

## GCSE Mathematics (9–1) Practice Tests Set 9 – Paper 2H mark scheme

Question	Working	Answer	Mark	Notes
<b>1</b>	eg $\frac{x+10+y}{3} = 11$ oe or $y - x = 7$ oe $3 \times 11 (=33)$		2	M1 for one correct equation in $x$ and $y$ <b>OR</b> finding the total of $x$ , 10 and $y$ <b>OR</b> two numbers with a sum of 23 <b>OR</b> two numbers with a range of 7  Note: condone non-integers for the award of M1
		$x = 8, y = 15$		A1
				<b>Total 2 marks</b>

Question	Working	Answer	Mark	Notes
<b>2</b>	(area =) $2 \times 1.25 (=2.5)$		3	M1
	( $F =$ ) $42 \times "2.5"$ or $42 = \frac{F}{"2.5"}$			M1 Correct substitution into pressure formula
		105		A1 cao
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
3	$1 \times 5 + 3 \times 9 + 5 \times 24 + 7 \times 40 + 9 \times 7 (= 495)$ <b>or</b> $5 + 27 + 120 + 280 + 63 (= 495)$	5.8	4	M2 for at least 4 correct products added (need not be evaluated) If not M2 then award M1 for consistent use of value within interval (including end points) for at least 4 products which must be added <b>OR</b> correct mid-points <b>used</b> for at least 4 products and not added
	"495" $\div$ 85			M1 dep on at least M1 Allow division by their $\sum f$ provided addition or total under column seen
				A1 for 5.8 – 5.824
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
4	eg $(6.3 \times 1000) \div 210 (= 30)$		4	M1 for a method to find the number of candles, could work in grams or kg
	$\frac{2}{5} \times "30" \times 13 (= 156)$			M1 for a method to find money made from the \$13 candles
	$\left(1 - \frac{2}{5}\right) \times "30" \times 0.8 \times 13 (= 187.20)$			M1 for a method to find money made from the reduced candles
		343.2(0)		A1
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes	
5	$675 \div (5 + 4) \times 5 (= 375)$	225	3	M1	M2 $675 \div (5 + 4) \times 3$
	“375” $\div 5 \times 3$			M1 dep M1	
				A1	
<b>Total 3 marks</b>					

Question	Working	Answer	Mark	Notes	
6	(a) $3c - 21 + 6c + 8$	$9c - 13$	2	M1	For 3 or 4 terms correct
	(b) $x^2 - 2x + 7x - 14$			A1	
	(c)	$x^2 + 5x - 14$	2	M1	For 3 correct terms or for 4 correct terms ignoring signs or for $x^2 + 5x + k$ for any non-zero value of $k$ or for $\dots + 5x - 14$
	(d)	$7y(4y - 3)$	2	B2	B1 for $y(28y - 21)$ or $7(4y^2 - 3y)$ or $7y(4y + k)$ or $7y(ay - 3)$
	eg $7x - 2 = 4(3x + 1)$ oe	$-\frac{6}{5}$	3	M1	correct first step
	$7x - 12x = 4 + 2$ oe or $-2 - 4 = 12x - 7x$ oe			M1	for rearranging the $x$ terms on one side and the numerical terms on the other. ft rearranging their expansion $ax + b = cx + d$ eg $7x - 2 = 12x + 4$
				A1	oe, dep on M1
<b>Total 9 marks</b>					

Question	Working	Answer	Mark	Notes
7	eg $7x - 2 = 4(3x + 1)$ oe	$-\frac{6}{5}$	3	M1 correct first step
	$7x - 12x = 4 + 2$ oe or $-2 - 4 = 12x - 7x$ oe			M1 for rearranging the $x$ terms on one side and the numerical terms on the other. ft rearranging their expansion $ax + b = cx + d$ eg $7x - 2 = 12x + 4$
				A1 oe, dep on M1
				<b>Total 9 marks</b>

Question	Working	Answer	Mark	Notes
8	6h 42 min = 6.7 h or $6\frac{42}{60}$ oe or 402 (mins) or 24120 (secs) <b>OR</b> 10.8(33...)(km)	4355	3	B1 for converting 6h 42min into hours or minutes or seconds <b>OR</b> finding distance travelled in 1 minute
	eg $6.7 \times 650$ or $(402 \times 650) \div 60$ or $(24120 \times 650) \div 3600$ or $6 \times 650 + 42 \times 10.8$			M1 use of $s \times t$ , allow $6.42 \times 650 (=4173)$
				A1
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes	
9	Eg $\frac{1.5}{100} \times 20\,000$ oe or 300	OR  20 000 $\times 1.015^3$	3	M1 for eg $\frac{1.5}{100} \times 20\,000$ oe or 300	OR M2 for $20\,000 \times 1.015^3$ or $20\,000 \times 1.015^4$ or 21 227.27..  (M1 for $20\,000 \times 1.015^2$ or 20 604.5)
	$\frac{1.5}{100} \times (20\,000 + '300') = 304.5$			M1 for completing method	
	$\frac{1.5}{100} \times (20\,000 + '300' + '304.5')$ = 20913.5675				Accept $1 + 0.015$ as equivalent to 1.015 throughout
					SC: If no other marks gained, award M1 for $20\,000 \times 1.045$ oe or 20900 or 900
				20 914	A1 Answers in range 20 913– 20 914
				<b>Total 3 marks</b>	

