International GCSE Maths
Apart from questions 5a, 10, 18a, 19, 22, 23, 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1	e.g. $\pi \times 8.2^2$ (= 211.24..., $\frac{1681}{25}\pi$) **or** 1.5 × 1000 (= 1500) **or** $\pi \times 8.2^2 \times 10$ (= 2112.4..., $\frac{3362}{5}\pi$)		3	M1 for a correct first step
	e.g. (1.5 × 1000) ÷ ($\pi \times 8.2^2$) (= 7.1009...) **or** (1.5 × 1000) ÷ "2112.4" × 10 oe (= 7.1009...) **or** 10 – (("2112.4" – 1.5 × 1000) ÷ ($\pi \times 8.2^2$)) (= 7.1009...)			M1 for a complete method to find the depth of the water or an answer of 2.89 – 2.91
		7.1		A1 accept 7.09 – 7.11
				Total 3 marks

2	Ext $\angle$ = 180 – 162 (= 18) oe **or** $\frac{(n-2)180}{n} = 162$ oe		3	M1
	360 ÷ "18" oe **or** 18*n* = 360			M1
		20		A1
				Total 3 marks

3	(i)		12, 18	1	B1
	(ii)		12, 14, 15, 16, 18, 20	1	B1
	(iii)		11, 13, 15, 17, 19	1	B1
					Total 3 marks

4		e.g. $4x - 8x = 17 + 13$ oe		2	M1 For collecting terms in x and number terms on either side of a correct equation
			−7.5		A1 oe e.g. $-\frac{30}{4}$
					Total 2 marks

5	(a)	e.g. 720 = 2 × 360 = 2 × 2 × 180 or 720 = 3 × 240 = 3 × 3 × 80 etc		3	M1	At least 2 correct stages in prime factorisation
		2, 2, 2, 2, 3, 3, 5			M1	condone inclusion of 1 (may be a fully correct factor tree or ladder)
			2 × 2 × 2 × 2 × 3 × 3 × 5		A1	dep on M2, accept $2^4 \times 3^2 \times 5$
	(b)		5	1	B1	
						Total 4 marks

6 (a)	4.25 × 0.08 (= 0.34) oe		3	M1	M2 for 4.25 × 1.08 oe
	4.25 + "0.34"			M1	
		4.59		A1	SC: B1 for 4.25 × 0.92 (= 3.91) oe
(b)	9.45 ÷ 108 (= 0.0875) oe		3	M1	M2 for 9.45 ÷ 1.08
	9.45 ÷ 108 × 100 oe			M1	
		8.75		A1	
					Total 6 marks

7	$7.5^2 - 6^2$ (= 20.25)		4	M1	**OR** for a correct trig statement involving one of the angles e.g. $\cos BAM = \frac{6}{7.5}$ **or** $\sin ABC = \frac{6}{7.5}$ where *M* is the midpoint of *BC*
	$\sqrt{7.5^2 - 6^2}$ (= 4.5)			M1	**OR** for a method to find one of the angles in the triangle e.g. $BAM = \cos^{-1}\left(\frac{6}{7.5}\right)(= 36.8...)$ **or** $ABC = \sin^{-1}\left(\frac{6}{7.5}\right)(= 53.1...)$
	"4.5"× 6 oe			M1	for a complete method to find the area of triangle *ABC* e.g. $2 \times \frac{1}{2} \times 7.5 \times 6 \times \sin("36.8")$ oe **or** $2 \times \frac{1}{2} \times 7.5 \times \sqrt{7.5^2 - 6^2} \times \sin("53.1")$ oe
		27		A1	cao
					Total 4 marks

8	10 × 79.2 (= 792) **or** 3 × 68 (= 204)		3	M1
	(10 × 79.2 − 3 × 68) ÷ 7			M1
		84		A1
				Total 3 marks

9 (a)		t^6	1	B1	
(b)		w^{12}	1	B1	
(c)		$125x^3y^6$	2	B2 (B1) for 2 correct terms as part of a product	
					Total 4 marks

10	22 × 60 × 60 (= 79 200) oe **or** 22 ÷ 1000 (= 0.022) oe		3	M1	for converting from m/s to m/h **or** from m to km	M2 for 22 × 3.6 oe
	22 × 60 × 60 ÷ 1000 oe			M1	for a complete method	
		79.2		A1	oe, dep on at least M1	
						Total 3 marks

