Question 1

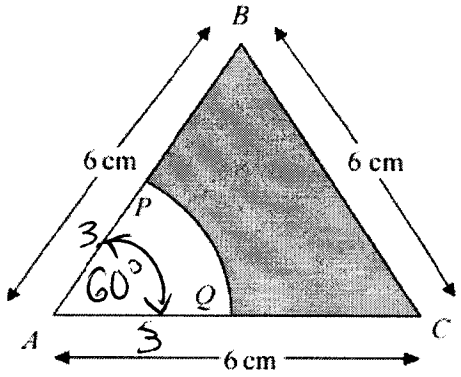


Diagram **NOT** accurately drawn

The diagram shows an equilateral triangle ABC with sides of length 6 cm.

P is the midpoint of AB.
Q is the midpoint of AC.
APQ is a sector of a circle, centre A.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

$A = A_{triangle} - A_{sector}$

$= 15.5885 - 4.7124 \ m^2$

$= 10.876 m^2 = 10.9 \ m^2$

$A_{triangle}$

$A = \frac{1}{2} \times 6 \times 6 \sin(60°)$

$= 15.5885 \ m^2$

A_{sector}

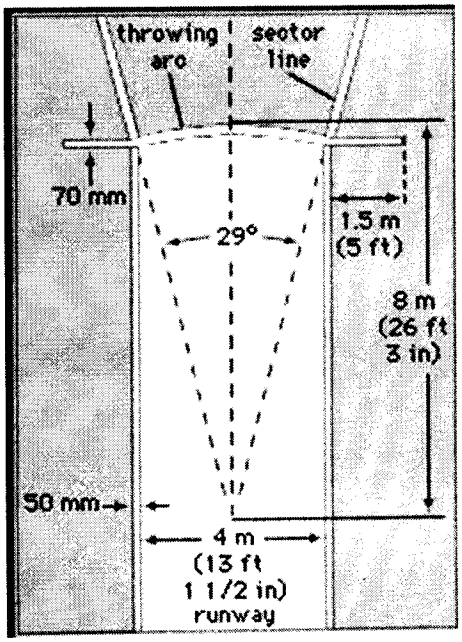
$= \frac{\pi \times 60}{360} \times 3^2$

$= 4.7124 \ m^2$

2 marks

Question 2

The throwing area for the javelin in an athletics competition is a sector with a radius of 8m and an angle at the centre of 29°



a. Calculate the area of the sector, in square metres, correct to four significant figures.

$A = \frac{\pi r^2 \theta}{360} = \frac{\pi \times 8^2 \times 29}{360} = 16.20 \ m^2$

b. Calculate the length of the throwing arc in metres, correct to two decimal places.

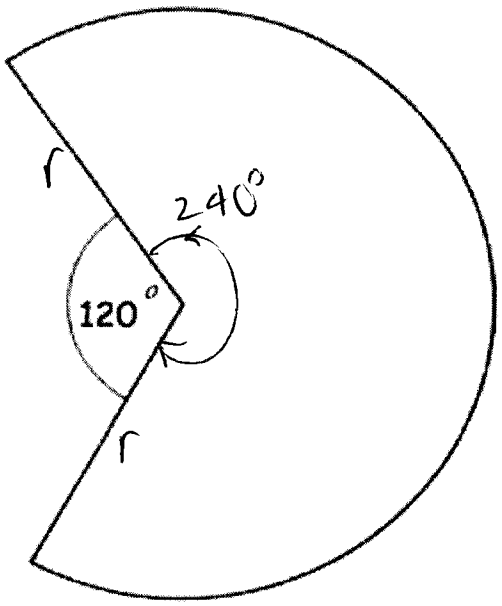
$L = \frac{\pi r \times \theta}{180}$

$= \frac{\pi \times 8 \times 29}{180}$

$= 4.05 \ m$

2 marks

Question 3



The area of the major sector is 180cm².

