

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

Q	Working	Answer	Mark	Notes
1	$20 \times 14 (= 280)$	460	4	M1
	$\frac{20+16}{2} \times (24-14) (= 180)$			M1
	“280” + “180”			M1 (dep) on at least one of the previous M marks
				A1
				<b>Total 4 marks</b>
	<b>Alternative scheme 1</b>			
	$(24+14) \div 2 (= 19)$ and $(20-16) \div 2 (=2)$	460	4	M1
	$2 \times 19 (= 38)$ and $16 \times 24 (= 384)$			M1
	“38” + “38” + “384”			M1 (dep) on at least one of the previous M marks
				A1
				<b>Total 4 marks</b>
	<b>Alternative scheme 2</b>			
	$20 \times 24 (= 480)$	460	4	M1
	$(20-16) \div 2 (=2)$ and $24 - 14 (= 10)$ $2 \times 10 = 20$			M1
	“480” – “20”			M1 (dep) on at least one of the previous M marks
				A1
				<b>Total 4 marks</b>

Q	Working	Answer	Mark	Notes
2 (a)		Correct <b>R</b> (5,6), (3,6), (3,5)	2	B2 fully correct If not B2 then B1 for correct orientation of <b>R</b> but in wrong position
(b)		Correct <b>T</b> (2,-1), (2,-3), (1,-3)	1	B1
				<b>Total 3 marks</b>

Q	Working	Answer	Mark	Notes												
3	For example, <table border="1" style="margin-left: 20px;"> <thead> <tr> <th><math>n</math></th> <th><math>E</math></th> </tr> </thead> <tbody> <tr><td>1</td><td>7</td></tr> <tr><td>2</td><td>11</td></tr> <tr><td>3</td><td>17</td></tr> <tr><td>4</td><td>25</td></tr> <tr><td>5</td><td>35</td></tr> </tbody> </table>	$n$	$E$	1	7	2	11	3	17	4	25	5	35	No + reason	2	M1 for evaluating $E$ correctly for any value of $n$
$n$	$E$															
1	7															
2	11															
3	17															
4	25															
5	35															
				A1 for No with $E$ evaluated correctly as a non-prime number												
				<b>Total 2 marks</b>												

Q	Working	Answer	Mark	Notes
4	Angle $EBG = 180 - 2 \times 65 (= 50)$ or Angle $ABE = 180 - (38 + 65) (= 77)$	27	3	M1
	Angle $ABE = 180 - (38 + 65) (= 77)$ and Angle $ABG = "77" - "50"$			M1 for a complete method to find angle $ABG$
				A1
				<b>Total 3 marks</b>
	<b>Alternative scheme 1</b>			
	Angle $EBG = 180 - 2 \times 65 (= 50)$ or Angle $EBC = 103$	27	3	M1
	Angle $EBC = 103$ and Angle $ABG = 180 - (103 + "50")$			M1 for a complete method to find angle $ABG$
				A1
				<b>Total 3 marks</b>

Q	Working	Answer	Mark	Notes
5 (a)		$4n + 2$	2	M1 for $4n + k$ ( $k$ may be 0 or absent) oe
				A1 oe e.g $6 + (n - 1)4$
(b)		$4n + 6$	1	B1 oe ft part (a) providing M1 in part (a) is awarded e.g $4(n + 1) + 2$
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
6 (a)		$5y^4$	2	B2 B1 for fully simplifying terms in $x$ or terms in $y$
(b)	$h-f=3e$ or $\frac{h}{3}=e+\frac{f}{3}$ or $\frac{h-f}{3}$	$e=\frac{h-f}{3}$	2	M1
				A1 oe, accept $e=\frac{f-h}{-3}$
				<b>Total 4 marks</b>

Q	Working	Answer	Mark	Notes
7 (a)		$1.39 \times 10^6$	1	B1
(b)		$5 \times 10^{-3}$	1	B1
				<b>Total 2 marks</b>

Question	Working	Answer	Mark	Notes
8	$16x=32$ or $32y=144$	(2, 4.5)	3	M1 for a correct sequence of operations which leads to 1 equation in one unknown, allowing one arithmetical error
	$3 \times '2' + 2y = 15$ or $3x + 2 \times '4.5' = 15$			M1 (dep) substitute found value of one variable in one equation
				A1
				<b>Total 3 marks</b>

