MATHS

NCERT - NCERT MATHS (GUJARATI ENGLISH)

TANGENTS AND SECANTS TO A CIRCLE

Example

1. Find the length of the tanget to a circle with centre 'O' and radius $= 6cm$ from a point P

such that $OP = 10cm$.

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

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3. Find the area of the segment AYB shown in the adjacent figure. It is given that the radius

of the circle is 21 cm and $\angle AOB = 120^0$ $\left(Use \pi = \frac{22}{7} \right.$ and $\sqrt{3} = 1.732)$

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4. Find the area of the segments shaded in figure, if $PQ = 24cm$, $PR = 7cm$ and QR is the diameter of the circle with centre O (Take $\pi = \frac{22}{7}$)

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5. A round table top has six equal designs as shown in the figure. If the radius of the table top is $14cm$, find the cost of making the designs with paint at the rate of $rs5Percm^2$ (use $\sqrt{3} = 1.732$)

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Exercise 9 1

1. Fill in the blanks

(i) A tangent to a circle touches it in ..... Point (s).

(ii) A line intersecting a circle in two points is called a .....

(iii) Number of tangents can be drawn to a circle parallel to the given tangent is ....

(iv) The common point of a Tangent to a circle and the circle is called .....

(v) We can draw ..... tangents to a given circle.

(vi) A circle can have ..... parallel tangents at the most.

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2. Fill in the blanks

A tangent PQ at a point P of a circle of radius $5cm$ meets a line through the centre O at a point Q so that $OQ = 13cm$. Find length of PQ.

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3. Fill in the blanks

Draw a circle and two lines parallel to a given line drawn outside the circle such that one is a tangent and the other, a secant to the circle.

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4. Fill in the blanks

Calculate the length of tangent from a point $15cm$ away from the centre of a circle of radius $9cm$.

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5. Fill in the blanks

Prove that the tangents to a circle at the end points of a diameter are parallel.

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Exercise 9 2

1. Choose the correct answer and give justification for each.

(i) The angle between a tangent to a circle and the radius at the point of contact is

A. 60°

B. 30°

C. 45°

D. 90°

Answer: D

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2. Choose the correct answer and give justification for each.

(ii) From a point Q, the length of the tangent to a circle is 24 cm. and the distance of Q from the centre is 25 cm. The radius of the circle is

A. $7cm$

B. $12cm$

C. $15cm$

D. $24.5cm$

Answer: A

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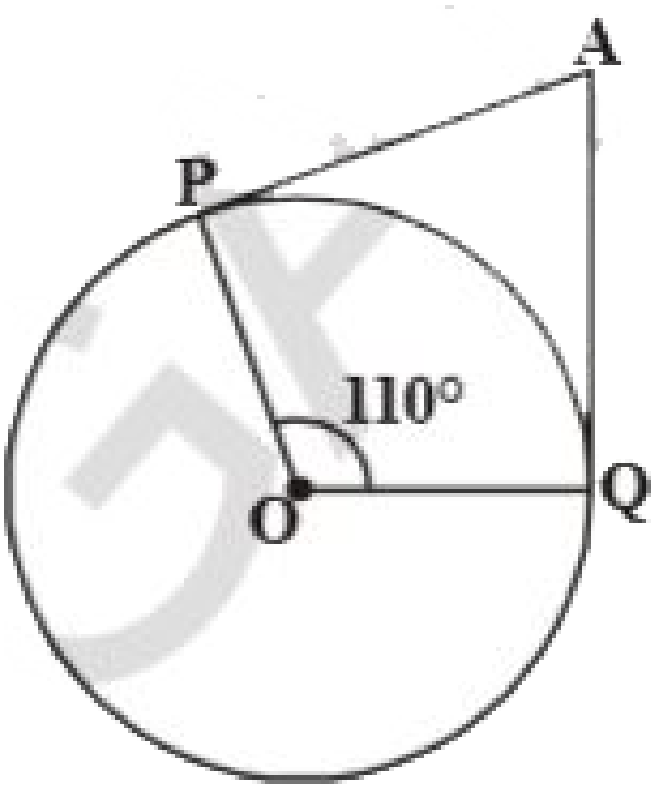
3. Choose the correct answer and give justification for each.

