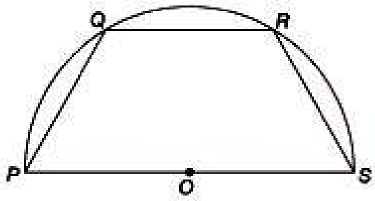
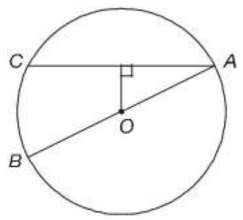
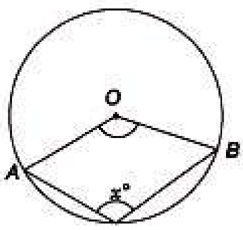
4. In figure $PQ = QR = RS = 15$ cm, find the perimeter of quadrilateral *PQRS.*



5. In figure *OD* is perpendicular to chord *AC*. If *AB* is the diameter of the circle, prove that $BC = 2\ OD$.

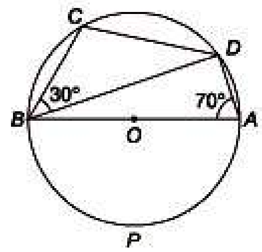


6. In figure $\angle AOB = 100°$, find the value of *x*.



7. Prove that the angle in a major segment of a circle is acute.

8. The side *PQ* of cyclic quadrilateral *PQRS* is produced to *a* point *X.* Then prove that $\angle RQX = \angle PSR$.



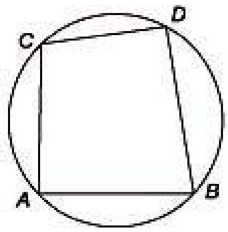
9. In the given circle with centre O, find $\angle BDC$.

10. AB and CD are chords of a circle whose Centre is O. If $OM \perp AB$, $ON \perp CD$ and $\angle OMN = \angle ONM$, prove that $AB = CD$.

PROJECT WORK

Make different rangoli designs of circle

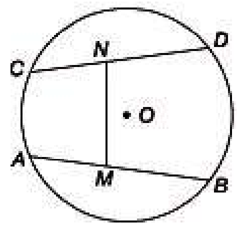
Cyclic Quadrilateral



ABCD is cyclic quadrilateral, if all the vertices lie on the circumference of a circle. There are some properties of cyclic quadrilateral. Draw cyclic quadrilateral of sides of different sizes and name them *ABCD*. Draw circles of different radii. Measure opposite angles of all the cyclic quadrilateral and write them in the following table

S. No. of Quadrilateral	$\angle A$	$\angle B$	$\angle C$	$\angle D$	$\angle A + \angle C$	$\angle B + \angle D$
1						
2						
3						
4						
5						
6						

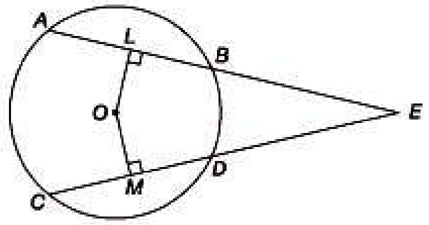
What conclusion you draw from the above table?

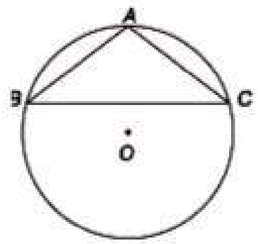


Challenging Questions

1. In figure AB and CD are two equal chords of a circle with centre at O.
   MN is the line segment joining the mid points of AB and CD.
   Prove that $\angle AMN = \angle CNM$

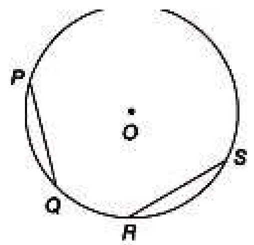
2. In the given circle with centre O, *AB* and *CD* are chords of the circle when produced these chords meet at *E*. $OL \perp AB$ and $ON \perp CD$. If *EL* = *EM*, prove that *AB* = *CD*.



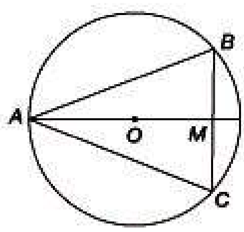


3. In figure *AB* = *AC* = 6 cm radius of circle = 5cm. Find the length of chord *BC*.

4. In the given figure, O is centre of circle and *PQ* = *RS*, prove that *PR* = *QS*.



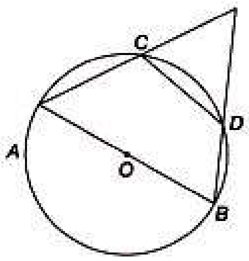
5. In figure



AB = *AC*

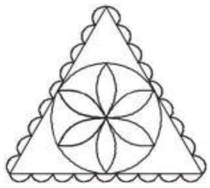
AO meets *BC* at *M*, prove that *AM* is perpendicular bisector of chord *BC*.

6. Two circles intersect each other at *A* and *B*, *AD* and *AC* are diameters of these circles. Then prove that *DBC* is a straight line.
7. In figure *O* is the centre of the circle, *AB* is a diameter and *CD* is a chord equal to radius of the circle. *AC* and *BD* when produced intersect at *E*. prove that $\angle AEB = 60°$.



TANGENT OF CIRCLE

A girl wanted to draw a Rangoli in triangular shape, then she wanted to draw a circle inside the triangle such that sides of the triangle touch the boundary of the circle.

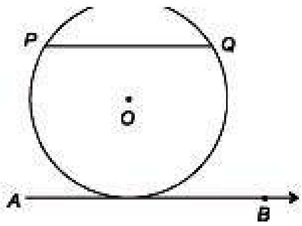


To draw such rangoli design a child need to understand the concept of tangent of circle.

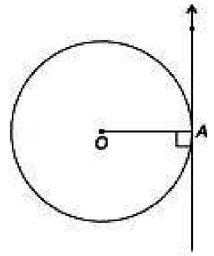
Key Concepts

1. Tangent is a line that touches a circle exactly in one point.

AB is a tangent



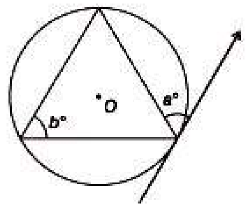
2. (a) No tangent can be drawn to a circle from a point inside a circle.
   (b) Only one tangent can be drawn to a circle at a point on the circle.
   (c) Two tangents can be drawn to a circle from a point outside the circle.
3. A tangent at any point of a circle is perpendicular to the radius through the point of contact.

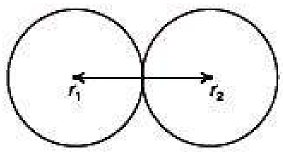


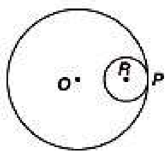
4. The length of two tangents drawn from the external point to a circle are equal.
5. Tangents drawn from an outside point create two congruent right angle triangles with the radii at the point of contact and line segment joining centre in the external point.
6. Angle between a chord and a tangent equal to the angle subtended at the circumference in the opposite segment. $\angle a = \angle b$.

7. Let $r1$ and $r2$ be the radii of the bigger and smaller circle respectively and d be the distance between their centres then circle touch externally if
   (i) $d = r1 + r2$

   (ii) $d = r1 - r2$
   Circle touch internally







$OP = r1$
$RP = r2$

LEARNING TEACHING STRATEGIES

The Teacher will ask

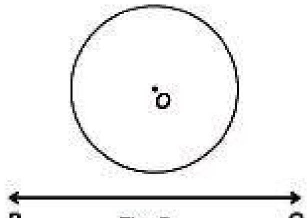


Fig. (i)

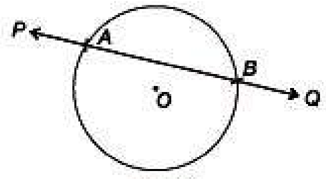


Fig. (ii)

All the example you have seen that there is a circle and a line touches the circle only at one point. Is there any position of the line with respect to the circle shown earlier.

Yes

In this case *PQ* is called a non-intersecting line with respect to the circle (Fig. i) (Fig ii) there are two common point '*A*' and '*B*' that the line and circle have. This line is called 'Secant' of the circle.

Q. What is the line called which touches the circle on one point only?

A. The line which touches the circle at one point only is called tangent to a circle.

WORKSHEET 1

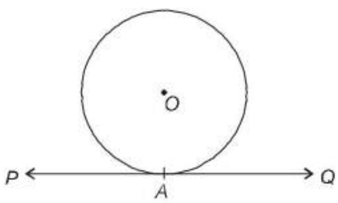
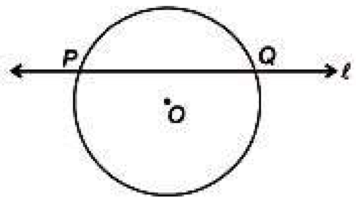


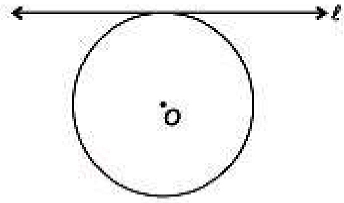
Fig. (iii)

Name the line drawn in the figure as, secant line, tangent line, or none of these.

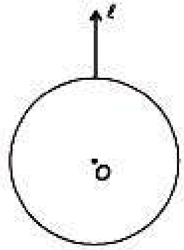


(i)

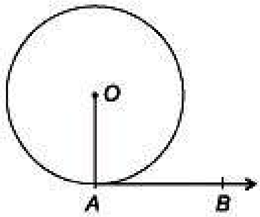
(ii)



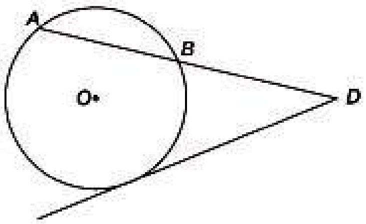
(iii)



(iv)



(v)



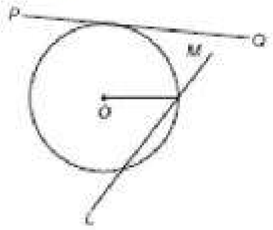
Key: (i) Chord PQ (ii) Tangent line (iii) not a tangent (iv) tangentAB

(v) Chord AB and tangentCD.

