

GCSE Mathematics (9-1) Practice Tests

Set 8 – Paper 3H mark scheme

Question	Working	Answer	Mark	Notes
1		2, 20, 29	3	M2 for 3 number selected with at least two of the properties: mean = 17, median = 20, range = 27 else M1 with one of these properties
				A1 in any order
Alternative				
1	$17 \times 3 (= 51)$	2, 20, 29	3	M1 method to find sum of 3 numbers
	$17 \times 3 - 20 (=31)$			M1 method to find sum of smallest and largest numbers
				A1 in any order
Alternative				
1	$x, 20, z$ or x, y, z and $y = 20$	2, 20, 29	3	M1 use of different letters with 20 shown as the middle value
	$x + z = 31$ or $\frac{x + 20 + z}{3} = 17$ oe			M1 an equation for the sum or for the difference of the two unknown numbers
	or $z - x = 27$ or $x - z = 27$			A1 in any order
				Total 3 marks

Question	Working	Answer	Mark	Notes
2 (a)(i)		67	1	B1
(ii)		<u>reason</u>	1	B1 dep on B1 or a fully correct method shown in (i) e.g. <u>alternate angles</u> are equal or other fully correct method
(b)	e.g. $180 - (67 + 60)$ or $120 - 67$ or $(180 - 67) - (180 - 120)$ or $113 - 60$ or $180 - 67 = 60 + y$ or $113 = 60 + y$ or $120 - y = 67$	53	2	M1 Correct calculation for y or correct equation in y , or $BFC = 60^\circ$ and $BCF = 67^\circ$ or $ABF = 60^\circ$ and $BCF = 67^\circ$ or $ABF = 60^\circ$ and $ABC = 113^\circ$
Total 4 marks				
3 (a)	$(0 \times 2) + 1 \times 7 + 2 \times 3 + 3 \times 4 + 4 \times 3 + 5 \times 1$ $(0 +) 7 + 6 + 12 + 12 + 5$	42	2	M1 For at least 4 correct products with the intention to add. A1 SC B1 for 2.1
(b)		2	1	B1
Total 3 marks				
4	$\frac{6}{100} \times 8.50$ or 0.06×8.50 or 0.51 or $51p$ $8.50 + "0.51"$	9.01	3	M1 M1 dep A1 M2 for 1.06×8.50 oe
Total 3 marks				

Question	Working	Answer	Mark	Notes
5 (a)		A correct enlargement in the correct position	2	M1 Enlargement of given shape by SF 3 anywhere on grid or completely correct enlargement by SF 2
				A1 Fully correct
(b)		Rotation (Centre) (0,0) 90° clockwise oe	3	B1 B1 <i>O</i> or origin B1 -90°, 270° If more than one transformation mentioned then no marks
Total 5 marks				
6	$2240 \div 805 (=2.78(26)....)$ “0.7826...” $\times 60 (= 46.95...)$ or “2.7826...” $\times 60 (= 166.95...)$	2 hrs 47 mins	3	M1
				M1 Method to change “0.7826...” to minutes or “2.7826...” to minutes
				A1 cao
Total 3 marks				
7	e.g. $7x = 4x - 13.5$ or $7x - 4x = -13.5$ or $7x + 13.5 = 4x$ or $4y - 7y = 54$ e.g. $y = 4 \times “-4.5”$ or $4x = “-18”$ or $7 \times “-4.5” - y = -13.5$	$x = -4.5$ $y = -18$	3	M1 For correctly eliminating y or x
				M1 dep on first M1 For method to find second variable
				A1 dep on first M1 for both answers
Total 3 marks				

Question	Working	Answer	Mark	Notes
8	$\cos A = \frac{43}{70} (=0.6142)$ or $\sin B = \frac{43}{70} (=0.6142)$	142	4	M1 $\cos B = \frac{55.23...}{70}$, $\sin A = \frac{55.23...}{70}$
	$A = \cos^{-1}\left(\frac{43}{70}\right)$ or $B = \sin^{-1}\left(\frac{43}{70}\right)$			M1 $A = \sin^{-1}(0.7890...)$ $B = \cos^{-1}(0.7890...)$
	$A = 52.1^\circ$ or $B = 37.9^\circ$			A1 $52^\circ - 52.1^\circ$ or $37.9^\circ - 38^\circ$ SC B1 If M0 M0 A0 award B1 for 52.1° or 37.9° not identified as A or as B
				B1 fit for an angle identified as A or B Correct bearing (142 – 142.1)
Total 4 marks				
9		$27a^6b^{12}$	2	B2 fully correct B1 for 2 of the three terms correct in a product.
Total 2 marks				
10	$-5 - 3 \leq 2p < 13 - 3$ or $-5 - 3 \leq 2p$ and $2p < 13 - 3$ or $-\frac{5}{2} \leq \frac{2p+3}{2} < \frac{13}{2}$ or $-\frac{5}{2} \leq \frac{2p+3}{2}$ and $p + \frac{3}{2} < \frac{13}{2}$	$-4 \leq p < 5$	3	M2 Correctly subtracting 3 from each part of the inequality or dividing each term by 2 or $(p =) -4$ and $(p =) 5$ M1 for one end correct e.g. $2p \leq -5 - 3$ or $\frac{2p+3}{2} < \frac{13}{2}$ or $(p =) -4$ or $(p =) 5$
				A1 accept $p \geq -4$ and $p < 5$
Total 3 marks				