Question	Working	Answer	Mark	Notes
10	$160^2 + 200^2 (=65600)$		3	M1
	$\sqrt{160^2 + 200^2}$			M1
		256		A1 accept 256 – 256.2
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
<b>11</b>	$2.5 - 0.6 = 1.9$	2 hours 51 minutes	4	M1
	$3 \times 12 \times \text{"1.9"} (= 68.4)$			M1 for using length $\times$ width $\times$ height to find a volume
	$\text{"68.4"} \times 1000 \div 400$ (= 171 minutes)			M1 for their volume $\times 1000 \div 400$
				A1
				<b>Total 4 marks</b>
	<b>Alternative scheme</b>			
	$250 - 60 = 190$	2 hours 51 minutes	4	M1
	$300 \times 1200 \times \text{"190"} (= 6.84 \times 10^7)$			M1 for using length $\times$ width $\times$ height to find a volume
	$\text{"6.84} \times 10^7" \div 10^6 \times 1000 \div 400$ (= 171 minutes)			M1 for their volume $\div 10^6 \times 1000 \div 400$
				A1
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
<b>12</b>	Interior angle of pentagon $(180 \times 3) \div 5 (= 108)$ oe		4	M1 or exterior angle of pentagon = $\frac{360}{5} (= 72)$
	Interior angle of octagon $(180 \times 6) \div 8 (= 135)$ oe			M1 or exterior angle of octagon = $\frac{360}{8} (= 45)$
	$(CBF =) 360 - (\text{"108"} + \text{"135"}) (= 117)$			M1 $(CBF =) \text{"72"} + \text{"45"} (= 117)$
		31.5		A1
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
13	24.3 – 16 (= 8.3)	123.6	4	M1 Forming a right angled triangle with 24.3 – 16 on one side, 8.3 may be seen on diagram
	$\tan y = \frac{12.5}{8.3}$ or $\tan z = \frac{8.3}{12.5}$ OR $\sqrt{8.3^2 + 12.5^2}$ (= 15.004...) and $\sin y = \frac{12.5}{15.0}$ or $\sin z = \frac{8.3}{15.0}$ or $\cos y = \frac{8.3}{15.0}$ or $\cos z = \frac{12.5}{15.0}$			M1 for a correct trig statement involving angle <i>CDE</i> or <i>DCE</i> where <i>E</i> is on the line <i>AD</i> and <i>CE</i> is perpendicular to <i>AD</i>
	$\tan^{-1}\left(\frac{12.5}{8.3}\right)$ (= 56.415 ...) or $\tan^{-1}\left(\frac{8.3}{12.5}\right)$ (= 33.584 ...) or $\sin^{-1}\left(\frac{12.5}{15.0}\right)$ (= 56.415 ...) or $\sin^{-1}\left(\frac{8.3}{15.0}\right)$ (= 33.584 ...) or $\cos^{-1}\left(\frac{8.3}{15.0}\right)$ (= 56.415 ...) or $\cos^{-1}\left(\frac{12.5}{15.0}\right)$ (= 33.584 ...)			M1 complete method to find angle <i>CDE</i> or <i>DCE</i>
				A1 123.5 – 123.6
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
14	72 × 1000 (= 72000) or 72 ÷ 60 (= 1.2) or 72 ÷ 60 ÷ 60 (= 0.02) or 60 ÷ 60 × 1000 (= 3.6)	20	3	M1 for at least <b>one</b> of × 1000 or ÷ 60
	$\frac{72}{60 \times 60} \times 1000$			M1 (dep) for a complete method
				A1
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
15 (a)	$6 \times 25 + 6 \times 45 (= 150 + 270 = 420)$	20	4	M1 for $6 \times 25 (=150)$ or $6 \times 45 (=270)$
	“150” + “270” – 350 (= 70) or “420” – 350			M1
	$\begin{array}{r} 70 \\ \hline 350 \times 100 \end{array}$			M1 (dep on M2)
				A1
	<b>Alternative scheme</b>			
	$6 \times 25 + 6 \times 45 (= 150 + 270 = 420)$	20	4	M1 for $6 \times 25 (=150)$ or $6 \times 45 (=270)$
	$\begin{array}{r} 420 \\ \hline 350 \times 100 = 120 \end{array}$			M1
	“120” – 100			M1 (dep on M2)
				A1
(b)	$500\,000 \div 8 (=62\,500)$	6 250 000	3	M1
	$500\,000 \div 8 \times 100$			M1 for a complete method
				A1
				<b>Total 7 marks</b>