Question	Working	Answer	Mark	Notes
9	eg ( $COA=$ ) $360 - (2 \times 90 + 74) (=106)$ or ( $COA=$ ) $180 - 74 (=106)$ or $OAB = 90$ or $OCB = 90$	53	3	M1 Fully correct method to find $COA$ or $OAB$ or $OCB$
	"106" $\div 2$			M1
				A1 values may be seen on diagram throughout
				<b>Total 3 marks</b>

Q	Working	Answer	Mark	Notes
10	$\frac{1}{3} + \frac{1}{5} (= \frac{8}{15})$ or 0.53... or 53.3.....% or 53%	900	4	M1
	$1 - \frac{8}{15} (= \frac{7}{15})$ or 0.46..... or 0.47 or 46.6...% or 47%			M1
	$420 \div \frac{7}{15} (= 900)$ oe			M1
				A1
				<b>Total 4 marks</b>

Question	Working	Answer	Mark	Notes
11	$2^7 = 4^{2x} \times 2^x$ or $128 = (2^2)^{2x} \times 2^x$	1.4	3	M1 Replacing 128 by $2^7$ or 4 by $2^2$
	$7 = 2(2x) + x$			M1
				A1 oe
				<b>Total 3 marks</b>

Q	Working	Answer	Mark	Notes
12 (a)		$8e^6f^9$	2	B2 B1 for 2 correct terms in a product of 3 terms
(b)	$3x^2 + 9xy - 4yx - 12y^2$	$3x^2 + 5xy - 12y^2$	2	M1 M1 for 3 correct terms out of 4 <b>or</b> for 4 correct terms ignoring signs <b>or</b> for $3x^2 + 5xy + c$ for any non zero value of $c$ <b>or</b> for $d + 5xy - 12y^2$ for any non zero value of $d$
				A1
(c)	$a^{\frac{1}{2}} \times a = a^{\frac{3}{2}}$ or $\frac{a}{a^{-2}} = a^3$  or $\frac{a^{\frac{1}{2}}}{a^{-2}} = a^{\frac{5}{2}}$	$\frac{7}{2}$	2	M1 for one correct step
				A1 oe
(d)	$\frac{2^n - 1}{(2^n - 1)(2^n + 1)}$	$\frac{1}{2^n + 1}$	2	M1 for $(2^n - 1)(2^n + 1)$
				A1
				<b>Total 8 marks</b>

Q	Working	Answer	Mark	Notes
13 (a)		$\frac{9}{20}$ on first red branch	3	B1
		Correct binary structure		B1
	$\frac{9}{20}, \frac{7}{16}, \frac{9}{20}, \frac{7}{16}$	Labels and correct probabilities on all second branches		B1
(b)	$\frac{9}{20} \times \frac{7}{16}$	$\frac{63}{320}$ or 0.196(875)	2	M1
				A1 oe ft diagram Accept 0.20 or better
(c)	$\frac{9}{20} \times \frac{7}{16} + \frac{11}{20} \times \frac{9}{16}$	$\frac{162}{320}$ or 0.506(25)	3	M1 for $\frac{11}{20} \times \frac{9}{16}$
				M1 for $\frac{9}{20} \times \frac{7}{16} + \frac{11}{20} \times \frac{9}{16}$
				A1 oe Accept 0.51 or better
				<b>Total 8 marks</b>

Q	Working	Answer	Mark	Notes
14	FDs are 2, 3, 2.8, 0.7, 0.8	Correct histogram	3	M1 for any two correct FD calculations (can be implied by at least two correct bars)
				M1 for any three correct FDs (can be implied by at least three correct bars )
				A1 fully correct histogram
				(SC: B2 for all five bars of correct width with heights in the correct ratio)
				(SC:B1 for three bars of correct width with heights in the correct ratio)
				<b>Total 3 marks</b>



Question	Working	Answer	Mark	Notes
15 (a)	eg $x = 0.4\dot{3}\dot{6}$ and $100x = 43.\dot{6}\dot{3}$ or $10x = 4.\dot{3}\dot{6}$ and $1000x = 436.\dot{3}\dot{6}$	show	2	M1 eg two decimals that when subtracted give a finite decimal
	$99x = 43.2, x = \frac{43.2}{99}$ or $990x = 432, x = \frac{432}{990}$			A1 for completing the 'show that' arriving at given answer from correct working.
(b)			3	M1 for $\sqrt{20} = 2\sqrt{5}$ and $\sqrt{80} = 4\sqrt{5}$ or $\frac{\sqrt{20} + \sqrt{80}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{\sqrt{20} + 2\sqrt{20}}{\sqrt{3}}$
				M1dep for $\frac{6\sqrt{15}}{3}$ or $2\sqrt{15}$ or $\frac{3\sqrt{60}}{3}$ oe
		$\sqrt{60}$		A1 dep on M2, accept $a = 60$
				<b>Total 5 marks</b>

