1	$\pi \times 15^2$ (= 225π)		2	M1	
		707		A1	awrt 707
					Total 2 marks

2 (e)	$\frac{1}{2}(6+10)\times 4$		2	M1	for correct application of formula allow triangle method
		32		A1	cao

3	eg $\frac{1}{2}\times(20+26)\times 12$ (= 276) **or** $12 \times 20 + \frac{1}{2}\times(26-20)\times 12$ (= 276) **or** $12 \times 26 - \frac{1}{2}\times(26-20)\times 12$ (=276)		5	M2	complete method to find the area of the shape M1 for method to find the area of a rectangle 12 × 20 (= 240) **or** 12 × 26 (=312) **or** the area of the triangle $\frac{1}{2}\times(26-20)\times 12$ (= 36)
	"276" ÷ 20 (= 13.8)			M1	(indep) method to find the number of tins for their area ft any value from a calculation that includes at least two of 20, 26 & 12
	eg 3 × \$40 + 2 × \$13 (= \$146) or 14 × \$13 (= \$182) or 4 × \$40 (= \$160)			M1	method to calculate a cost for their number of tins dep on previous M1 (NB: use n × \$40 where n is the next multiple of 4 greater than the number of tins needed, divided by 4)
		146		A1	cao dep on accurate figures
					Total 5 marks

4	$8.5^2 - (8 \div 2)^2$ (= 56.25) **or** $\cos x = \frac{4}{8.5}$		4	M1	**or** eg $\cos A = \frac{8^2+8.5^2-8.5^2}{2\times 8\times 8.5}$
	$\sqrt{"56.25"}$ (= 7.5) **or** $x = \cos^{-1}\left(\frac{4}{8.5}\right)$ (= 61.927...)			M1	**or** eg $(A =)\cos^{-1}\left(\frac{8^2+8.5^2-8.5^2}{2\times 8\times 8.5}\right)$ (61.927...) (other angle = 56.144...)
	8 × "7.5" ÷ 2 oe **or** 0.5 × 8 × 8.5 × sin "61.927..."			M1	**or** eg 0.5 × 8.5 × 8 × sin61.927...oe
		30		A1	
					Total 4 marks

5	28 ÷ 4 (= 7)			M1	
				M1	for using at least six lengths correctly (may be seen on diagram or in calculation)
	e.g. "7" + "3" + 4 + "3" + "7" + 4 + "7" + 4 + "7" + 4			M1	for a complete method to find perimeter
		50	4	A1	
				SC	Award B2 for an answer of 66 or 68
					Total 4 marks

6	$\pi \times 7.2^2 \div 2$ (= 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

7	$30 = \frac{27}{1.2x}$		3	M2	M1 for $\frac{27}{1.2x}$
		0.75		A1	oe
					Total 3 marks

8	20 ÷ 4 (= 5) **or** width = 15 **or** length = 20		3	M1	Could be clearly shown on diagram
	(4 × '5') × (3 × '5') **or** 20 × 15 **or** ('5' × '5') × 12 **or** 25 × 12			M1	dep on M1
		300		A1	for 300 SCB1 for 60 × 80 (=4800)
					Total 3 marks

9	[perimeter =]10 + 6 + 10 + 6 (= 32) **or** (10 + 6) × 2 (= 32) **or** 10 + 6 (= 16)		4	M1	for perimeter or semi perimeter of rectangle
	[area =]10 × 6 (= 60)			M1	(indep) for area of rectangle
	("32" ÷ 4)^2 – '60' **or** ("16" ÷ 2)^2 – '60'			M1	for a completely correct method Allow 60 – area of square
	Working not required, so correct answer scores full marks (unless from obvious incorrect working eg a wrong conversion)	4		A1	
					Total 4 marks

10	$\pi \times 7.5^2$ or 3.14×7.5^2 or $\frac{22}{7} \times 7.5^2$ oe		2	M1	A correct method to find the area of the circle Students may use π or 3.14, 3.142 or $\frac{22}{7}$ oe
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	177		A1	answers in range 176.6 - 177
					Total 2 marks