If AP and AQ are the two tangents a circle with centre O so that $\angle POQ = 110^\circ$, then $\angle PAQ$

is equal to



A. 60°

B. 70°

C. 80°

D. 90°

Answer: B

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4. Choose the correct answer and give justification for each.

If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then $\angle POA$ is equal to

A. 50°

B. 60°

C. 70°

D. 80°

Answer: A

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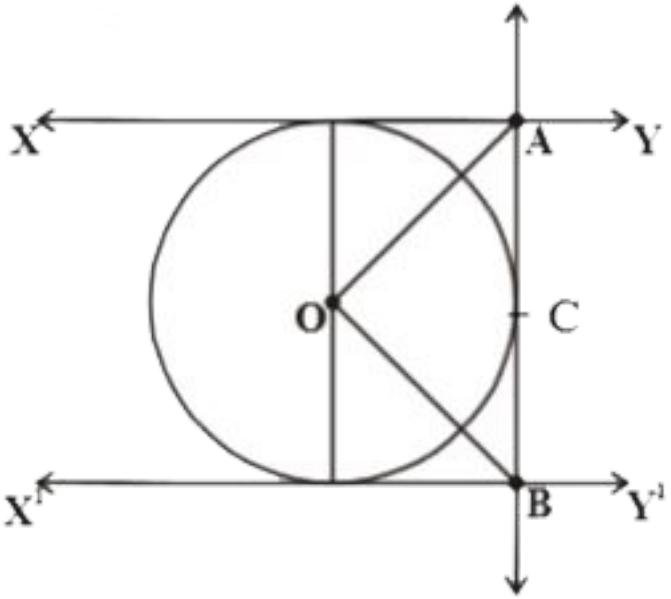
5. Choose the correct answer and give justification for each.

In the figure XY and X^1Y^1 are two parallel tangents to a circle with centre O and another

tangent AB with point of contact C intersecting XY at A and X^1Y^1 at B then $\angle AOB =$



A. 80°

B. 100°

C. 90°

D. 60°

Answer: C

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6. Two concentric circles of radii $5cm$ and $3cm$ are drawn. Find the length of the chord of the larger circle which touches the smaller circle.

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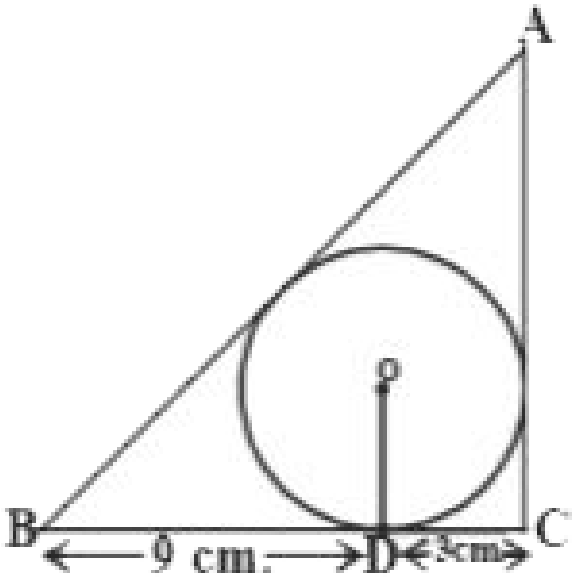
7. A triangle ABC is drawn to circumscribe a circle of radius $3cm$ such that the segments BD and DC into which BC is divided by the point of contact D are of length $9cm$. And $3cm$. Respectively (See adjacent figure). Find the sides AB and AC.



