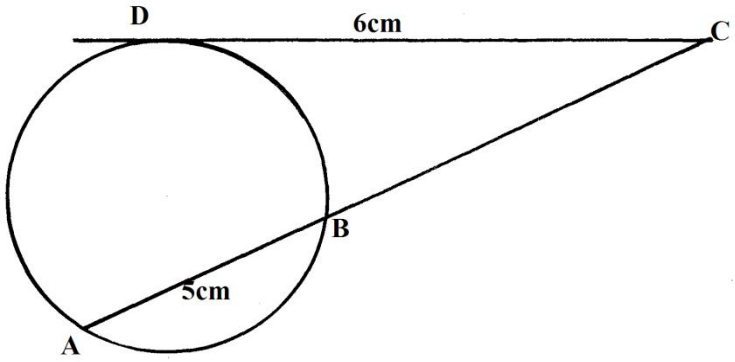
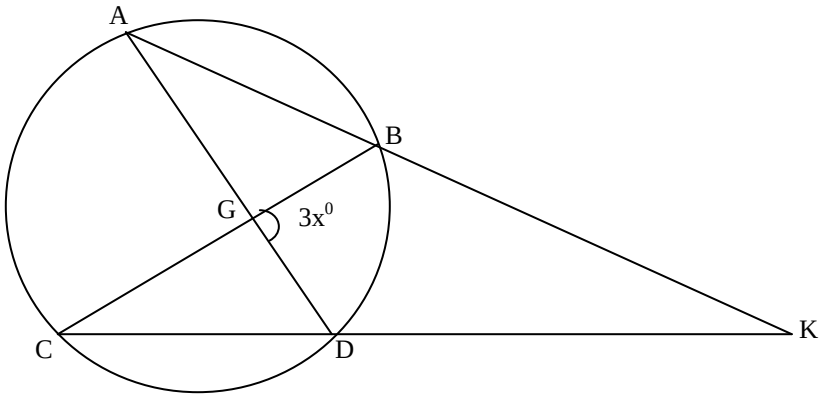
1. Circles –chords and tangents

1. In the figure below not drawn to scale. DC is a tangent to the circle. DC = 6cm, AB = 5cm. Calculate BC. (3mks)



2.



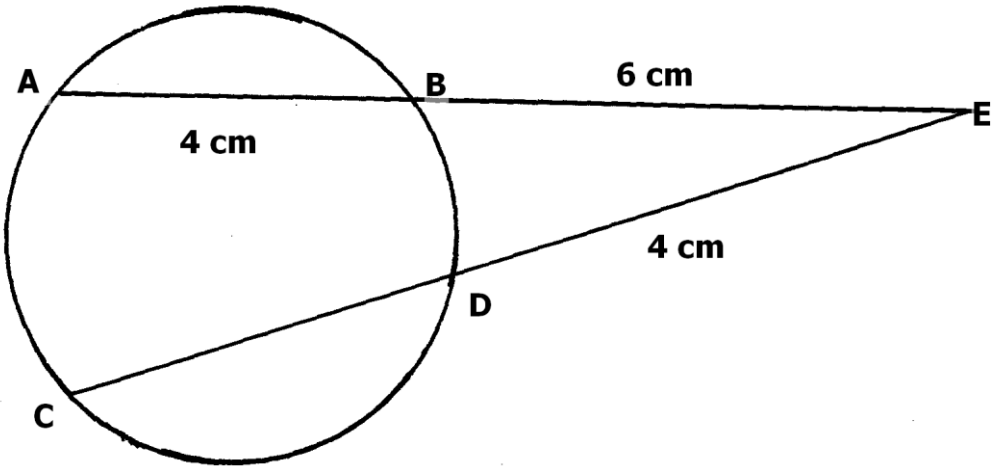
The figure above shows a circle in which chords AD and BC intersect at G. chords AB and CD produced meet at K.