Question	Working	Answer	Mark	Notes
16	$\frac{1}{2}$ $\frac{1}{2}$ eg $m = \frac{1}{2}$ or $y = \frac{1}{2}x + c$		4	M1 for gradient = $\frac{1}{2}$
	$\frac{1}{2}$ $\frac{1}{2}$ eg $7 = \frac{1}{2} \times 4 + c$ or $y - 7 = \frac{1}{2}(x - 4)$			M1 for substituting (4,7) into an equation with gradient = $\frac{1}{2}$
	$\frac{1}{2}$ $\frac{1}{2}$ eg $\frac{1}{2}x + 5 = 0$ or $-7 = \frac{1}{2}(x - 4)$			M1 Inputting $y = 0$ into their correct equation
		(-10, 0)		A1 SC B2 for an answer of (18,0) or (0.5,0) oe or (7.5,0) oe
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
17			4	M1 for $\frac{a}{8} \times \frac{b}{7} \times \frac{c}{6}$ where $a < 8, b < 7, c < 6$
	eg $P(o, o, o) = \frac{5}{8} \times \frac{4}{7} \times \frac{3}{6} \left( = \frac{60}{336} = \frac{5}{28} = 0.178(571\dots) \right)$ or $P(e, e, o) = \frac{3}{8} \times \frac{2}{7} \times \frac{5}{6} \left( = \frac{30}{336} = \frac{5}{56} = 0.0892(857\dots) \right)$			M1 for a complete method to find $P(o, o, o)$ or $P(o, e, e)$ or $P(e, o, e)$ or $P(e, e, o)$
		$\frac{25}{56}$		M1 for a complete method to find $P(o, o, o)$ <b>and</b> at least one of $P(o, e, e), P(e, o, e), P(e, e, o)$
				A1 oe $\frac{150}{336}, 0.446(428571\dots)$ SC B2 for $\frac{260}{512} \left( = \frac{65}{128} = 0.507(8125) \right)$ , B1 for $\frac{170}{512} \left( = \frac{85}{256} = 0.332(03125) \right)$
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
18	8.35, 8.45, 6.25, 6.35, 0.265, 0.275	8.3	3	M1 For sight of 8.35, 8.45, 6.25, 6.35, 0.265 or 0.275
	$(a =) \frac{8.45 - 6.25}{0.265}$			M1 $a = \frac{UB - LB_1}{LB_2}$ Where $8.4 < UB \leq 8.45$ and $6.25 \leq LB_1 < 6.3$ and $0.265 \leq LB_2 < 0.27$
				A1 8.3(018867...) dep on M2
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
19	eg $(4x + 3)(x - 2)$ or $(x =)$ $\frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 4 \times (-6)}}{2 \times 4}$	$x < -\frac{3}{4}$ $x > 2$	4	M1 first step to finding the critical values
	$(x =) -\frac{3}{4}$ and 2			A1 for two correct critical values
				M1 (dep on two critical values having been found) for a diagram showing the inequalities <b>OR</b> $x < a$ and $x > b$ where $a$ is their lower critical value and $b$ is their upper critical value <b>OR</b> $x > 2$ <b>OR</b> $x < \frac{-3}{4}$ <b>OR</b> $\frac{-3}{4} > x > 2$
				A1 for both correct inequalities
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
20	$\frac{4}{3} \times \pi \times R^3 - \frac{4}{3} \times \pi \times 1.2^3$ or $\frac{4}{3} \times \pi \times (1.2 + t)^3 - \frac{4}{3} \times \pi \times 1.2^3$	3.9	5	M1 for an expression for the volume of the inner sphere
	$\left( \frac{4\pi}{3} R^3 - \frac{4}{3} \times \pi \times 1.2^3 \right) \times 2700 = 1980$			M1
	$\frac{4\pi}{3} R^3 = \frac{4}{3} \times \pi \times 1.2^3 + \frac{1980}{2700}$ $= 7.238229474 + 0.7333333$ $= 7.97(1562807)$			M1 for a correct expression or sight of 7.23(8229474) + 0.73(33333) or sight of 7.97(1562807)
	$R = \sqrt[3]{\left( \frac{3}{4\pi} \times \left( \frac{4}{3} \times \pi \times 1.2^3 + \frac{1980}{2700} \right) \right)} = 1.2392\dots$ $1.2392 - 1.2 = 0.0392$			M1 for a correct expression or sight of $\sqrt[3]{1.90(3070437)}$ or sight of 1.23(9229151) or sight of 0.0392(29151)
				A1 for 3.9 – 3.92
				<b>Total 5 marks</b>

