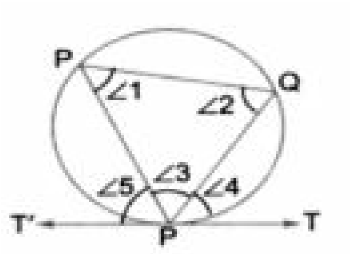
CBSE Test Paper 03

Chapter 11 Construction

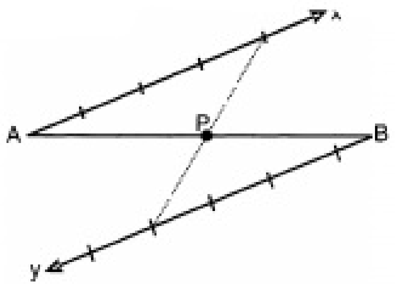
1. In drawing the tangent to circle at a point on it without using the centre of the circle as shown in figure, T’ PT is the tangent, because


(1)
   a. $\angle 2$ = $\angle 5$
   b. $\angle 3$ = $\angle 4$
   c. $\angle 2$ = $\angle 1$
   d. $\angle 3$ = $\angle 1$
2. To draw a pair of tangents to circle which are inclined to each other at an angle of 60^{o}, it is required to draw tangents at endpoints of those two radii of the circle, the angle between them should be : **(1)**
   a. 60o
   b. 135o
   c. 120o
   d. 90o
3. To divide line segment AB in the ratio m:n (where m and n are positive integers), draw a ray AX so that $\angle BAX$ is an acute angle and then mark these points on ray AX at equal distances such that the minimum number of these points is: **(1)**
   a. greater of m and n
   b. m + n
   c. m + n - 1
   d. mn
4. A pair of tangents can be constructed to a circle inclined at an angle of : **(1)**
   a. 205°
   b. 175°
   c. 185°
   d. 195°

5. To divide a line segment AB in the ratio 5 : 7, draw a ray AX such that is$\angle BAX$ an acute angle, then draw a ray BT || AX and mark the points and$A_1, A_2, A_3, \ldots.$ B_1, B_2, B_3,....with$A_1 A_2 = A_2, A_3 = \ldots = BB_1 = B_1 B_2 = B_2 B_3 = \ldots$ on the rays AX and BY respectively. Then, the points to be joined are : **(1)**
    a. $A_5 \ to \ B_2$
    b. $A_7 \ to \ B_5$
    c. $A_2 \ to \ B_5$
    d. $A_5 \ to \ B_7$
6. To draw a tangent at point B to the circumcircle of an isosceles right ΔABC right angled at B, we need to draw through B **(1)**
    a. a line inclined to 60° to AB
    b. a line parallel to AC
    c. a line perpendicular to AB
    d. a line perpendicular to BC
7. To divide a line segment AB in the ratio 5 : 6 draw a ray AX such that $\angle BAX$ is an acute angle, then draw a ray BY parallel to AX and the points $A_{11}, A_{12}, A_{13}, \ldots$ and $B_{11}, B_{12}, B_{13}, \ldots.$ are located equal distances on ray AX and BY respectively. Then the points joined are: **(1)**
    a. A_5 and B_6
    b. A_4 and B_5
    c. A_5 and B_4
    d. A_6 and B_5
8. To construct a triangle similar to given ΔABC with its sides of $\frac{7}{4}$ the corresponding sides of ΔABC, with a ray BX such that $\angle CBX$ is an acute angle and X is on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on ray BX is : **(1)**
    a. 4
    b. 7
    c. 3
    d. 3

9. When are the two triangles said to be similar? **(1)**

10. In given figure, in what ratio does P divides AB internally? **(1)**



11. A line Segment AB is divided at point P such that $\frac{PB}{AB} = \frac{3}{7}$, then find the ratio AP : PB. **(1)**

12. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 45°. **(2)**

13. Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its center. Draw tangents to the circle from these points P and Q. **(2)**

14. Construct the pair of tangents form a point 3 cm away from the centre of a circle of radius 2cm and measures their tangents. **(2)**

15. Draw a circle of radius 4cm from a point P, 7cm from the centre of the circle, draw a pair of tangents to the circle measure the length of each tangent segment. **(2)**

16. Prove that the tangents drawn at the ends of a chord of a circle make equal angles with chord. **(2)**

17. Divide a line segment of length 8 cm internally in the ratio 3:4. **(3)**

18. Construct tangents to a circle of radius 3 cm from a point on concentric circle of radius 5 cm and measure its length. **(3)**

19. Draw a pair of tangents to a circle of radius 4.5 cm, which are inclined to each other at an angle of 45°. **(3)**

20. Draw a right angled triangle PQR, right angled at Q in which the sides PQ and QR are of lengths 4 cm and 3 cm, respectively. Then, construct another triangle whose sides are $\frac{3}{5}$ times of the corresponding sides of given triangle. Justify your construction. **(3)**