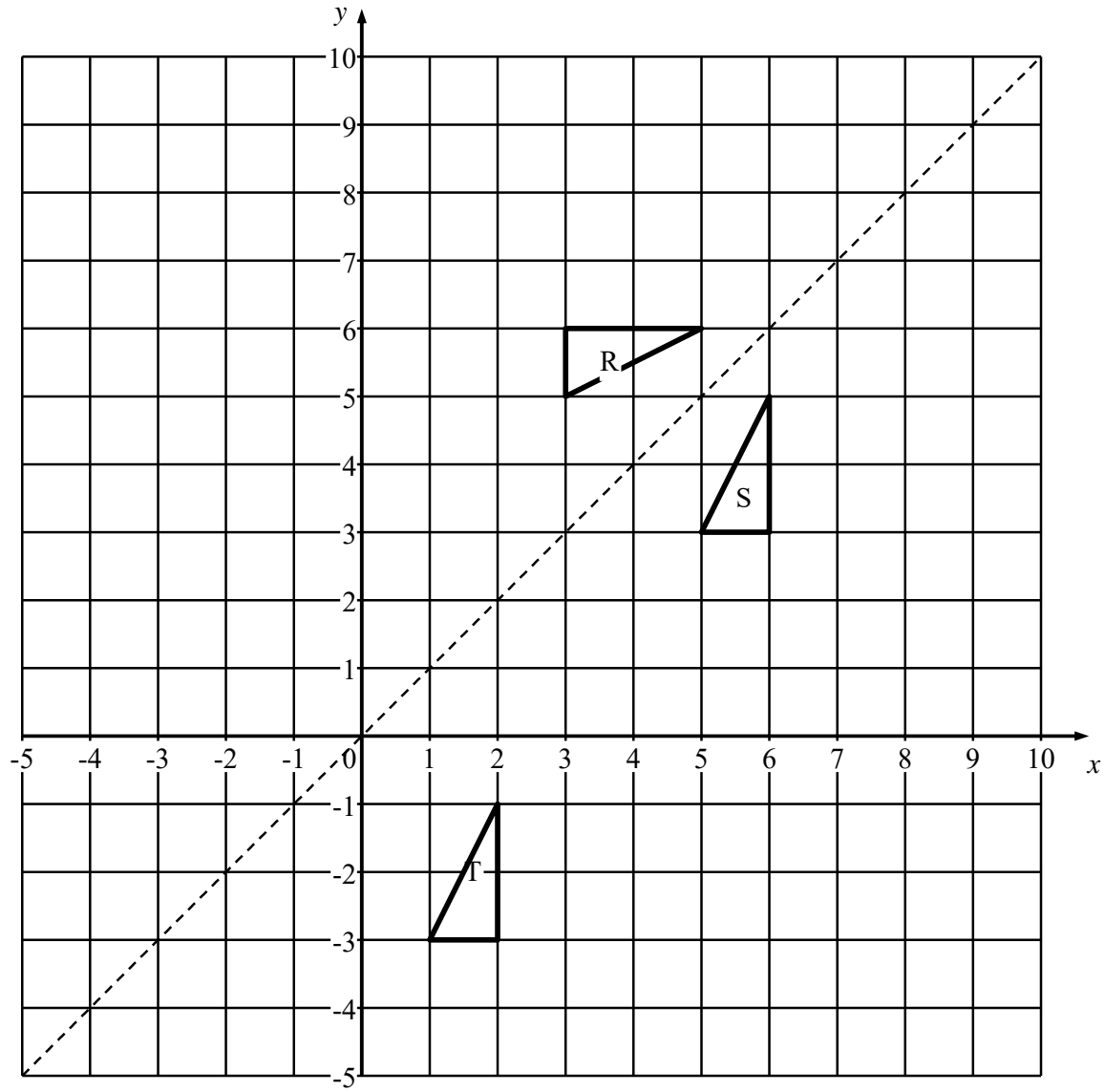
Q	Working	Answer	Mark	Notes
16	$h = f \left( \frac{x+1}{2} \right) = 1 + \frac{1}{\frac{x+1}{2}} \left( = 1 + \frac{2}{x+1} \right)$	$\frac{2}{x-1} - 1 \text{ or } \frac{3-x}{x-1}$	4	M1 $1 + \frac{1}{\frac{x+1}{2}}$ for
	$\left( y = 1 + \frac{2}{x+1} \right)$ $y - 1 = \frac{2}{x+1} \text{ or } y(x+1) = 1(x+1) + 2$			M1 (dep on M1) for a correct first step to change the subject
	$x+1 = \frac{2}{y-1} \text{ or } xy - x = 3 - y$			M1 (dep on M1)
	$x = \frac{2}{y-1} - 1 \text{ or } x = \frac{3-y}{y-1}$			A1 oe
				<b>Total 4 marks</b>
	<b>Alternative scheme</b>			
	$h = f \left( \frac{x+1}{2} \right) = 1 + \frac{1}{\frac{x+1}{2}} \left( = 1 + \frac{2}{x+1} = \frac{x+3}{x+1} \right)$	$\frac{3-x}{x-1}$	4	M1 $1 + \frac{1}{\frac{x+1}{2}}$ for
	$\left( y = \frac{x+3}{x+1} \right)$ $y(x+1) = (x+3)$			M1 (dep on M1) for a correct first step to change the subject
	$xy - x = 3 - y$			M1 (dep on M1)
	$x = \frac{3-y}{y-1}$			A1 oe
				<b>Total 4 marks</b>
<b>Note: Allow candidates to swap x and y when finding the inverse</b>				

