International GCSE Maths				
Apart from questions 2, 6, 10, 13a, 18ai (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	**Working**	**Answer**	**Mark**	**Notes**
1	e.g. $36 \div (2 + 6)$ $(= 4.5)$ **or** $36 \div \frac{2+6}{3+2+6} (= 49.5)$ oe **or** Asha = £9 **OR** Julie = £27			M1
	e.g. $3 \times$ "4.5" **or** $\text{"49.5"} \times \frac{3}{3+2+6}$ **or** $\text{"9"} \times \frac{3}{2}$ **or** $\text{"27"} \times \frac{3}{6}$			M1 or an answer of $\frac{27}{2}$
		13.5(0)	3	A1 SCB1 for 36/5 × 7(= 43.2) or 36/9 × 2(= 8)
				Total 3 marks

2	e.g. $\frac{16}{5}$ **and** $\frac{21}{8}$ oe			M1 both fractions expressed as improper fractions
	e.g. $\frac{\cancel{16}^{2}}{5} \times \frac{21}{\cancel{8}^{1}}$ **OR** $\frac{336}{40}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = \frac{42}{5} = 8\frac{2}{5}$ **or** $\frac{16}{5} \times \frac{21}{8} = \frac{336}{40} = 8\frac{16}{40} = 8\frac{2}{5}$ **or** $\frac{\cancel{16}^{2}}{5} \times \frac{21}{\cancel{8}^{1}} = \frac{42}{5} = 8\frac{2}{5}$ **or** candidate clearly shows that in the question, the result of $8\frac{2}{5} = \frac{42}{5}$ and that their answer becomes $\frac{42}{5}$	shown	3	A1 Dep on M2 for conclusion to $8\frac{2}{5}$ from correct working – either sight of the result of the multiplication e.g. $\frac{336}{40}$ must be seen or correct cancelling prior to the multiplication to $\frac{42}{5}$ NB: use of decimals scores no marks
				Total 3 marks

3	a	e.g. $d-g=2ac$ $\frac{d}{2c}=\frac{g}{2c}+a$			M1	for a correct first step eg subtract g from both sides **OR** divide all terms by 2 **OR** divide all terms by c **OR** divide all terms by $2c$
			$a=\frac{d-g}{2c}$	2	A1	oe
	b		$3f(3e-4)$	2	B2	(B1 for $3(3ef-4f)$ or $f(9e-12)$ or $3f(ke-4)$ or $3f(3e-m)$ where $k\neq 0$ and $m\neq 0$)
	c	$x^2-5x+2x-10$			M1	for any 3 correct terms **or** for 4 out of 4 correct terms ignoring signs **or** $x^2-3x\ldots$ **or** for $\ldots-3x-10$
			$x^2-3x-10$	2	A1	
	d	$\frac{n^{11}}{n^5}$ **OR** $n^{-1}\times n^7$ **OR** $n^4\times n^2$ **OR** $n^4\times n^7\times n^{-5}$ **OR** $n^{"11"}\div n^5=n^{("11"-5)}$			M1	for simplifying two terms
			n^6	2	A1	
						Total 8 marks

4	ai		b, l, u, e, g, r, y	1	B1	No incorrect or repeats
	aii		w, h, i, t	1	B1	No incorrect or repeats
	b		No with reason	1	B1	eg 'e is in all three sets' **OR** 'all three sets share a member' **OR** $B\cap G\cap W=(\{\})e(\{\})$
						Total 3 marks

5	$\pi \times 7.2^2 \div 2$ (= 81.4....)			M1	allow 81.3 – 81.5 for area of semi circle
	"81.4" ÷ 6 (= 13.5...) **or** 12 × 6 (= 72) **or** "81.4" ÷ 12 (= 6.7...)			M1	(dep) allow 13.5 – 13.6 for the number of boxes needed (NB: 12 × 6 = 72 alone is 0 marks)
		No with correct figures	3	A1	
					Total 3 marks