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8. Draw a circle of radius 6 cm. From a pint 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

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9. 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. Also verify the measurement by actual calculation.

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10. Draw a circle with the help of a bangle. Take a point outside the circle. Construct the pair of tangents from this point to the circle.

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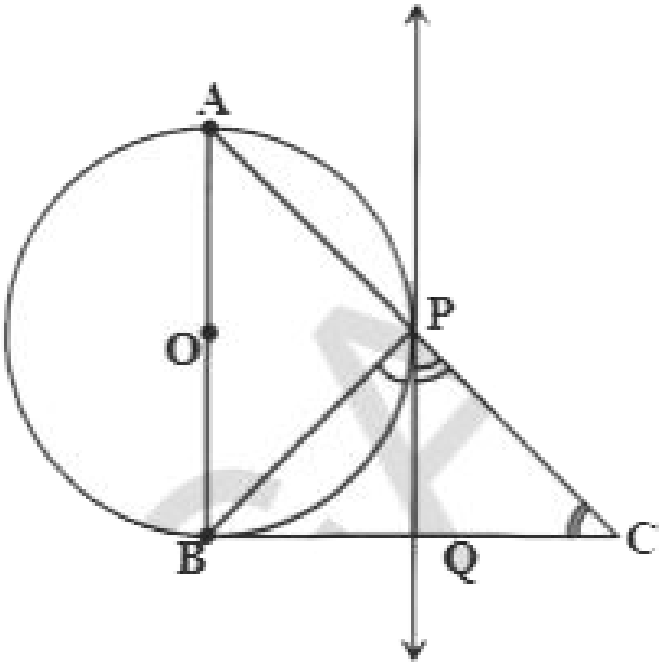
11. Draw a tangent to a given circle with center O from a point 'R' outside the circle. How many tangents can be drawn to the circle from that point ?



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Exercise 9 3

1. In a circle of radius $10cm$, a chord subtends a right angle at the centre. Find the area of the corresponding : $(use\pi = 3.14)$

i. Minor segment

ii. Major segment

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2. In a circle of radius $12cm$, a chord subtends an angle of 120° at the centre. Find the area of the corresponding minor segment of the circle (use $\pi = 3.14$ and $\sqrt{3} = 1.732$)

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3. A car has two wipers which do not ovarlap. Each wiper has a blade of length $25cm$ sweeping through an angle of 115° . Find the

total area cleaned at each sweep of the blades.

$\left(use\pi = \frac{22}{7}\right)$

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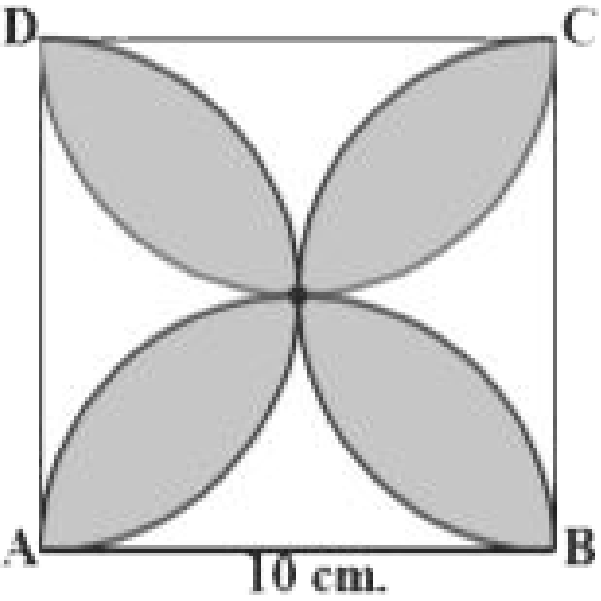
4. Find the area of the shaded region in the adjacent figure, where ABCD is a square of side $10cm$ and semicircles are drawn with each side