(a) If $\angle BGD = 3x^0$ and $\angle CGD = 2x$, determine the size of $\angle BGA$ (2 mks)

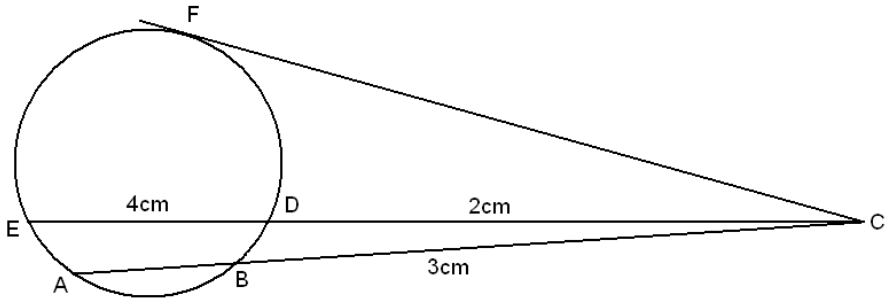
(b) Given that KB = 5 cm, KC = 15 cm and KD = 7 cm, determine the length of KA (3 mks)

(c) Giving reasons for your answer, show that triangle KDA and KBC are similar (5 mks)

3. The figure below shows a circle with secants ABE and CDE, If AB = 4cm and BE = 6 cm and DE = 4 cm. Find the length of CD. (2mks)



4. In the figure below, CF is a tangent to the circle. BC = 3cm, ED = 4cm and DC = 2cm.

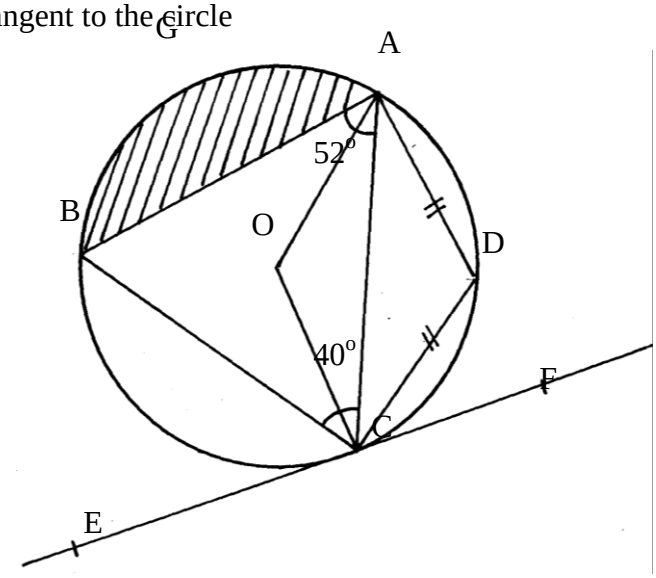


(Not drawn to scale)

Find:-

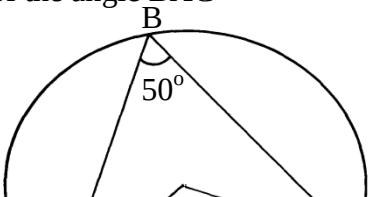
a. AB (2 mks)
b. FC (2 mks)

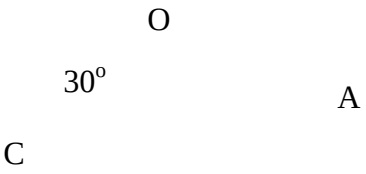
5. In the figure below angle BAC =52^o, angle ACB = 40^o and AD = DC. The radius of the circle is 7cm. EF is a tangent to the circle



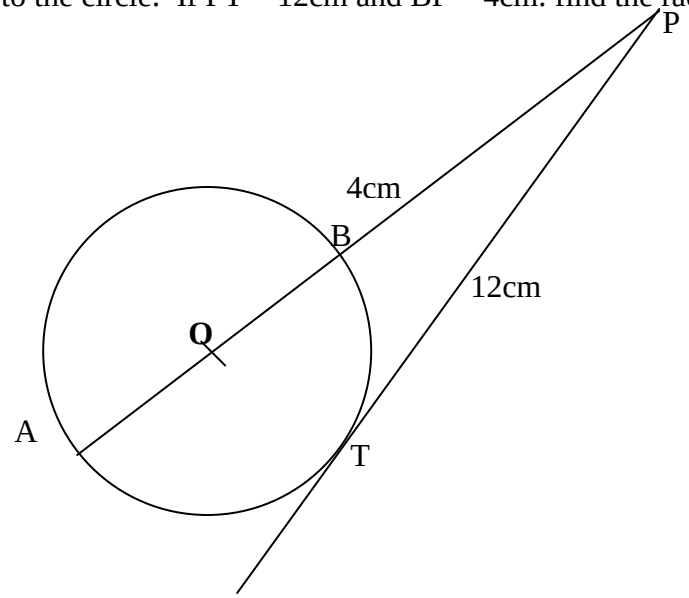
(a) Find; giving reasons
(i) angle DCF
(ii) angle AOB (obtuse)
(b) Calculate the area of the shaded segment AGB