6	$(x \pm 9)(x \pm 4)$	$\frac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 1 \times (-36)}}{2 \times 1}$ **or** $\frac{5 \pm \sqrt{25 + 144}}{2}$			M1	**or** $(x + a)(x + b)$ where $ab = -36$ **or** $a + b = -5$ **OR** correct substitution into quadratic formula (condone one sign error in a, b or c) (if + rather than ± shown then award M1 only unless recovered with answers)
	$(x - 9)(x + 4)$	$\frac{5 \pm \sqrt{169}}{2}$ **or** $\frac{5 \pm 13}{2}$			M1	**or** $\frac{5 \pm \sqrt{169}}{2}$ **or** $\frac{5 \pm 13}{2}$
			9, −4	3	A1	dep on at least M1
						Total 3 marks

7	20.40 ÷ (1 – 0.15)			M2	for a complete method eg 20.40 ÷ (1 – 0.15) for 20.40 ÷ (100 – 15) (= 0.24) (M1) **or** e.g. $0.85x = 20.40$
		24	3	A1	
					Total 3 marks

8	28 × 5 (= 140) **OR** 26.5 × 2 (= 53)			M1	or 87
	(28 × 5 − 26.5 × 2) ÷ (5 – 2)			M1	for a complete method
		29	3	A1	
					Total 3 marks

9	1.5 × 2 × 8 (= 24 (cm^3))			M1	for finding the volume of the cuboid
	e.g. ($V =$) $\frac{5.73\times1000}{19.32}$ (= 296.58...) **or** ($M =$) 19.32 × “24” (= 463.68)			M2	complete method to find the volume of statue **or** the mass of one block, could work in g or kg (if not M2 then award M1 for correct use of density formula e.g. $19.32 = \frac{5.73\times1000}{V}$ **or** $19.32 = \frac{M}{"24"}$)
	e.g. “296.58” ÷ “24” (= 12.3576...) **or** “5730” ÷ “463.68” (= 12.3576...)			M1	could work in g or kg
		13	5	A1	cao
					Total 5 marks

10	e.g. $6(x – 1)$ $(= 6x – 6)$			M1	method to find expression for perimeter of hexagon
	e.g. $2(x + 5) + 2x – 3$ $(= 4x + 7)$			M1	method to find expression for perimeter of triangle
	"$6x – 6$" = "$4x + 7$"			M1	(dep on at least M1) for equating both expressions
	e.g. $6x – 4x = 7 + 6$			M1	(dep on previous M1 and equation of the form $ax + b = cx + d$)for rearranging the x terms on one side and the numerical terms on the other and all expansions correct.
		5.5	5	A1	oe (dep on M2)
					Total 5 marks

11	a		4.35	1	B1	accept 4.34$\dot{9}$
	b		4.25	1	B1	cao
	c	17.5 **or** 9.35 **or** $e – f$ where $17 < e \leq 17.5$ and $9.35 \leq f < 9.4$			M1	
			8.15	2	A1	
						Total 4 marks

12	a		23	1	B1	accept 22 – 24
	b	e.g. 29 − 17			M1	For subtracting readings from 15 and 45
			12	2	A1	accept 10 – 14
	c				B1	ft comparison of the medians
			Two comparisons (at least one of which must be in context)	2	B1	ft comparison of the IQR **Note: to award 2 marks at least one comparison must be in context**
						Total 5 marks

13	a	e.g. $x = 0.57272....$ **and** $100x = 57.272....$ **OR** e.g. $10x = 5.7272....$ **and** $1000x = 572.72....$			M1	For 2 recurring decimals with correct algebraic labels that when subtracted give a whole number or terminating decimal eg 56.7 or 567 etc e.g. $100x = 57.272....$ **and** $x = 0.57272....$ **OR** $1000x = 572.72....$**and** $10x = 5.7272....$ **with intention to subtract.** (If recurring dots not shown then showing at least the digits 57272, ie 5sf)
		e.g. $100x - x = 57.272.... - 0.57272.... = 56.7$ **and** $\frac{56.7}{99} = \frac{63}{110}$ **or** $1000x - 10x = 572.72.... - 5.7272.... = 567$ **and** $\frac{567}{990} = \frac{63}{110}$	Shown	2	A1	for completion to $\frac{63}{110}$
	b	$\frac{3}{2-\sqrt{y}} \times \frac{2+\sqrt{y}}{2+\sqrt{y}}$ **or** $6+3\sqrt{y}$ **or** $4-y$			M1	for multiplying numerator and denominator by $(2+\sqrt{y})$ **or** a correct expression for the numerator or denominator
			$\frac{6+3\sqrt{y}}{4-y}$	2	A1	
						Total 4 marks