of the square as diameter $(use\pi = 3.14)$



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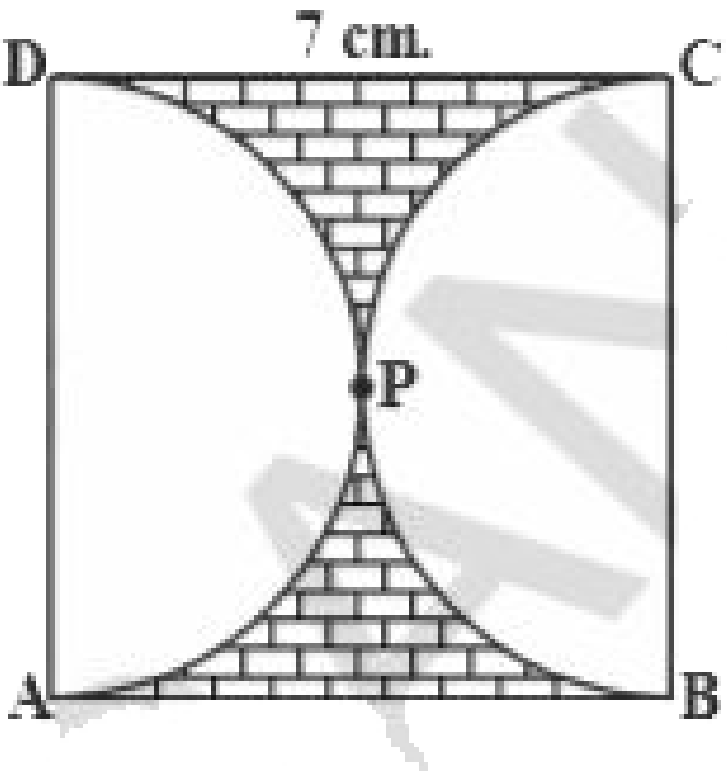
5. Find the area of the shaded region in figure, if ABCD is a square of side $7cm$. And APD and

BPC are semicircles. $\left(use\pi = \frac{22}{7}\right)$



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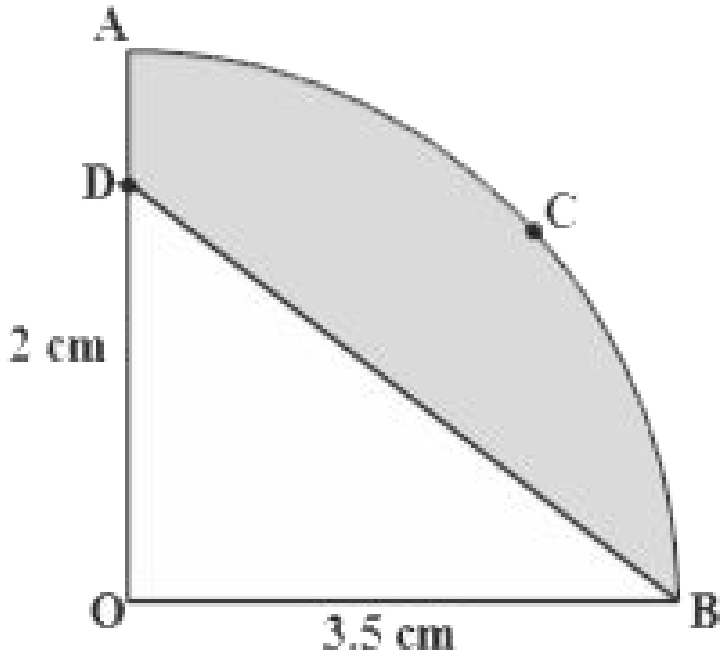
6. In the figure, OACB is a quadrant of a circle with centre O and radius $3.5cm$. If $OD = 2cm$, find the area of the shaded region. $\left(use\pi = \frac{22}{7}\right)$



