1(a)	$\frac{1}{2}(13 + 10) \times 12$ or 138 or $\frac{1}{2} \times 10 \times 8$ or 40	M1	oe
	$\frac{1}{2}(13 + 10) \times 12$ or 138 and $\frac{1}{2} \times 10 \times 8$ or 40 or 178	M1dep	oe
	25 ÷ (their 138 + their 40)	M1dep	oe
	0.14(0…)	A1	
	Additional Guidance		

1(b)	less than and valid reason	B2	eg less than and you should be dividing by a bigger number or less than and the (actual) area is bigger B1 less than
	Additional Guidance		
	If no box is ticked, condone if less than is clearly stated in working lines		
	Wrong box or > 1 box ticked		B0
	less than and he has not included all the base		B2
	less than and it doesn't cover 100% of the base		B2
	less than and it doesn't include the parts outside the areas		B2
	less than and the area is an underestimate		B2
	less than and it is an underestimate		B1
	less than and it is only an estimate		B1
	less than and the answer to (a) is not the exact area		B1

2(a)	**Alternative method 1** large rectangle – 4 squares		
	$x(x + 5)$	M1	
	$x^2 + 5x - 400 = 1000$ or $x^2 + 5x - 400 - 1000 = 0$ or $x^2 + 5x = 1000 + 400$ with M1 seen	M1dep	400 may be seen as 4×10^2 or 4×100 oe equation with brackets expanded and 400 and 1000 seen
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Alternative method 2 three vertical rectangles		
	$(x + 5)(x - 20)$ or $(2 \times)10(x - 15)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 20x + 5x - 100 + 20x - 300 = 1000$ or $x^2 - 15x - 100 + 20x - 300 = 1000$ with M1 seen	M1dep	oe equation with brackets expanded and 100 and 300 and 1000 seen allow 150 seen twice for 300
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0

2(a) cont	**Alternative method 3** three horizontal rectangles		
	$x(x - 15)$ or $(2 \times)10(x - 20)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 15x + 20x - 400 = 1000$ with M1 seen	M1dep	oe equation with brackets expanded and 400 and 1000 seen allow 200 seen twice for 400
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Alternative method 4 central rectangle + four outer rectangles		
	$(x - 15)(x - 20)$ or $(2 \times)10(x - 15)$ or $(2 \times)10(x - 20)$	M1	$(x - 20)$ may be seen as $(x - 10 - 10)$ $(x - 15)$ may be seen as $(x + 5 - 10 - 10)$
	$x^2 - 20x - 15x + 300 + 20x - 300 + 20x - 400 = 1000$ or $x^2 - 35x + 300 + 20x - 300 + 20x - 400 = 1000$ with M1 seen	M1dep	oe equation with brackets expanded and 300 seen twice and 400 and 1000 seen allow 150 seen twice for one of the 300s allow 200 seen twice for 400
	$x^2 + 5x - 1400 = 0$ with M2 seen	A1	must have = 0
	Additional Guidance		
	If 1st M1 seen award M1 even if expression is not subsequently used		
	For M1 allow multiplication signs eg $x \times (x + 5)$		M1
	$x(x + 5) = x^2 + 5x$ $1000 + 400 = 1400$ $x^2 + 5x = 1400$ (previous line shows 1000 and 400) $x^2 + 5x - 1400 = 0$		M1 M1 A1
	$x(x + 5) = x^2 + 5x$ $x^2 + 5x = 1400$ (equation does not have 1000 and 400) $x^2 + 5x - 1400 = 0$		M1 M0 A0
	Only equation seen is $x^2 + 5x - 1400 = 0$ the maximum mark is M1		

2(b)	No and valid reason	B1	eg No and x cannot be negative (in this context)
	Additional Guidance		
	If neither box is ticked condone if No is clearly stated in working lines		
	Yes or both boxes ticked		B0
	Allow 'it' to represent x		
	No and x is (only) 35		B1
	No and it cannot be –40		B1
	No and the width would be negative		B1
	No and the width should be positive		B1
	No she put –40		B1
	No and you can't have two answers		B0
	No and the answers are too big		B0
	No and it should be 40 (and –35)		B0

3(a)	$\frac{1}{2} \times 9.7 \times 3.8 \times \sin 73°$ or 17.6…	M1	oe
	their 17.6… × 6 ÷ 8.5 or 105.7… ÷ 8.5 or 12.4…	M1dep	oe
	13	A1	
	Additional Guidance		
	$\frac{1}{2} \times 9.7 \times 3.8 = 18.43$ $18.43 \times 6 \div 8.5 = 13.0…$		M0M0A0
3(b)	$9.7^2 + 3.8^2 - 2 \times 9.7 \times 3.8 \times \cos 73°$ or $94.09 + 14.44 - 73.72 \cos 73°$ or 86.976… or 86.98 or 87	M1	oe
	$\sqrt{\text{their } 86.976…}$	M1dep	
	9.3(2…) or 9.33	A1	
	$\frac{\sin x}{\text{their } 9.32…} = \frac{\sin 42}{8}$ or $\sin^{-1}[0.7778, 0.7804]$	M1	oe their 9.32… must be their length of the vertical line
	[51, 51.3]	A1ft	ft their 9.3(2…) or 9.33
	Additional Guidance		
	Their 9.32… must come from M1M1 or be clearly identified in working or on the diagram as the length of the vertical line		