Calculator the perimeter of the major sector.
Give your answer to 1 decimal place.

$$\frac{\pi r^2 \theta}{360} = 180$$

$$\therefore \frac{\pi \times r^2 \times 240}{360} = 180$$

Solve for r:

$$r = 9.27058 \text{ cm}$$

4 marks

$$P = \frac{\pi r \theta}{180} + r + r$$

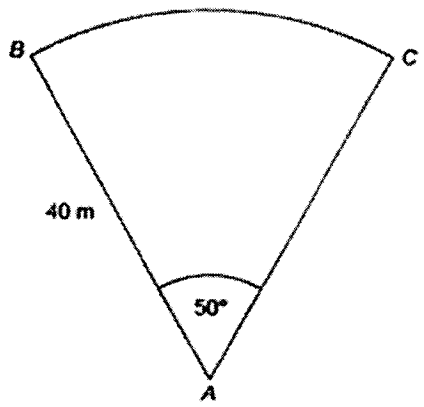
$$= \frac{\pi \times 9.27058 \times 240}{180} + 2 \times 9.27058$$

$$= 57.4 \text{ cm}$$

Question 4

Fred is marking out the sector of a circle on a sports field as shown. He puts tape around the perimeter. Tape comes in 3 m rolls.

How many rolls does he need? Show all your reasoning.



$P = 2 \times 40 + \frac{\pi r \theta}{180}$

2 marks

$= 80 + \frac{\pi \times 40 \times 50}{180}$ m

$= 114.9066$ m

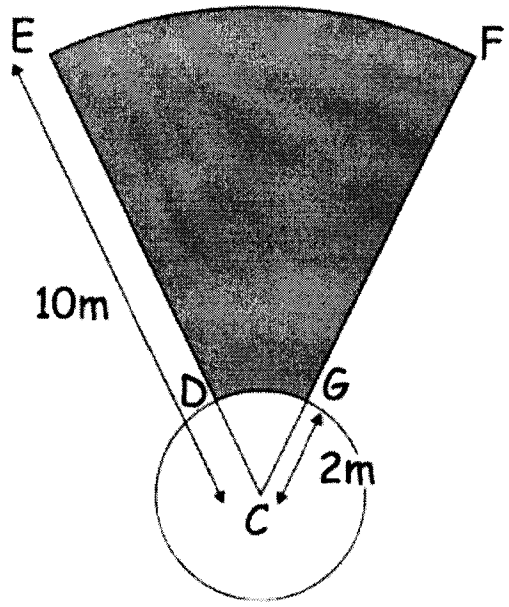
$114.9066 \div 3 = 38.3$

$\therefore$ 39 rolls will be required.

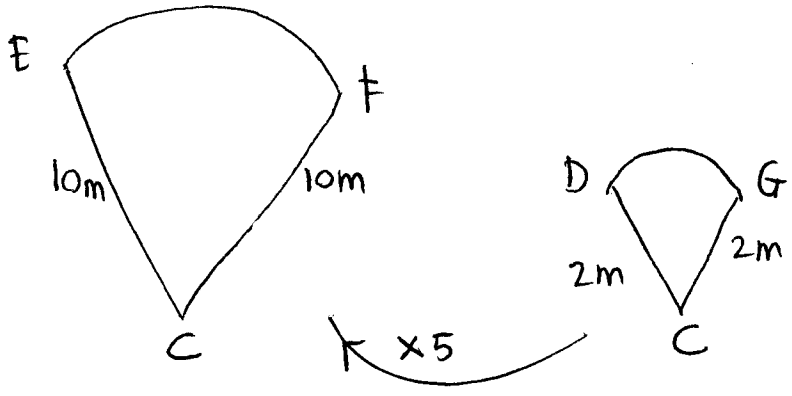
Question 5

The shot putt throwing area, on a school's sport field, is formed from the sectors of two circles with centre C.

The area of sector CDG is 1.2m².



Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.