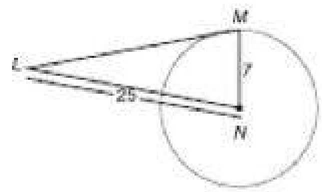
WORKSHEET 2

1. Two tangents drawn from a common point to a circle are _______________.

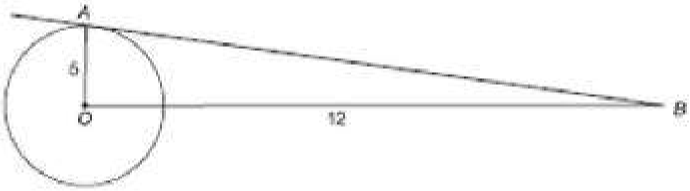
2. In the circle below, try to identify which segment is the tangent.



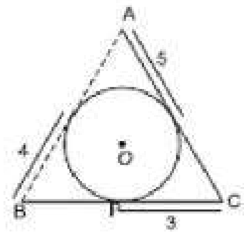
3. What is the length of *LM*?



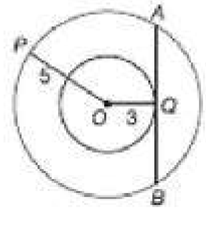
4. Find *AB*



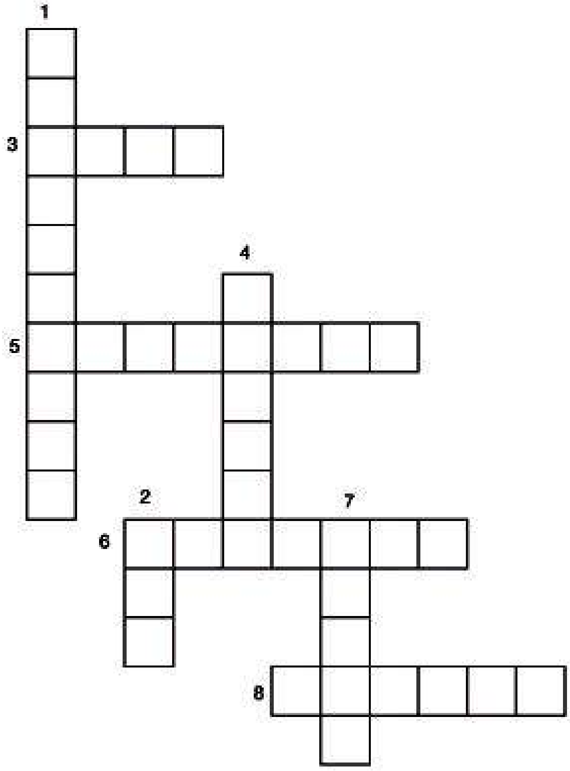
5. What is the perimeter of triangle?



6. *OP* and *OQ* are radius of two concentric circle. Find the length of *AB* if $OP = 5$ cm and $OQ = 3$ cm.



PUZZLE CROSSWORD



Across

3. Number of tangents that can be drawn from a point inside the circle.
5. Latin word from which the word tangent has been defined.
6. A line that intersects a circle in one point only.
8. Tangent is perpendicular to the ___________ through the point of contact.

Down

1. Two or more circles having same centre.
2. Number of tangents that can be drawn from an external point of circle.

4. A line that intersects a circle in two distinct points.
5. Length of two tangents drawn from external point.

ACTIVITY

Tangent and Radius through point of contact.

Objective

Tangent is perpendicular to the radius at the point of contact.

Material Required

Coloured papers Coloured straw Card board sheets

Method

Step 1: Draw a circle having radius (6 cm above) on a coloured paper. Step 2: Cut this circle and paste this on the card board.

Step 3: Draw a line touching this circle at one point only. Step 4: Mark points on this line as shown in the figure.

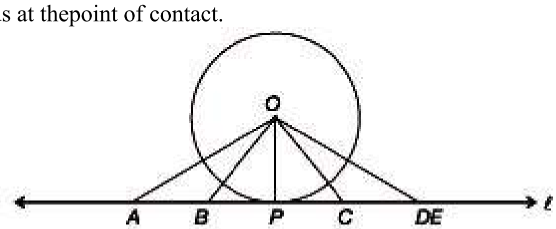
Step 5: Join these points to the centre of the circle with the help of different coloured straws.

Observation

1. Measure the lengths of the straws, which straw is the smallest.
2. The smallest straw joins the centre to the point of contact to the line and circle.
3. Perpendicular distance is the smallest distance.

Result

Tangent is perpendicular to the radius at thepoint of contact.



OA, OB, OP, OC, OD → coloured straws.

Length of the *OA* — OB —

OC —

OD —

OP —

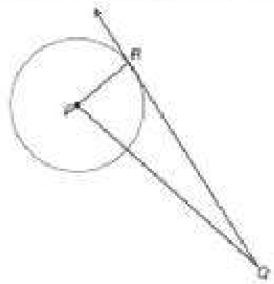
Smallest length → ?

Verification

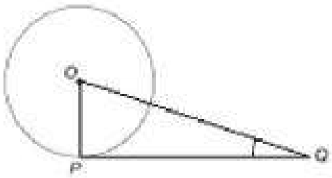
Prove start $OP \perp \ell$ using Pythagorean theorem.

ASSIGNMENT

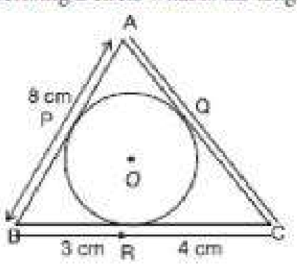
1. What is the length of the tangent if radius = 5 cm and PQ = 13 cm?



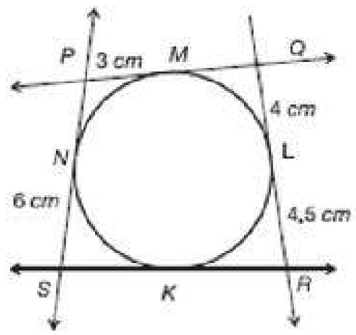
2. What is the radius of the circle if $\angle PQO = 45°$ and $OQ = 5\sqrt{2}$?



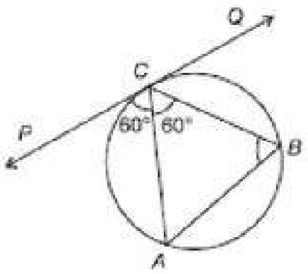
3. In the figure ΔABC is circumscribing a circle what is the length of AC?



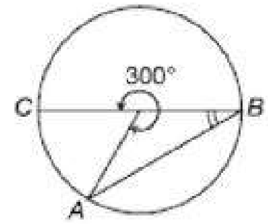
4. What is the perimeter of *PQRS*?



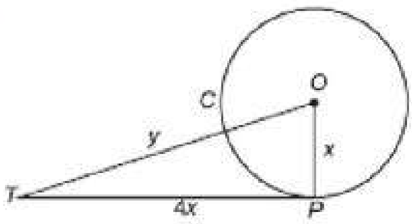
5. In figure *PCQ* in tangent to the given circle. Find $\angle CBA$ when $PC \parallel AB$.



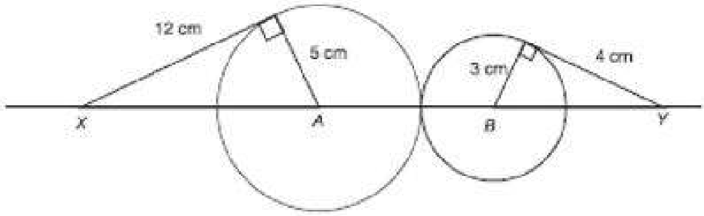
6. What is the measure of $\angle ABC$?



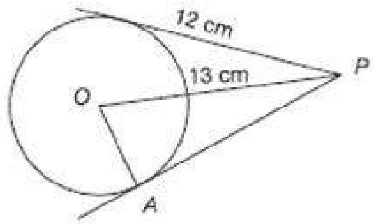
7. If the area of triangle $OTP = 8\text{cm}^2$, find the length of *OT*.



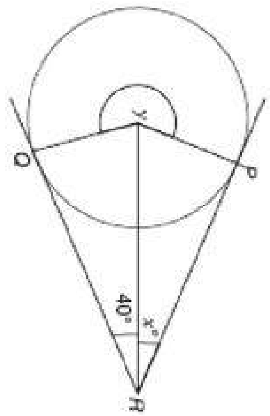
8. What is the length of XY?



9. What is the measure of *OA*?



10. What is the value of *x* and *y*?

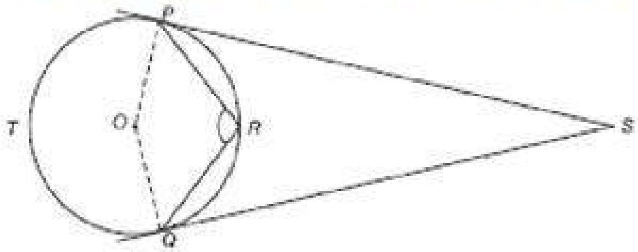


ASSIGNMENT

1. A circle touches the side BC of ΔABC and also touches the side AB and AC produced at Q and R respectively. Prove that

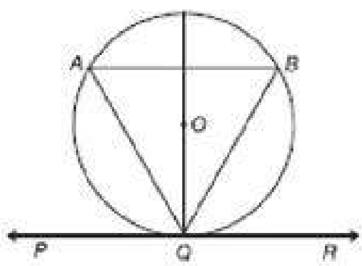
   $AQ = ½$ (perimeter of ΔABC)

2. Find $\angle PRQ$ from the given figure if $\angle PSQ = 20°$ and PS and SQ are tangents.

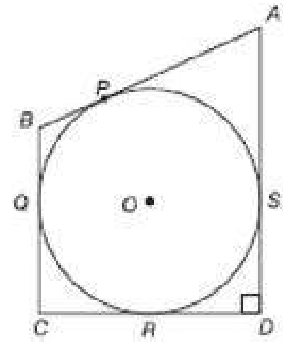


3. Two tangent segments BC and BD are down to a circle (O, R) and angle $CBD = 120°$. Prove that $BO = 2BC$.

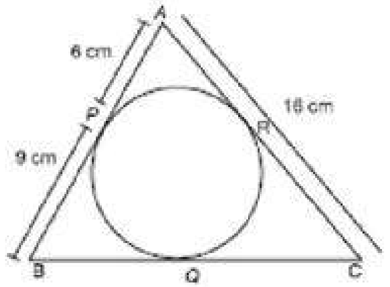
4. In figure $AB \parallel PR$, $\angle BQR = 70°$ find $\angle QAB$.



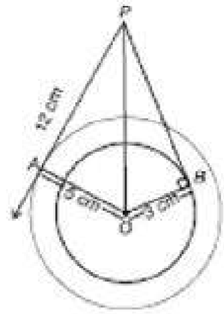
5. $ABCD$ is a quadrilateral in which $\angle D = 90°$. A circle $C\ (O, r)$ touches the sides AB, BC, DC and DA, at P, Q, R, S respectively. If $BC = 38$ cm, $DC = 25$ cm, BP = 27 cm, find the value of 'r'.