6. In the figure below, O is the centre of the circle. Angle CBA = 50^o and angle BCO = 30^o. Find the size of the angle BAC

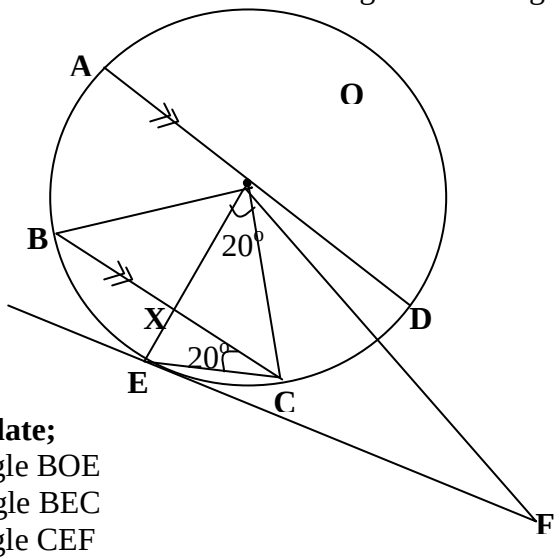




7. In the given figure, O is the centre of the circle and AOBP is a straight line. PT is a tangent to the circle. If PT = 12cm and BP = 4cm. find the radius of the circle



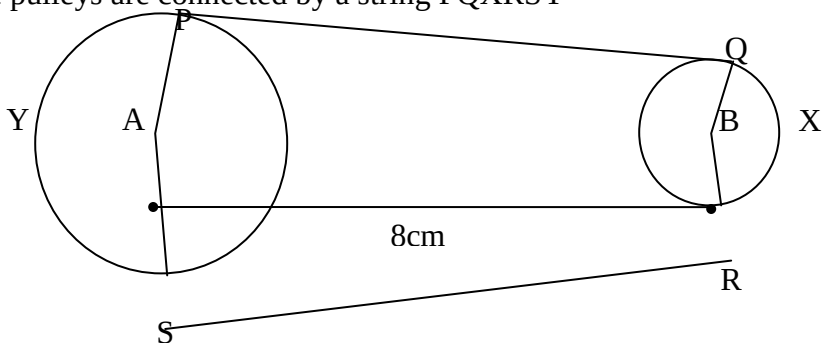
8. In the figure below AOD is a diameter of the circle cetre O. BC is a chord parallel to AD. FE is a tangent to the circle. OF bisects angle COD. Angle BCE = angle COE = 20^o BC cuts OE at X



Calculate;

(a) angle BOE
(b) angle BEC
(c) angle CEF
(d) angle OXC
(e) angle OFE

9. The figure below shows two pulleys of radii 6cm and 4cm with centres **A** and B respectively. **AB** = 8cm. The pulleys are connected by a string PQXRSY

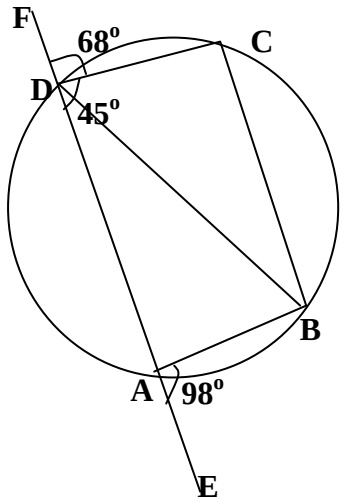


Calculate:

(a) Length PQ
(b) ∠PAS reflex
(c) Length of arc PYS and QXR
(d) The total length of the string PQXRSY