Q	Answer	Mark	Comments
4	20^2 ($\times \pi$) or 400 ($\times \pi$) or 15^2 ($\times \pi$) or 225 ($\times \pi$)	M1	oe
	$\frac{3}{4} \times 20^2$ ($\times \pi$) or 300 ($\times \pi$) or $\frac{1}{3} \times 15^2$ ($\times \pi$) or 75 ($\times \pi$)	M1dep	oe
	$\frac{3}{4} \times 20^2$ ($\times \pi$) or 300 ($\times \pi$) and $\frac{1}{3} \times 15^2$ ($\times \pi$) or 75 ($\times \pi$)	M1dep	
	300 ($\times \pi$) and 75 ($\times \pi$) and 4	A1	Accept P = 4Q for 4 SC2 40 ($\times \pi$) and 30 ($\times \pi$) and 30 ($\times \pi$) and 10 ($\times \pi$) and answer 3

Additional Guidance	
Answer 4 with no working	M0A0
Condone inconsistent use of π eg 300π and 75 and 4	M3A1
Condone, for example, π400 for 400π	
Allow use of a numerical value for π for method marks and for the A mark with answer 4	
Ignore units throughout	

5	**Alternative method 1**		
	Sight of at least one of 2.35 or 2.45 or 2.85 or 2.95	M1	allow $2.44\dot{9}$ for 2.45 and $2.94\dot{9}$ for 2.95
	their 2.35 × their 2.85	M1	$2.3 \leqslant$ their 2.35 < 2.4 $2.8 \leqslant$ their 2.85 < 2.9
	2.35 × 2.85 selected and 6.6(975)	A1	accept 6.7(0) or 6.698 with 2.35 × 2.85 selected
	Alternative method 2		
	Sight of at least one of 2.35 or 2.45 or 2.85 or 2.95	M1	allow $2.44\dot{9}$ for 2.45 and $2.94\dot{9}$ for 2.95
	6.51 ÷ their 2.35 or 6.51 ÷ their 2.85	M1	$2.3 \leqslant$ their 2.35 < 2.4 $2.8 \leqslant$ their 2.85 < 2.9
	6.51 ÷ 2.35 and 2.7(7…) and 2.85 or 6.51 ÷ 2.85 and 2.2(8…) and 2.35	A1	
	Additional Guidance		
	Alt 1 2.35 × 2.85 amongst other calculations eg 2.45 × 2.95 and/or 2.35 × 2.95 can still score the second M1 but it must be clear that they are considering 2.35 × 2.85 = 6.6(975) to show that the bedroom can be rented eg1 2.35 × 2.85 = 6.6975 2.45 × 2.95 = 7.2275 eg2 2.35 × 2.85 = 6.6975 2.45 × 2.95 = 7.2275 2.35 × 2.95 = 6.9325 The lower bounds show it can be rented		M1M1A0 M1M1A1
	Ignore the calculation 2.4 × 2.9 throughout		
	Alt 1 6.6(975) or 6.7 or 6.698 without 2.35 × 2.85 selected		A0
	6.6975 only		M0M0A0
	Alt 2 2.7(7…) without 6.51 ÷ 2.35 and 2.85 seen		A0
	Alt 2 2.2(8…) without 6.51 ÷ 2.85 and 2.35 seen		A0

Q	Answer	Mark	Comments
6	**Alternative method 1 – using Pythagoras' theorem or 3, 4, 5 triangle**		
	$16 \div 4 \times 5$ or 20 (cm) or identifies triangle as 3, 4, 5	M1	oe length of c may be on diagram
	$\sqrt{(\text{their } 20)^2 - 16^2}$ or $\sqrt{400 - 256}$ or $\sqrt{144}$ or 4×3	M1dep	
	12 (cm)	A1	length of b may be on diagram
	96	A1ft	ft $\frac{1}{2} \times 16 \times$ their 12 with M2 awarded
	Alternative method 2 – using trigonometry and ½ab sin C formula		
	$16 \div 4 \times 5$ or 20 (cm)	M1	oe length of c may be on diagram
	$\cos^{-1}\left(\frac{16}{20}\right)$ or 36.8(…) or 36.9	M1dep	angle between sides a and c
	$\frac{1}{2} \times 16 \times 20 \times \sin(\text{their } 36.8(\ldots))$	M1dep	dep on M2
	96	A1	
	Additional Guidance		
	$\frac{1}{2} \times 16 \times 12 \times \sin 90$		M1M1M1