2 marks

These are similar shapes

$k = 5 \quad \therefore k^2 = 25$

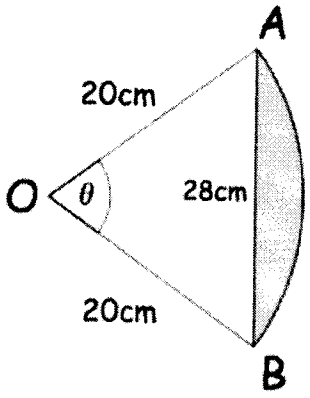
Area of CEF $= 25 \times 1.2\ m^2 = 30\ m^2$

$\therefore$ Shaded area $= 30 - 1.2\ m^2$

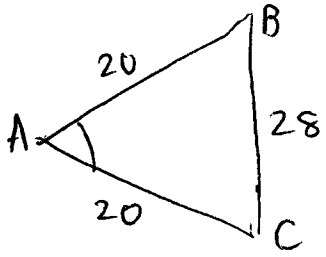
$= 28.8\ m^2$

Question 6

The diagram shows a triangle OAB and the arc AB of a circle whose centre is O and whose radius is 20cm.



(a) Find the size of the angle θ.



$\cos(A) = \frac{20^2+20^2-28^2}{2\times 20^2}$

$\therefore A = \cos^{-1}\left(\frac{20^2+20^2-28^2}{2\times 20^2}\right)$ 88.85^{-0} .....°

(3)

(b) Find the length of the ~~chord~~ arc AB.

$L = \frac{\pi r\theta}{180} = \frac{\pi \times 20 \times 88.85}{180} = 31.02$ cm

.....cm

(3)

(c) Find the area of the shaded segment to the nearest cm².

$A_{segment} = A_{sector} - A_{triangle}$

$= \frac{\pi r^2\theta}{360} - \frac{1}{2} r^2 \sin(\theta)$

$= \frac{\pi \times 20^2 \times 88.85}{360} - 0.5 \times 20^2 \sin(88.85^\circ)$

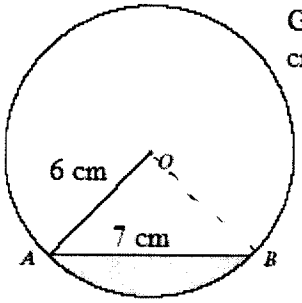
$= 110.199 \text{ cm}^2$

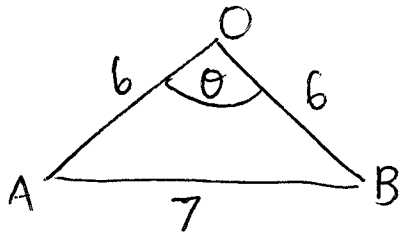
$\simeq 110 \text{ cm}^2$

Question 7

AB is a chord of a circle, centre O, radius 6 cm. *AB* = 7 cm
Calculate the area of the shaded segment. (6 marks)

Give your answer to the nearest square cm.





$A_{segment} = A_{sector} - A_{triangle}$

$= \frac{\pi r^2 \theta}{360} - \frac{1}{2} r^2 \sin(\theta)$

$= \frac{\pi \times 6^2 \times 71.371}{360} - 0.5 \times 6^2 \sin(71.371)$

$= 5.36 \text{ cm}^2$

$\cos(\theta) = \frac{6^2 + 6^2 - 7^2}{2 \times 6^2}$

$\theta = \cos^{-1}\left(\frac{6^2 + 6^2 - 7^2}{2 \times 6^2}\right)$

$\theta = 71.371°$

Question 8 3 marks

: **Find the area of the segment APB shown in Fig 4, if radius of circle is 14cm and the central angle is 60°.**

Also, find the area of the corresponding major segment.

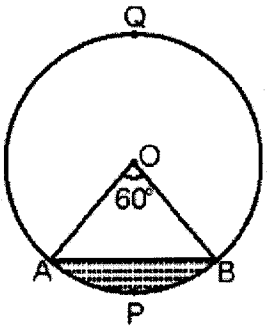


FIG. 4

$A_{segment} = \frac{\pi r^2 \theta}{360} - \frac{1}{2} r^2 \sin(\theta)$

$= \frac{\pi \times 14^2 \times 60}{360} - \frac{1}{2} \times 14^2 \sin(60°)$

$= 17.75 \text{ cm}^2$

$\approx 17.8 \text{ cm}^2$

Area of major segment

$= A_{circle} - 17.75$

$= \pi \times 14^2 - 17.75487\ldots$

$= 597.997 \text{ cm}^2$

$\approx 598.0 \text{ cm}^2$ 3 marks