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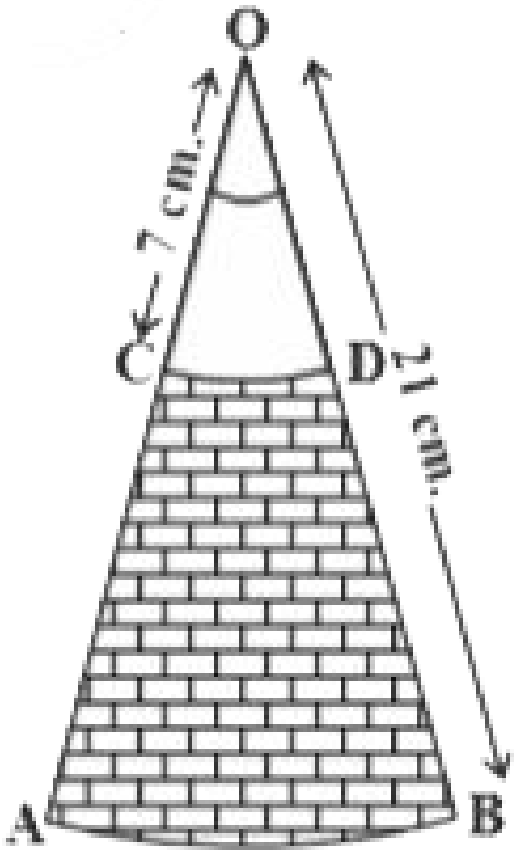
7. AB and CD are respectively arcs to two concentric circles of radii $21cm$ and $7cm$ with centre O (See figure), If $\angle AOB = 30^\circ$, find

the area of the shaded region. $\left(use\pi = \frac{22}{7}\right)$



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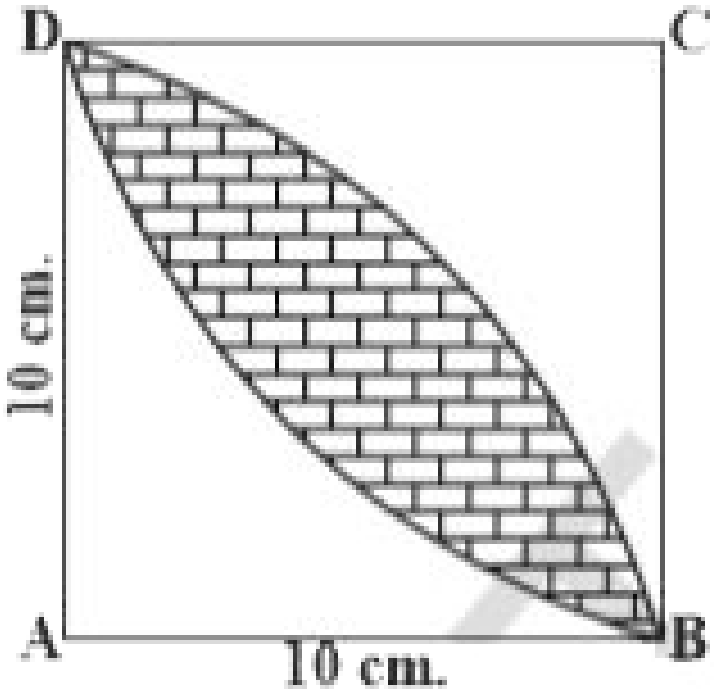
8. Calculate the area of the designed region in figure, common between the two quadrants of the circles of radius $10cm$ each. $(use\pi = 3.14)$



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Optional Exercise

1. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line - segment joining the points of contact at the centre.

