MARK SCHEME 5505

Number	Working	Answer	Mark	Notes
1 (a)	e.g. $2\overline{)120}$ $2\overline{)60}$ $2\overline{)30}$ $3\overline{)15}$ $5\overline{)5}$ 1	$2^3 \times 3 \times 5$	3	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error (M1 for 120 written as either 2×60 or 3×40 or 5×24 or equivalent division or a full process with 2 calculation errors) A1 for $2^3 \times 3 \times 5$ (accept $2 \times 2 \times 2 \times 3 \times 5$)
(b)	e.g. $150 = 2 \times 3 \times 5^2$ LCM = $2^3 \times 3 \times 5^2$	600	2	B2 cao (B1 for either a multiple of 600 or numerical expression which equals 600)
2	$5x - 16 = 3(x + 10)$ $5x - 16 = 3x + 30$ $5x - 3x = 30 + 16$ $2x = 46$	23	4	B1 for either $5x - 16$ or $3(x + 10)$ or $3x + 30$ or $\frac{5x}{3} - \frac{16}{3}$ seen (accept letters /symbols other than x) M1 for $5x - 16 = 3(x + 10)$ oe M1 for isolating terms correctly; ft on $ax + b = cx + d$, a,b,c and d not zero A1 cao
3	$\frac{7}{20} \times 300$	105	3	M1 for either $\frac{7}{20}$ oe or $\frac{300}{20}$ oe (condone slip in $\sum f$) M1 for $\frac{7}{20} \times 300$ oe (condone slip in $\sum f$) or $\frac{105}{300}$ seen A1 cao

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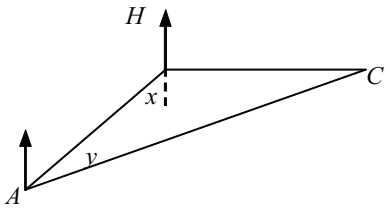
4 (a) (i)		p^9	3	B1 cao
(ii)		x^5		B1 cao
(iii)		y^2		B1 cao
(b)		$3t^3 + 4t$	2	B2 for $3t^3 + 4t$ (B1 for either $3t^3$ or $4t$ seen or $3t^3 + 4t$ then an error)
5	 $x = 72°$ $y = \frac{180 - 162}{2} = 9°$ $72° + 9° = 81°$	081 or 81	3	M1 for (AHC=) 90 + 72 (=162) accept x marked as 72 and CHS as 90 or symbol M1 dep for $\frac{(y =)180 - "162"}{2}$ (= 9) A1 cao ALTn Draws line from A parallel to HC M1 for $z = w$ and $y + z = 90 - 72$ (= 18) M1 for y (or z) = $\frac{"18"}{2}$ A1 cao
6	$\frac{1}{2}ac,\ a(b+c),\ \pi a^2$		3	B3 B1 × 3 (deduct B1 for each additional expression (>3) to min 0)
7	$\frac{17}{3} - \frac{11}{4}$ or $5 - 2$ & $\frac{2}{3} - \frac{3}{4}$ oe $\frac{68}{12} - \frac{33}{12}$ or $\frac{8}{12} - \frac{9}{12}$ oe	$2\frac{11}{12}$	3	M1 for correctly decomposing into non mixed numbers M1ft for correct method to write all fractions to a common denominator A1 for $\frac{35}{12}$ oe single fraction or mixed number SC: B3 for 2.916 (B1 for 5.6 – 2.75 oe decimals)