11	$\pi \times (18 \div 2)^2$ (= 254.469...)			M1	
		254	2	A1	accept 254 – 255
					Total 2 marks

12	0.5 × π × 6^2 (= 56.54…) **or** 12 × 6 (= 72) **or** π × 6^2 oe		3	M1	
	"72" – "56.54…"			M1	dep M1 for a complete method
		15.5		A1	15.4 to 15.5
					Total 3 marks

13	$4x + 6x + 11 + 9x - 18 = 126$ oe eg $19x - 7 = 126$ or eg (126 + 18 – 11) ÷ 19		4	M1	A correct equation or a correct calculation for x
	$x = 7$			A1	
	0.5 × (9 × "7" – 18) × (4 × "7") (0.5 × 45 × 28)			M1	Dep on M1
		630		A1	cao
					Total 4 marks

14	(a)	0.5 × (13.5 + 17) × 10.4	158.6	2	M1 for a complete method eg rectangle ±2 triangles A1 allow 159	

15	(c)	$\frac{1}{2} \times 6 \times 4$ oe		2	M1	for a correct method
			12		A1	

16	e.g. 0.5 × (6 + 13) × 3		2	M1	for a complete method
		28.5		A1	oe
					Total 2 marks

17	(e)		8	1	B1	

18	(Area of kite =)12		3	B1	for a correct area of the kite – may be implied by their diagram
				M1	for any rectangle
				A1ft	A correct rectangle or ft for a rectangle with their stated area of the kite
					Total 3 marks

19	eg $\pi \times \left(\frac{14}{2}\right)^2$ oe **or** $\pi \times 7^2$ oe **or** 49π		2	M1	
		154		A1	accept 153.86 – 154
					Total 2 marks

20	$17.5^2 - 14^2$ (= 110.25)		4	M1	or for use of cosine rule to find one of the angles eg $28^2 = 17.5^2 + 17.5^2 - 2 \times 17.5 \times 17.5 \times \cos A$ **or** eg $\cos B = \frac{14}{17.5}$
	$\sqrt{17.5^2 - 14^2}$ (=10.5)			M1	**or** for rearranging the cosine rule to eg $\cos A = \frac{17.5^2 + 17.5^2 - 28^2}{2 \times 17.5 \times 17.5}$ (A = 106.26...) **or** eg $B = \cos^{-1}(\frac{14}{17.5})$ (= 36.86...)
	0.5 × 28 × "10.5" oe			M1	**or** for 0.5 × 17.5 × 17.5 × sin106.26... oe eg 0.5 × 17.5 × 28 × sin36.86... [clear use of Heron's formula: M1 for S = 0.5(17.5 + 17.5 + 28)(=31.5) M2 for $\sqrt{"31.5"("31.5"-17.5)^2("31.5"-28)}$ oe]
		147		A1	accept awrt 147
					Total 4 marks

21	$\frac{1}{2} \times 7 \times h = 42$ oe or $(h =) \frac{42 \times 2}{7}$ (= 12) oe or $3.5^2 + h^2 = y^2$ or $h = \sqrt{y^2 - 3.5^2}$ oe		4	M1	A correct equation involving the height or a correct expression for height – could be in terms of y
	$y^2 = \left(\frac{7}{2}\right)^2 + ("12")^2$ oe or $\frac{1}{2} \times 7 \times "\sqrt{y^2 - 3.5^2}" = 42$ oe			M1	(indep) use of *their* height (any found value that they have called 'height')
	$y = \sqrt{\left(\frac{7}{2}\right)^2 + ("12")^2}$ oe			M1	**all values must come from a correct method**
	Correct answer scores full marks (unless from obvious incorrect working)	12.5		A1	oe eg $\frac{25}{2}$
					Total 4 marks