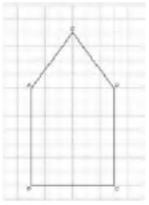
Q	Answer	Mark	Comment
7	**Alternative method 1** Works out *BC* using Pythagoras then works out *EH*		
	7^2 or 49 and 4.2^2 or 17.64	M1	oe
	$\sqrt{7^2 - 4.2^2}$ or $\sqrt{49 - 17.64}$ or $\sqrt{31.36}$ or 5.6	M1dep	oe implied by 11.76 as the area of the smaller triangle may be on diagram
	6 ÷ 4.2 × their 5.6 or 8	M1dep	oe full method to work out *EH* may be on diagram as *EH* or *FG* implied by 24 as the area of the larger triangle or 60 as the area of the rectangle
	0.5 × their 8 × 6 or 24 and their 8 × 7.5 or 60	M1dep	oe eg 0.5 × their 5.6 × 4.2 × $(6 \div 4.2)^2$ and their 8 × 7.5 **or** 0.5 × their 8 × (7.5 + 13.5)
	84	A1	

7 cont	**Alternative method 2** Works out *ED* using similar triangles then works out *EH*		
	6 ÷ 4.2 × 7 or 10	M1	oe may be on diagram
	(their 10)^2 or 100 and 6^2 or 36	M1dep	oe
	$\sqrt{(\text{their } 10)^2 - 6^2}$ or $\sqrt{100 - 36}$ or $\sqrt{64}$ or 8	M1dep	oe full method to work out *EH* may be on diagram as *EH* or FG implied by 24 as the area of the larger triangle or 60 as the area of the rectangle
	0.5 × their 8 × 6 or 24 and their 8 × 7.5 or 60	M1dep	oe eg 0.5 × their 5.6 × 4.2 × $(6 \div 4.2)^2$ and their 8 × 7.5 **or** 0.5 × their 8 × (7.5 + 13.5)
	84	A1	

7 cont	**Alternative method 3** Uses trigonometry to work out *BC* then works out *EH* or uses trigonometry to work out *EH*		
	(angle *ABC* =) $\sin^{-1}\left(\frac{4.2}{7}\right)$ or (angle *ABC* =) [36.8, 36.9] or (angle *BAC* =) $\cos^{-1}\left(\frac{4.2}{7}\right)$ or (angle *BAC* =) [53.1, 53.2]	M1	oe full method to work out *ABC* or *BAC*
	7 × cos (their [36.8, 36.9]) or 7 × sin (their [53.1, 53.2]) or 5.6 or tan (their [36.8, 36.9]) = $\frac{6}{EH}$ or tan (their [53.1, 53.2]) = $\frac{EH}{6}$	M1dep	oe full method to work out *BC* or partial method to work out *EH*
	6 ÷ 4.2 × their 5.6 or 8 or 6 ÷ tan (their [36.8, 36.9]) or 6 × tan (their [53.1, 53.2])	M1dep	oe full method to work out *EH* may be on diagram as *EH* or FG implied by 24 as the area of the larger triangle or 60 as the area of the rectangle
	0.5 × their 8 × 6 or 24 and their 8 × 7.5 or 60	M1dep	oe eg 0.5 × their 5.6 × 4.2 × $(6 \div 4.2)^2$ and their 8 × 7.5 **or** 0.5 × their 8 × (7.5 + 13.5)
	84	A1	
	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		

Q	Answer	Mark	Comment
8	7.15 or 7.25 or 13.55 or 13.65 or 109.5 or 110.5	B1	
	7.25 and 13.65 and 109.5 chosen	B1	
	0.5 × their 7.25 × their 13.65 × sin their 109.5	M1	their 7.25 must be [7.2, 7.25] their 13.65 must be [13.6, 13.65] their 109.5 must be [109.5, 110] or 110.5
	46.6(4…) with correct bounds seen	A1ft	condone 47 with B1B1 scored ft their three bounds within M1 ranges which are not 7.2 or 13.6 or 110
	Additional Guidance		
	Accept $7.24\dot{9}$ for 7.25 or $13.64\dot{9}$ for 13.65 or $110.4\dot{9}$ for 110.5		
	7.25 and 13.65 and 110.5 used and answer 46.3…		B1B0M1A1ft
	7.25 and 13.65 and 110 used and answer 46.497… or 46.5		B1B0M1A0ft
	7.2 and 13.6 and 110 used, with or without answer 46(.0…)		B0B0M1A0ft
	46.6(4…) or 47 with no working		B0B0M0A0

<table>
<tr><th>Q</th><th>Answer</th><th>Mark</th><th>Comments</th></tr>
<tr><td rowspan="6">9</td><td>Fully correct diagram with all these 6 conditions met
• Line length 6 cm from B
• Line perpendicular to AB from B
• Line length 7 cm parallel to AB
• Area of pentagon = 54 cm^2
• Pentagon has exactly one line of symmetry
• Labelled pentagon</td><td>B4</td><td>B3 5 conditions met
B2 4 conditions met
B1 3 conditions met

condone label E missing</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Mark intention</td><td></td></tr>
<tr><td colspan="2">Ignore any lines inside the shape eg lines of symmetry</td><td></td></tr>
<tr><td colspan="2">A diagram that is not a pentagon can only meet the first 3 conditions</td><td>B0 or B1</td></tr>
<tr><td colspan="2">  </td><td>B4</td></tr>
</table>