Question	Working	Answer	Mark	Notes
<b>21</b>	$\frac{(2x+5)(2x-5)}{(5x+7)(x-1)} \times \frac{2(2x-5)-3(x-3)}{(x-3)(2x-5)}$	$\frac{2x+5}{(5x+7)(x-3)}$	4	M1 For $4x^2 - 25 = (2x+5)(2x-5)$ or $5x^2 + 2x - 7 = (5x+7)(x-1)$
	$\frac{(2x+5)(2x-5)}{(5x+7)(x-1)} \times \frac{x-1}{(x-3)(2x-5)}$			M1 $\frac{2}{x-3} - \frac{3}{2x-5} = \frac{2(2x-5)-3(x-3)}{(x-3)(2x-5)}$ oe
	$\frac{2x+5}{(5x+7)(x-3)}$			M1 $\frac{(2x+5)(2x-5)}{(5x+7)(x-1)} \times \frac{x-1}{(x-3)(2x-5)}$ oe may be partially simplified
				A1 Denominator may be expanded eg $\frac{2x+5}{5x^2-8x-21}$ isw for incorrect denominator expansion
				<b>Total 4 marks</b>

Question	Skill tested	Mean score	Max score	Mean %	Mean score of students achieving grade:							
					ALL	9	8	7	6	5	4	3
Q01	Statistical measures	1.63	2	82	1.63	1.97	1.87	1.72	1.38	1.15	0.84	0.29
Q02	Measures	2.77	3	92	2.77	2.96	2.88	2.80	2.72	2.60	2.26	2.17
Q03	Statistical measures	3.37	4	84	3.37	3.93	3.74	3.42	3.04	2.55	2.14	1.84
Q04	Applying number	3.58	4	90	3.58	3.99	3.72	3.72	3.37	3.17	2.68	1.29
Q05	Ratio and proportion	2.77	3	92	2.77	2.94	2.92	2.85	2.76	2.45	2.28	1.60
Q06a	Algebraic manipulation	1.92	2	96	1.92	1.99	1.96	1.95	1.91	1.85	1.66	1.54
Q06b	Algebraic manipulation	1.90	2	95	1.90	1.98	1.96	1.95	1.92	1.82	1.52	1.33
Q06c	Algebraic manipulation	1.81	2	91	1.81	1.99	1.92	1.91	1.74	1.52	1.31	1.08
Q07	Linear equations	2.56	3	85	2.56	2.98	2.86	2.74	2.47	1.85	0.89	0.46
Q08	Measures	2.66	3	89	2.66	2.97	2.91	2.81	2.43	2.09	1.84	1.75
Q09	Percentages	2.38	3	79	2.38	2.87	2.63	2.43	2.11	1.64	1.60	1.04
Q10	Pythagoras' Theorem	2.65	3	88	2.65	2.98	2.87	2.82	2.57	2.11	1.53	0.62
Q11	3D shapes and volume	3.07	4	77	3.07	3.84	3.46	3.32	2.62	1.95	1.28	0.44
Q12	Polygons	3.28	4	82	3.28	3.88	3.77	3.56	2.85	2.30	1.37	0.79
Q13	Trigonometry	3.09	4	77	3.09	3.83	3.50	3.22	2.78	1.99	1.31	0.38
Q14	Measures	2.10	3	70	2.10	2.74	2.25	2.08	1.78	1.36	1.05	1.00
Q15a	Percentages	3.35	4	84	3.35	3.90	3.63	3.54	3.07	2.46	2.17	1.32
Q15b	Percentages	1.83	3	61	1.83	2.76	2.10	1.67	1.23	0.88	0.75	0.52
Q16	Graphs	1.71	4	43	1.71	3.52	2.29	1.02	0.32	0.09	0.02	0.00
Q17	Probability	1.06	4	27	1.06	2.26	1.18	0.66	0.33	0.05	0.02	0.00
Q18	Degree of accuracy	1.84	3	61	1.84	2.81	2.33	1.88	1.10	0.45	0.23	0.04
Q19	Inequalities	1.95	4	49	1.95	3.50	2.29	1.51	0.92	0.59	0.32	0.00
Q20	3D shapes and volume	0.97	5	19	0.97	2.64	0.72	0.29	0.15	0.06	0.00	0.00
Q21	Algebraic manipulation	1.86	4	47	1.86	3.62	2.33	1.24	0.67	0.30	0.11	0.04
		<b>56.11</b>	<b>80</b>	<b>70</b>	<b>56.11</b>	<b>72.85</b>	<b>62.09</b>	<b>55.11</b>	<b>46.24</b>	<b>37.28</b>	<b>29.18</b>	<b>19.54</b>

**Suggested Grade Boundaries based on performance of students in Summer 2018**

9	8	7	6	5	4	3
66	58	50	42	33	24	19