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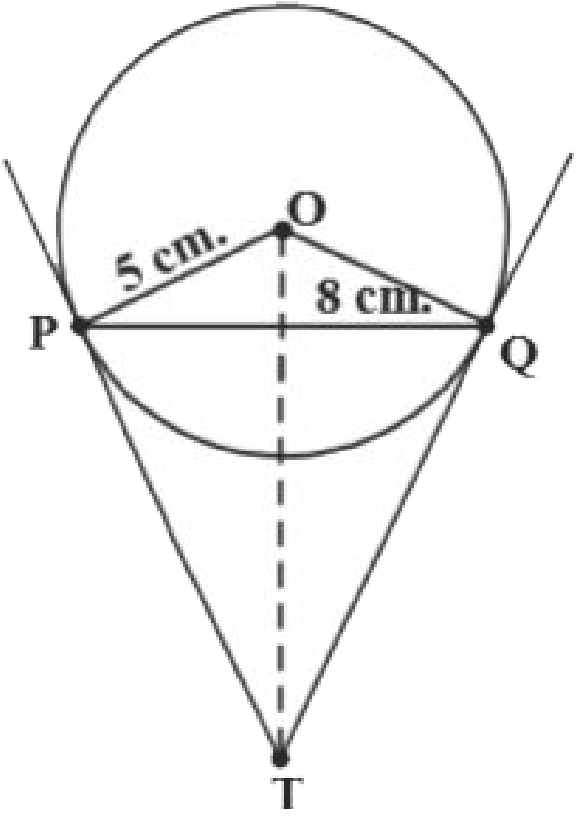
2. PQ is a chord of length $8cm$ of a circle of radius $5cm$. The tangents at P and Q intersect at a point T (See figure). Find the length of TP.



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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.

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4. Let ABC be a right triangle in which $AB = 6cm, BC = 8cm$ and $\angle B = 90^\circ$(. BD is the perpendicular from B on AC. The circle

through B,C,D is drawn. Construct the tangents from A to this circle.

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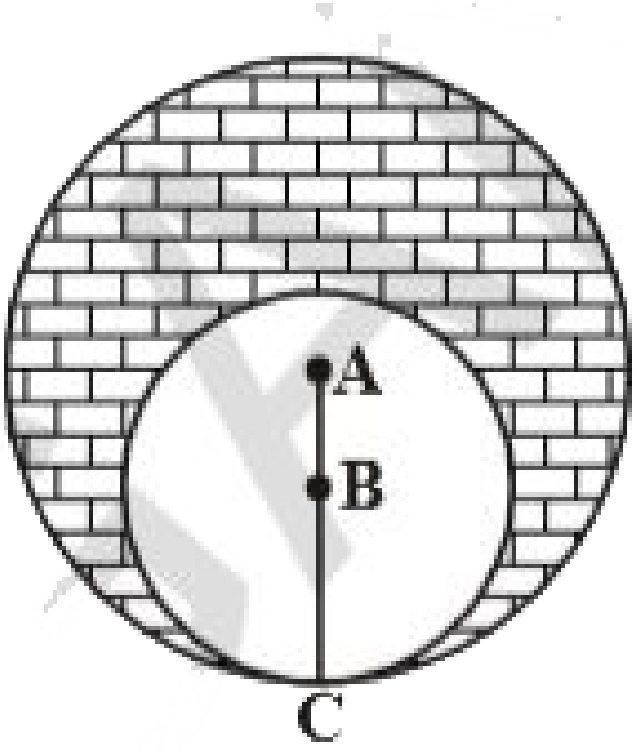
5. Find the area of the shaded region in the figure, in which two circles with centres A and B touch each other at the point C, where

$AC = 8cm$ and $AB = 3cm$



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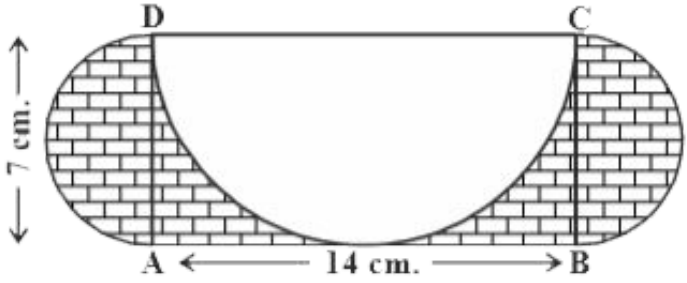

6.