Question	Working	Answer	Mark	Notes
11	10 – 3	7	2	M1 10 and 3 identified A1
Total 2 marks				
12	e.g. $4(5x-2)+3(3-5x)=2\times 12$ or $\frac{4(5x-2)}{12} + \frac{3(3-5x)}{12}$ or $\frac{4(5x-2)+3(3-5x)}{12}$	4.6	4	M1 For clear intention to multiply all terms by 12 or a multiple of 12 or to express LHS as a single fraction or as the sum of a pair of fractions with a common denominator of 12 or a multiple of 12
	$20x-8+9-15x=2\times 12$ or $\frac{20x-8+9-15x}{12} = 2$ or $\frac{20x-8}{12} + \frac{9-15x}{12} = 2$			M1 Expanding brackets correctly in a correct equation.
	$5x = 23$ or $20x - 15x = 24 + 8 - 9$ or $20x - 15x = 24 - 1$ oe			M1 For correct rearrangement of a correct equation with fractions cleared and terms in x isolated.
				A1oe dep on at least M1
Total 4 marks				
13	$(1.4 \times 10^9) \div (3.5 \times 10^7)$ or $\frac{1\ 400\ 000\ 000}{35\ 000\ 000}$	40	2	M1 or for an answer equivalent to 4×10^n where n is an integer, e.g. 4, 4×10^{-2} , 4000, 0.4×10^3
				A1 Accept 4×10^1 or 4×10
Total 2 marks				

Question	Working	Answer	Mark	Notes
14 (a)		$\frac{4}{7}$	2	B1 For left branch correct 0.57(142...)
		$\frac{4}{9}, \frac{5}{9}, \frac{4}{9}, \frac{5}{9}$		B1 For right branches correct 0.44(4...), 0.55(5...)
(b)	$\frac{3}{7} \times \frac{4}{9}$	$\frac{4}{21}$	2	M1 ft their tree
				A1 ft their tree for fractions less than 1 oe $\frac{12}{63}$, 0.19(0476...)
Total 4 marks				
15	$p^2 = \frac{w+4}{w-2}$	$w = \frac{2p^2+4}{p^2-1}$	4	M1 For squaring both sides
	$p^2(w-2) = w+4$			M1 For multiplying both sides by (w-2)
	$p^2w - w = 4 + 2p^2$ or $-4 - 2p^2 = w - p^2w$			M1 For isolating terms in w in a correct equation.
				A1 oe $w = \frac{-2p^2-4}{1-p^2}$
Total 4 marks				

Question	Working	Answer	Mark	Notes
16 (a)	$15 \div (80 - 50) (= 0.5)$	28, 18	2	M1 correct method to find fd for interval $50 < t \tilde{N} 80$ or one correct frequency for $80 < t \tilde{N} 120$ or $120 < t \tilde{N} 180$ or 0.5 shown correctly on fd axis (1 cm = 0.1) or 10 small squares = 1 person oe A1 Both values correct
(b)	$\frac{10}{50-0} (= 0.2), \frac{12}{240-180} (= 0.2),$ $\frac{8}{320-240} (= 0.1)$	Correct bars drawn	2	M1 For method to find one correct frequency density. Accept one bar drawn with correct height Accept $10 \times 10 = 100$ or $12 \times 10 = 120$ or $8 \times 10 = 80$ small squares. A1 Three bars with correct widths and heights
	$0 < t \tilde{N} 50$ fd = 0.2 (height 2 cm) $180 < t \tilde{N} 240$ fd = 0.2 (height 2 cm) $240 < t \tilde{N} 320$ fd = 0.1 (height 1 cm)			
Total 4 marks				