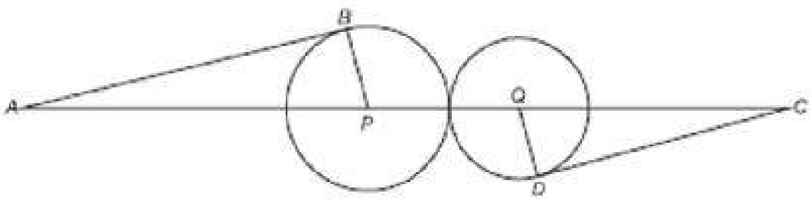
6. Find perimeter of ΔABC in the given figure.



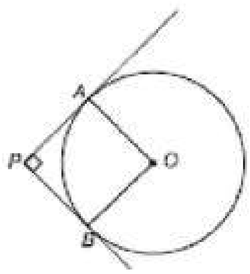
7. In given figure $AP = 12$ cm; $OA = 5$ cm and $OB = 3$ cm. Find BP.



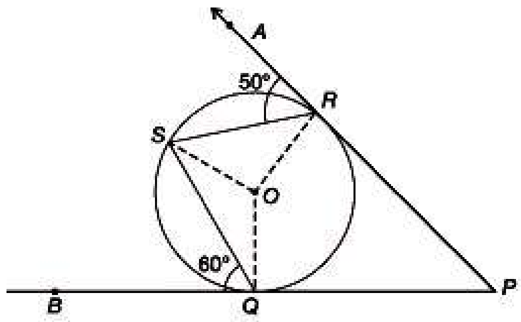
8. Circle with centre P and Q touch each other externally. If $AP = 25$ cm $CQ = 17$ cm and $AB = 24$ cm and $CD = 15$ cm then find the length of PQ.



9. PA and PB are tangents from a point P to a circle with centre O and $\angle APB = 90°$, show that quadrilateral $OAPB$ in a square.



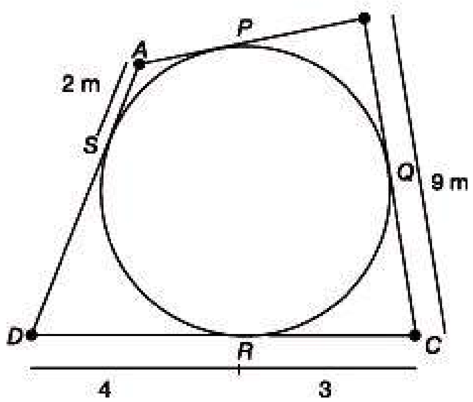
10.



In above figure *PQ* and *PR* are two tangents $\angle ARS = 50°$, $\angle BQS = 60°$ then find $\angle QSR$.

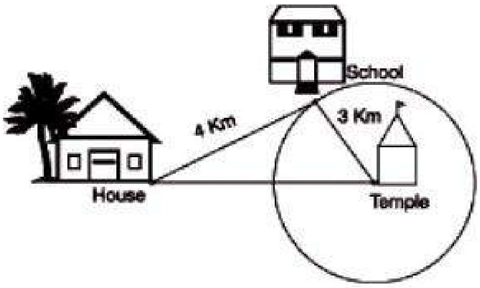
THOUGHT PROVOKING PROBLEMS

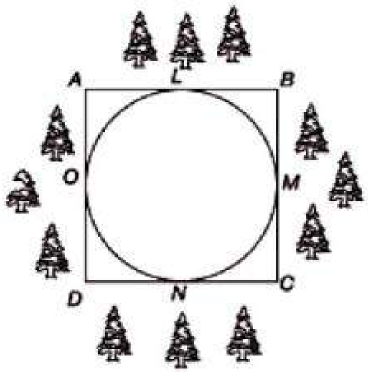
1. Four students Deepak, Rashid, Sam and Sandhil found a circular pit in the jungle during their scout camping. The pit was meant to trap the animals, hence in order to save the animals from being trapped they fenced the pit with the help of poles and rope as shown in the figure. Find the length of rope required to fence the pit. What values are depicted in this problem.



2. As shown in figure a school which is 4 Km. apart from Ananya's house, is situated on a circular field. A temple which is 3 Km away from school is situated on the centre of the circular field. The road connecting house and school is perpendicular to road connecting school and temple. If

Ananya takes 10 minutes to cover the distance of 1 Km. How much time will she take to reach the temple by taking smallest route from the house.





3. Four roads have to be constructed by touching a village Rampur in circular shape of radius 2 Km. in the following manner

Gram Pradhan Meena decided to give this work to two contactors. Sarita got contract to construct the roads *AB* and *CD*, while Rashid had to construct *AD* and *BC*. Sarita completed her work two days early. Find if the distance (*AB* + *CD*) is less than (*AD* + *BC*) why? Explain your answer. What values are depicted in the problem?

MISCONCEPTION

1. They don't make figure while solving the problems based on Geometry.
2. They generally misunderstand the figure and get confused about hypotenuse. Hence they get wrong answer.
3. While solving word problem they are unable to comprehend correctly.

REMEDIAL STRATEGIES

1. Motivate students to participate actively while teacher is solving problem on black board.
2. While solving word problem students are asked to write "what is given", what has to find" in the question.

3. Students should be encouraged to find examples from their day to day life related to the topic.
4. Students are advised to draw the figure always, even it is given in the question or not.

CONSTRUCTION

Introduction

Geometrical constructions plays an important role in hands on skill development of a child. It involves a logical thought process with different geometrical concepts. In different streams like engineering drawing, architecture, it provides the fundamental background to us. For example we have a line segment and we have to divide it into two parts of 3 : 4.We can put the dividing point by measuring the line and using the given ratio. But if we are able to measure it accurately then what we will do. In such cases geometrical constructions are useful to us.

Key Concepts

For geometrical constructions we need to know the different mathematical concepts which are involved in the thought process of the construction. Here we shall construct the following:

1. Division of a line segment in a given ratio (internally)
2. To draw tangent to a circle from a point outside it.
3. Construction of a triangle similar to a given triangle. We should keep in mind the following:
   (i) The perpendicular bisector of a chord passes through the centre.
   (ii) The tangent to a circle is perpendicular to the line joining the centre and the point of contact.
   (iii) Tangents drawn from an internal point to the circle are equal.

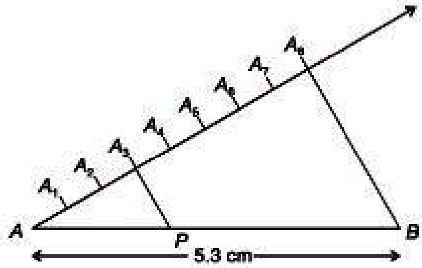
LEARNING TEACHING STRATEGIES

Construction 1:

Draw a line segment of length 5.3 cm and divide it in the ratio 3 : 5.

Steps of construction:

(i) Draw a line segment AB = 5.3 cm.
(ii) Draw any ray making an acute angle ∠ BA X with AB
(iii) on ray AX starting from A mark 5 + 8 = 13 equal arcs AA_1,$A_1 A_2$, $A_2 A_3$, $A_3 A_4$, $A_4 A_5$, $A_5 A_6$, $A_6 A_7$, $A_7 A_8$



(iv) join A_8B

(v) From A_3 draw A_3P // A_8B, meeting AB at P, thus P divides AB in ratio 3 : 5.

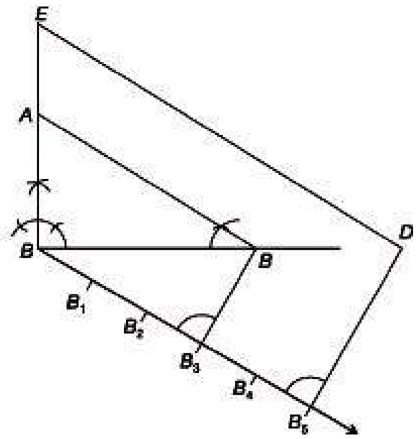
Justification

In ABA_8, we have PA_3 //BA_8 by basic proportionality theorem $\frac{AP}{PB} = \frac{AA_5}{A_5A_{13}} = \frac{3}{5}$

$\Rightarrow \frac{AP}{PB} = \frac{3}{5}$ ∴AP : PB = 3 : 5

Construction 2:

Draw right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.



(i) Construct a ABC in which BC = 4 cm, ∠ B = 90° and BA = 3cm.

(ii) Below BC, make an acute ∠ CBX.

(iii) Along BX mark off five points B_1, B_2, B_3, B_4 and B_5 such that $BB_1 = B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5$.

(iv) From B_5, draw B_5D // B_3C meeting BC produced at D.

(vi) From D, draw ED // AC, meeting BA produced at E. Then EBD is the required triangle whose sides are $\frac{5}{3}$ times the corresponding sides of ABC.

Justification

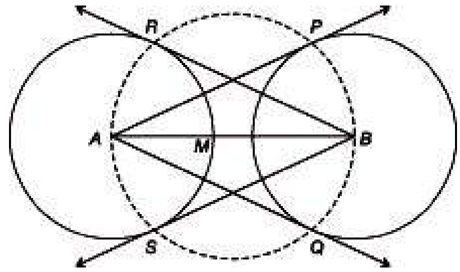
Since DE // CA

ABC ~ EBD

and $\frac{EB}{AB} = \frac{BD}{BC} = \frac{DE}{CA} = \frac{5}{3}$

Construction 3:

Draw a line segment AB of length 8 cm. Taking A as centre draw a circle of radius 4 cm and taking B as centre draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.



Steps: (i) Draw a line segment AB = 8 cm

(ii) With A as centre, draw a circle of radius 4 cm and let it intersect the line segment AB in M.

(iii) With B as centre draw a circle of radius 3 cm

(iv) With M as centre, draw a circle of radius AM and let it intersect the given two circles in P, Q and R, S

(v) Join AP; AQ, BR and BS these are required tangents.

Justification

On joining BP, we have ∠BPA = 90° as ∠BPA is the angle in semicircle.

∴ AP ⊥ PB

Since BP is the radius of the given circle, so AP has to be a tangent to the circle. Similarly AQ, BR and BS are the tangents.

ACTIVITY I

To verify the lengths of tangents drawn from an external point are equal.

Objective

Using paper cutting, folding and pasting to verify the above statement.

Pre-Requisite Knowledge

Basic terms related to the circle.

Material Required

White chart paper Different coloured sheets of glazed paper.
Sketch pens. Geometry box.
Cutter/a pair of scissors. Fevicol tube.