11	15 – 3 : x – 3 = 2 : 7 **or** (15 – 3) ÷ 2 (= 6)	(n =) (15 – 3) ÷ $\frac{2}{2+7}$ (= 54) where n is the total age 3 years ago		3	M1	M2 for $\frac{(15-3)\times 7}{2}$ (= 42)
	$\frac{x-3}{15-3}=\frac{7}{2}$ oe **or** 7 × "6" (= 42)	"54" × $\frac{7}{2+7}$ (= 42)			M1	
			45		A1	
						Total 3 marks

12	105 ÷ (5 × 4) (=5.25) oe **or** 105 ÷ (4 × 3) (=8.75) oe **or** 105 ÷ (3 × 5) (=7)		3	M1
	"8.75" − "5.25"			M1 dep on previous M1. If M1 gained and they have worked out 3 pressures, award M1 for their highest minus their lowest.
		3.5		A1 oe
				Total 3 marks

13 (a)			1	B1	Professional judgment required, eg allow double shading if meaning clear.
(b)		$(D \cup E) \cap F$	1	B1	oe eg $(D \cap F) \cup (E \cap F)$
					Total 2 marks

14 (a)		0.7, 0.2, 0.8, 0.1, 0.9	2	B2 (B1)	oe, all correct 2 or 3 or 4 correct probabilities
(b)	0.3 × "0.2" (= 0.06) **or** 0.7 × "0.1" (= 0.07) oe		4	M1	ft from (a) dep on probabilities being between 0 and 1, **OR** 0.3 × "0.8" (= 0.24) **or** 0.7 × "0.9" (= 0.63) oe
	0.3 × "0.2" + 0.7 × "0.1" (= 0.13) oe **or** "0.06" × 200 (= 12) **or** "0.07" × 200 (= 14)			M1	ft from (a), **OR** 0.3 × "0.8" + 0.7 × "0.9" (= 0.87) oe **or** "0.24" × 200 (= 48) **or** "0.63" × 200 (= 126)
	"0.13" × 200 oe **or** "12" + "14"			M1	ft from (a), 200 – "0.87" × 200 oe **or** (1 – "0.87") × 200 **or** 200 – "48" – "126"
		26		A1	cao
					Total 6 marks

15	(Gradient of $\mathbf{L_1}$ =) 6 ÷ 2 (=3)		4	M1	could be seen as part of an equation. Ignore constant term if candidate rearranges $\mathbf{L_1}$
	$m \times$ "3" = −1 **or** $m = -\frac{1}{"3"}$			M1	for use of $m_1m_2 = -1$ could be seen as part of an equation
	$-1 = "-\frac{1}{3}" \times 9 + c$ **or** $y - -1 = "-\frac{1}{3}"(x-9)$ **or** $c = 2$			M1	
		$y + \frac{1}{3}x = 2$		A1	oe in required form eg $3y + x = 6$, $6y + 2x = 12$ etc
					Total 4 marks

16 (a)	$3 \times 4t^2 - 2 \times 6t + 5$		2	M1	For 2 terms correct
		$12t^2 - 12t + 5$		A1	Fully correct
(b)	$24t - 12$		3	M1	Method to differentiate their v, ft a 3 term quadratic expression from (a)
	"$24t - 12$" = 6			M1	ft if previous M1 awarded
		0.75		A1	oe
					Total 5 marks

17 (a)	e.g. one correct value on the vertical scale e.g. 1 at 1 cm high **or** 1 cm^2 = 5 passengers **or** 5 small squares = 1 passenger **or** (FD =) 24 ÷ 20 (= 1.2)		3	M1	For a correct scale on the vertical axis **or** a 1 cm × 1 cm square = 5 passengers **or** other correct scale **or** one correct product or frequency (other than the 24) **or** (FD =) 24 ÷ 20 (= 1.2)
	10×0.4 (= 4) 10×1.8 (= 18) 5×6.4 (= 32) 15×2 (= 30) 20×0.8 (= 16)			M1	At least 3 correct products or frequencies (other than the 24) stated (could be seen on diagram)
		124		A1	
(b)	e.g. 0.25 × 24 + 20 × 0.8 (= 22) **or** "1.2" × 5 + 20 × 0.8 (= 22)		2	M1	ft from (a)
		$\frac{"22"}{"124"}$		A1ft	oe (0.17(741…))
					Total 5 marks