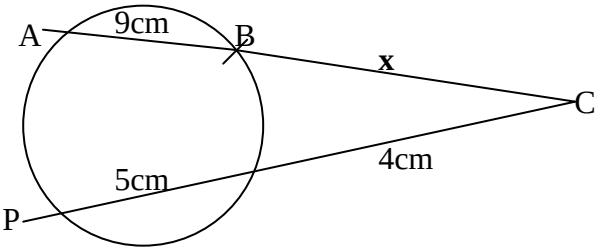
10. a) Two pipes **A** and **B** can fill a tank in 3hrs and 4 hrs respectively. Pipe **C** can empty the full tank in 6 hrs.
i) How long would it take pipes **A** and **B** to fill the tank if pipe **C** is closed?
ii) Starting with an empty tank, how long would it take to fill the tank with all pipes running?
b) The high quality Kencoffee is a mixture of pure Arabica coffee and pure Robusta coffee in the ratio 1 : 3 by mass. Pure Arabica coffee costs shs. 180 per kg and pure Robusta coffee costs sh 120 per kg. Calculate the percentage profit when the coffee is sold at sh 162 per kg.

11. In the figure below, ABCD is a cyclic quadrilateral and BD is a diagonal. EADF is a straight line, ∠CDF = 68^o, ∠ BDC = 45^o and ∠ BAE = 98^o.

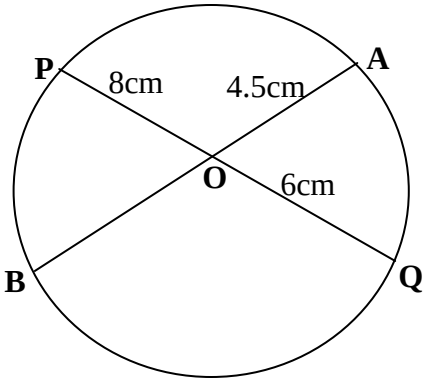


Calculate the size of:
a) ∠ ABD.
b) ∠ CBD

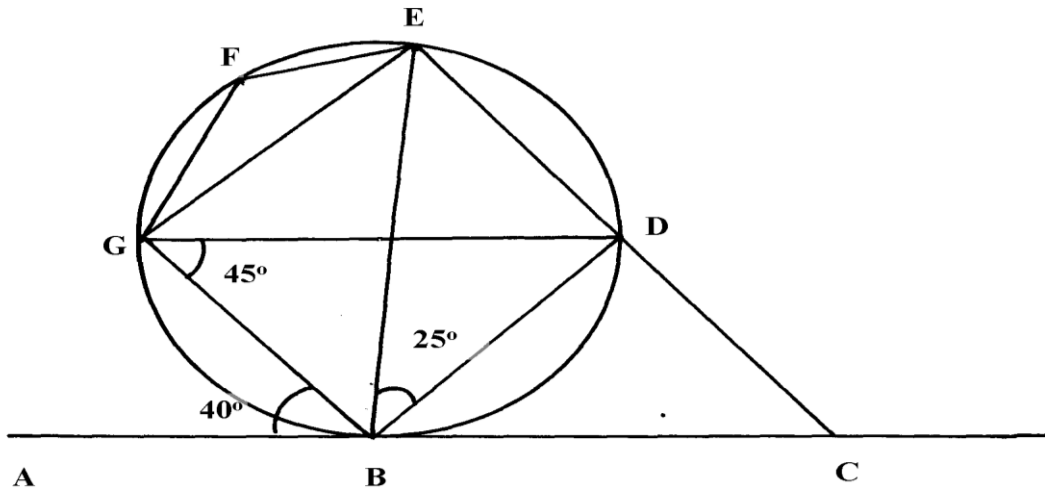
12. The figure below shows a circle centre O. AB and PQ are chords intersecting externally at a point C. AB = 9cm, PQ = 5cm and QC = 4cm. Find the value of **x**



13. The chords AB and PQ intersects internally at O. Given that the length of OP=8cm, OA= 4.5cm and OQ=6cm. Calculate the length of OB



14. In the figure below ABC is a tangent to the circle at B. given that $<ABG=40^{\circ}$, $<BGD=45^{\circ}$, and $<DBE=25^{\circ}$ as shown below.