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8 (a)		5, 23, 35, 39, 40	1	B1 for all correct
(b)	(175,5), (180,23),(185,35), (190,39) and (195,40)	Points correct Curve or line segments	2	B1 ft for at least 4 of 5 pts plotted correctly (± ½ sq) at ends of intervals dep on sensible table B1 ft (dep on previous B1) for pts joined by curve/line segments provided no gradient is negative (SC:B1 ft from sensible table for 4 or 5 pts plotted not at ends but consistently within each interval **and** joined)
(c)		~179	1	B1 ft from cf graph using cf = 20 or 20.5
9 (a)	$\left(\frac{x+2+x+6}{2}\right)(x-5)$	Printed	4	B1 for $\left(\frac{x+2+x+6}{2}\right)(x-5)$ or any correct unsimplified form for the area
	$(x+4)(x-5)$			M1 for at least 3 terms correct in expansion of form $(x+a)(x+b)$ or $(2x + a)(x + b)$
	$x^2-5x+4x-20$			A1 for area = $x^2-5x+4x-20$ or better
	$x^2-x-20=36$			A1 for $x^2-x-56(=0)$ obtained convincingly
(b)(i)	$(x-8)(x+7)=0$	8, −7	4	M1 for $(x\pm8)(x\pm7)$ or correct subst. into quadratic formula (condone sign errors) A2 cao (B1 for either $x = -7$ o*r* $x = 8$)
(ii)		3		B1 cao (the only value)
10 (a)		90	2	B1 cao
	Angle in a semi circle (is a right angle)			B1 for a valid reason
(b)		56	2	B1 cao
	Angles in the same segment (are equal)			B1 for reason
(c)		112	2	B1 cao
	Angle at the centre is twice the angle at the circumference			B1 for reason

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11 (a)	$\frac{3w+20}{200}=1$ $3w+20=200$	60	3	M1 $p = 1$ stated or used M1dep $3w+20=200$ oe A1 cao
(b)	$200p=3w+20$ $3w=200p-20$	$\frac{200p-20}{3}$	3	M1 for $200p=3w+20$ or $p=\frac{3w}{200}+\frac{20}{200}$ M1 $3w=200p-20$ or correct ft to isolate the w term A1 for $\frac{200p-20}{3}$ oe

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(c)	$(3w+20)(A+12)=200A$ $3wA+36w+20A+240 \quad (=200A)$ $36w+240=3A\,(60-w)$ or eg. $36w+240=A\,(180-3w)$ ***Alternative for (c)*** $\frac{A+12}{A}=\frac{200}{3w+20}$ $1+\frac{12}{A}=\frac{200}{3w+20}$ $\frac{12}{A}=\frac{200}{3w+20}-1$ $\frac{A}{12}=\frac{1}{\frac{200}{3w+20}-1}$ $A=\frac{12(3w+20)}{180-3w}$	$\frac{4(3w+20)}{60-w}$	4	M1 for $(3w+20)(A+12)=200A$ B1 for correct expansion of brackets M1for isolating A terms and factorising; condone one arithmetic/sign slip in total during these two processes A1 for $\frac{4(3w+20)}{60-w}$ oe e.g. $\frac{36w+240}{180-3w}$ M1 for $1+\frac{12}{A}=\frac{200}{3w+20}$ A1 for $\frac{12}{A}=\frac{200}{3w+20}-1$ M1 for $\frac{A}{12}=\frac{1}{\frac{200}{3w+20}-1}$ or $12(3w+20)=A\,[200-(3w+20)]$ A1 $A=\frac{12(3w+20)}{180-3w}$ oe

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12 (a)	$\frac{50}{500} \times 76$	8	3	M1 for $\frac{50}{500} \times 76$ oe A2 cao (A1 for 7.6)
(b)	9×10 or 90 or 8.5×10	86	2	M1 for 9×10 or 90 or 8.5×10 or 8.6×10 seen A1 for either 86 or for 85
(c)	$\frac{30}{80}$ $\frac{40}{100}$ $\frac{3}{8} \times \frac{2}{5}$	$\frac{3}{20}$	3	B1 for $\frac{30}{80}$ or $\frac{40}{100}$ oe seen M1 for multiplying only two probabilities or full relevant complete method A1 $\frac{3}{20}$ oe
13	$100x = 29.\dot{2}\dot{9}$ $x = 0.\dot{2}\dot{9}$ $99x = 29$	$\frac{29}{99}$	2	M1 for $29.\dot{2}\dot{9} - 0.\dot{2}\dot{9}$ or for $99x = 29$ A1 cao
14	$CD = AD$ & $DG = DE$	See working column	3	M1 for $CD = AD$ & $DG = DE$
	$\angle CDG = \angle ADE$ $(= \angle ADG + 90°)$			M1 for $\angle CDG = \angle ADE$ since both equal $\angle ADG + 90°$
	2 sides & included angle			A1 for SAS oe in words