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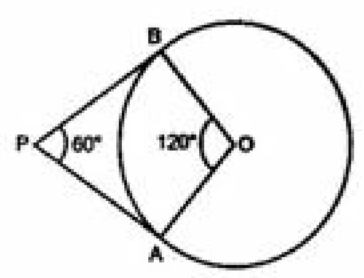
Solution

1. a. $\angle 2 = \angle 5$
   Explanation: By using the concept of the sum of the interior angle of the triangle and linear pair angle. To draw a tangent to a circle at a point on it without using the centre of the circle as shown in the figure, we draw a line segment T'PT such that $\angle 2 = \angle 5$. Then T'PT will be a tangent.

2. c. 120^{o}
   Explanation: According to the question, the angle between the radii should be 180^{o} - 60^{o} = 120^{o}

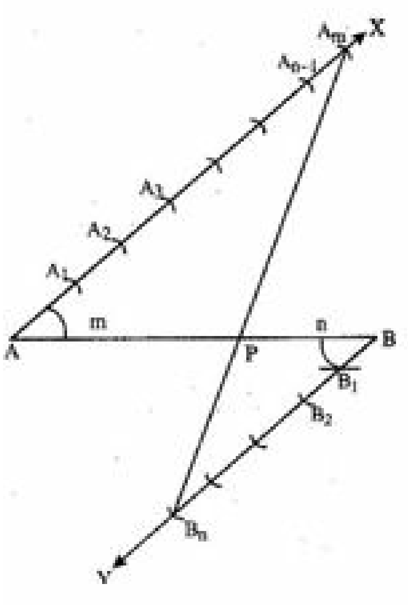


3. b. m + n
   Explanation: To divide line segment AB in the ratio m:n (m, n are positive integers), draw a ray AX so that is $\angle BAX$ an acute angle and then mark points on ray AX at equal distances such that the minimum number of these points is (numerator + denominator) i.e. m + n.

4. b. 175°
   Explanation: If the angle between the pair of tangents is always greater than 0 or less than 180°, then we can construct a pair of tangents to a circle. Hence, we can draw a pair of tangents to a circle inclined at an angle of 175°.

5. d. $A_5\ to\ B_7$
   Explanation: According to the question, the points to be joined are A_5 to B_7 because if we have to divide a line segment AB in the ratio m:n, then we draw rays AX and BY and mark the points A_1, A_2, ..., Am and $\mathbf{B_1}$, $\mathbf{B_2}$, **....**, $\mathbf{B_n}$ on rays AX

and BY respectively. Then we join the point A_m to B_n

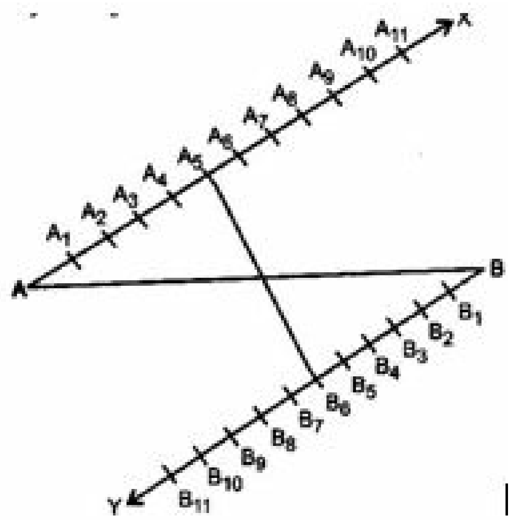


6. b. a line parallel to AC

Explanation: To draw a tangent at point B to the circumcircle of an isosceles right ΔABC right angled at B, we need to draw through B in parallel to AC.

7. a. A_5 and B_6

Explanation:



According to the question, the point joined are A_5 and B_6 . The point where A_5B_6 intersects the given line is the required point.

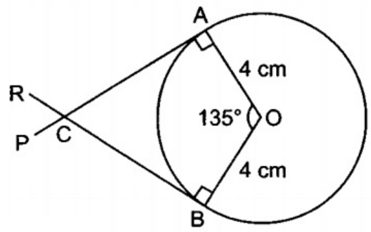
8. b. 7

Explanation: When numerator is greater than the denominator, the number of arcs should be drawn larger of m and n. Therefore, according to the question, the minimum number of points to be located at equal distances on ray BX is 7.