ABCD is a rectangle with $AB = 14cm$ and $BC = 7cm$. Taking DC, BC and AD as diameters, three semicircles are drawn as shown in the figure. Find the area of shaded region.

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What We Have Discussed

1. A Tangent to a circle is a line which touches the circle at only one point.

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2. The tangent at any point of a circle is perpendicular to the radius through the point of contact.

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3. The lengths of the two tangents from an external point to a circle are equal.

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4. To construct the tangents to a circle from a point outside it.

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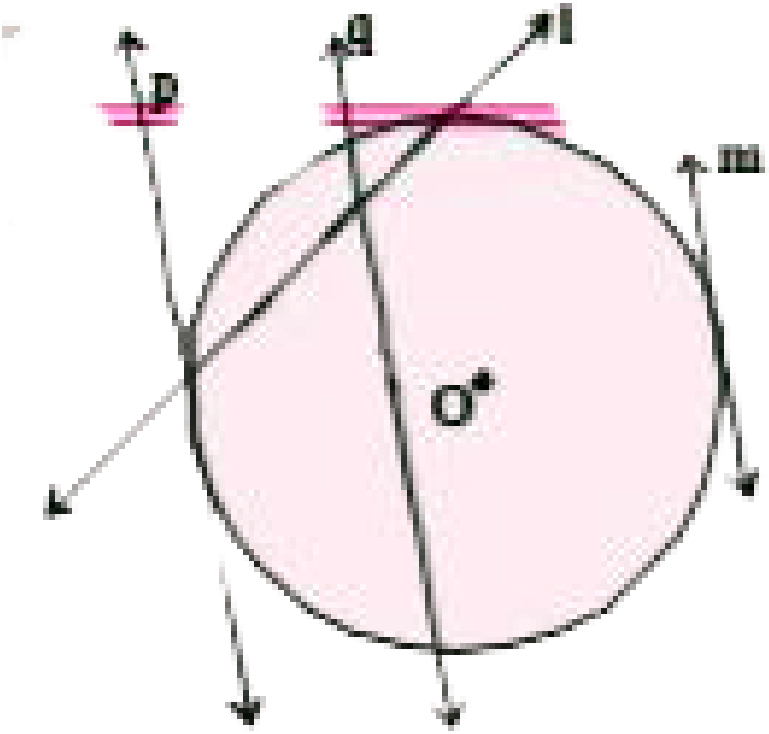
Do This

1. Draw a circle with any radius. Draw four tangents at different points. How many more tangets can you draw to this circle ?



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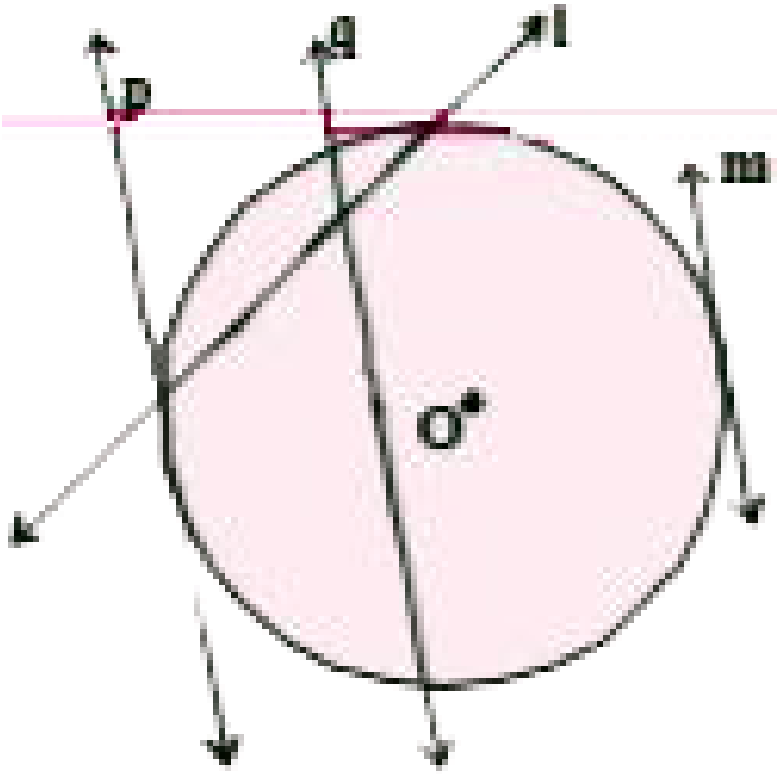
2. How many tangents can you draw to a circle from a point away from it ?



