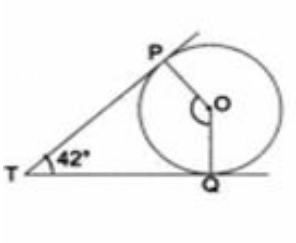
CBSE Test Paper 02

Chapter 11 Construction

1. Point E bisects the line segment PQ in the ratio: **(1)**
   a. $3:5$
   b. $3:6$
   c. $2:3$
   d. $1:1$
2. If PT, QT are two tangents to a circle with centre O such that $\angle PTQ = 42^o$, then $\angle POQ =$ **(1)**



   a. 48^o
   b. 84^o
   c. 42^o
   d. 138^o
3. In division of a line segment AB, any ray AX making angle with AB is: **(1)**
   a. Right angle
   b. Acute angle
   c. Obtuse angle
   d. Any arbitrary angle
4. By geometrical construction, which of the following is possible to divide a line segment in the given ratio? **(1)**
   a. $(\sqrt{3}-2):\left(\sqrt{3}+2\right)$
   b. $\left(2+\sqrt{3}\right):\left(2-\sqrt{3}\right)$
   c. $\sqrt{6}:2$
   d. $\sqrt{5}:\frac{1}{\sqrt{5}}$
5. 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 endpoints of those two radii of the circle, the

angle between them should be **(1)**

a. 90°
b. 100°
c. 60°
d. 135°

6. To divide a line segment AB in the ratio 5: 7, first a ray AX is drawn so that $\angle BAX$ is an acute angle and then at equal distances points are marked on the ray AX such that the minimum number of these points is **(1)**

a. 8
b. 11
c. 10
d. 12

7. To draw a pair tangents to a circle which are inclined to each other at an angle of 70^o, it is required to draw tangents at endpoints of those two radii of the circle, the angle between them should be: **(1)**

a. 90^o
b. 120^o
c. 20^o
d. 110^o

8. To divide a line segment AB in the ratio 4 : 7, a ray AX is drawn first such that $\angle BAX$ is an acute angle and then points A_1, A_2, A_3 ..... are located at equal distances on the ray AX and the point B is joined to: **(1)**

a. A_{12}
b. A_{10}
c. A_9
d. A_{11}

9. When construction of a triangle similar to a given triangle in the scale factor $\frac{5}{3}$, then what is the nature of a given triangle? **(1)**

10. To construct a triangle similar to a given $\triangle ABC$ with its sides $\frac{8}{5}$ times of the corresponding sides of $\triangle ABC$, draw a ray BX such that $\angle CBX$ is an acute angle and X is on the opposite side of A with respect to BC. How many minimum number of

points to be located at equal distances on ray BX? **(1)**

11. In drawing a triangle, if AB = 3 cm, BC = 2 cm and AC = 6 cm. What is the possibility that a triangle cannot be drawn? **(1)**

12. Draw a pair of tangents to a circle of radius 5cm which are inclined to each other at 60^{o}. **(2)**

13. Construct a triangle similar to a given equilateral $\triangle$PQR with side 5 cm such that each of its side is $\frac{6}{7}$ of the corresponding sides of $\triangle$PQR. **(2)**

14. Draw a circle of radius 4cm with centre O. Draw a diameter POQ. Through P or Q draw a tangent to the circle. **(2)**

15. 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. **(2)**

16. Draw a triangle ABC with sides BC = 6.3cm, AB = 5.2cm and $\angle ABC = 60^{\circ}$. Then construct a triangle whose sides are times $\frac{4}{3}$ the corresponding sides of $\triangle ABC$ **(2)**

17. Construct a $\triangle$ABC in which BC = 8 cm, $\angle B = 45^{\circ}$ and $\angle C = 30^{\circ}$. Construct another triangle, similar to $\triangle$ ABC such that its sides are $\frac{3}{4}$ of corresponding sides of $\triangle$ ABC. **(3)**

18. Draw a ΔABC in which BC = 6 cm, AB = 4 cm and AC = 5 cm. Draw a triangle similar toΔABC with its sides equal to (3/4)$^{\text{th}}$ of the corresponding sides ofΔABC. **(3)**

19. Construct a rhombus ABCD in which AB = 4 cm and $\triangle$ABC = 60°. Divide it into two triangles ABC and ADC. Construct the triangle AB'C' similar to $\triangle$ABC with scale factor $\frac{2}{3}$. Draw a line segment CD' parallel to CD, where D' lies on AD. Is AB'C'D' a rhombus? Give reasons. **(3)**

20. Take a point O on the plane of the paper. With O as centre, draw a circle of radius 3 cm. Take a point P on this circle and draw a tangent at P. **(3)**

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Solution

1. d. $1:1$

   Explanation: We know that point E bisects line segment PQ so,

   $PE = QE$

   or, $\frac{PE}{QE} = \frac{1}{1}$

   or, $PE : QE = 1:1$

2. d. 138^o

   Explanation: As, OPTQ is a quadrilateral the sum of four angles are

   $\angle OPT$ and $\angle OQT$ are 90^o as tangents makes 90^o with radius of their touching points. So.