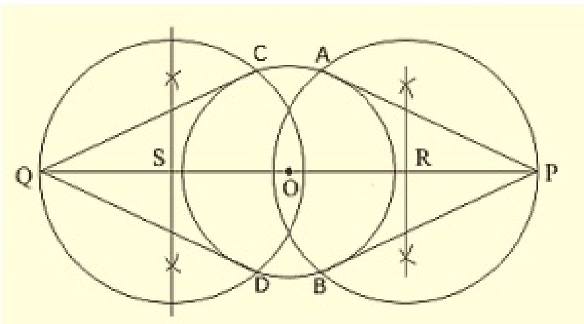
9. We have to say when two triangles are similar.
   Two triangles are said to be similar when their corresponding sides are proportional or angles are equal.

10. P divides AB internally in the ratio 4 : 4
    $\Rightarrow \frac{4}{4} = \frac{1}{1}$
    $\Rightarrow$ 4 : 4 = 1 : 1.

11. A line Segment AB is divided at point P such that $\frac{PB}{AB} = \frac{3}{7}$, then we have to find the ratio AP : PB.
    Here, AB = 7,PB = 3
    $\therefore$AP = AB - PB = 7 - 3 = 4
    $\therefore$ AP : PB = 4 : 3

12. 

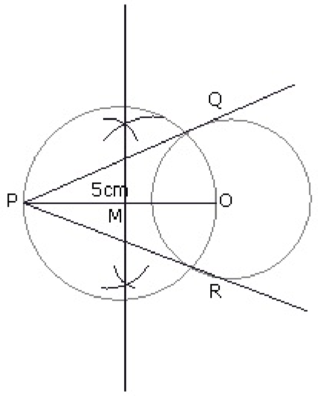
    Steps of Construction:
    i. Draw a circle with centre O and radius = 4 cm.
    ii. Draw any radius OA.
    iii. Draw another radius OB such that $\angle$AOB = 180° - 45° = 135°
    iv. At point A draw AP $\perp$ OA.
    v. At point B draw BR $\perp$ OB, intersecting AP at C. AC and BC are required tangents.

13. 

    Steps of construction:
    i. Draw a line segment PQ of 14 cm.
    ii. Take the midpoint O of PQ.
    iii. Draw the perpendicular bisectors of PO and OQ which intersects at points R and S.

iv. With center R and radius RP draw a circle.
v. With center S and radius, SQ draw a circle.
vi. With center O and radius 3 cm draw another circle which intersects the previous circles at the points A, B, C, and D.
vii. Join PA, PB, QC, and QD.
So, PA, PB, QC, and QD are the required tangents.

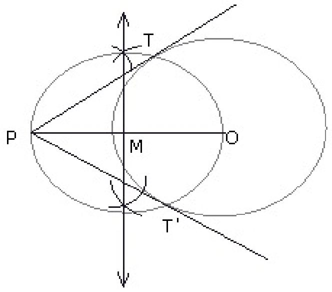
14.



Steps of construction:

i. Draw a circle with centre O and radius 2cm.
ii. Draw line segment OP = 5 cm.
iii. Bisect OP, let the point of bisection be M.
iv. Taking M as a centre and OM radius draw a circle which intersect the given circle at Q and R.
v. Join PQ and PR.
vi. Length of tangents PQ = PR = 4.6 cm.

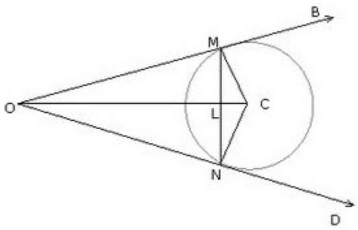
15.



Steps of construction:

i. Take a point O in the plane of a paper and draw a circle of the radius 4 cm.
ii. Make a point P at a distance of 7cm from the centre O and Join OP.
iii. Bisect the line segment OP. Let M be the mid-point of OP.
iv. Taking M as a centre and OM as radius draw a circle to intersect the given circle at the points, T and T'.
v. Join PT and PT', then PT and PT' are required tangents.

PT = PT' = 5.75 cm

16. 

Let NM be chord of circle with centre C.

Let tangents at M.N meet at the point O.

Since OM is a tangent

$\therefore OM \perp CM$ i.e. $\angle OMC = 90^{\circ}$

$\because ON$ is a tangent

$\therefore ON \perp CN$ i.e. $\angle ONC = 90^{\circ}$

Again in $\triangle CMN . CM = CN = r$

$\therefore \angle CMN = \angle CNM$

$\therefore \angle OMC - \angle CMN = \angle ONC - \angle CNM$

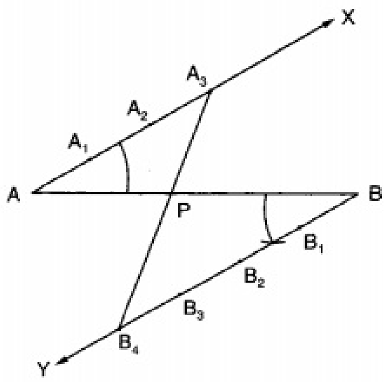
$\Rightarrow \angle OML = \angle ONL$

Thus, tangents make an equal angle with the chord.