Procedure

1. Draw a circle with centre O and of any radius on a blue coloured sheet of glazed paper and cut it.
2. Paste the cut out on a sheet of white chart paper. (Fig. 1)

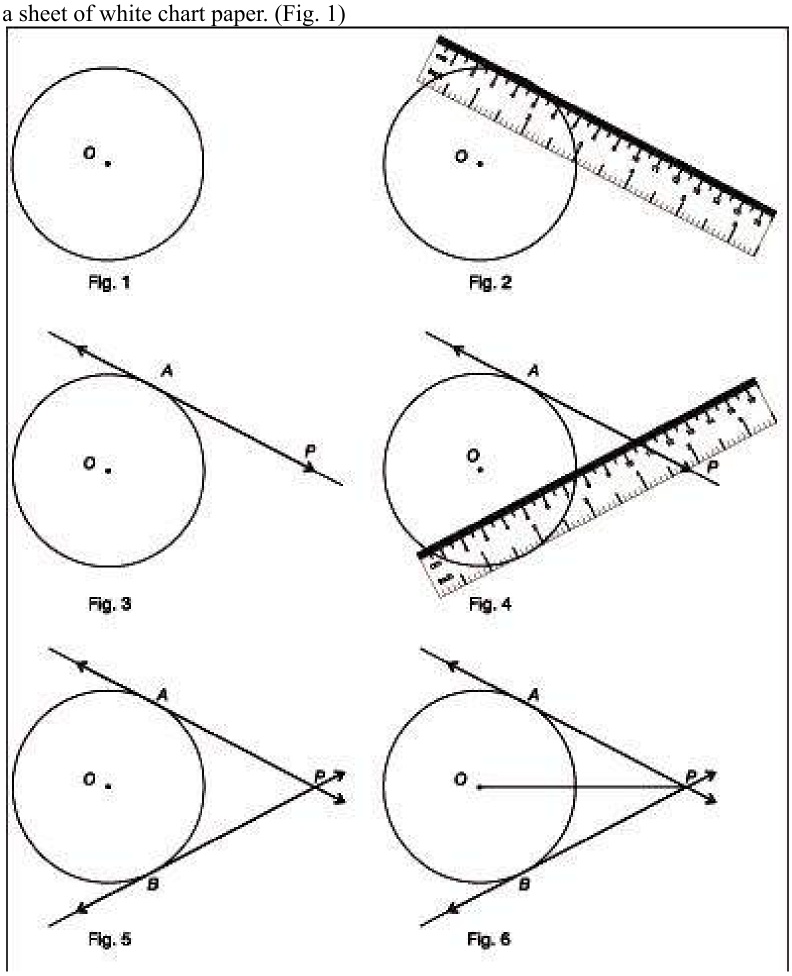


Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6

3. Take any point P outside the circle.
4. Place a ruler touching the point P and the circle and lift the chart paper and fold it to create a crease. (Fig. 2).

5. The crease is first tangent to the circle from point P. Mark the point of contact of the tangent and the circle as A. Join PA. (Fig. 3).
6. Now place ruler touching point P and other side of the circle and the chart paper to create a crease. (Fig. 4).
7. The crease is second tangent to the circle from point. P. Mark the point of contact of the tangent and the circle as B. Join PB. (Fig. 5).
8. Join the centre of the circle O to P, A and B. (Fig. 6).

Demonstration

(i) Fold the circle along OP.

(ii) We observe that A coincides with B, therefore AP = BP.

i.e., length of the tangent PA = length of the tangent PB.

(ii) This verifies the result that length of the tangents drawn from external point are equal.

(iv) Paste the figure for record.

(A) **State true or false for each of the following and justify your answer**

(i) We can divide a line segment in the ratio $\sqrt{3} - 1 : \sqrt{3} + 1$ by geometrical instruction

(ii) A pair of tangents can be constructed to a circle inclined at angle of 90°.

(iii) A pair of tangents can be constructed from a point to circle of radius 5 cm situated at a distance of 5.5 cm of the centre.

(B) **Multiple choice questions**

(i) To divide a line segment AB in the ratio a : b (a, b are positive integers) a ray AX is drawn an so that ∠BAX is an acute angle and points on ray AX are marked at equal distances such that the minimum number of these points is

WORKSHEET 1

(a) a b (b) a + b – 1 (c) a + b (d) a + b + 1

(ii) To draw a pair of tangents to a circle which are inclined to each other at an angle of 80°, it is required to draw tangents at end points of those two radii of the circle, the angle between which should be

(a) 80° (b) 90° (c) 100° (d) 10°

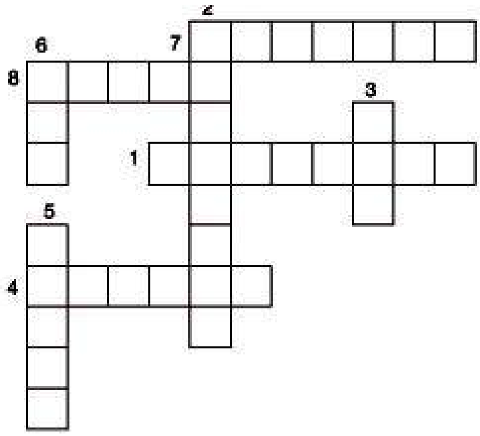
(iii) In order to divide a line segment PQ in the ratio 3 : 7, a ray PX is drawn such that ∠QPX is an acute angle and then points P_1 P_2 ….. are located at equal distances on the ray PX and the point Q is found to

(a) P_4 (b) P_5 (c) P_{10} (d) P_{11}

(iv) To construct a triangle similar to a given PQR with its sides $\frac{9}{4}$ of the corresponding sides of ∠PQR, we draw a ray QX such that ∠RQX is an acute angle and X is on the opposite side of P with respect to QR the minimum number of points to be located at equal distances on ray QX is (a) 9 (b) 4 (c) 13 (d) 5

ACTIVITY 2

CROSSWORD



Across:

(1) Only two —— can be drawn to a circle from an external point.

(4) A circle made by moving one point at a fixed distance from another.

(7) We Two points on a line segment are marked such that the three parts they make are equal. call these points ……………. line segments.

(8) ……………………. Two circles are drawn with same centre. The circle have bigger radius.

Down:

2. A plane closed figure bounded by three lines.
3. Only ……. tangents can be drawn from a point to the circle.
5. ………………… factor means the ratio of the sides of the triangle to be constructed with corresponding sides of a given triangle.
6. Number of points common to a circle and one of its tangent.

WORKSHEET 2

(1) Draw a ∠ABC with sides BC = 7 cm, ∠B = 45°, A = 105°. Then construct a triangle 4
whose sides are times the corresponding sides of ABC
3

(2) Draw a pair of tangents to a circle of radius 5 cm which are include to each other at an angle of 60°

(3) Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length.

(4) Draw a circle radius of 3 cm. Take two points P and Q on one of its extended diametric each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q.

AREA OF PARALLELOGRAMS AND TRIANGLES

Introduction

Sometimes just observing the plane figures, we can't judge which is small or large in area. For this we need a technique to find the area of these figures. Area is used to measure the plane region enclosed by the closed figure.

Key Concepts

(1) Two figures are called congruent, if they have the same shape and the same size.

(2) Parallelogram on the same base and between the same parallel line are equal in area.

(3) Area of a parallelogram is the product of lengths of its base and the corresponding altitude.

(4) Parallelogram on the same base (or equal bases) and having equal areas must lie between the same parallel lines.

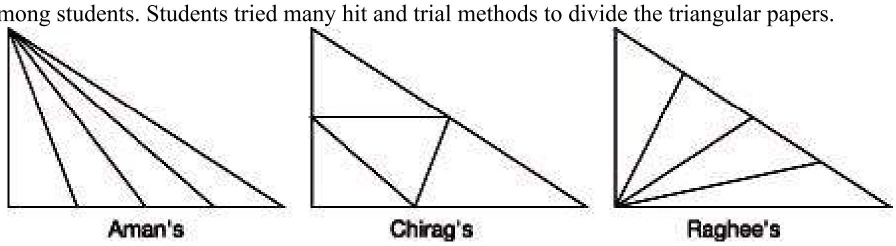
(5) If a parallelogram and a triangle are on the same base and between the same parallels then area of the triangle is half the area of the parallelogram.

(6) Triangles on the same base and between the same parallels are equal in area.
(7) Area of a triangle is half the product of its base and the corresponding altitude.
(8) Triangles on the same base and having equal areas must lie between the same parallels.
(9) A median of a triangle divides it into two triangles of equal area.
(10) Two congruent figures have equal areas but the converse need not be true.

LEARNING TEACHING STRATEGIES

ACTIVITY I

In an art and craft class, the teacher had some triangular pieces of coloured papers. She wanted to utilise these papers to decorate her room. She distributed these papers to some children and asked them to divide each triangular piece of paper into four equal parts. This aroused the curiosity among students. Students tried many hit and trial methods to divide the triangular papers.



Teacher: Put all the four cutouts one on the other
Aman: My cutouts are not overlapping each other
Chirag: My cutouts are overlapping each other
Reghee: My cutouts are not overlapping each other and so on.

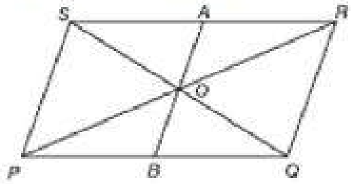
Teacher: Chirag your cutouts are overlapping each other so they are all congruent triangles and hence have the same area.

Teacher: Aman and Reghee your cutouts are not overlapping each other but the lengths of their bases are same their heights are same i.e., they have the same area but their shapes are different.

Now teacher explained it is not necessary for triangles to have same shapes for having same area. So lets discuss some results related to areas of triangles and parallelogram.

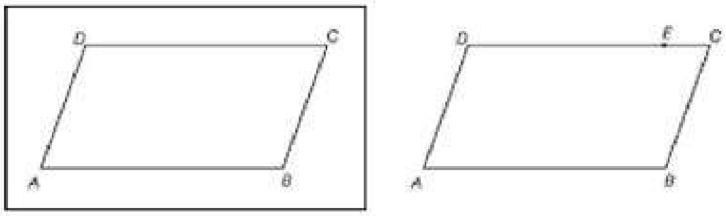
WORKSHEET 1

1. If ABCD is a parallelogram which is not a rectangle; AB = CD = x units and BC = AD = y units. Prove that the area (ABCD) < x y square units.
2. PQRS is a $\|^{gm}$ where diagonals meet at O A line AB is drawn through O to meet RS at A and PQ at B then prove that, are (□ ABPS) = ar($\|^{gm}$ PQRS)



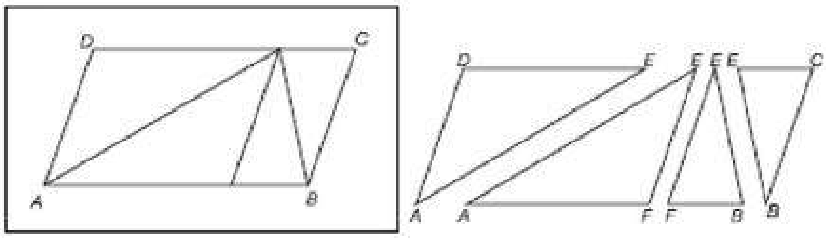
ACTIVITY 2

(i) Draw a parallelogram ABCD on a paper and cut it. (ii) Take a point E on CD anywhere complete Δ ABE.



