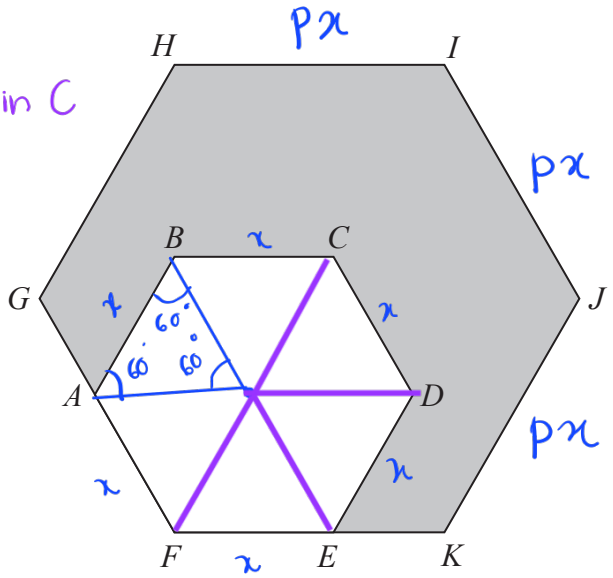
1

Area of triangle $= \frac{1}{2}ab\sin C$



1 hexagon = 6 equilateral triangle

ABCDEF is a regular hexagon with sides of length x.
This hexagon is enlarged, centre F, by scale factor p to give hexagon *FGHIJK*.

Show that the area of the shaded region in the diagram is given by $\frac{3\sqrt{3}}{2}(p^2 - 1)x^2$

Area of equilateral triangle : $\frac{1}{2} \times x^2 \times \sin 60°$ (1)

$= \frac{x^2\sqrt{3}}{4}$

Area of small hexagon $= 6 \times \frac{x^2\sqrt{3}}{4}$

$= \frac{3x^2\sqrt{3}}{2}$ (1)

Area of large hexagon $= \frac{3(px)^2\sqrt{3}}{2}$

length of large hexagon is px

$= \frac{3p^2x^2\sqrt{3}}{2}$ (1)

Area of shaded region $= \frac{3p^2x^2\sqrt{3}}{2} - \frac{3x^2\sqrt{3}}{2}$

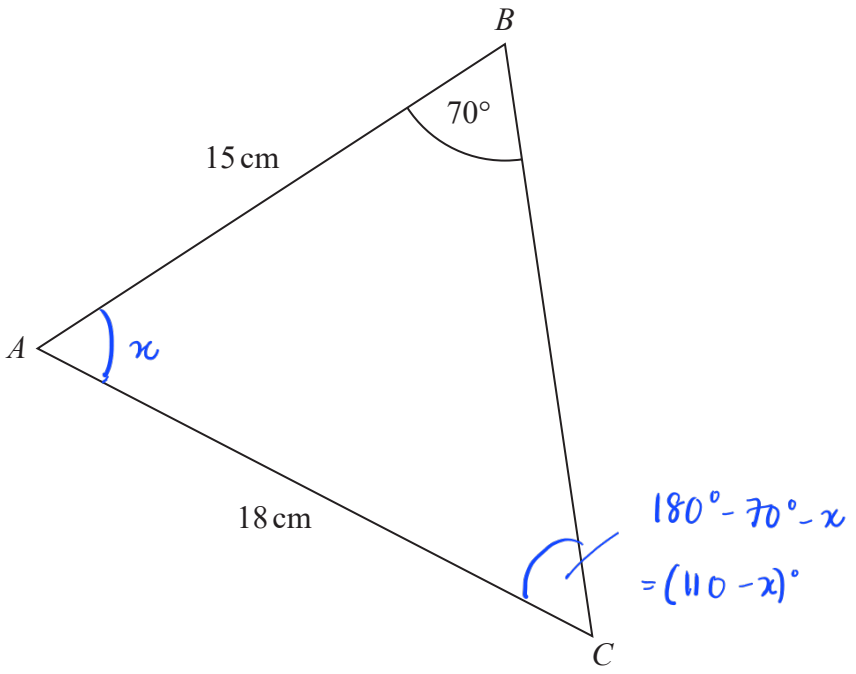
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Area of large hexagon − Area of small hexagon

$= (p^2-1)\frac{3x^2\sqrt{3}}{2}$ (1)

(Total for Question 1 is 4 marks)

2 ABC is a triangle.



Calculate the size of angle BAC.
Give your answer correct to 1 decimal place.

$$\frac{\sin(110-x)}{15} = \frac{\sin 70^\circ}{18} \quad (1)$$

$$\sin(110-x)^\circ = \frac{15\sin 70^\circ}{18} \quad (1)$$

$$= 0.78307\ldots$$

$$110 - x = \sin^{-1}(0.78307\ldots)$$

$$= 51.543\ldots$$

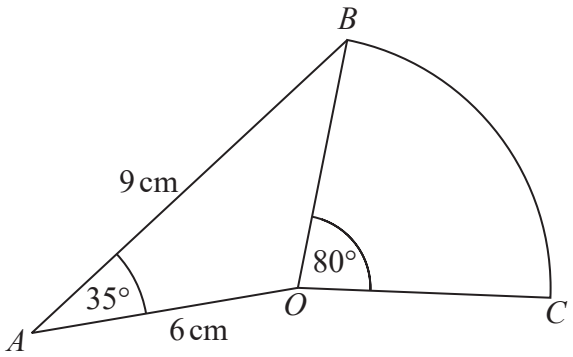
$$110 - 51.543 = x \quad (1)$$

$$x = 58.5^\circ \text{ (1dp)} \quad (1)$$

58.5 °

(Total for Question 2 is 4 marks)

3 *OAB* is a triangle.
OBC is a sector of a circle, centre *O*.



Calculate the area of *OBC*.
Give your answer correct to 3 significant figures.

Area of sector of a circle $= \pi \times r^2 \times \frac{\theta}{360}$

by using cosine rule

Finding length OB :

cosine rule $= a^2 = b^2 + c^2 - 2bc\cos\theta$

$OB^2 = 9^2 + 6^2 - 2(9)(6)\cos 35^\circ$ (1)

$OB = \sqrt{28.532\ cm^2}$ (1)

$OB = 5.34\ cm$

Finding area of OBC :

$\frac{80}{360} \times \pi \times 5.34^2$ (1)

$= 19.9\ cm^2$ (1)

19.9 ..... cm^2

(Total for Question 3 is 4 marks)