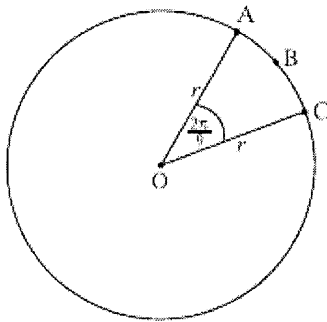


NAME:

# Trigonometry Worksheet

104 min  
103 marks

1. The diagram below shows a circle centre  $O$ , with radius  $r$ . The length of arc  $ABC$  is  $3\pi$  cm and  $\hat{AOC} = \frac{2\pi}{9}$ .



*diagram not to scale*

- (a) Find the value of  $r$ . (2)
- (b) Find the perimeter of sector  $OABC$ . (2)
- (c) Find the area of sector  $OABC$ .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

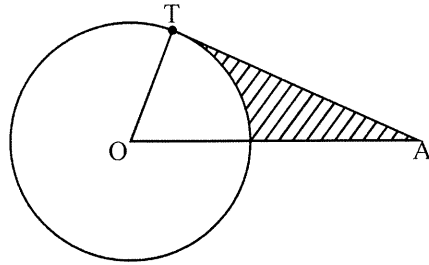
.....

.....

(2)  
(Total 6 marks)



3. In the following diagram, O is the centre of the circle and (AT) is the tangent to the circle at T.



**Diagram not to scale**

If  $OA = 12$  cm, and the circle has a radius of 6 cm, find the area of the shaded region.

*Working:*

*Answer:*

.....

**(Total 4 marks)**

4. In the triangle PQR,  $PR = 5$  cm,  $QR = 4$  cm and  $PQ = 6$  cm.

Calculate

- (a) the size of  $\hat{PQR}$  ;
- (b) the area of triangle PQR.

.....

.....

.....

.....

.....

.....

.....

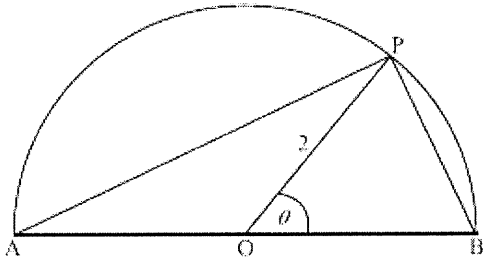
.....

.....

.....

**(Total 6 marks)**

5. The following diagram shows a semicircle centre O, diameter [AB], with radius 2. Let P be a point on the circumference, with  $\widehat{POB} = \theta$  radians.



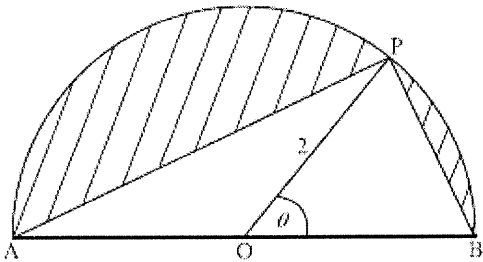
- (a) Find the area of the triangle OPB, in terms of  $\theta$ .

(2)

- (b) Explain why the area of triangle OPA is the same as the area triangle OPB.

(3)

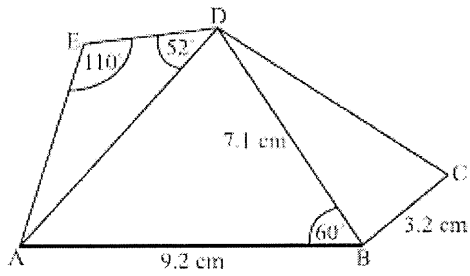
Let  $S$  be the total area of the two segments shaded in the diagram below.



- (c) Show that  $S = 2(\pi - 2 \sin \theta)$ .

(3)  
(Total 8 marks)

6. The following diagram shows a pentagon ABCDE, with  $AB = 9.2$  cm,  $BC = 3.2$  cm,  $BD = 7.1$  cm,  $\hat{AED} = 110^\circ$ ,  $\hat{ADE} = 52^\circ$  and  $\hat{ABD} = 60^\circ$ .



- (a) Find AD.

(4)

- (b) Find DE.

(4)

- (c) The area of triangle BCD is  $5.68 \text{ cm}^2$ . Find  $\hat{DBC}$ .

(4)

- (d) Find AC.

(4)

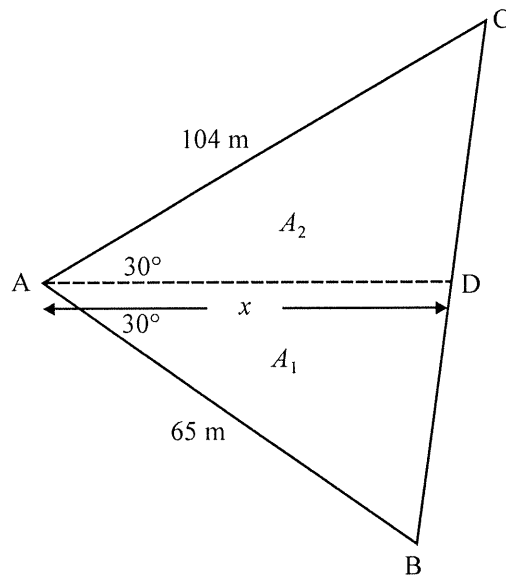
- (e) Find the area of quadrilateral ABCD.

