05	0.02	0.00
		50.47	**80**	**63**	**50.47**	**69.79**	**57.52**	**46.55**	**36.13**	**27.31**	**19.35**	**13.62**

Suggested Grade Boundaries based on peformance of students in Summer 2018

9	8	7	6	5	4	3
61	51	41	32	24	16	12