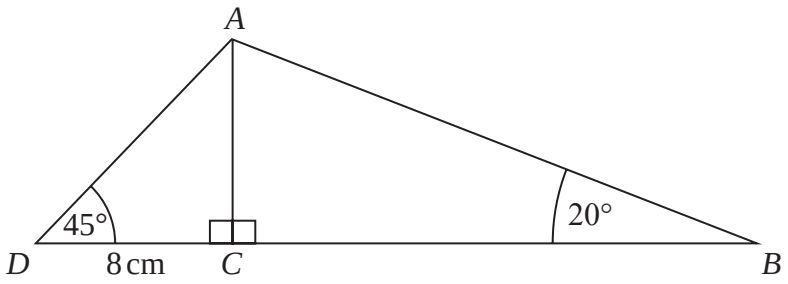
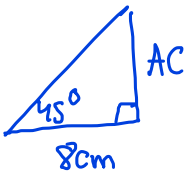
1 *ABC* and *ACD* are right-angled triangles.



DC = 8 cm
Angle *ADC* = 45°
Angle *ABC* = 20°

Work out the length of *AB*.
Give your answer correct to 3 significant figures.

considering △ADC

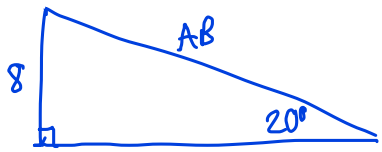


$\tan 45° = \frac{AC}{8}$

$\Rightarrow AC = 8\tan 45°$

$= 8$ (1)

considering △ABC



$\sin 20° = \frac{8}{AB}$ (1)

$\Rightarrow AB = \frac{8}{\sin 20°}$

$= 23.390...$

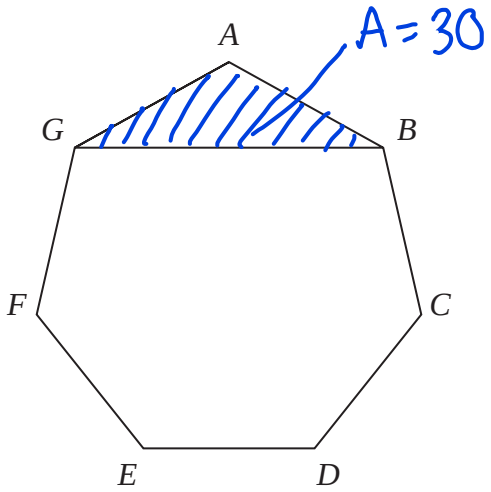
$= 23.4$ (3sf) (1)

23.4 cm

(Total for Question 1 is 3 marks)

2 *ABCDEFG* is a regular heptagon.

so AG = AB

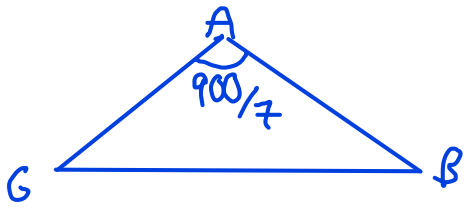


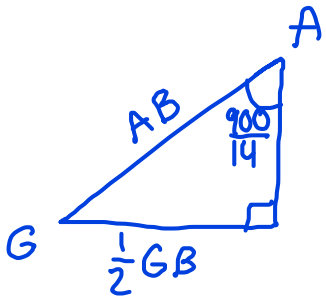
The area of triangle *ABG* is 30 cm^2

Calculate the length of *GB*.
Give your answer correct to 3 significant figures.
You must show all your working.

formula for interior angle = $\frac{180(n-2)}{n}$, n = # of sides
heptagon has $n = 7$

$\therefore \angle GAB = \frac{180 \times 5}{7} = \frac{900}{7}$ (1)





$\sin \frac{900}{14} = \frac{\frac{1}{2} GB}{AB}$ (1)

$\Rightarrow GB = \frac{\sin \frac{900}{14} \times AB}{1/2}$ (1)

using "$\frac{1}{2}ab\sin C$" for area ABG

$30 = \frac{1}{2} \times AB \times AG \times \sin \frac{900}{7}$ (1)

AB = AG

$30 = \frac{1}{2} \times AB^2 \times \sin \frac{900}{7}$

rearrange for AB

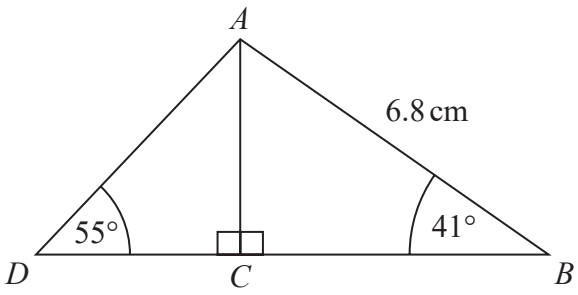
$AB = \sqrt{\frac{30}{\frac{1}{2} \times \sin \frac{900}{7}}} = 8.76\ldots$

$= 15.7855\ldots$
$= 15.8$ (3sf) (1)

15.8 cm

(Total for Question 2 is 5 marks)

3 *ABD* is a triangle.
C is a point on *BD*.



Work out the length of *DC*.
Give your answer correct to 1 decimal place.

Finding length AC :

$\sin 41^\circ = \frac{AC}{6.8\text{ cm}}$

$AC = 6.8 \sin 41^\circ$ (1)

$= 4.46$ cm

Finding length DC :

$\tan 55^\circ = \frac{AC}{DC}$

$DC = \frac{AC}{\tan 56^\circ}$

$= \frac{4.46}{\tan 55^\circ}$ (1)

$= 3.12$

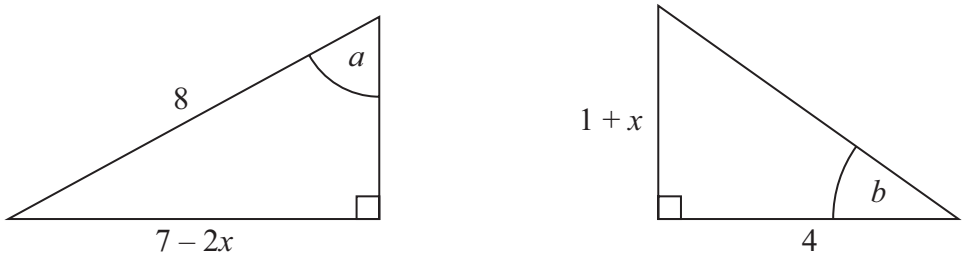
$= 3.1$ (one decimal place)

(1)

3.1 ..... cm

(Total for Question 3 is 3 marks)

4 The diagram shows two right-angled triangles.



All lengths are measured in centimetres.

Given that

$$\sin a = \tan b$$

work out the value of x.

sin = opposite / hypothenus tan = opposite / adjacent

$\sin a = \frac{7-2x}{8}$ (1)

$\tan b = \frac{1+x}{4}$

$\sin a = \tan b : \frac{7-2x}{8} \times 8 = \frac{1+x}{4} \times 8$ (1)

$7 - 2x = (1+x) \times 2$

$7 - 2x = 2 + 2x$

$4x = 5$

$x = \frac{5}{4} = 1.25$ (1)

$x =$ 1.25

(Total for Question 4 is 3 marks)