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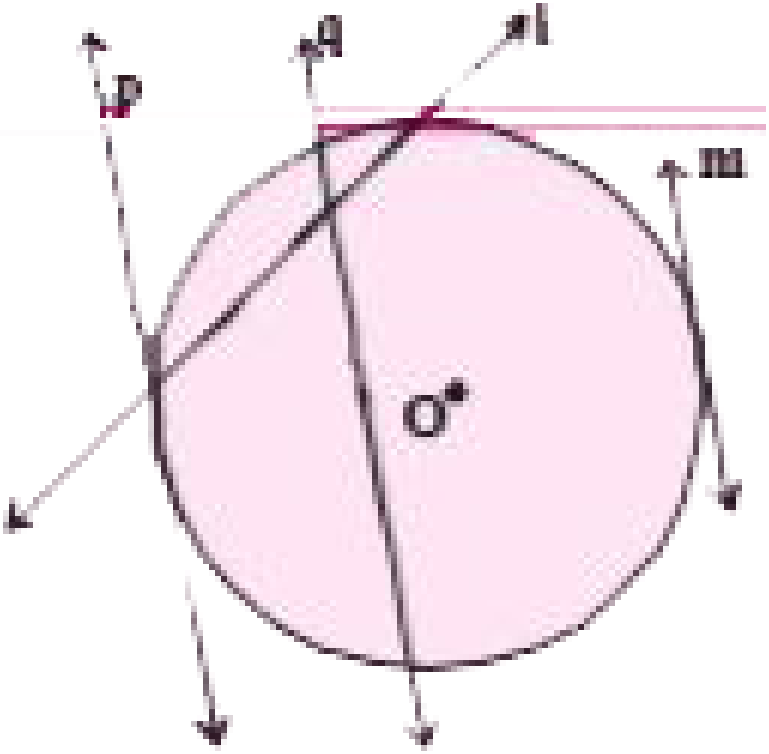
3. In the adjacent figure, which lines are tangents to the circle ?



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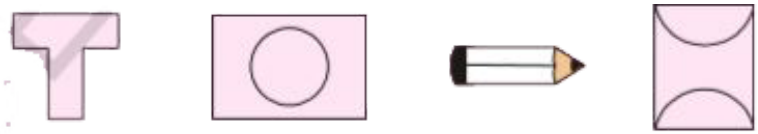
4. Shankar made the following pictures also.



What shapes can they be broken into, of which we can find area easily ?

Make some more pictures and think of the shapes they can be divided into different parts.

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5. Find the area of sector, whose radius is 7 cm. with the given angle :

i. 60° ii. 30° iii. 72° iv. 90° v. 120°

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6. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 10 minutes.

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Try This

1. Draw a pair of radii OA and OB in a circle such that $\angle BOA = 120^\circ$. Draw the bisector of $\angle BOA$ and draw lines perpendiculars to OA and OB at A and B. These lines meet on the bisector of $\angle BOA$ at a point which is the external point and the perpendicular lines are the required tangents. Construct and Justify.

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2. How can you find the area of a major segment using area of the corresponding minor segment ?

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