   $\angle POQ = ((360 - (90 + 90 + 42))$

   $\Rightarrow \angle POQ =$(360^o - 212^o) = 138^o

3. b. Acute angle

   Explanation: In division of a line segment AB, any ray AX making angle with AB is an acute angle always because of path of ray.

4. d. $\sqrt{5} : \frac{1}{\sqrt{5}}$

   Explanation: A line segment can be divided into the ratio $\sqrt{5} : \frac{1}{\sqrt{5}}$ because the ratio should be whole numbers.

   $\Rightarrow \sqrt{5} : \frac{1}{\sqrt{5}} = \frac{\sqrt{5} \times \sqrt{5}}{1} = \frac{5}{1}$

   = 5:1

5. b. 100^o

   Explanation: As the sum of four angles of a quadrilateral is 360° and each of, makes 90°

   Then the angle at the centre $((360 - (90 + 90 + 80))$

   =$360 - 260$

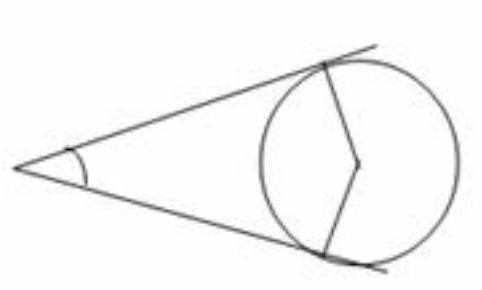
   $= 100^\circ$

6. d. 12

Explanation: According to the question, the minimum number of those points which are to be marked should be (Numerator + Denominator) i.e., 5 + 7 = 12

7. d. 110^o

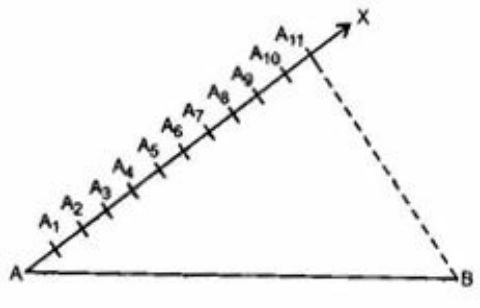
Explanation:



According to the question, the angle between the radii should be 180^o - 70^o = 110^o

8. d. A_{11}

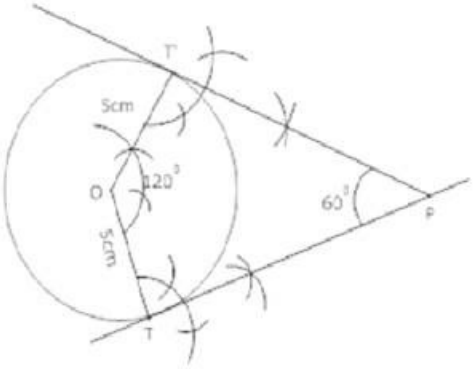
Explanation: According to the question, point B is joined to A11.



9. When construction of a triangle similar to a given triangle in the scale factor $\frac{5}{3}$, then the nature of a given triangle is new triangle is bigger than the original traingle.

10. Let's take corresponding sides of the new triangle be $\frac{m}{n}$
The minimum number of points to be located at an equal distance is equal to the greater of m and n, in $\frac{m}{n}$.
Here, $\frac{m}{n} = \frac{8}{5}$ and 8 > 5.
So, the minimum number of points to be located at equal distances on ray BX is 8.

11. When AB + BC < AC, triangle cannot be drawn, because in any triangle, sum of any two sides is greater than the third side.
3 cm + 2 cm < 6 cm.
Hence ΔABC cannot be drawn.

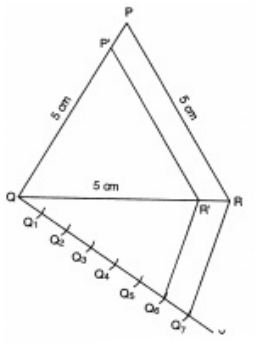
12. 