(i) (ii)

To prove: ar. (ΔABE) $\frac{1}{2}$ are($\|^{gm}$ ABCD)



(iii)

(iii) Draw a line EF ∥ BC.

(iv) Cut the four triangles ADE, AEF, BEF and BEC

(v) Place DAE on DEF and EFB on EBC.

Result: They overlap each other

∴ ar (DAE) = ar(AEF)

And ar(EFB) = ar(EBC)

⇒ ar(DAE) + ar(EBC) = ar(AEF) + ar(EFB)

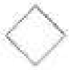
⇒ = ar(EAB)

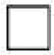
∴ (ar. EAB) + $\frac{1}{2}$ (ar.||gm ABCD)

WORKSHEET 2

Q 1. Match the following.

(a) Parallelogram (i) 

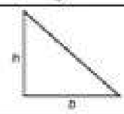
(b) Square (ii) 

(c) Rhombus (iii) 

(d) Triangle (iv) 

(e) Rectangle (v) 

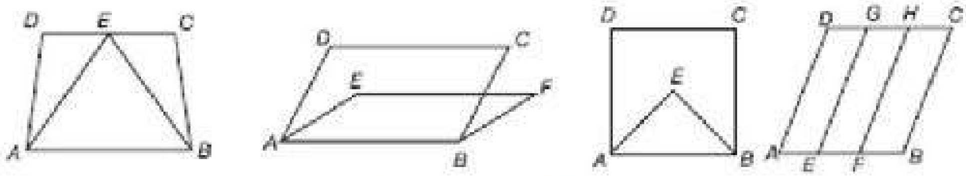
2. Fill in the table given below:

Figure	*Area*
	
	
	
	

3. Congruent figures have same _______.

4. Diagonal divides a parallelogram in two _______ of ______ area.

5. Which of the following figures are on the same base and between the same parallels



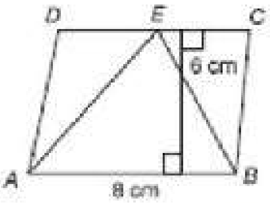
6. Give figures A and figure B are such that ar(A) = 28 sq.cm ar(B) = 28 sq.cm, then

(a) Figure A and B are congruent

(b) Figure A and B are not congruent

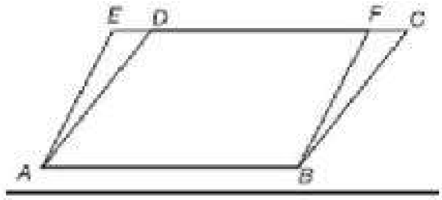
(c) Figure A and B have the same area.

7. In the figure ABCD is a parallelogram, then ar.(ΔAEB) is



(a) 16cm^2 (b) 48cm^2 (c) 24 cm^2 (d) 12cm^2

8. In the given figure



Which of the following is true

(a) $\|^{gm}$ABCD and llgm ABFE are on the same base and between the same parallel.

(b) ar($\|^{gm}$ABCD) > ar($\|^{gm}$ABFE)

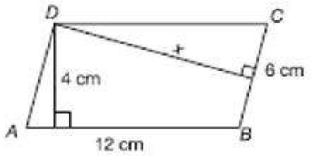
(c) ar(ΔADE) $\neq$ ar(ΔDFC)

9. (ar. ABC) = 58 cm^2 and AD is the median; the ar(ABD) is

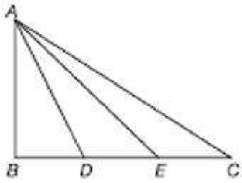
(a) 116cm^2 (b) 29cm^2 (c) 38cm^2 (d) 58cm^2

10. In the figure ABCD is a parallelogram, then x is

(a) 7cm (b) 9cm (c) 6cm (d) 8cm



11. In the figure BD=DE = EC, then



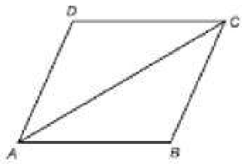
(a) ar.(ΔABD) = ar.(ΔADC)

(b) ar.(ΔADE) = ar.(ΔAEC)

(c) ar.(ΔABD) = $\frac{1}{2}$ ar.(ΔABC)

12. Area of parallelogram ABCD is 28 cm^2 then area ΔADC is

(a) 28 cm^2 (b) 14 cm^2 (c) 18 cm^2 (d) 7 cm^2



13. Area ABC = $\frac{1}{2}$ ……….x…………

(a) AB and AC
(b) base and altitude
(c) AB and BC
(d) (AB + BC), AC

14. Median of a triangle divides the triangle into two

(a)	congruent triangles	(b)	triangles of equal area
(c)	Similar triangles	(d)	two right angled triangles

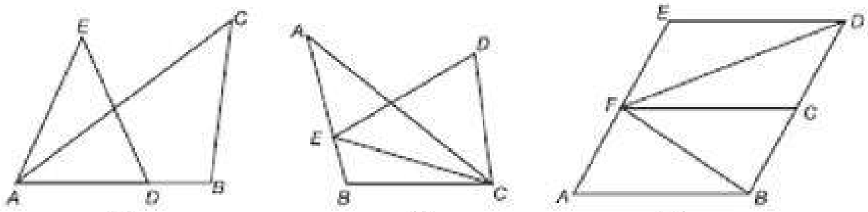
15. If a parallelogram and a triangle are on the same base and between the same parallels, then

(a) ar.(||gm) = ar(triangle) (b) = ar.(||gm) $\frac{1}{3}$ ar.(triangle)

(a) ar.(||gm) = $\frac{1}{2}$ ar(triangle) (b) ar.(triangle) = $\frac{1}{2}$ ar.(ar||gm)

WORKSHEET 3

1. Which of the following figures triangles have the same base?

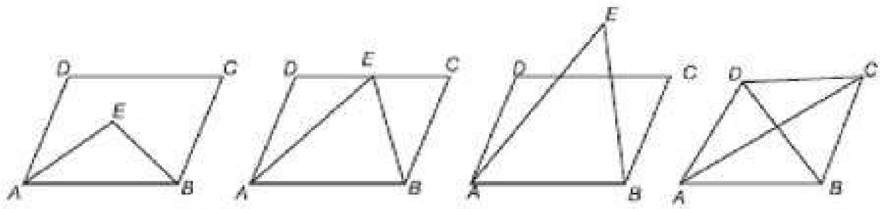


(a) (b) (c)

(a) Δ ABC and ΔABC (b) ΔABC and ΔDEC

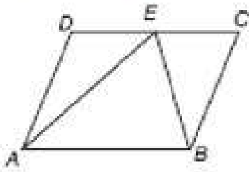
(c) ΔABF and ΔFCB

2. Which of the following figures are on the same base but not between the same parallels?



(a) (b) (c) (c)

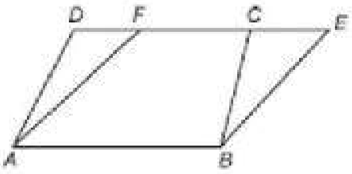
3. In the adjoining figure of ar(||gm ABCD) = 28 cm^2



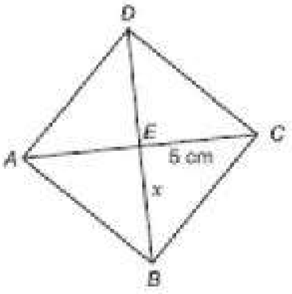
(a) What is the area of ΔABE?

(b) What is the sum of areas of ΔADE and ΔBCE?

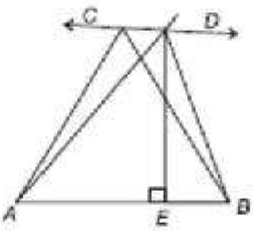
4. In the fig. ABCD and ABFE are parallelograms with area $37cm^2$ and area of quad ABCF is $18cm^2$. Find the area of ΔBCE.



5. In the given fig. ABCD is a rhombus with area $200cm^2$ segment EC is 5cm. Find the value of x



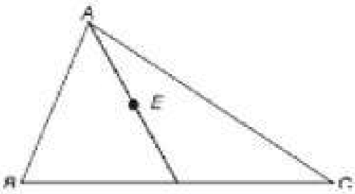
6. In the given fig. of of Q. No. 5. What is the area of rhombus ABCD if $x = 12cm$.



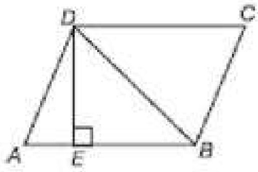
7. In the fig. AB = 7cm and area of ABC is $42cm^2$ if $AB \parallel CD$. Find DE.

8. In parallelogram ABCD, diagonals intersect at the point O. If area of ΔOAB is $6cm^2$, what is the area of $\parallel^{gm}$ ABCD.

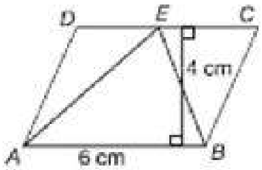
9. In ΔABC, E is the mid point of median AD if the area ΔABC is $36cm^2$, find the area of ΔBED.



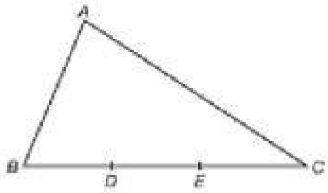
10. In the adjoining fig. ABCD is a parallelogram and ar(llgm ABCD) = $42cm^2$ and DE = 6cm. Find CD.