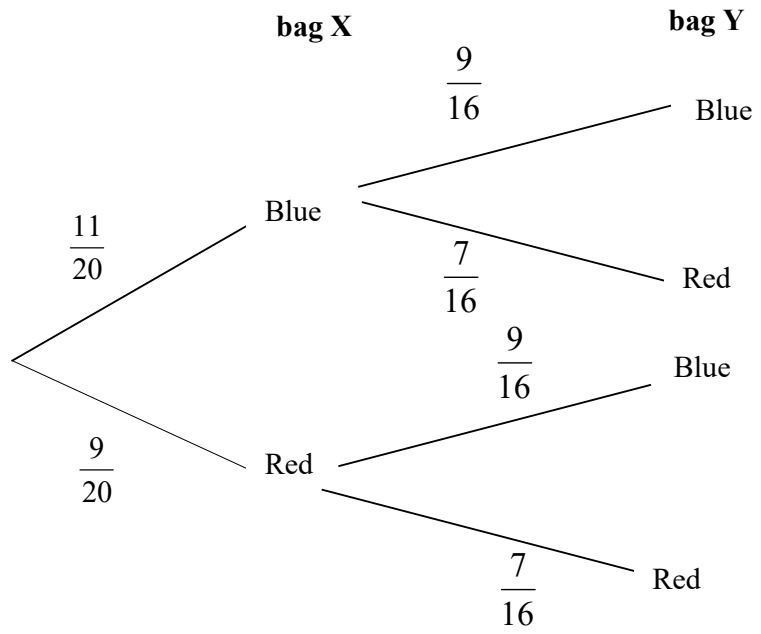
Question	Working	Answer	Mark	Notes
17 (a)		$(-2, -2), (1, 6), (4, -2)$ Plotted and joined	2	B2 Fully correct graph- professional judgment required.  (B1 for $(1, 6)$ plotted <b>OR</b> $(-2, -2)$ and $(4, -2)$ plotted)
(b)		$(2, -1), (-1, 3) (-4, -1)$ Plotted and joined	2	B2 Fully correct graph – professional judgment required.  (B1 for 2 of the 3 points plotted)  SC B1 for a correct reflection in the $x$ -axis
				<b>Total 4 marks</b>