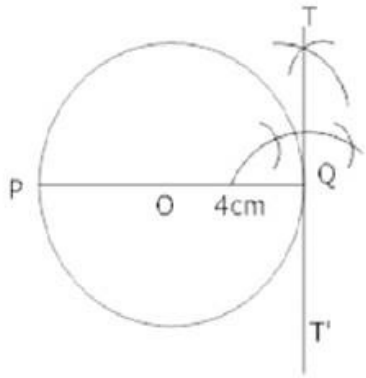
Steps of construction:

i. Draw a circle with centre O and radius 5 cm.
ii. Draw any radius OT.
iii. Construct. $\angle TOT' = 180^\circ - 60^\circ = 120^\circ$
iv. Draw and $TP \perp OT\ T'P \perp OT'$. Then PT' and PT are the two required tangents such that. $\angle TPT' = 60^\circ$ Here, PT = PT'.

13. We have to Construct a triangle similar to a given equilateral $\triangle$PQR with side 5 cm such that each of its side is $\frac{6}{7}$ of the corresponding sides of $\triangle$PQR. We write the steps of construction as follows:
Steps of construction :

i. Draw a line segment QR = 5 cm.
ii. With Q as centre and radius = PQ = 5 cm, draw an arc.
iii. With R as centre and radius = PR = 5 cm, draw another arc meeting the arc drawn in step 2 at the point P.
iv. Join PQ and PR to obtain $\triangle$PQR.
v. Below QR, construct an acute $\angle$RQX,
vi. Along QX, mark off seven points Q_1,Q_2, ... Q_7 such that $QQ_1 = Q_1Q_2 = Q_2Q_3 ..... = Q_6Q_7$
vii. Join Q_7R.
viii. Draw Q_6R'||Q_7R.
ix. From R' draw R'P' || RP.
Hence, P'QR' is the required triangle.

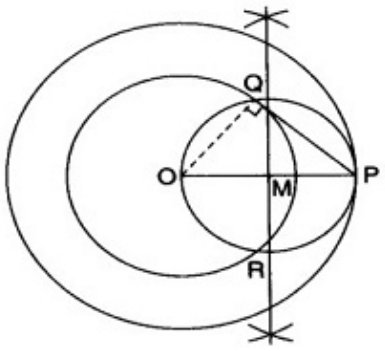


14. 

Steps of construction:

i. Draw a circle of radius 4 cm.
ii. Draw diameter POQ.
iii. Construct. $\angle PQT = 90^\circ$
iv. Produce PQ to T', then TQT' is the required tangent at the point Q.

15. Required: To 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 to verify the measurement by actual by actual calculation.



Steps of construction :

i. join PO and bisect it, Let M be the mid-point of PO.

ii. Taking M as centre and MO as radius, draw a circle. Let it intersect the given circle at the point Q and R.

iii. Join PQ

Then PQ is the required tangent. By measurement, PQ = 4.5 cm By actual calculation,

$\mathrm{PQ} = \sqrt{\mathrm{OP}^2 - \mathrm{OQ}^2}$ [By Pythagoras Theorem]

$= \sqrt{(6)^2 - (4)^2}$

$= \sqrt{36 - 16} = \sqrt{20}$

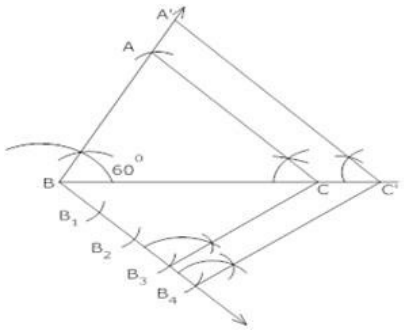
= 4.47 cm

Justification: Join OQ. Then $\angle \mathrm{PQO}$ is an angle in the semicircle and, therefore, $\angle PQO = 90^\circ$

$\Rightarrow \quad \mathrm{PQ} \perp 0Q$

Since OQ is a radius of the given circle, PQ has to be a tangent to the circle.

16.



Steps of construction:

i. Draw a line segment BC = 6.3cm.

ii. At B make $\angle CBX = 60^\circ$

iii. With B as centre and radius equal to 5.2cm, draw an arc intersecting BX at A.

iv. Join AC, then $\triangle$ABC is the required triangle.

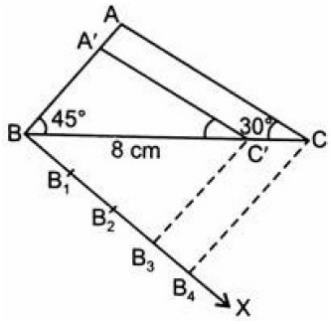
v. Draw any ray by making an acute angle with BC on the opposite side to the vertex A.

vi. Locate the points B_1, B_2, B_3 and B_4 on BY so that $BB_1 = B_1B_2 = B_2B_3 = B_3B4$.

vii. Join B_3 to C and draw a line through B_4 parallel to B_3C intersecting the extended line segment BC at C'.

viii. Draw a line through C' parallel to CA intersecting the extended line segment BA at A'.