11. In the figure, ABCD is a parallelogram then ar(ΔAEB) = ______ cm^2.

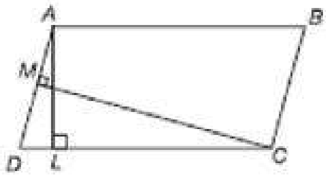


12. If area of ΔABC is $39cm^2$ and BD = DE = EC then find ar.(ΔADC).

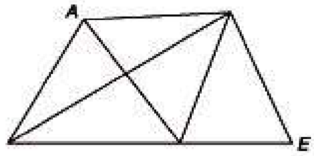


13. AE is a median to side BC of ΔABC, if ar.(ΔABC) = $64cm^2$ then find the ar.(ΔABE).

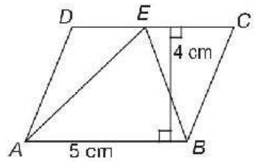
14. In the parallelogram ABCD, AL $\perp$ CD and CM $\perp$ AD. If AL = 20cm, CD = 18cm and CM = 15cm that find perimeter of llgm ABCD.

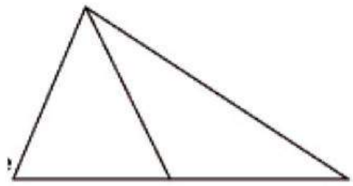


15. In the figure ABCD is a parallelogram and BE is drawn parallel to AC and meet DC produced at E. If ar.(||gm ABCD) = 42cm^2. What is the area (BDE).



16. In the figure ABCD is a parallelogram and E is any pt. on side CD. What is the area of AEB?



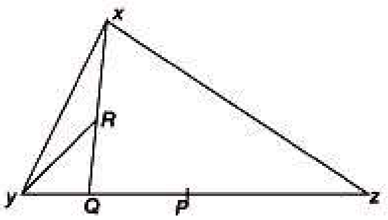


17. In a triangular park as shown in the figure Chirag divides the park into two parts by joining the mid point of the side to the opposite vertex. He gave both the parts of parks to his two sons. If one son spend ` 840 for planting grass in his part. How much money the second son spend for planting grass at the same rate?

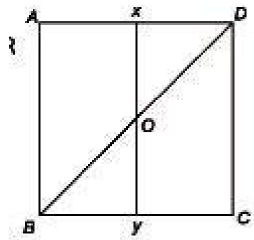
WORKSHEET 4

1. P is the mid point of side YZ of XQ. Then ratio of ar(YRQ): ar(

XYZ and Q is the mid point of YP. If R is the mid point of XYZ).

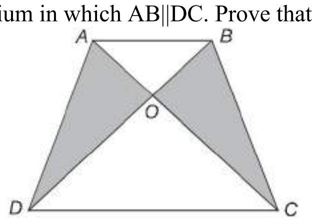


2. AD is the median of the triangle ABC. If area of ABC is 24 cm^2 the find the area of ABD.

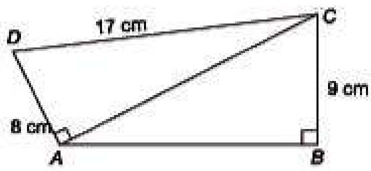


3. In the parallelogram PQRS, PQ = 18cm. The altitudes corresponding to side PQ is 10cm and corresponding to side QR is 12cm. Find PS
4. In the figure, ABCD is a square with side 10cm mid points of AD and BC are X and Y respectively. Find the area of QXD.

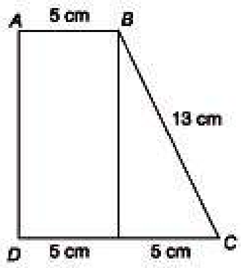
5. In the figure ABCD is a trapezium in which AB||DC. Prove that ar.(AOD) = ar.(BOC)



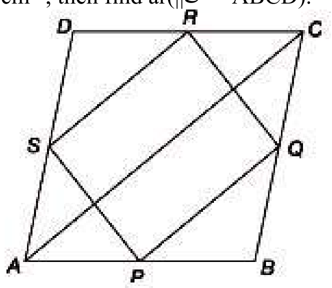
6. The diagonals of the parallelogram XYZP intersect at O. Through O a line is drawn to intersect XP at A and YZ at B. Prove that ar(|gm.XYBA) = ar(||gm.ABZP)
7. Find the area of the quadrilateral ABCD.



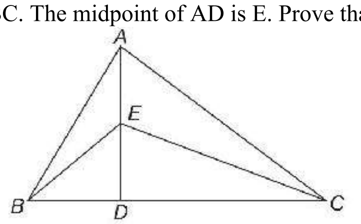
8. Compute the area of the trapezium ABCD.

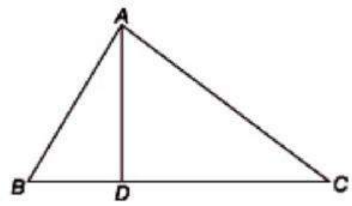


9. P, Q, R, S are respectively the midpoints of the sides AB, BC, CD and DA of ||gm ABCD. Show that PQRS is a parallelogram. If ar.(||gmPQRS) = 56cm^2, then find ar(||gm.ABCD).



10. The vertex A of ABC is joined to a point D on the side BC. The midpoint of AD is E. Prove that ar.(ABC) = 2 ar.(BEC)

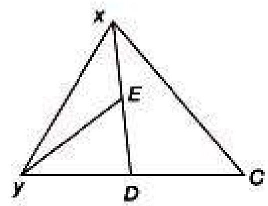




11. In the adjoining figure, the point D divides the side BC of ABC in the ratio 2 : 3. Prove that ar.(ABD) : ar(ADC) = 2 : 3.

12. The base BC of ABC is divided at D. Such that DC = 2 BD. If ar(ABD) is 24cm^2. Find the ar(ABC).

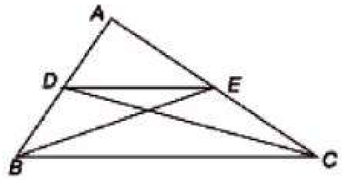
13. In XYZ, D is the midpoint of YZ and E is the midpoint of XD.

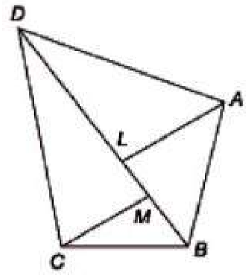


What is the ratio of ar.(YED) and ar.(XYZ).

14. Prove that a median divides a triangle into two triangles of equal area.

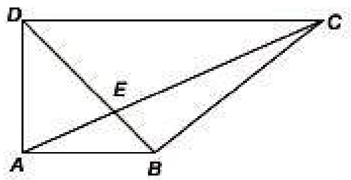
15. In the adjoining figure D and E are any points on the sides AB and AC of ABC such that ar(DCE) = ar.(BCD) then show that DE || BC.





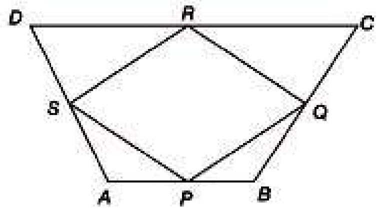
16. In the adjoining figure ABCD is a quadrilateral in which BD = 16 cm. If AL ⊥ BD and CM ⊥ BD. Such that AL = 9cm and CM = 7cm. Find the area of the quadrilateral.

17. In the adjoining figure ABCD is a quadrilateral in which diagonals AC and BD intersect at a point E. Prove that ar (AED) × ar (BEC). = ar (AEB) × ar (CED)



18. ABCD is a parallelogram. Side BC is produced to E such that BC = CE. AE intersect CD at F. Prove that ar.(ABE) = ar. (||gm. ABCD).

19. Midpoints P, Q, R, S of sides of a quadrilateral ABCD are joined to form a quadrilateral. Prove that (i) PQRS is a parallelogram. (ii) ar(qud.ABCD) = 2ar(||gmPQRS)



5

MENSURATION

INTRODUCTION

Mensuration is the branch of mathematics which deals with the measurement of length, area of plane figures and surface area, volume of solid figures. It was originated from need of measuring land for cultivation. In our day to day life we come across many objects (figures) which are in the shape of square, rectangle, triangle, circle or a part of circle. (All these are plane figures) Triangle and circle is one of the most common shapes in our day to day life. To know the length of these closed plane figures we need to know about its perimeter and how much area they acquired can be calculated by knowing the concept of area. To determine the amount of paint a painter would require to paint a circular area. To determine the area covered in hockey field (D-area), cricket ground, we required to know about area of circle.

Instead of plane figures like square, rectangle, circle, triangle etc. we see many object around us which have definite shape and size e.g. book, match box, room, almirah, road roller, ice-cream cone, football, cricket ball etc. are called solid.

Types of Solids

Solids are of two types

1. **Polyhedrons:** Which are formed from plane surface e.g. cube, cuboid etc.
2. **Non-Polyhedrons:** Which are formed from curved surface e.g. cone, cylinder, sphere, frustum etc.

Some time we also see the object like capsule, toy. rocket. etc. There are the object formed by combination of two or more solid. We think how much medicine is inside the capsule, how much paper is required to wrap the toy etc. For this we need to know the surface area and volume of respective figure (object).

KEY CONCEPTS

1. Area of a triangle using Heron's formula.

2. Circumference and area of a circle.
3. Area of sector and segment of a circle.
4. Area of combination of plane figures.
5. Surface area and volume of a cube and cuboid.
6. Surface area and volume of a right circular cylinder.
7. Surface area and volume of a right circular cone.
8. Surface area and volume of a hemisphere and sphere.
9. Surface area and volume of a combination of solids.
10. Surface area and volume of a frustum of a cone.

LEARNING TEACHING STRATEGIES

Perimeter and area of plane figures

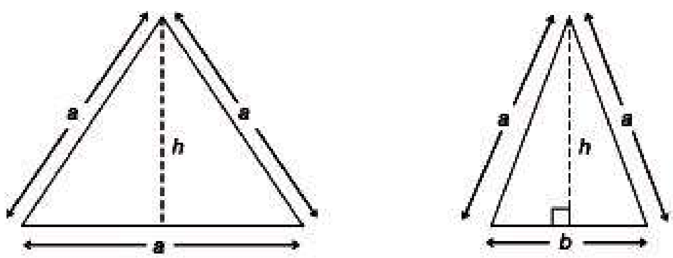
The perimeter of a closed plane figure is the length of its boundary i.e. the sum of length of its sides. The unit of measurement of perimeter is the unit of length. The area of a closed plane figure is the measurement of the surface (region) enclosed by its boundary (sides). It is measured in square unit.

We know about the perimeter and area of plane closed figure like square, rectangle, parallelogram, trapezium, right angled triangle etc.

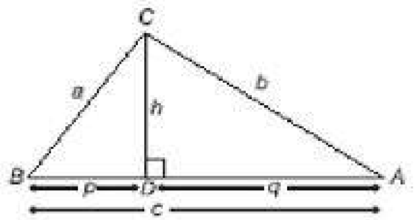
(a) Area of triangle (Heron's formula)

Area of a triangle = $\frac{1}{2}$ × base × height (for a right angle triangle) When triangle is equilateral or an isosceles triangle, then to find its area we need its height.