Find the sizes of the following angles giving reasons in each case:

a) ∠BDG

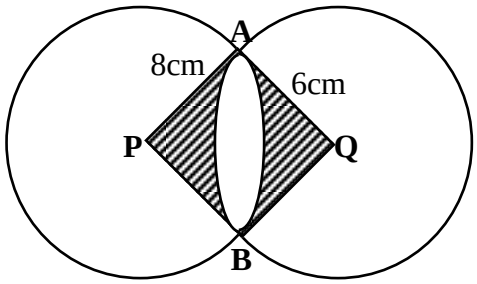
b)∠DGE

c)∠EFG

d)∠CBD

e)∠BCD

15. The figure below shows two intersecting circles radii 8 cm and 6 cm respectively. The common chord AB = 9cm ad **P** and **Q** are the centres as shown:



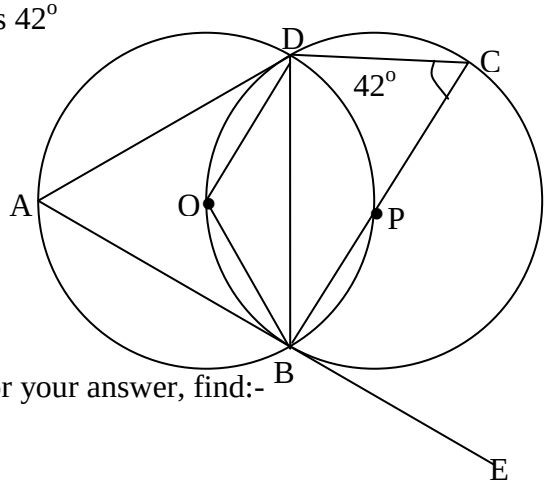
(a) Calculate the size of angles:-

(i) ∠APB

(ii) ∠AQB

(b) Calculate the area of the shaded region

16. The figure O and P are centres of two intersecting circles. ABE is tangent to circle BCD at B angle BCD is 42^{o}

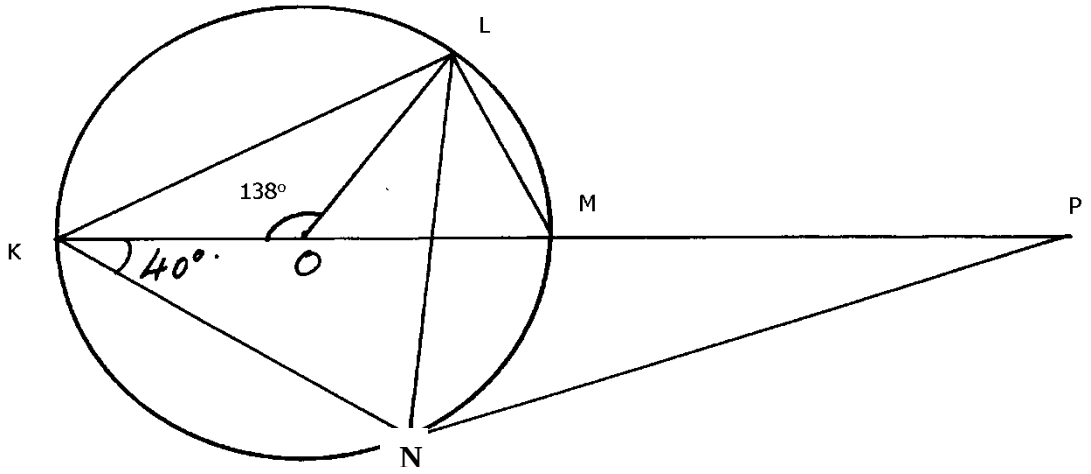


(a) Giving reasons for your answer, find:-

(i) CBD
(ii) DOB
(iii) DAB
(iv) CDA

b) Show that ΔADB is isosceles

17.



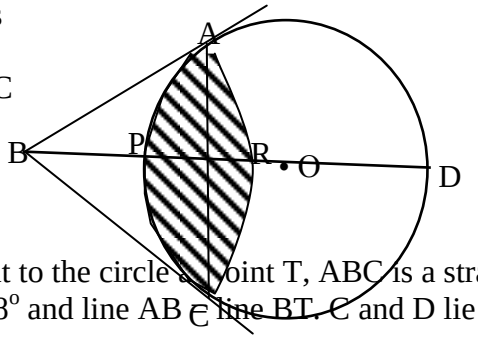
In the figure above K, M & P are points on a straight line. PN is a tangent of the circle centre O. Angle KOL = 130^o and angle MKN = 40^o. Find, giving reasons, the values of angles.