22	$\sin 52 = \frac{12 \div 2}{r}$ oe **or** $\frac{r}{\sin 90} = \frac{6}{\sin 52}$ oe **or** $\cos(90 - 52) = \frac{12 \div 2}{r}$ oe **or** $(r^2 =)(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2$ oe $\left[r^2 = 6^2 + 4.687...^2\right]$ **or** $\frac{r}{\sin 38} = \frac{12}{\sin 104}$ oe		4	M1	A correct trig statement for the radius use of tan must also include a correct Pythagoras statement.
	$r = \frac{6}{\sin 52}$ (=7.614) oe **or** $r = \frac{6}{\cos 38}$ oe **or** $(r =)\sqrt{(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2}$ $\left[r = \sqrt{6^2 + 4.687...^2}\right]$ oe **or** $\frac{12 \sin 38}{\sin 104}$ oe			M1	A correct method to find the radius of the circle use of tan must also use Pythagoras to find an expression for r
	(Area =) $\pi \times ("7.61...")^2$			M1	the radius must come from a completely correct method
	Correct answer scores full marks (unless from obvious incorrect working)	182		A1	Accept 181 - 183
					Total 4 marks

23	$(54 - 24) \div 2$ (=15) [may be marked on diagram]		5	M1	
	$"15"^2 - (24 \div 2)^2 (= 81)$			M1	ft their "15" (if > 12)
	[height =] $\sqrt{"15"^2 - (24 \div 2)^2} (= 9)$			M1	ft their "15" (if > 12)
	$(24 \times "9") \div 2$ oe			M1	figures must be from correct working
	Correct answer scores full marks (unless from obvious incorrect working)	108		A1	allow 107.9 – 108.1
	ALTERNATIVES BELOW				**Total 5 marks**
23	$(54 - 24) \div 2$ (=15) [may be marked on diagram]		5	M1	
	or $x = \cos^{-1}\left(\frac{"12"}{"15"}\right) (= 36.86...)$ **or** $y = \sin^{-1}\left(\frac{24 \div 2}{"15"}\right) (= 53.13...)$ **or** $A = \cos^{-1}\left(\frac{15^2 + 15^2 - 24^2}{2 \times 15 \times 15}\right) (= 106.2...)$ **or** $B = \cos^{-1}\left(\frac{15^2 + 24^2 - 15^2}{2 \times 15 \times 24}\right) (= 36.8....)$			M1	ft their "15" (if > 12) [using Hero's formula S = 0.5 × 54 (= 27) and] 27 × (27 – 24) × (27 – "15") × (27 – "15")
	or "12"tan"36.86…" (= 9) (allow 8.9… for these) "12" ÷ tan"53.13…" (= 9) **or** "15" × sin "36.86…" (= 9) **or** "15" × cos "53.13…" (= 9)			M1 ft their "15" (if > 12)	M2 for 0.5 × 24 × "15" × sin"36.86…" or 0.5 × "15" × "15" × sin(2 × "53.13…") or 0.5×"15"×"15"×sin("106.2...") **or** $\sqrt{"27"("27" - 24)("27" - "15")("27" - "15")}$
	$(24 \times "9") \div 2$ oe			M1	
	Correct answer scores full marks (unless from obvious incorrect working)	108		A1	allow 107.9 – 108.1
					Total 5 marks

24	$\frac{1}{2}(330 + 170) \times 240$ (= 60 000) oe or $\left(\frac{80 \times 240}{2}\right) + (170 \times 240) + \left(\frac{80 \times 240}{2}\right) (= 60\,000)$ oe or (2 × 9600) + 40 800 (= 60 000) oe		4	M1 for working out the area of the trapezium
	[60 000] ÷ 10 000 (= 6) or 10 000 × 6 (= 60 000)			M1 ft their area (must come from a two dimensional area) Allow $\frac{\text{their area}}{10\,000}$
	49 650 ÷ [6]			M1 dep on either previous M1 ft their number of hectares Allow $\frac{49\,650}{\text{their number of hectares}}$
	Correct answer scores full marks (unless from obvious incorrect working)	8275		A1
				Total 4 marks