In equilateral and an isosceles triangle when mid point of opposite side is meet with opposite vertex altitude is formed and it is the height of . Height h can be calculated by using Pythagoras Theorem.



If the triangle is scalene how can we find its height. Let a, b, c be the length of sides of the triangle and h be its height to the side of length C.



Area of triangle $= \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2}\ C\,h$ ....(1)

here $\quad p + q = C \Rightarrow q = C - p$

In figure $\quad p^2 + h^2 = a^2$ ....(2)

$h^2 + q^2 = b^2$ ....(3)

because $\quad q = c - p$

$q^2 = (c-p)^2$

$q^2 = c^2 + p^2 - 2cp$

adding h^2 both sides

$h^2 + q^2 = h^2 + p^2 + c^2 - 2cp$

$b^2 = a^2 + c^2 - 2cp$ (Using (2) & (3))

$2cp = a^2 + c^2 - b^2$

$p = \dfrac{a^2 + c^2 - b^2}{2c}$ ....(4)

From (2) $h^2 = a^2 - p^2$

$h^2 = (a-p)(a+p)$

$$h^2 = \left(a - \frac{a^2+c^2-b^2}{2c}\right)\left(a + \frac{a^2+c^2-b^2}{2c}\right)$$

$$h^2 = \left(\frac{2ac - a^2 - c^2 + b^2}{2c}\right)\left(\frac{2ac + a^2 + c^2 - b^2}{2c}\right)$$

$$h^2 = \left[\frac{b^2 - (a-c)^2}{2c}\right]\left[\frac{(a+c)^2 - b^2}{2c}\right]$$

$$h^2 = \frac{(b+a-c)(b-a+c)(a+c+b)(a+c-b)}{4c^2}$$

$$h^2 = \frac{(a+b+c)(-a+b+c)(a-b+c)(a+b-c)}{4c^2} \quad \text{.................................... (5)}$$

By using S

From (5) $\quad 2(S-a)\ 2(S-b)\ 2(S-c)$

2

$= \dfrac{a+b+c}{2} \Rightarrow 2S = a + b + c$

$= -a + b + c$ (by adding both sides $-2a$)

$= a - b + c$ (by adding both sides $-2b$)

$= a + b - c$ (by adding both sides $-2c$)

$2S \times 2(S - a) \times 2(S - b) \times 2(S - c)$ h

=

$4c^2$

2

$4S(S - a)(S - b)(S - c)$ h

=

c^2

h

c h

1 c h 2

$2\sqrt{S(S - a)(S - b)(S - c)} =$

c

$= 2\sqrt{S(S - a)(S - b)(S - c)}$

$= \sqrt{S(S - a)(S - b)(S - c)}$

Using (1)

Area of triangle = $\sqrt{S(S - a)(S - b)(S - c)}$ This formula is known as Heron's Formula.

Do you Know

Area of a cyclic quadrilateral having sides a, b, c, d.

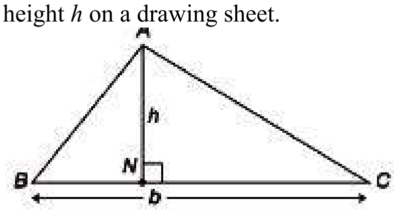
Area of cyclic quadrilateral = $\sqrt{(S-a)(S-b)(S-c)(S-d)}$

Where $2S = a + b + c + d$

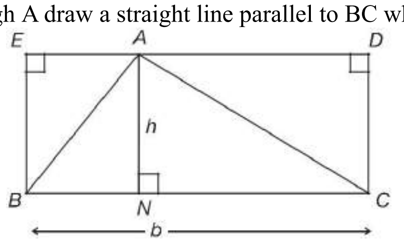
ACTIVITY

Objective:
To find a formula for the area of triangle.
Pre-requisite Knowledge:
Formula for the area of rectangle.
Material Required:
Drawing sheet Geometry box Scissors Fevistick Procedure:

1. Draw any triangle *ABC* of base *b* and height *h* on a drawing sheet.



2. Draw line ⊥ on B and C. Also through A draw a straight line parallel to BC which makes a rectangle BCDE.



3. Cut off *A E B* and *A D C* and paste there in the position *ABN* and *ANC* respectively.

Observation:
We observe that the two triangles *ABN* and *ANC* cover the triangle *ABC* exactly. 2(area of triangle *ABC*)= area of rectangle *BCDE*

2 (area of *A BC*) = $b \times h$ Area of *A BC* = $\frac{1}{2} b \times h$

$= \frac{1}{2} \times$ base $\times$ height

WORKSHEET 1

FORMATIVE

Choose the correct answer from the given four options.

1. The area of whose sides are 4 cm, 13 cm, and 15 cm is

(a) 24 cm^2 (b) 32 cm^2 (c) 48 cm^2 (d) 420 cm^2

2. If the sides of a triangle are in the ratio 13 : 14 : 15 and its perimeter is 84 cm then its area is

(a) 168 cm^2 (b) 236 cm^2 (c) 336 cm^2 (d) 536 cm^2

3. Heron's formula is

(a) $(S-a)(S-b)(S-c)$ (b) $S(S+a)(S-b)(S-c)$

(c) $2\sqrt{S(S-a)(S-b)(S-c)}$ (d) $\sqrt{S(S-a)(S-b)(S-c)}$

4. The area of a triangle, two sides of which are 18 and 10 cm and the perimeter is 42 cm, will be

(a) 21 11 cm^2 (b) 11 21 cm^2

(c) 1 2 1 cm^2 (d) 441 cm^2

5. The length of each sides of an equilateral triangle having an area of $9\sqrt{3}$ cm^2 is

(a) 4 cm (b) 6 cm

(c) 8 cm (d) 36 cm

6. An isoscele right triangle has area 8 cm^2. The length of its hypotenuse is

(a) 16 cm (b) 24 cm

(c) 32 cm (d) 48 cm

7. If *a, b, c* are the sides of triangle then semi-perimeter of triangle is

(a) $\frac{a-b+c}{2}$ (b) $\frac{a+b+c}{2}$

(c) $\frac{a+b-c}{2}$ (d) $\frac{a-b-c}{2}$

8. The perimeter of an equilateral triangle is 60 m. The area is

(a) $10\sqrt{3}$ m^2 (b) $15\sqrt{3}$ m^2

(c) $20\sqrt{3}$ m^2 (d) $100\sqrt{3}$ m^2

9. If *a, b, c* are the sides of a triangle then the area of the triangle, when each of the sides is doubled will be

(a) $\sqrt{S(S-2a)(S-2b)(S-2c)}$ (b) $2\sqrt{S(S-a)(S-b)(S-c)}$

(c) $4\sqrt{S(S-a)(S-b)(S-c)}$ (d) None of these

10. If the diagonals of a rhombus are 8 cm and 10 cm then its area is

(a) 40 cm^2 (b) 64 cm^2 (c) 80 cm^2 (d) 100 cm^2

WORKSHEET 2

FORMATIVE

1. What is a scalene triangle?
2. State the Heron's Formula for the area of triangle.
3. What is the semi-perimeter of a triangle?
4. What is the name of triangle whose two sides are equal?
5. What is the name of triangle whose all sides are equal?
6. What will be the area of triangle with base 4 cm and height 6 cm?
7. What will be the area of triangle *ABC* in while *AB* = *BC* = 4 cm and ?
8. What will be the area of an equilateral triangle whose side is 6 cm?
9. Name the country from which Heron belong
10. What is the area of trapezium?

WORKSHEET 3

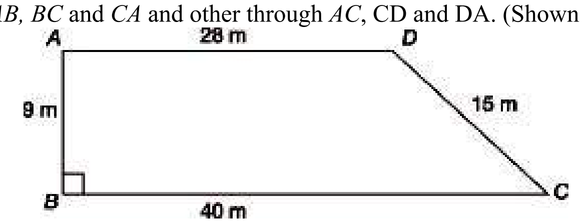
SUMMATIVE

1. Find the area of a right angled triangle if the radius of its circumcircle is 3 cm and altitude drawn to the hypotenuse is 2 cm.

2. The sides of triangular plate are 8 cm, 15 cm on and 17 cm. If its weight is 96 gm. Find the weight of the plate per square cm.
3. The base of an isosceles triangle in 24 cm and its area is 192 sq. cm. Find its perimeter.

4. A park in the shape of a quadrilateral ABCD having $\angle C = 90°$, $AB = 9$ m, $BC = 12$ m, $CD = 5$ m and $AD = 8$ m. How much area does it occupy? What is the utility of a park for society? What should be the duties of people to keep the park neat and clean.

5. Students of a school staged a rally for cleanliness campaign. They walked through the lane in two groups. One group walked through the lanes *AB, BC* and *CA* and other through *AC*, CD and DA. (Shown in adjoining figure)



They cleaned the area enclosed within their lanes. Which group cleaned more area and by how much? Find the total area cleaned by the students (neglecting the width of the lanes). Which moral value of student is shown in this question.

6. A field is in the shape of a trapezium, whose parallel sides are 25 m and 10 m and the non-parallel sides are 14 m and 13 m. Find the area of the field.
7. The sides of a triangle are 35 cm, 54 cm and 61 cm respectively. Find the length of its longest altitude.
8. From a point in the interior of an equilateral triangle, perpendiculars are drawn on the three sides. The lengths of the perpendiculars are 10 cm, 14 cm and 6 cm. Find the area of the triangle.
9. If each side of a scalene triangle is tripled then prove that ratio of their area will be 1 : 9.
10. A parallelogram has two sides 60 m and 25 m and a diagonal 65 m long. Find the area of the parallelogram.

Area Related to Circles

Perimeter (Circumference) and area of a circle:

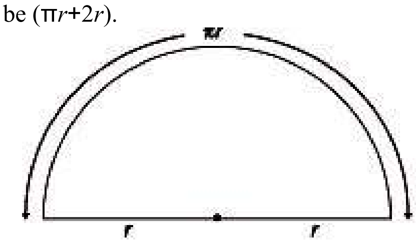
The total length (distance) around a circle is called its circumference. If r is the radius of a circle then its circumference will be $2\pi r$

.

The plane surface enclosed in a circle is called its area. Area of a circle is πr^2 (area of circle mean area of the circular region).

The interior of a circle along with its boundary is called the circular region of the circle.

Perimeter of the semicircle will be ($\pi r+2r$).



If two circles touch internally, then the distance between their centres is equal to the difference of their radii.

If two circles touch externally then distance between their centres is equal to the sum of their radii.

