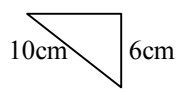


Qu	Give one mark for each •	Illustrations for awarding mark
1	ans: $y = -2x + 8$ 3 marks <ul style="list-style-type: none"> •¹ finds gradient of line •² subs into equation •³ rearranges to required answer form 	<ul style="list-style-type: none"> •¹ $m = \frac{0-6}{4-1} = -2$ •² $y - 6 = -2(x - 1)$ •³ $y = -2x + 8$
2a	ans: $x + 3$ 3 marks <ul style="list-style-type: none"> •¹ first term correct •² second term correct •³ simplifies 	<ul style="list-style-type: none"> •¹ $x^1 \dots\dots$ •² $\dots\dots + 3x^0$ •³ $x + 3$
b	ans: 1 3 marks <ul style="list-style-type: none"> •¹ knows meaning of negative index •² knows meaning of fractional index •³ processes answer 	<ul style="list-style-type: none"> •¹ $\frac{1}{64^{\frac{2}{3}}} \times 16$ •² $\frac{1}{\sqrt[3]{64^2}} \times 16$ •³ $\frac{1}{16} \times 16 = 1$
3	ans: $x > 1$ 4 marks <ul style="list-style-type: none"> •¹ removes brackets on both sides •² simplifies both sides •³ collects 'x' terms and numbers •⁴ reverses inequality and solves 	<ul style="list-style-type: none"> •¹ $5 - 6x + 9 < 6 - 4x + 6$ •² $14 - 6x < 12 - 4x$ •³ $-2x < -2$ •⁴ $x > 1$
4a	ans: $\frac{5}{7}$ 3 marks <ul style="list-style-type: none"> •¹ simplifies $\sqrt{75}$ •² simplifies $\sqrt{147}$ •³ simplifies 	<ul style="list-style-type: none"> •¹ $5\sqrt{3}$ •² $7\sqrt{3}$ •³ $\frac{5\sqrt{3}}{7\sqrt{3}} = \frac{5}{7}$
b	ans: $\frac{3\sqrt{7}}{2}$ 3 marks <ul style="list-style-type: none"> •¹ knows to multiply by $\frac{\sqrt{7}}{\sqrt{7}}$ •² multiplies fractions •³ simplifies 	<ul style="list-style-type: none"> •¹ $\frac{21}{2\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$ •² $\frac{21\sqrt{7}}{14}$ •³ $\frac{3\sqrt{7}}{2}$

Qu	Give one mark for each •	Illustrations for awarding mark
5a	ans: $a = -3; b = -1$ 3 marks • ¹ starts to complete square • ² completes ans: $y = -1$ and $x = 3$ 1 mark	• ¹ $y = (x - 3)^2 \dots$ • ² $y = (x - 3)^2 - 1$
b	• ¹ states minimum value • ² states value of x	• ¹ $(y =) -1$ } Award 2 out of 2 for (3, -1) • ² $(x =) 3$ }
6	ans: $\frac{16 - x}{x(x - 4)}$ 3 marks • ¹ correct denominator • ² numerator • ³ simplifies	• ¹ $\frac{\dots\dots}{x(x - 4)}$ • ² $\frac{3x - 4(x - 4)}{x(x - 4)}$ • ³ $\frac{16 - x}{x(x - 4)}$ or $\frac{-x + 16}{x(x - 4)}$
7	ans: 371.2cm 4 marks • ¹ subs correct values into formula • ² starts to evaluate • ³ completes evaluation • ⁴ adds radii	• ¹ $\frac{240}{360} \times 3 \cdot 14 \times 120$ • ² $\frac{2}{3} \times 3 \cdot 14 \times 120 = 3 \cdot 14 \times 80$ • ³ 251.2 cm • ⁴ 371.2cm [units not required]
8	ans: $g = \sqrt{\frac{kf}{E}}$ 3 marks • ¹ multiples both sides by g^2 • ² divides both sides by E • ³ takes square root of both sides	• ¹ $Eg^2 = kf$ • ² $g^2 = \frac{kf}{E}$ • ³ $g = \sqrt{\frac{kf}{E}}$
9	ans: two distinct, real roots 3 marks • ¹ knows to find discriminant • ² finds discriminant • ³ states nature of the roots	• ¹ $b^2 - 4ac = 7^2 - 4 \times 2 \times 1$ • ² 41 • ³ two distinct, real roots
10	ans: 16cm 3 marks • ¹ assembles facts in R.A.T. • ² uses Pythagoras • ³ final answer	• ¹  • ² $\sqrt{10^2 - 6^2}$ Award • ¹ and • ² for 8cm • ³ $8\text{cm} \times 2 = 16\text{cm}$