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15	$-\frac{1}{2}$ or $2m = -1$ oe $y = -\frac{1}{2}x + c$	$y = -\frac{1}{2}x + 9$	3	B1 for $-\frac{1}{2}$ or $2m = -1$ oe M1 for $y = -\frac{1}{2}x + c$, $c \neq 0$ A1 for $y = -\frac{1}{2}x + 9$ oe (SC: if $\frac{0}{3}$ then B1 for either $y = 2x - 1$ oe or $y = -2x + 15$ oe)
16	Sf $= \frac{3}{2}$ Vol $= \left(\frac{3}{2}\right)^3 \times 80$	270	3	M1 for $\frac{3}{2}$ oe (or $\frac{2}{3}$ oe or ratio with evidence) M1 for $\left(\frac{3}{2}\right)^3 \times 80$ oe A1 cao
17 (a)(i)		$\frac{1}{9}$	5	B1 cao
(ii)		6		B1 cao
(iii)		9		B1 cao
(iv)	$\left(\frac{2}{3}\right)^{-3} = \left(\frac{3}{2}\right)^3$	$\frac{27}{8}$ oe		B2 for $\frac{27}{8}$ oe (B1 for $\left(\frac{81}{16}\right)^{\frac{3}{4}}$ or $\left(\frac{2^3}{3^3}\right)^{-1}$ *or* $\left(\frac{2}{3}\right)^{-3}$ *or* $\left(\frac{3}{2}\right)^3$ or better) or $\frac{1}{\frac{8}{27}}$ or $\frac{8}{27}$
(b)(i)	$\frac{21\sqrt{7}}{\sqrt{7} \times \sqrt{7}}$	$3\sqrt{7}$	4	M1 for $\frac{21\sqrt{7}}{\sqrt{7} \times \sqrt{7}}$ A1 cao
(ii)	$5+2\sqrt{3}\sqrt{5}-2\sqrt{3}\sqrt{5}-12$	-7		M1 for correct expansion with at least one non zero integer term or 3 of our 4 terms correct and slip in 4th ; or for $5 + k - k - 12$ where k is a surd A1 for -7 with no error seen

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18	$\frac{4}{3}\pi \times 3^3$ (= 36π) $\frac{4}{3}\pi \times 3^3 = 3 \times \frac{1}{3} \times \pi \times 3^2 \times h$ $h = 4$ $3^2 + h^2 = l^2$ $l = 5$ CSA $= \pi \times 3 \times 5$	15π	7	M1 V sphere = $\frac{4}{3}\pi \times 3^3$ or for Vcone = $\frac{1}{3} \times \pi \times 3^2 \times h$ M1 for $\frac{4}{3}\pi \times 3^3 = 3 \times \frac{1}{3} \times \pi \times 3^2 \times h$ oe A1 for $h = 4$ M1 for $3^2 + h^2 = l^2$ A1 ft for $l = \sqrt{9+"4"^2}$ $(= 5)$ evaluated as a single term M1 (dep) for CSA $= \pi \times 3 \times "5"$ A1 cao
19 (a)		**b – a**	1	B1 for **b – a** cao
(b)	Eg $\overrightarrow{OT} = \mathbf{a} + \frac{2}{3}\overrightarrow{PQ}$ or $\overrightarrow{OT} = \mathbf{b} - \frac{1}{3}\overrightarrow{PQ}$ oe	$\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$	2	M1 for $\overrightarrow{OT} = \mathbf{a} + \frac{2}{3}\overrightarrow{PQ}$ oe A1 for $\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe simplified
20(a) (i)	$p = 3$	3	3	B1 cao
(ii)	$"3"^2 + q = 14$	5		M1 for $p^2 + q = 14$ *or* $p^2 - 6p + 14 = q$ or $(x-p)^2 + 14 - p^2$ A1 cao
(b)		(3, 5)	1	B1 ft from (a) (accept (*p*, *q*))
(c)		5	1	B1 ft from (a)(ii) (accept *q*)
(d)(i)		(4, 5)	3	B2 B1 for each correct coordinate ft from (b) (accept (*p*+1, *q*))
(ii)		(0,21)		B1 for (0, 21) accept 21