18 (a)	$(x + 2)(2x + 3) = 2x^2 + 3x + 4x + 6$ $(2x + 3)(x – 7) = 2x^2 – 14x + 3x – 21$ $(x + 2)(x – 7) = x^2 – 7x + 2x – 14$		3	M1	For multiplying a pair of brackets and getting 3 out of 4 terms correct.
	$(2x^2+7x+6)(x–7) = 2x^3–14x^2+7x^2–49x+6x–42$ $(2x^2–11x–21)(x+2) = 2x^3+4x^2–11x^2–22x–21x–42$ $(x^2–5x–14)(2x+3) = 2x^3+3x^2–10x^2–15x–28x–42$			M1dep	For multiplying the product of the first 2 brackets (ft from the 1st stage) by the 3rd bracket, and getting at least 3 out of 6 or 4 out of 8 terms correct
		$2x^3 – 7x^2 – 43x – 42$		A1	Fully correct. isw extra work as long as correct e.g. $x(2x^2 – 7x – 43) – 42$
	Alternative (all in one method)				
	$(x + 2)(2x + 3)(x – 7) =$ $2x^3 – 14x^2 + 3x^2 – 21x + 4x^2 – 28x + 6x – 42$			M2 (M1)	For at least 6 out of 8 correct terms for 4 or 5 out of 8 correct terms
		$2x^3 – 7x^2 – 43x – 42$		A1	
(b)	$p^2(2m – y) = x + m$ $2p^2m – p^2y = x + m$		3	M1	Multiplying by denominator **and** expanding bracket
	e.g. $2p^2m – m = x + p^2y$ $m(2p^2 – 1) = x + p^2y$			M1	Collect terms in m **and** factorise in a correct equation
		$m = \frac{x + p^2y}{2p^2 – 1}$		A1	oe eg $m = \frac{–x – p^2y}{1 – 2p^2}$ must have $m =$

				Total 6 marks

19	$a + 24d = 44.5$		5	M1	oe
	$\frac{30}{2}(2a+(30-1)d) = 765$ oe, eg (15(2a + 29d) = 765), (2a + 29d = 51), etc			M1	oe (may be simplified)
	e.g. 2(44.5 – 24d) + 29d = 51 oe or _2a + 48d = 89 2a + 29d = 51 oe			M1	dep on M2, a complete method to eliminate one variable, allow one arithmetic error
		26.5		A2 (A1)	dep on M2, oe dep on M2. If not A2, award A1 for $a = -3.5$ **or** $d = 2$
					Total 5 marks

20	125 **or** 10^{21n}		3	M1
	125×10^{21n}			M1
		$1.25 \times 10^{21n+2}$		A1
				Total 3 marks

21	(a)(i)		(9, 3)	1	B1
	(a)(ii)		(4, 9)	1	B1
	(b)		$a = -2$, $b = 3$	2	B2 **or** $a = 2$, $b = -3$ (B1) for $a = -2$ **or** $a = 2$ **or** $b = 3$ **or** $b = -3$
					Total 4 marks

22	$2x^2 + 3(2x + 1)^2 = 5$		5	M1	$2\left(\frac{y-1}{2}\right)^2 + 3y^2 = 5$
	eg $14x^2 + 12x - 2 = 0$ **or** if completing the square, allow $14x^2 + 12x = 2$ oe			A1	$7y^2 - 2y - 9 = 0$ **or** if completing the square, allow $7y^2 - 2y = 9$ oe
	eg $(7x - 1)(x + 1)$ or $(7x - 1)(2x + 2)$ eg $\frac{-12 \pm \sqrt{12^2 - 4 \times 14 \times -2}}{2 \times 14}$ oe eg $7\left(\left(x + \frac{3}{7}\right)^2 - \frac{9}{49}\right) = 2$ oe			M1	ft as long as M1 awarded and 3 term quadratic eg $(7y - 9)(y + 1)$ eg $\frac{2 \pm \sqrt{(-2)^2 - 4 \times 7 \times -9}}{2 \times 7}$ oe eg $7\left(\left(y - \frac{1}{7}\right)^2 - \frac{1}{49}\right) = 9$ oe
	$x = \frac{1}{7}, x = -1$ (need both)			A1	$y = \frac{9}{7}, y = -1$ (need both)
		$x = \frac{1}{7}$, $y = \frac{9}{7}$ $x = -1$, $y = -1$		A1	Dep on M1 Must be paired correctly Must be 3 sf or better (0.142857...) (1.28571...)
					Total 5 marks