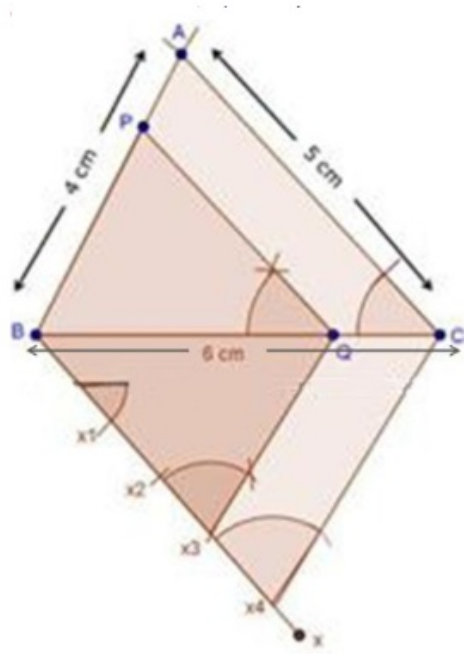
Thus, $\triangle$A'BC' is the required triangle.

17. 

Steps of construction:

i. Draw a line segment BC = 8 cm.
ii. Construct $\angle B$ = 45° at point B.
iii. Again construct $\angle C$ = 30 ° at point.
iv. Line segment from the angles B and C, when produced, meet at A.
v. Hence, $\triangle$ABC is constructed.
vi. Now , Draw an acute angle CBX opposite to point A.
vii. Take points B_1, B_2, B_3 & B_4 at ray BX such that $BB_1=B_1B_2=B_2B_3= B_3B_4=\frac{1}{4} BB_4$.....(1)
viii. Join B_4C
ix. Draw B_3C' parallel to B_4C meeting BC at C'.
x. Draw C'A' parallel to CA, meeting BA at A'.
xi. A'B'C' is required triangle.

18. Steps of construction

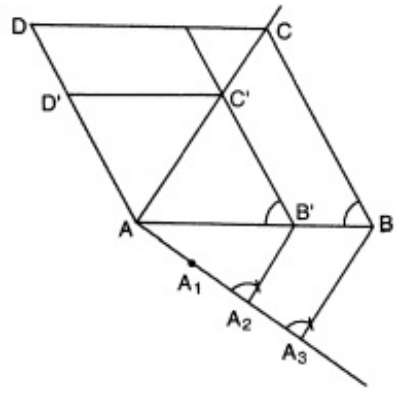


i. Draw a line segment BC of 6 cm.
ii. With centres B and C, and radii 4 cm and 6 cm respectively draw two arcs which intersect each other at A.
iii. Join AB and AC.
iv. At B, draw $\angle CBX$ of any measure.
v. Starting from B, cut 4 equal parts on BX such that $BX_1 = X_1X_2 = X_2X_3 = X_3X_4$
vi. Join X_4C
vii. Through X_3, draw X_3 Q || X_4C
viii. Through Q, draw QP || CA
$\therefore \triangle PBQ \sim \triangle ABC$

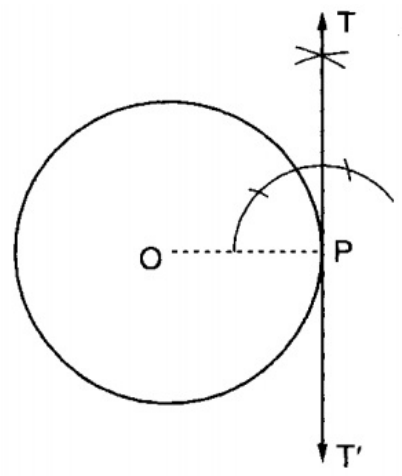
19. The steps of construction :

a. The rhombus ABCD is drawn in which AB = 4 cm and ∠ABC = 60°.
b. Join AC. ABCD is divided into two triangles ABC and ADC.
c. Construct triangle AB'C' similar to ABC with scale factor $\frac{2}{3}$.
d. Draw the line segment C'D' parallel to CD.

It can be observed that:
$\frac{AB'}{AB} = \frac{2}{3} = \frac{AC'}{AC}$
Also, $\frac{AC'}{AC} = \frac{CD'}{CD}$
$= \frac{AD'}{AD} = \frac{2}{3}$
Therefore, AB' = B'C = CD' = AD' = $\frac{2}{3}$ AB



20. We follow the following steps:



Steps of construction

STEP I Take a point O on the plane of the paper and draw a circle of given radius 3 cm.

STEP II Take any point P on the circle and join OP.

STEP III Construct $\angle OPT$ = 90°.

STEP IV Produce TP to T ' to obtain the required tangent TPT '.