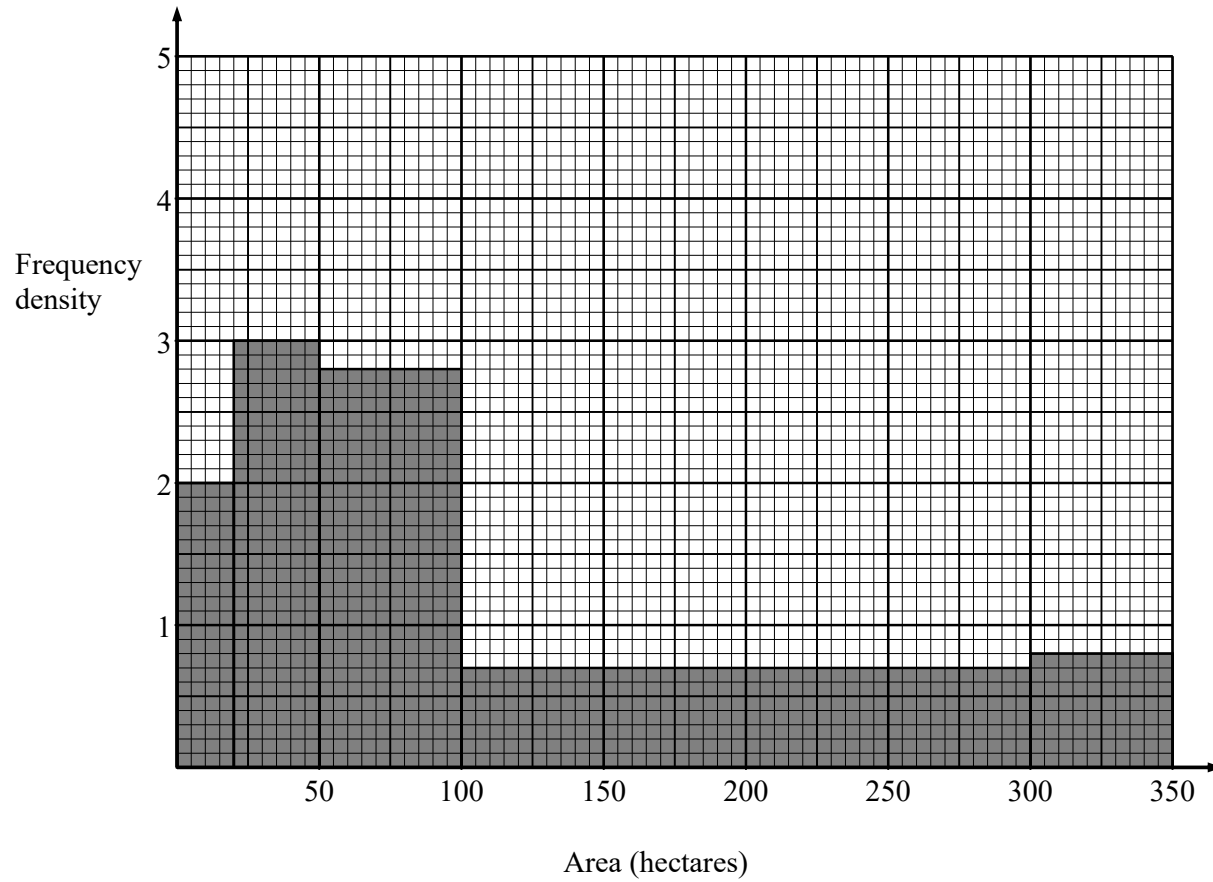
Q	Working	Answer	Mark	Notes
18 (a)	$x(x^2 - 1)$ or $(x^2 - x)(x + 1)$	$x^3 - x$	1	B1 for correct expansion of a pair of brackets and then $x^3 - x$ written down
(b)	(One of the numbers) is even <b>or</b> multiple of 2 <b>or</b> 2 is a factor	Proof	3	M1
	(One of the numbers) is a multiple of 3 <b>or</b> 3 is a factor			M1
	Hence a multiple of 6			A1
				<b>Total 4 marks</b>

Q	Working	Answer	Mark	Notes
19	(First term = 3 and last term = 999) or $a = 3$ and $d = 3$	166 833	4	M1
	$999 \div 3 (= 333)$			M1 for finding the number of terms Allow $1000 \div 3 = 333.3 = 333$
	Sum = $\frac{333}{2}(3 + 999)$ or Sum = $\frac{333}{2}(2 \times 3 + (333 - 1)3)$			M1 for using a correct method to find the sum
				A1
				<b>Total 4 marks</b>

