1	**Alternative method 1**		
	15^2 or 225 and $(16 \div 2)^2$ or 8^2 or 64	M1	oe
	$\sqrt{15^2 + (16 \div 2)^2}$ or $\sqrt{\text{their } 225 + \text{their } 64}$ or $\sqrt{289}$ or 17	M1dep	oe full trigonometric method leading to 17 scores M2 eg $\dfrac{15}{\sin\left(\tan^{-1}\dfrac{15}{8}\right)}$
	6 × their 17 + 3 × 16 or 102 + 48	M1dep	oe
	150	A1	SC2 $48 + 6\sqrt{161}$ or [124.08, 124.2]
	Alternative method 2		
	$(48 \div 2)^2$ or 24^2 or 576 and $(15 \times 3)^2$ or 45^2 or 2025	M1	oe eg $(16 \times 1.5)^2$ and $(3 \times 15)^2$
	$\sqrt{(48 \div 2)^2 + (3 \times 15)^2}$ or $\sqrt{\text{their } 576 + \text{their } 2025}$ or $\sqrt{2601}$ or 51	M1dep	oe full trigonometric method leading to 51 scores M2 eg $\dfrac{45}{\sin\left(\tan^{-1}\dfrac{15}{8}\right)}$ or $\dfrac{45}{\sin\left(\tan^{-1}\dfrac{45}{24}\right)}$
	2 × their 51 + 3 × 16 or 102 + 48	M1dep	oe
	150	A1	SC2 $48 + 6\sqrt{161}$ or [124.08, 124.2]
	Additional Guidance		
	$15^2 - 8^2$ or $45^2 - 24^2$		M1M0M0A0 (unless SC2 scored)
	Allow 61.9(2…) or 61.93 or 62 for $\tan^{-1}\dfrac{15}{8}$ but do not award A1 if premature approximation seen		

Q	Answer	Mark	Comments
2	**Alternative method 1**		
	$20\pi \div 2\pi$ or 10	M1	oe may be seen on diagram implied by diameter = 20
	$x^2 + x^2 = (\text{their } 10)^2$ or $2x^2 = 100$ or $x^2 = 50$ or their $10 \times \sin 45$ or their $10 \times \cos 45$ or their $10 \times \frac{1}{\sqrt{2}}$	M1	oe any letter (condone a) their 10 is their length OQ (the radius of the circle)
	$\sqrt{\text{their } 10^2 \div 2}$ or $\sqrt{50}$ or $5\sqrt{2}$ or $4 \times \sqrt{50}$ or $4 \times$ their $10 \times \sin 45$ or $4 \times$ their $10 \times \cos 45$ or $40 \times \frac{1}{\sqrt{2}}$ or $\frac{40\sqrt{2}}{2}$ or $20\sqrt{2}$	M1dep	oe value for the length of one side of the square or the perimeter of the square eg $\frac{10}{\sqrt{2}}$ dep on previous mark
	2 with full working seen for M3	A1	

2 cont	**Alternative method 2**		
	$20\pi \div 2\pi$ or 10 or side length of square $= 5\sqrt{a}$	M1	oe may be seen on diagram implied by diameter = 20
	(Perimeter of square $= 20\sqrt{a}$ and) side length of square $= 5\sqrt{a}$ and $\left(5\sqrt{a}\right)^2 + \left(5\sqrt{a}\right)^2 =$ (their 10)^2	M1	oe their 10 is their length OQ (the radius of the circle) condone missing brackets if recovered
	$25a + 25a =$ (their 10)^2 or $50a = 100$	M1dep	dep on M1M1
	2 with full working seen for M3	A1	
	Additional Guidance		
	2 with no working		M0M0M0A0
	$\sqrt{2}$ on answer line (may score method marks)		A0

Q	Answer	Mark	Comments
3	**Alternative method 1**		
	$6x + x + 5x + 6x + x + 6x + x$ or $26x$ or $6 + 1 + 5 + 6 + 1 + 6 + 1$ or 26	M1	oe eg $7x + 6x - x + 6x + x + 6x + x$ $26x$ or 26 is implied by 3.8 oe if addition not seen
	their $26x = 98.8$ or $98.8 \div$ their 26 or 3.8 or $\frac{19}{5}$	M1	oe equation must have terms collected if 1st M1 **not** awarded their $26x$ must be $24x$ or $25x$ or $27x$ if 1st M1 **not** awarded their 26 must be 24 or 25 or 27
	their 3.8×14	M1dep	dep on 2nd M1 oe eg $45.6 + 7.6$
	53.2	A1ft	oe ft their 3.8 if M0M2 awarded

3 cont	**Alternative method 2**		
	$6x + x + 6x$ or $13x$ or $6 + 1 + 6$ or 13	M1	oe eg $6x + x + 5x + x$ $13x$ or 13 is implied by 3.8 oe if addition not seen
	their $13x = 98.8 \div 2$ or $49.4 \div$ their 13 or 3.8 or $\frac{19}{5}$	M1	oe equation must have terms collected if 1st M1 **not** awarded their $13x$ must be $12x$ if 1st M1 **not** awarded their 13 must be 12
	their 3.8×14	M1dep	dep on 2nd M1 oe eg $49.4 + 3.8$
	53.2	A1ft	oe ft their 3.8 if M0M2 awarded
	Additional Guidance		
	Up to M3 may be awarded for correct work with no answer, or incorrect answer, even if this is seen amongst multiple attempts		
	Follow through must be to at least 1 dp and their 26 or their 13 must be seen For information: $24 \rightarrow 57.6\ldots$ $25 \rightarrow 55.3\ldots$ $27 \rightarrow 51.2\ldots$ $12 \rightarrow 57.6\ldots$		M0M1M1A1ft
	Both 2nd and 3rd method marks may be implied by their answer. If not using 24, 25, 26, 27, 12 or 13 you must have seen the first M1.		
	$27x = 98.8$ (1st M0, no addition seen, but $27x$ allowed) $\frac{98.8}{27} \times 14$, answer 51.2		M0M1 M1A1ft
	$7x + 5x + 6x + x + 6x + x = 20x$ (correct terms added with incorrect total) $98.8 \div 20 = 4.94$ 69.16 (multiplication by 14 implied)		M1 M1 M1A0
	$98.8 \div 20 = 4.94$ (1st M0, no addition seen, and 20 not allowed) 4.94×14, answer 69.16		M0M0 M0A0
	$6x + x + 5x + 6x + x + 6x + x = 26x^7$		M1M0M0A0