17. **Steps of construction**

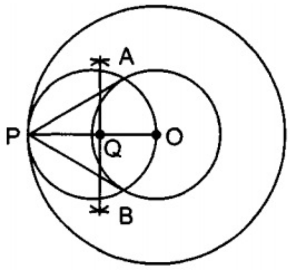
1. Draw the line segment AB of length 8 cm.
2. Draw any ray AX making an acute angle $\angle$BAX with AB.
3. Draw a ray BY parallel to AX by making $\angle ABY$ equal to $\angle BAX.$
4. Mark the three point A_1, A_2, A_3 on AX and 4 points B_1, B_2, B_3, B_4 on BY such that

   $AA_1 = A_1A_2 = A_2A_3 = BB_1 = B_1B_2 = B_2B_3 = B_3B_4$.



5. Join A_3 B_4. Suppose it intersects AB at a point P.

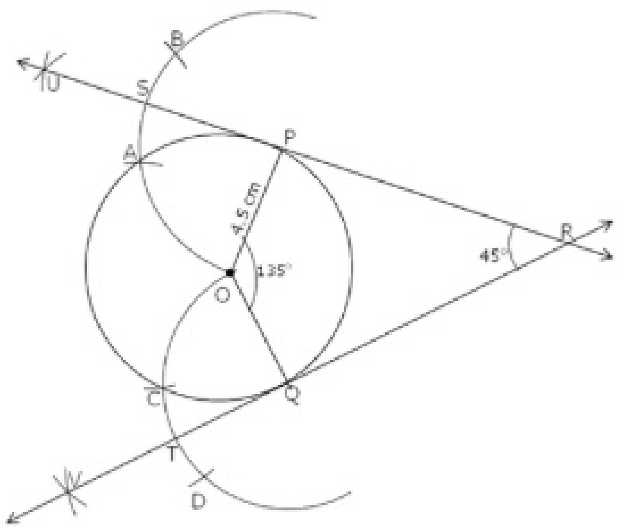
   Then, P is the point dividing AB internally in the ratio 3:4.

18. 

Steps of Construction:

i. With O as centre a circle of radius 3 cm is drawn.
ii. With same centre O another circle of radius 5 cm is drawn.
iii. A point P is taken on outer circle and OP is joined.
iv. Perpendicular bisector of OP is drawn intersecting OP at Q.
v. With Q as centre and OQ as radius a circle is drawn intersecting the smaller circle at A and B.
vi. PA and PB is joined.
vii. PA and PB are the required tangents.
Length of tangent = 4 cm.

19. Steps of construction:-



i. Draw a circle having a centre O and a radius of 4.5 cm.
ii. Take point P on the circle and join OP.
iii. Angle between the tangents = 45°
Hence, the angle at the centre
$= 180^{\circ} - 45^{\circ} = 135^{\circ}$ (supplement of the angle between the tangents)
$\therefore$ Construct $\angle POQ = 135^{\circ}$
iv. Keeping a radius of 4.5 cm, draw arcs of circle taking the points P, and Q as the centres.

v. Name the points of intersection of arcs and circle as A and C respectively.
vi. Taking A as the centre and with the same radius mark B such that OA = AB.
vii. Similarly, taking C as the centre and with the same radius mark D such that OC = CD.
viii. Taking A and B as the centres and the same radius draw two arcs intersecting each other at U.
ix. Join P, S and U and extend it on both the sides to draw a tangent at point P.
x. Taking C and D as the centres and the same radius draw two arcs intersecting each other at V.
xi. Join Q, T and V and extend it on both the sides to draw a tangent at point Q.
xii. Extended tangents at P and Q intersect at R.
xiii. Hence, the required tangents are UR and VR such that the angle between them is 45° .

20. Given, a right angled $\triangle PQR$, in which $PQ = 4$ cm and $QR = 3$cm.
Here, scale factor = $\frac{3}{5} < 1$
Steps of construction:
i. Draw a line segment $QP = 4$ cm.
ii. Make an angle of 90^o at point Q and cut off $QR = 3$ cm from it.
iii. Join PR. Thus, $\triangle PQR$ is the given right angled triangle.
iv. Now, from B, draw a ray QX making an acute $\angle PQY$ on the opposite side of vertex R.
v. Mark five points Q_1, Q_2, Q_3, Q_4, Q_5 on QX such that $QQ_1 = Q_1Q_2 = Q_2Q_3 = Q_3Q_4 = Q_4Q_5$
vi. Join Q_5P
vii. From point Q_3, draw $Q_3P' \parallel Q_5P$ intersecting line segment QP at P'
viii. From point P, draw $P'R' \parallel PR$ intersecting the line segment PR at R'
Thus, $\triangle P'QR'$ is the required triangle.