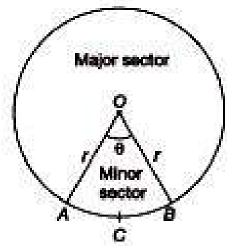
Distance moved by a rotating wheel in one revolution is equal to the circumference of the wheel.

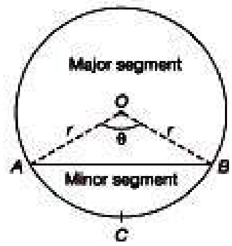
The number of revolutions completed by a rotating wheel in one minute

= Distance moved in one minute Circumfrence of the wheel

Angle described by the minute hand of a clock in 60 minutes = 360°.

Angle described by the hour hand of a clock in 12 hours = 360°.





Area of Sector and Segment of a Circle

The portion (or part) of the circular region enclosed by two radii and the corresponding arc is called a sector of a circle.

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

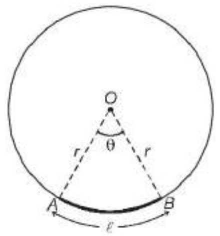
The portion (or part) of the circular region enclosed between a chord and the corresponding arc is called a segment of the circle.

Area of minor segment $= \frac{\pi r^2 \theta}{360°} - \frac{1}{2} r^2 \sin\theta$

$= \frac{\pi r^2 \theta}{360°} - r^2 \sin\frac{\theta}{2} \cos\frac{\theta}{2}$

The sum of the arcs of major and minor sectors of a circle is equal to the circumference of the circle.
The sum of the areas of major and minor sectors of a circle is equal to the area of the circle.
The part of boundary of a circle between any two points on the circle is called an arc of the circle.

Length of arc of a circle will be $\ell = \frac{2\pi r\theta}{360°}$



Perimeter of the minor sector = $\frac{2\pi r\theta}{360°} + 2r$

ACTIVITY 1

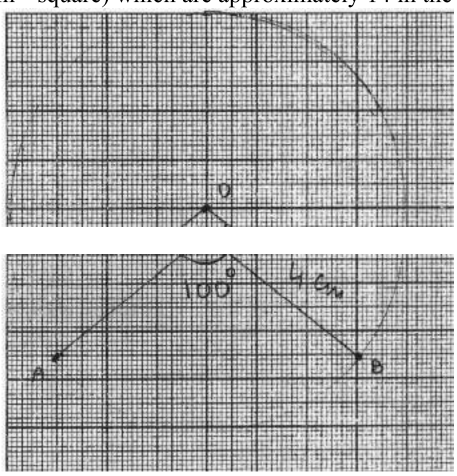
Objective

Find the area of the sector of a circle by using graph paper.

Material Required:

Graph Paper Geometry box Procedure:

1. Draw a circle of radius 4 cm on a graph paper.
2. Count the number of squares (1 cm^2 square) which are approximately 14 in the minor sector AOB.



Observation table:

Radius of Circle	*Central Angle*	*Area of sector by formula* = $\frac{\pi r^2\theta}{360°}$	*Area of sector by counting no. of squares from graph*
$r = 4$ cm	$\theta = 100°$	$= \frac{22}{7} \times \frac{4 \times 4 \times 100}{360}$ = 14 (*approx.*)	14

For Practice:

- By taking different radius of circle and central angle verify the result for area of sector, area of circle and area of a segment of a circle.

ACTIVITY 2

Objective:

To find the area of the circle by using the area of small sectors.

Pre-requisite Knowledge:

Area of triangle = $\frac{1}{2}$ × base × height

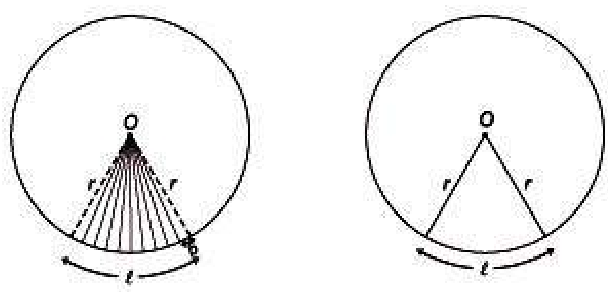
Circumference of the circle = $2\pi r$

Material Required:

Drawing sheet Geometry box

Procedure:

1. Draw a circle of any desired radius r.
2. Take a sector of the circle whose length of arc is ℓ.



3. Divide the sector whose length of arc ℓ into n small sector. Each sector look like a triangle.

Observation:

1. Base of each triangle will be the length of arc of each small sector (b) where $b = \frac{\ell}{n}$.
2. Height of each triangle is h (here r).
3. Area of each triangle (small sector) $= \frac{1}{2} b\, h = \frac{1}{2} b\, r$.
4. Sector has n triangle so area of sector $= n \frac{1}{2} b\, h = n \frac{1}{2} b\, r$

$$= \frac{1}{2} n\, b\, r = \frac{1}{2} \ell r$$

5. Area of circle $= \frac{1}{2} r(2\pi r) = \pi r^2$

ACTIVITY 3

Statement:

The area of a sector of a circle of radius r, which subtends an angle θ degree at the centre of the circle is $\frac{\theta}{360} \times \pi r^2$ sq. unit.

Objective:

To verify the above statement for θ = 45 °.

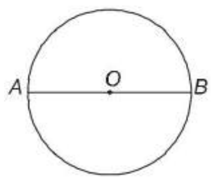
Pre-requisite Knowledge:

Area of circle of radius r is πr^2

Concept of a sector of a circle.

Material Required:

Glaze Paper Fevistick Scissor Drawing sheet

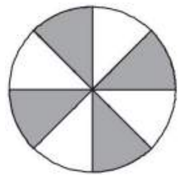


Geometry box

Procedure:

1. On the glaze paper draw a circle of radius r.

2. Fold the paper along *AOB*.
3. Now again fold the two semicircles and cut each in two equal parts.
4. Now each of these four quadrant are folded and then cut equally into eight equals sectors.
5. With the help of fevistick fix all the eight parts as shown in figure.



Observation:

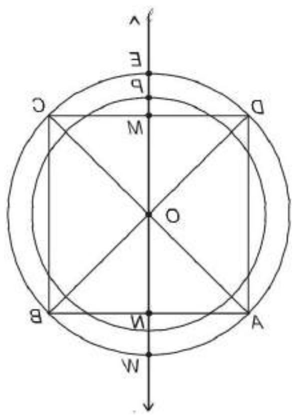
1. We observers that same circle is constructed then area of sector $= \frac{1}{8} \times \pi r^2 = \frac{45}{360} \times \pi r^2$

Hence, the statement is used for area of a sector with $\theta = 45°$.

PROJECT WORK

Construct a circle whose area is equal to the area of given square (taking the side of square 6 cm and also verify your result using area of circle) Procedure:

1. Draw a square *ABCD* (by taking any desired length of side).
2. Diagonals of a square intersect at O.



3. M & N are the mid point of side DC and AB.
4. Draw a line ℓ passing through the points M, O, N.
5. Draw a circle of radius OA, taking O as centre which intersect the line ℓ at E and W.
6. EM is divided such that $EP = 2\, PM$.
7. With O as centre and OP as radius another circle is drawn. The area of this circle is approximately equal to the area of given square.

WORKSHEET 1

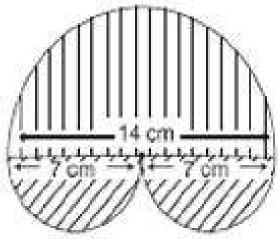
FORMATIVE

1. The area of a circle whose diameter is d will be

(i) $2\pi d$ (ii) πd (iii) πd^2 (iv) $\pi \frac{d^2}{4}$

2. If circumference of two circles are in the ratio 4 : 5. The ratio of their areas will be
(i) 4 : 5 (ii) 16 : 25 (iii) 64 : 125 (iv) 8 : 10
3. A wire is in the form of a circle of radius 7 cm. It is bent into a square. The area of the square will be
(i) 11 cm^2 (ii) 121 cm^2 (iii) 154 cm^2 (iv) 44 cm^2
4. The perimeter of a sector of circle with radius 6 cm, if angle of sector is 60° will be
(i) 17.28 cm (ii) 18.28 cm (iii) 19.28 cm (iv) 18 cm
5. The perimeter of a sector of a circle of radius 5.6 cm is 27.2 cm. The area of sector is
(i) 24.5 cm^2 (ii) 34.5 cm^2 (iii) 44.8 cm^2 (iv) 44 cm^2
6. The difference between the circumference and the radius of the circle is 74 cm. The area of circle is
(i) 416 cm^2 (ii) 616 cm^2 (iii) 516 cm^2 (iv) 661 cm^2
7. If area of a circle is 154 cm^2 then its perimeter is
(i) 11 cm (ii) 22 cm (iii) 44 cm (iv) 55 cm
8. The area of a square that can be inscribed in a circle of radius 8 cm is
(i) 256 cm^2 (ii) 128 cm^2 (iii) $64\sqrt{2}$ cm^2 (iv) 64 cm^2

9. The area of the shaded region in the figure is



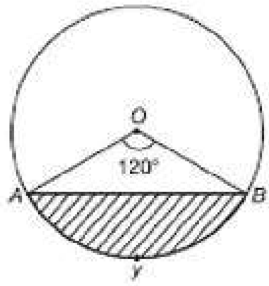
(i) 824 cm^2

(ii) 724 cm^2

(iii) 624 cm^2

(iv) 924 cm^2

10. In figure radius of the circle is 21 cm and $\angle AOB = 120°$. Then area of segment AyB is



(i) $\frac{21}{4}\left(88 - 21\sqrt{3}\right)$ cm^2

(ii) $\frac{21}{4}\left(88 - 22\sqrt{3}\right)$ cm^2

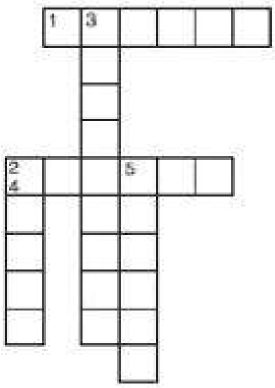
(iii) $\frac{21}{3}\left(77 - 21\sqrt{3}\right)$ cm^2

(iv) None of these

WORKSHEET 2

FORMATIVE

Cross-word Puzzle



Across

For 1 and 2

If C is a fixed point and P is a point such that PC remains constant, then the locus of P is called (2)…….and constant distance PC is called (1)…………..

Down

3. The minor and major segments of a circle are called …………….. segments of each other.
4. A line segment joining any two points on a circle is called a ………………. of the circle.
5. If all the vertices of a quadrilateral lie on a circle, then it is called…………….quadrilateral.

WORKSHEET 3

SUMMATIVE