14	(AOC =) 38 × 2 (= 76)		4	M1
		52		A1
				B2 (dep on M1) for all reasons relevant to their method – underlined words must be seen. angle at the centre is 2 × (double) angle at circumference / angle at circumference is ½ angle at centre angles in a triangle add to 180° **or** angles in a triangle add to 180° base angles in an isosceles triangle (are equal) If not B2 then award B1 (dep on M1) for a correct circle theorem
				Total 4 marks

15	e.g. (EF =) 12cos40 (= 9.19...) **or** (FD =) 12sin40 (= 7.71...) **and** (EF =) $\sqrt{12^2 - "7.71"^2}$ (= 9.19...)			M2 complete method to find EF (if not M2 then M1 for a correct statement involving EF e.g. $\frac{EF}{12} = \cos 40$)
	e.g. $\frac{"9.19"}{EG} = \tan 28$ or $\tan 62 = \frac{EG}{"19.9"}$ **or** $\frac{"9.19"}{FG} = \sin 28 (= 19.5...)$ **and** $"19.5"^2 - "9.19"^2 (= 298.9...)$			M1 (dep on M2) for a correct trig statement involving EG **or** complete method to find FG **and** a correct start to Pythagoras process
		17.3	4	A1 accept 17.2 – 17.3
				Total 4 marks

16	0.42 ÷ 0.6 (= 0.7) oe			M1	(indep)
	1 – "0.7" (= 0.3) oe **OR** 1 – 0.6 (= 0.4) oe			M1	(indep)
	"0.3" × "0.4" oe **OR** 1 – (0.42 + 0.6 × "0.3" + "0.4" × "0.7") oe			M1	for a complete method
		0.12	4	A1	oe
					Total 4 marks

17	a		9	1	B1	
	b		f(x) ≥ 0	1	B1	accept $y \geq 0$ or f ≥ 0
	c	(g(2) =) $\frac{4}{2+3}\left(=\frac{4}{5}\right)$ oe			M1	**or** for sight of fg(x) e.g. $\left(\frac{4}{x+3}-4\right)^2$
			10.24	2	A1	oe e.g. $\frac{256}{25}$
						Total 4 marks

18 ai				B1	tangent drawn at P ($x = 2$)
				M1	(dep on B1) for a method to find gradient e.g. $\frac{\text{difference in } y\text{-values}}{\text{difference in } x\text{-values}}$
		-0.6	3	A1	(dep on B1) accept answers in range -0.4 to -0.7 **and** from correct figures for their line
aii	e.g. $y = -0.6x + c$ **or** $y = mx + 3.6$ **or** $2.4 = -0.6 \times 2 + c$			M1	for start of method to find the tangent equation e.g. $y = mx + c$ where m is their gradient **or** $y = mx + c$ where c is the y-intercept for their tangent **or** for substituting a point from the curve e.g. (2, 2.4) into $y = mx + c$ where m is their gradient
		$y = -0.6x + 3.6$	2	A1	ft their gradient from (i) and intercept of their tangent, so long as intercept / value of c is > 3
b		3		B1	
		-1	2	B1	
					Total 7 marks