Question	Working		Answer	Mark	Notes
17 (a)	$(2x + 1)(x + 3) - 2 \times 3 (= 45)$ or $(2x + 1)(x + 3) - 6 (= 45)$		$2x^2 + 7x - 48 = 0$ obtained correctly.	2	M1 A correct unsimplified expression or equation for shaded area
	$2x^2 + 6x + x + 3 - 6 = 45$				A1dep Convincingly arriving at given equation. Expansion of brackets must be shown (3 or 4 terms).
(b)	$(x =) \frac{-7 \pm \sqrt{7^2 - 4 \times 2 \times -48}}{2 \times 2} \left(= \frac{-7 \pm \sqrt{49 + 384}}{4} \right)$		3.45	3	M1 Correct substitution into the quadratic formula, allow one sign error in numbers and + instead of \pm ; discriminant must not be simplified as far as 433
					M1 dep on first M1 for simplification of discriminant to $\sqrt{433}$ or $\sqrt{49 + 384}$
					A1 dep on first M1 3.45(216...) Award A0 if negative root is not excluded.
Total 5 marks					
18	$1000x = 278.7878\dots$ $10x = 2.7878\dots$	$100x = 27.8787\dots$ $x = 0.2787\dots$	$\frac{46}{165}$ correctly shown	2	M1 Two appropriate equations selected for use. e.g. $1000x = 278.7878\dots$ and $10x = 2.7878\dots$
	$990x = 276$ $x = \frac{276}{990}$	$99x = 27.6$ $x = \frac{27.6}{99} (= \frac{276}{990})$			A1 e.g. $\frac{276}{990} = \frac{46}{165}$ or $\frac{27.6}{99} = \frac{46}{165}$ must be shown
Total 2 marks					

Question	Working	Answer	Mark	Notes
19	$\frac{(x+3)(x-3)-(x+4)(x-4)}{(x-3)(x-4)}$ or $\frac{(x+3)(x-3)}{(x-3)(x-4)} - \frac{(x+4)(x-4)}{(x-3)(x-4)}$ oe	$\frac{7}{(x-3)(x-4)}$	3	M1 For a correct expression as one fraction or as two fractions with a common denominator
	$\frac{(x^2-3x+3x-9)-(x^2-4x+4x-16)}{(x-3)(x-4)}$ or $\frac{(x^2-9)-(x^2-16)}{(x-3)(x-4)}$ or $\frac{x^2-9-x^2+16}{(x-3)(x-4)}$ oe			M1 Correct expansion of $(x-3)(x+3)$ and $(x-4)(x+4)$ in a single correct fraction
				A1 Accept $\frac{7}{x^2-7x+12}$
Total 3 marks				
20	$\frac{5^{n^2+n^2-5n}}{5^{6+3}} (=125)$ or $5^{n^2-6} \times 5^{n^2-5n-3} (=125)$ or $5^{n^2+n^2-5n-9} (=125)$ or $5^{n^2+n^2-5n} = 125 \times 5^9$	4	5	M1 For simplifying the LHS to a product or quotient of two single powers of 5 or for an equation with 125 and at most a single power of 5 on each side.
	$5^{n^2+n^2-5n} = 5^{12}$ or $5^{n^2+n^2-5n-9} = 5^3$ or $5^{n^2+n^2-5n-9-3} = 5^0$			M1 For simplifying both sides to a single power of 5
	e.g. $2n^2 - 5n - 12 (=0)$ or $2n^2 - 5n = 12$			A1 A correct quadratic equation in n , simplified to three terms in any position.
	$(2n+3)(n-4) (=0)$ or $n = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times -12}}{2 \times 2} = \left(\frac{5 \pm \sqrt{25+96}}{4} \right)$			M1 A correct factorisation or correct substitution into the quadratic formula or correctly completing the square. A1 dep on correct quadratic equation Award A0 if negative root is not excluded.
Total 5 marks				

Question	Working	Answer	Mark	Notes
21	$\frac{1}{2}$ side of square = $11\cos 72$ (= 3.3991...) or $11\sin 18$ side of square = $\frac{11\sin 36}{\sin 72}$ (= 6.7983...) or $\sqrt{11^2 + 11^2 - 2 \times 11 \times 11 \times \cos(36)}$ or $2 \times 11 \cos 72$	9.89	4	M1 For a complete correct method to find a length identified as side of square or $\frac{1}{2}$ side of square.
	ht of triangular face = $11\sin 72$ (= 10.4616...) or $11\cos 18$ or $\sqrt{11^2 - ("3.3991...")^2}$ diagonal of base = $\frac{"6.7983..."}{\cos 45}$ (= 9.6143...) or $\frac{"6.7983..."}{\sin 45}$ or $\sqrt{("6.7983...")^2 + ("6.7983...")^2}$			M1 For complete correct method to find a length identified as height of triangular face, or diagonal of base or $\frac{1}{2}$ diagonal of base
	$\frac{1}{2}$ diagonal of base = $\frac{"3.3991..."}{\cos 45}$ (= 4.8071...) or $\frac{"3.3991..."}{\sin 45}$ or $\sqrt{("3.3991...")^2 + ("3.3991...")^2}$ or $"6.7983..." \cos 45$ or $"6.7983..." \sin 45$			M1 A correct method to find OP
	$OP = \sqrt{("10.4616...")^2 - ("3.3991...")^2}$ or $\sqrt{11^2 - (\frac{1}{2} \times "9.6143...")^2}$ or $\sqrt{11^2 - ("4.8071...")^2}$			A1 Allow 9.8 – 9.95 SC B1 If no other marks are scored, award B1 for $11\sin 72$ seen.
Total 4 marks				