(i) ∠MLN
(ii) ∠OLN
(iii) ∠LNP
(iv) ∠MPN
(v) ∠LMO

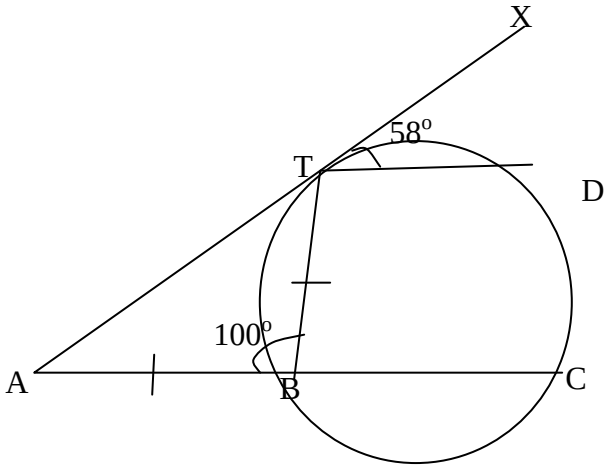
18. In the diagram below, O is the centre of the circle of radius 8cm. BA and BC are tangents to the circle at A and C respectively. PD is the diameter and AC is a chord of length 8cm. Angle ADC = 120^o. ARC is an arc of the circle, Centre B and radius 4.6cm

Calculate correct to 2 decimal places

(a) Angle ABR
(b) Area of sectors ABCR and OAPC
(c) Area of the shaded part



19. In the figure below, ATX is a tangent to the circle at point T, ABC is a straight line, angle ABT = 100^o, angle XTD = 58^o and line AB = line BT. C and D lie on the circle

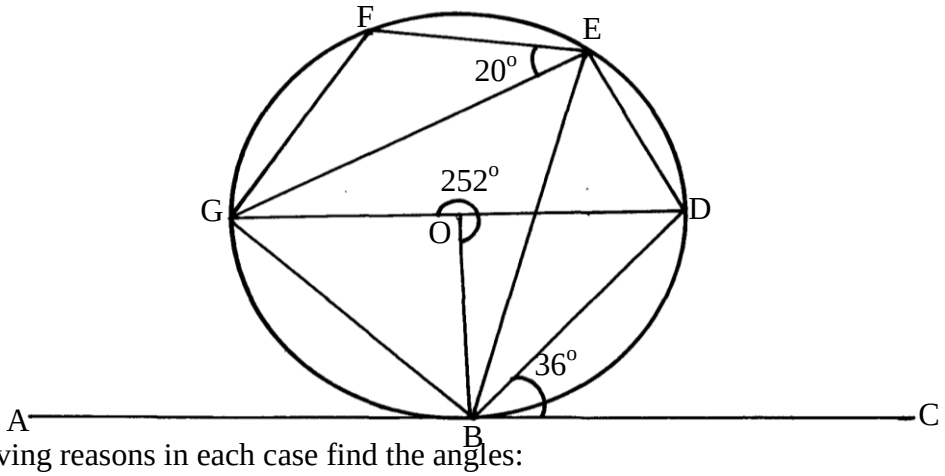


Find by giving reasons, the value of angle:

(a) TDC

(b) TCB
(c) TCD
(d) BTC
(e) DTC

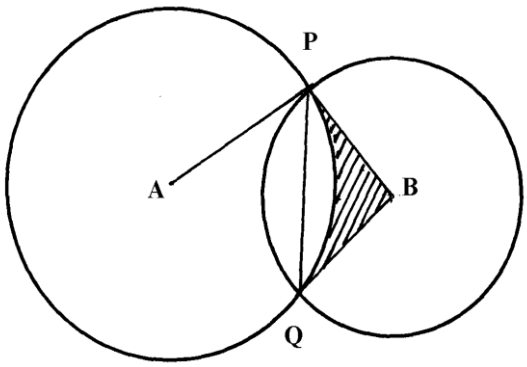
20. In the figure below, B, D, E, F and G are on the circumference of the circle centre O. A, B and C form a tangent to the circle at point B. GD is the diameter of the circle. Given that FG = DE, reflex angle GOB = 252°, angles DBC = 36° and FEG = 20°