Qu	Give one mark for each •	Illustrations for awarding mark
11	ans: 36° 4 marks <ul style="list-style-type: none"> •¹ recognises isosceles triangle •² third angle of isosceles triangle and vertically opposite •³ knows tangent and radius make RA •⁴ finds required angle 	<ul style="list-style-type: none"> •¹ $BAC = 63^\circ$ •² $ABC = 54^\circ = DCN$ •³ $CDN = 90^\circ$ •⁴ $DNC = 36^\circ$
12	ans: 480° 2 marks <ul style="list-style-type: none"> •¹ finds period •² finds amplitude 	<ul style="list-style-type: none"> •¹ 720° •² 4
13	ans: graph drawn 3 marks <ul style="list-style-type: none"> •¹ correct shape of graph •² correct max / min •³ correct number of cycles 	<ul style="list-style-type: none"> •¹ sine wave starting at origin and annotated •² 3 / -3 •³ 2 cycles shown with x intercepts at 90°, 180°, 270°, 360°
14	ans: $\cos x^\circ$ 2 marks <ul style="list-style-type: none"> •¹ replaces $\tan x^\circ$ •² simplifies 	<ul style="list-style-type: none"> •¹ $\frac{\sin x^\circ}{\sin x^\circ}$ $\cos x^\circ$ •² $\sin x^\circ \times \frac{\cos x^\circ}{\sin x^\circ} = \cos x^\circ$
		Total 50 marks

Qu	Give one mark for each •	Illustrations for awarding mark
1	<p>ans : $9 \cdot 12 \times 10^7 \text{ft}^3$ 4 marks</p> <ul style="list-style-type: none"> •¹ subs values into formula •² processes answer •³ rounds answer •⁴ answer in SN 	<ul style="list-style-type: none"> •¹ $V = \frac{1}{3} \times 755^2 \times 480$ •² 91204000ft^3 •³ 91200000 •⁴ $9 \cdot 12 \times 10^7 \text{ (ft}^3\text{)}$ (Units not req'd)
2a	<p>ans : 13 2 marks</p> <ul style="list-style-type: none"> •¹ substitutes •² answer 	<ul style="list-style-type: none"> •¹ $f(-3) = 2(-3)^2 - 5$ •² 13
b	<p>ans: $a = \pm 5$ 2 marks</p> <ul style="list-style-type: none"> •¹ equates function to 45 •² solves for a 	<ul style="list-style-type: none"> •¹ $2a^2 - 5 = 45$ •² $a^2 = 25; a = \pm 5$
3	<p>ans: not right angled 4 marks</p> <ul style="list-style-type: none"> •¹ finds third side •² knows to use converse of Pythagoras •³ squares sides •⁴ conclusion 	<ul style="list-style-type: none"> •¹ $15 \cdot 5 - (6 + 3 \cdot 2) = 6 \cdot 3$ •² evidence of testing Pythagoras •³ $6 \cdot 3^2 = 36 \cdot 69; 3 \cdot 2^2 + 6^2 = 46 \cdot 24$ •⁴ since $6 \cdot 3^2 \neq 3 \cdot 2^2 + 6^2$, triangle [sail] is not right angled
4	<p>ans : $2x^3 + 3x^2 - 23x - 12$ 5 marks</p> <ul style="list-style-type: none"> •¹ knows to multiply to find volume •² multiplies two brackets •³ starts to multiply by third brackets •⁴ completes multiplication by third bracket •⁵ simplifies 	<ul style="list-style-type: none"> •¹ $V = (2x + 1)(x - 3)(x + 4)$ •² $V = (2x + 1)(x^2 + x - 12)$ •³ $2x^3 + 2x^2 - 24x \dots\dots\dots$ •⁴ $\dots\dots\dots + x^2 + x - 12$ •⁵ $2x^3 + 3x^2 - 23x - 12$
5	<p>ans : $PQ = 2\frac{1}{3}$ 4 marks</p> <ul style="list-style-type: none"> •¹ equates to 0 •² factorises •³ solves for x •⁴ states distance PQ 	<ul style="list-style-type: none"> •¹ $3x^2 - 5x - 2 = 0$ •² $(3x + 1)(x - 2) = 0$ •³ $x = -\frac{1}{3}; 2$ •⁴ $2\frac{1}{3}$