2







Question	Skill tested	Mean score	Max score	Mean %	Mean score of students achieving grade:							
					ALL	9	8	7	6	5	4	3
Q01	Mensuration of 2D shapes	3.38	4	85	3.38	3.88	3.78	3.66	3.21	2.43	1.80	0.80
Q02a	Transformation geometry	1.37	2	69	1.37	1.92	1.69	1.41	0.93	0.69	0.25	0.16
Q02b	Transformation geometry	0.83	1	83	0.83	0.94	0.87	0.81	0.81	0.69	0.59	0.56
Q03	Expressions and formulae	1.06	2	53	1.06	1.39	1.21	1.01	0.92	0.70	0.27	0.40
Q04	Geometrical reasoning	2.33	3	78	2.33	2.90	2.59	2.31	1.98	1.65	1.38	0.80
Q05a	Sequences	1.66	2	83	1.66	1.97	1.82	1.69	1.49	1.30	1.00	0.72
Q05b	Sequences	0.42	1	42	0.42	0.81	0.51	0.27	0.16	0.09	0.05	0.08
Q06a	Algebraic manipulation	1.72	2	86	1.72	1.98	1.90	1.72	1.58	1.25	1.27	1.04
Q06b	Expressions and formulae	1.78	2	89	1.78	1.98	1.95	1.91	1.72	1.48	0.84	0.75
Q07a	Standard form	0.92	1	92	0.92	0.99	0.99	0.96	0.91	0.84	0.62	0.36
Q07b	Standard form	0.90	1	90	0.90	0.99	0.96	0.92	0.84	0.82	0.62	0.40
Q08a		1.59	2	80	1.59	-	-	1.84	-	-	0.92	-
Q08b		2.74	4	69	2.74	-	-	3.31	-	-	0.79	-
Q09	Circle properties	2.14	3	71	2.14	2.91	2.70	2.14	1.59	0.88	0.45	0.29
Q10	Simultaneous linear equations	2.59	3	86	2.59	2.97	2.88	2.73	2.39	1.99	1.56	0.76
Q11	Fractions	2.97	4	74	2.97	3.89	3.57	3.26	2.33	1.51	0.70	0.32
Q12	Powers and roots	1.56	3	52	1.56	2.84	1.99	0.92	0.70	0.49	0.31	0.62
Q13a	Probability	2.32	3	77	2.32	2.77	2.47	2.29	2.11	1.80	1.75	1.20
Q13b	Probability	1.66	2	83	1.66	1.99	1.92	1.85	1.50	0.98	0.64	0.24
Q13c	Probability	2.35	3	78	2.35	2.95	2.82	2.64	1.97	1.14	0.80	0.12
Q14a	Powers and roots	1.51	2	76	1.51	1.94	1.80	1.45	1.13	1.00	0.72	0.64
Q14b	Algebraic manipulation	1.65	2	83	1.65	1.91	1.76	1.68	1.61	1.30	1.03	0.60
Q14c	Powers and roots	0.82	2	41	0.82	1.80	1.06	0.40	0.15	0.07	0.03	0.00
Q14d	Expressions and formulae	0.29	2	14	0.29	0.85	0.18	0.05	0.04	0.01	0.00	0.00
Q15	Graphical representation of data	2.12	3	71	2.12	2.89	2.65	2.22	1.45	0.99	0.52	0.12
Q16a	Decimals	1.09	2	55	1.09	1.75	1.38	0.97	0.64	0.24	0.15	0.00
Q16b	Powers and roots	1.63	3	54	1.63	2.73	2.14	1.31	0.80	0.35	0.27	0.21
Q17	Function notation	1.32	4	33	1.32	3.08	1.39	0.64	0.31	0.10	0.05	0.00
Q18a	Transformation geometry	0.88	2	44	0.88	1.64	1.14	0.54	0.33	0.29	0.08	0.17
Q18b	Transformation geometry	0.85	2	43	0.85	1.67	1.07	0.52	0.25	0.18	0.18	0.08
Q19a	Algebraic manipulation	0.78	1	78	0.78	0.98	0.94	0.87	0.65	0.45	0.17	0.08
Q19b	Algebraic manipulation	0.13	3	4	0.13	0.43	0.03	0.02	0.00	0.01	0.00	0.00
Q20	Sequences	1.30	4	33	1.30	2.88	1.37	0.78	0.32	0.15	0.14	0.08
		<b>50.66</b>	<b>80</b>	<b>63</b>	<b>50.66</b>	<b>64.62</b>	<b>53.53</b>	<b>49.10</b>	<b>34.82</b>	<b>25.87</b>	<b>19.95</b>	<b>11.60</b>



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

<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>
59	51	42	31	23	16	12