Giving reasons in each case find the angles:
a) GEB
b) BED
c) OBE
d) BGE
e) GFE

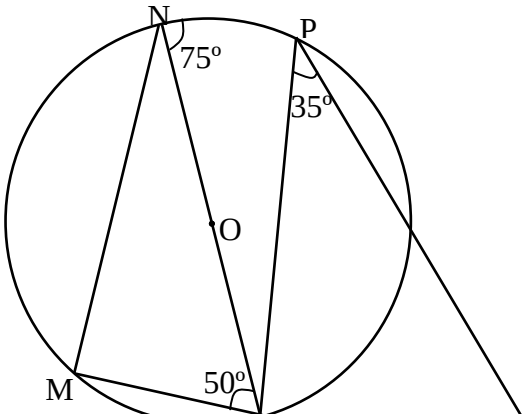
21. XYZ is a triangle in which x = 13.4cm, Z= 5cm and $\angle XYZ = 57.7^{o}$. Find:
(i) Length of XZ
(ii) The circum radius of the triangle

22. In the figure shown below, the centers of the two circles are A and B. PQ is a common chord to the two circles. AP = 6cm, BP=4cm and PQ =5cm



Calculate the area of the shaded region (take π as 3.142)

23. In the figure below NR is a diameter of the circle centre O. Angle PNR = 750^{0} $\angle$ NRM = 50^{0} and $\angle RPQ = 35^{0}$. MRS and PQS are straight lines.



Giving reasons for every statement you write, find the following angles

(a) $\angle$ PQR *

(b) $\angle$QSR

(c) Reflex $\angle$POR

(d) $\angle$ MQR

(e) $\angle$ PON

24. In the diagram below, ATX is a tangent to the circle at point T, ABC is a straight line, $\angle ABT = 100^o$, $\angle XTD = 58^o$ and the line AB = BT

Find giving reasons the value of :

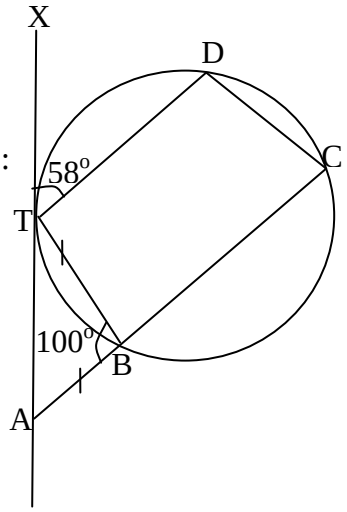
(a) $\angle$TDC

(b) $\angle$TCB

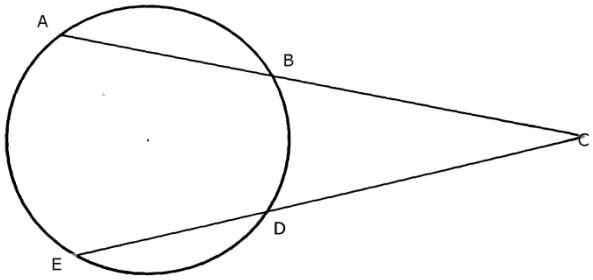
(c) $\angle$TCD

(d) $\angle$BTC

(e) $\angle$DTC



25.

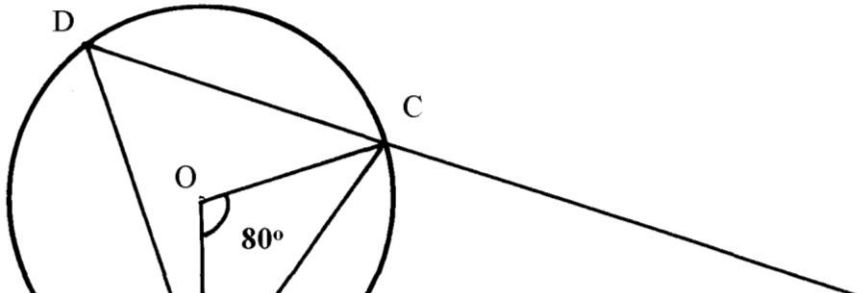


In the figure above AB = 6 cm, BC = 4 cm DC = 5 cm. Find the length DE.