(5)

(Total 21 marks)



Let D be a point on [BC] such that [AD] bisects the  $60^\circ$  angle. The farmer divides the field into two parts  $A_1$  and  $A_2$  by constructing a straight fence [AD] of length  $x$  metres, as shown on the diagram below.



(c) (i) Show that the area of  $A_1$  is given by  $\frac{65x}{4}$ .

(ii) Find a similar expression for the area of  $A_2$ .

(iii) **Hence**, find the value of  $x$  in the form  $q\sqrt{3}$ , where  $q$  is an integer.

(7)

(d) (i) Explain why  $\sin \hat{A}DC = \sin \hat{A}DB$ .

(ii) Use the result of part (i) and the sine rule to show that  $\frac{BD}{DC} = \frac{5}{8}$ .

(5)  
(Total 18 marks)

9. The following diagram shows a triangle with sides 5 cm, 7 cm, 8 cm.

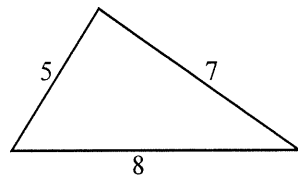


Diagram not to scale

Find

- (a) the size of the smallest angle, in degrees;
- (b) the area of the triangle.

*Working:*

*Answers:*

- (a) .....
- (b) .....

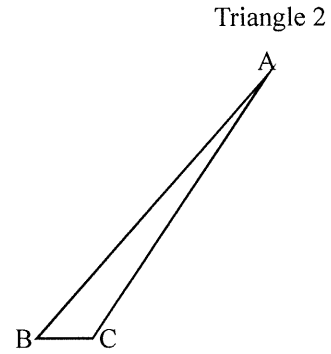
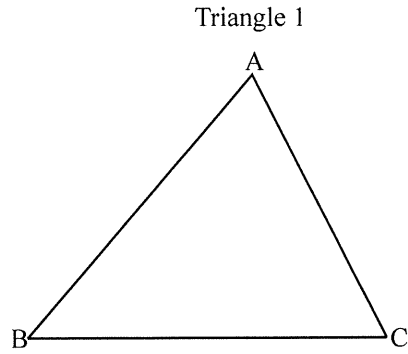
(Total 4 marks)



10. The diagrams below show two triangles both satisfying the conditions

$$AB = 20 \text{ cm}, AC = 17 \text{ cm}, \hat{A}BC = 50^\circ.$$

**Diagrams not  
to scale**



- (a) Calculate the size of  $\hat{A}CB$  in **Triangle 2**.  
(b) Calculate the area of **Triangle 1**.

*Working:*

*Answers:*

- (a) .....  
(b) .....

**(Total 4 marks)**

11. The points P, Q, R are three markers on level ground, joined by straight paths PQ, QR, PR as shown in the diagram.  $QR = 9$  km,  $\hat{PQR} = 35^\circ$ ,  $\hat{PRQ} = 25^\circ$ .

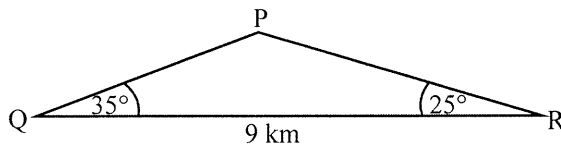


Diagram not to scale

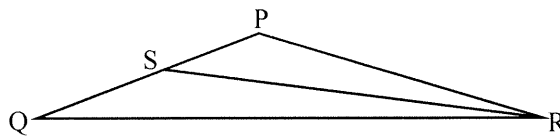
- (a) Find the length PR.

(3)

- (b) Tom sets out to walk from Q to P at a steady speed of  $8 \text{ km h}^{-1}$ . At the same time, Alan sets out to jog from R to P at a steady speed of  $a \text{ km h}^{-1}$ . They reach P at the same time. Calculate the value of  $a$ .

(7)

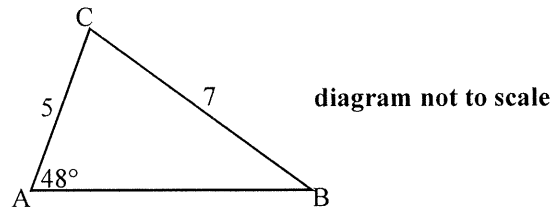
- (c) The point S is on [PQ], such that  $RS = 2QS$ , as shown in the diagram.



Find the length QS.

(6)  
(Total 16 marks)

12. In triangle ABC,  $AC = 5$ ,  $BC = 7$ ,  $\hat{A} = 48^\circ$ , as shown in the diagram.



Find  $\hat{B}$ , giving your answer correct to the nearest degree.

*Working:*

*Answer:*

.....

**(Total 6 marks)**