23	$ABF = 180 - x$ **or** $CDF = 180 - x$		4	M1	for finding an expression for *ABF* **or** *CDF*. May be seen on diagram.
	$FDE = 180 - (180 - x)$ $(= x)$ *AFB* or *ACE* $= 180 - (180 - x) - 54$ $(= x - 54)$ *DFE* or *ACE* $= 180 - x - 32$ $(= 148 - x)$ e.g. $54 + y + 180 - x = 180$ where $AFB = y$ $32 + y + (180 - (180 - x)) = 180$ where $DFE = y$			M1	method to find *FDE* **and** *AFB* **or** method to find *FDE* **and** *DFE* **or** method to find *ACE* **or** method to find *FDE* **and** an equation for *AFB* e.g. $54 + y + 180 - x = 180$ where $AFB = y$ **or** method to find *FDE* **and** an equation for *DFE* e.g. $32 + y + (180 - (180 - x)) = 180$ where $DFE = y$ May be seen on diagram.
	e.g. $32 + x + x - 54 = 180$ **or** $54 + 180 - x + 148 - x = 180$ **or** $x - 54 = 148 - x$ oe **or** $54 + y + 180 - x = 180$ **and** $32 + y + (180 - (180 - x)) = 180$ where $AFB = DFE = y$			M1	for setting up an equation or a pair of correct simultaneous equations to solve for *x*
		101		A1	dep on at least M1
					Total 4 marks

24	$\overrightarrow{AP} = \frac{3}{4} \times 2\mathbf{c}$ $(= \frac{3}{2}\mathbf{c})$ oe		5	M1 For $\overrightarrow{AP} = \frac{3}{2}\mathbf{c}$ oe, eg could be part of $\overrightarrow{OP} = \mathbf{a} + \frac{3}{2}\mathbf{c}$ oe or on diagram
	$\overrightarrow{AC} = \mathbf{c} - \mathbf{a}$ oe **or** $\overrightarrow{CA} = \mathbf{a} - \mathbf{c}$ oe			M1
	$\overrightarrow{OQ} = \mathbf{c} + n(\mathbf{a} - \mathbf{c})$ **or** $\overrightarrow{OQ} = \mathbf{a} + n(\mathbf{c} - \mathbf{a})$ **or** $\overrightarrow{QP} = n(\mathbf{a} - \mathbf{c}) + \frac{3}{2}\mathbf{c}$			M1
	$\frac{n}{1-n} = \frac{2}{3} \Rightarrow n = \frac{2}{5}$ oe **or** $\frac{1-n}{n} = \frac{2}{3} \Rightarrow n = \frac{3}{5}$ oe **or** $\frac{n}{\frac{3}{2}-n} = \frac{2}{3} \Rightarrow n = \frac{3}{5}$ oe			M1
		3 : 2		A1 oe, dep on M3
				Total 5 marks

25	e.g. (220 – 180) + (360 – 280) (= 120)		5	M1 for a method to find angle *XYZ*. Could be seen on a diagram
	$XZ = \sqrt{3.5^2 + 6^2 - 2\times 3.5\times 6\times \cos("120")}$ (=8.3... or $\frac{\sqrt{277}}{2}$)			M1
	$\frac{\sin YXZ}{6} = \frac{\sin("120")}{"8.32..."}$			M1 **or** $6^2 = 3.5^2 + "8.32"^2 - 2\times 3.5\times "8.32"\times \cos YXZ$
	$YXZ = \sin^{-1}\left(\frac{6\sin("120")}{"8.32..."}\right)$ (=38.6...)			M1 **or** $YXZ = \cos^{-1}\left(\frac{3.5^2 + "8.32"^2 - 6^2}{2\times 3.5\times "8.32"}\right)$ (= 38.6...)
		241.4		A1 accept 241.2 – 241.4
				Total 5 marks