Qu	Give one mark for each •	Illustrations for awarding mark
6a	ans: A(-1, 0) 2 marks	<ul style="list-style-type: none"> •¹ $3x + 3 = 0$ •² $x = -1$; A(-1, 0)
	<ul style="list-style-type: none"> •¹ equates to 0 •² solves and states coordinates of A 	
b	ans: B(-3, -3) 3 marks	<ul style="list-style-type: none"> •¹ $3x + 3 = 2x$ •² $x = -3$ •³ B(-3, -3)
	<ul style="list-style-type: none"> •¹ knows to use system of equation •² solves for x •³ states coordinates of B 	
7a	ans: $10g + 6w = 15 \cdot 8$ $13g + 12w = 23 \cdot 9$ 2 marks	<ul style="list-style-type: none"> •¹ $10g + 6w = 15 \cdot 8$ •² $13g + 12w = 23 \cdot 9$
	<ul style="list-style-type: none"> •¹ one equation correct •² second equation correct 	
b	ans: £24.50 4 marks	<ul style="list-style-type: none"> •¹ $20g + 12w = 31 \cdot 6$; $13g + 12w = 23 \cdot 9$ •² $g = 1 \cdot 1$ •³ $w = 0 \cdot 8$ •⁴ £24.50
	<ul style="list-style-type: none"> •¹ scales equations •² finds value for g •³ finds value for w •⁴ finds cost of new design 	
8	ans : $252 \cdot 7 \text{cm}^3$ 4 marks	<ul style="list-style-type: none"> •¹ evidence of strategy •² $V = 12 \times 4 \times 6 = 288 \text{ cm}^3$ •³ $V_{\text{cone}} = \frac{1}{3} \times \pi \times 1 \cdot 5^2 \times 5 \times 3 = 35 \cdot 34 \text{ cm}^3$ •⁴ $252 \cdot 7 \text{cm}^3$
9	ans : $1 \cdot 3, -5 \cdot 3$ 4 marks	<ul style="list-style-type: none"> •¹ evidence •² 44 •³ $\frac{-4 \pm \sqrt{44}}{2} = 1 \cdot 3166\dots; -5 \cdot 3166\dots$ •⁴ $1 \cdot 3, -5 \cdot 3$
	<ul style="list-style-type: none"> •¹ knows to use quadratic formula •² calculates $b^2 - 4ac$ •³ processes roots •⁴ states both roots correctly rounded 	
10	ans: graph drawn 5 marks	<ul style="list-style-type: none"> •¹ $x = -5, x = 3$ •² (0, -15) •³ TP where $x = -1$ •⁴ (-1, -16) •⁵ see graph
	<ul style="list-style-type: none"> •¹ correct x – axis intercepts •² correct y – axis intercept •³ knows how to find TP •⁴ finds TP •⁵ correct shape of graph annotated 	

Qu	Give one mark for each •	Illustrations for awarding mark
11a	ans: $(3x + 1)(x - 3)$ 2 marks • ¹ one bracket correct • ² second bracket correct b ans: $(3x + 7)(x - 1)$ 3 marks • ¹ subs in first bracket • ² subs in second bracket • ³ simplifies	• ¹ $(3x + 1).....$ • ² $(3x + 1)(x - 3)$ • ¹ $(3(x + 2) + 1).....$ • ² $((x + 2) - 3)$ • ³ $(3x + 7)(x - 1)$
12	ans: overflow with reason 4 marks • ¹ finds linear scale factor • ² finds volume scale factor • ³ finds volume of smaller container • ⁴ conclusion	• ¹ L.S.F. = $\frac{3}{5}$ • ² $\left(\frac{3}{5}\right)^3 = \frac{27}{125}$ • ³ $\frac{27}{125} \times 19 \cdot 625 = 4 \cdot 239$ • ⁴ $3 \times 1 \cdot 5 = 4 \cdot 5$ so the smaller tank would overflow since $4 \cdot 5 > 4 \cdot 239$ (Allow statement that it is 261ml or 0.261 litres too small) Allow inverted scale factors of $\frac{5}{3}$ for • ¹ and $\frac{125}{27}$ for • ² provided division is used at • ³ to reach the correct volume.
13a	ans : $a = 3; b = 2$ 2 marks • ¹ correct value of a • ² correct value of b b ans: $160 \cdot 5^\circ; 379 \cdot 5^\circ$ 4 marks • ¹ equates equation to 3 • ² isolates $\sin x^\circ$ and takes inverse • ³ states x – coordinate of P • ⁴ finds x – coordinate of Q	• ¹ $a = 3$ • ² $b = 2$ • ¹ $3 \sin x^\circ + 2 = 3$ • ² $\sin x^\circ = \frac{1}{3}; \sin^{-1}\left(\frac{1}{3}\right) = 19 \cdot 5^\circ$ • ³ $19 \cdot 5^\circ$ {Accept as coordinates; • ⁴ $160 \cdot 5^\circ$ { $(19 \cdot 5, 3)$ and $(160 \cdot 5, 3)$
Total 60 marks		