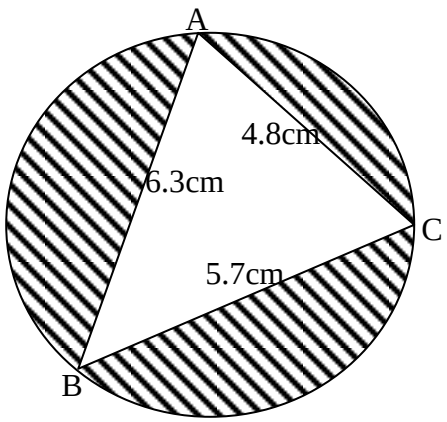
26. The eleventh term of an AP is four times the second term. If the sum of the first seven terms of the AP is 175, find the first term and the common difference

27. In the diagram below ABE is a tangent to a circle at B and DCE is a straight line.

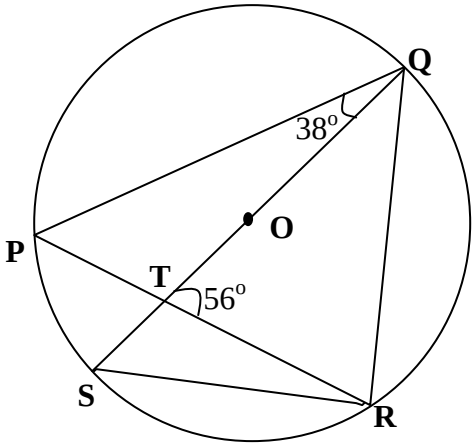
If ABD = 60^o, BOC = 80^o and O is the centre of the circle, find with reasons $\angle$BEC



28. The circle below circumscribes a triangle ABC where AB = 6.3cm, BC = 5.7cm and AC = 4.8cm. Find the area of the shaded part (use $\pi = 3.142$)



29.



(a) O is the centre of the circle and QOTS is a diameter. P, Q, R and S are points on the circumference of the circle. Angle PQS = 38^o and angle QTR = 56^o.
Calculate the size of ;

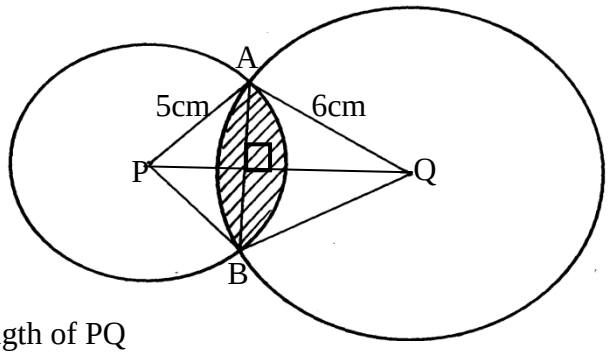
(i) ∠PRQ

(ii) ∠RSQ

(b) Given that A varies directly as B and inversely as the cube of C and that;
A = 12 when B = 3 and C = 2. Find B when A = 10 and C = 1.5

(c) A quantity y is partly constant and partly varies inversely as the square of x.
The quantity y=7 when x=10 and y=5½ when x=20. Find the value of y when x=18

30. The figure below shows two intersecting circles with centres P and Q and radius 5cm and 6cm respectively. AB is a common chord of length 8cm. Calculate;



:

(a) the length of PQ

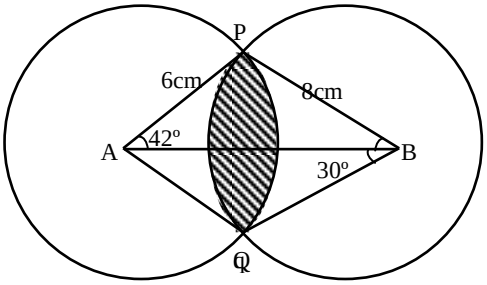
(b) the size of;
(i) angle APB
(ii) angle AQB

(c) the area of the shaded region

31. Triangle ABC is inscribed in the circle. AB= 7.8cm, AC 6.6cm and BC= 5.9cm. Find:

(a) The radius of the circle correct to one decimal place
(b) The area of the shaded region

32. The figure below shows two circles centres A and B and radii 6 cm and 8 cm respectively. The circles intersect at P and Q. Angle PAB = 42^0 and angle ABQ = 30^0.



(a) Find the size of ∠PAQ and PBQ.
(b) Calculate, to one decimal place the area of:
(i) Sector APQ and PBQ.
(ii) Triangle APQ and PBQ.
(iii) The shaded area (take π $\frac{22}{}$)

33. The minute hand of a clock is 6.5 cm long. Calculate the distance in cm moved by its tip between 10.30 am. and 10. 45 a.m. to 2 dpl.