19	eg $5 \times 2x + 10 \times x = 160$ **OR** $160 \div 2$ (= 80) [freq of one bar] **OR** $40 \times 5 + 20 \times 10$ (= 400) [total no. of sml squares] **OR** $160 \div 16$ (= 10) [students per $1cm^2$] **OR** $1cm^2 = 10$ students **OR** **e.g.** 5 small squares = 2 students oe			M1	for setting up an appropriate equation **OR** finding the area of the 2nd or 3rd bar **OR** finding the total number of small squares **OR** for finding the number of students per $1cm^2$ **or** $1cm^2 = 10$ students **OR** other appropriate scale e.g. 5 small squares = 2 students
	'x' = 8 **OR** 8 or 16 seen in the correct position on the vertical scale **OR** $160 \div$ "400" (= 0.4 oe)			M1	for finding frequency density **OR** method to find the frequency of the 1st, 4th or 5th bar (1st is 108, 4th is 90, 5th is 12)
	"7.2" × 15 + 160 + "6" × 15 + "2.4" × 5 **OR** 160 + "0.4" × (18 × 15 + 15 × 15 + 5 × 6)			M1	(dep on at least M1) for a complete method to find the total frequency (allow one error or one repeat but no omission)
		370	4	A1	
					Total 4 marks

20	$\frac{1}{3}\times\pi\times r^2\times 2h\left(=\frac{2}{3}\pi r^2h\right)$ **OR** $\frac{1}{3}\times\pi\times(0.5r)^2\times h\left(=\frac{1}{12}\pi r^2h\right)$			M1	for finding the volume of the small or large cone
	$"\frac{2}{3}\pi r^2h" - "\frac{1}{12}\pi r^2h"\left(=\frac{7}{12}\pi r^2h\right)$			M1	(dep) method to find the volume of the frustum (condone missing brackets)
	$"\frac{2}{3}\pi r^2h" - "\frac{1}{12}\pi r^2h" = \frac{4\pi r^3}{3}$			M1	equating volume of frustum and sphere (must be correct including brackets)
	e.g. $\frac{7}{12}\pi r^2h = \frac{4\pi r^3}{3}$			M1	for a correct simplified formula (1 term on each side)
		$\frac{7}{16}h$	5	A1	accept $0.4375h$
					Total 5 marks

21	$CB = 13\sin 40$ (= 8.3562...)			M1
	$\frac{1}{2}\times 6\times "8.35..."\times \sin ACB = 22$			M1
	Acute version of $ACB = \sin^{-1}\left(\frac{22}{\frac{1}{2}\times 6\times "8.35..."}\right)$ (= 61.35…)			M1
	ACB = 180 – "61.353…" (= 118.647...)			M1
	$AB^2 = 6^2 + "8.35..."^2 - 2\times 6\times "8.35..."\times\cos"118.64"$ (= 153.98...)			M1
		12.4	6	A1 accept 12.3 – 12.5
				Total 6 marks

22	a		2.5, −60	2	M1 A1 SC	for one correct value oe e.g. −2.5 & 120 M1 for drawing cos curve
	bi		(2, 5)	1	B1	
	bii		(4, −2)	1	B1	
						Total 4 marks

23	$(v=)\ 3t^2+2\times4t-5$				M1	2 out of 3 terms differentiated correctly
	$3T^2+8T-5=V$ **OR** $3T^2+8T-5-V=0$				A1	correct equation
	$3(T^2+\frac{8}{3}T)-5$ **OR** $3(T^2+\frac{8}{3}T-\frac{5}{3})$	$(T=)\ \frac{-8\pm\sqrt{8^2-4\times3\times(-5-V)}}{2\times3}$			M1	attempt to complete the square **OR** use quadratic formula (condone one sign error in a, b or c and ft their quadratic with mistake in a or b) (condone + instead of ±)
	$\left(T+\frac{4}{3}\right)^2=\left(\frac{4}{3}\right)^2+\frac{V+5}{3}$	$(T=)\ \frac{-8\pm\sqrt{124+12V}}{6}$			M1	sight of this method mark implies the previous M1 (condone + instead of ±) (ft their quadratic with mistake in a or b)
	$T=\frac{-4}{3}\pm\frac{1}{3}\sqrt{16+3V+15}$	$(T=)\ \frac{-8\pm2\sqrt{31+3V}}{6}$			M1	(condone + instead of ±) (ft their quadratic with mistake in a or b)
			$\frac{-4+\sqrt{31+3V}}{3}$	6	A1	accept $k=31$ and $m=3$
						Total 6 marks