Question	Working	Answer	Mark	Notes
22	$\frac{360}{5} (= 72)$ oe or $\frac{1}{2} \times \frac{(5-2)180}{5} (= 54)$ oe	16.5	4	M1 A correct method to find an angle in a triangle formed by two radii and a side of the pentagon.
	$\frac{72}{360} \times 2 \times \pi \times 6.8 (= \frac{68\pi}{25} = 8.54(5)\dots)$ oe			M1 A correct method to find arc length
	$2 \times 6.8 \times \sin 36^\circ$ or $2 \times 6.8 \times \cos 54^\circ$ or $\sqrt{6.8^2 + 6.8^2 - 2 \times 6.8 \times 6.8 \times \cos 72^\circ}$ or $\frac{6.8}{\sin 54^\circ} \times \sin 72^\circ (= 7.99(3)\dots)$			M1 indep A correct method to find length of chord
				A1 Allow 16.5 – 16.6
Total 4 marks				
23	11.45, 11.55, 5.05, 5.15	1001	4	M1 For a correct upper or lower bound for either number
	$11.55^3 (= 1540 (.798875\dots))$			M1 Correct method to find upper bound for volume of box
	$\frac{4}{3} \times \pi \times 5.05^3 (= 539 (.53429\dots))$			M1 Correct method to find lower bound for volume of ball
				A1 dep on correct working Accept 1001 or answer in range [1001.26, 1001.34]
Total 4 marks				

Practice Tests Set 8 – Paper 3H

Question	Skills tested	Mean score	Max score	Mean %	Edexcel averages:	Mean score of students achieving grade							
					ALL	9	8	A / 7	6	5	C / 4	3	
Q01		2.15	3	72	2.15				2.35			1.19	
Q02ai		0.85	1	85	0.85				0.89			0.70	
Q02aii		0.31	1	31	0.31				0.31			0.15	
Q02b		1.37	2	69	1.37				1.44			0.65	
Q03a		1.73	2	87	1.73				1.86			1.41	
Q03b		0.45	1	45	0.45				0.42			0.18	
Q04		2.68	3	89	2.68				2.78			2.39	
Q05a		1.51	2	76	1.51				1.68			0.89	
Q05b		2.08	3	69	2.08				2.15			1.44	
Q06		2.17	3	72	2.17				2.28			1.29	
Q07		2.34	3	78	2.34				2.69			1.29	
Q08		2.41	4	60	2.41				2.70			0.47	
Q09a		1.47	2	74	1.47				1.58			0.87	
Q010		2.05	3	68	2.05				2.38			0.84	
Q11		1.08	2	54	1.08				1.03			0.41	
Q12		3.01	4	75	3.01				3.48			1.48	
Q13		1.68	2	84	1.68				1.80			1.29	
Q14a		1.85	2	93	1.85				1.93			1.64	
Q14b		1.62	2	81	1.62				1.88			0.92	
Q15		2.29	4	57	2.29				2.43			0.48	
Q16a		1.17	2	59	1.17				1.31			0.34	
Q16b		1.13	2	56	1.13				1.24			0.36	
Q17a		1.27	2	64	1.27				1.61			0.15	
Q17b		1.63	3	54	1.63				1.83			0.39	
Q18		0.77	2	39	0.77				0.72			0.07	
Q19		1.49	3	50	1.49				1.47			0.29	

Q20		1.78	5	36	1.78			1.12			0.06
Q21		1.66	4	42	1.66			1.40			0.11
Q22		1.75	4	44	1.75			1.65			0.14
Q23		1.59	4	40	1.59			1.43			0.05
		49.34	80	62	49.34			51.84			21.94

Suggested Grade Boundaries based on performance of students in Summer 2018

9	8	7	6	5	4	3
65	56	47	37	27	17	12