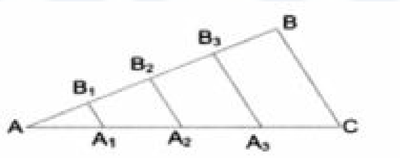
CBSE Test Paper 01

Chapter 11 Construction

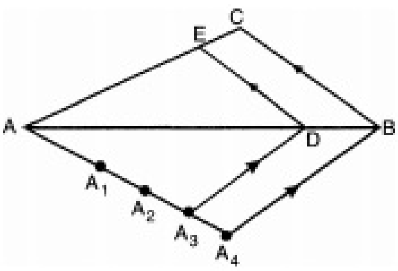
1. To divide a line segment PQ in the ration 7 : 3 internally, first a ray PX is drawn so that $\angle QPX$ is an acute angle and then at equal distances, points are marked on the ray PX such that the minimum number of these points is : **(1)**
   a. 7
   b. 3
   c. 4
   d. 10
2. Which theorem criterion we are using in giving the justification of the division of a line segment by usual method? **(1)**
   a. Basic Proportionality theorem
   b. SSS criterion
   c. Pythagoras theorem
   d. Area theorem
3. In the given figure, $AA_1 = A_1A_2 = A_2A_3 = A_3C$

   IF $B_1A_1 \parallel CB$, then A_1 divides AC in the ratio **(1)**

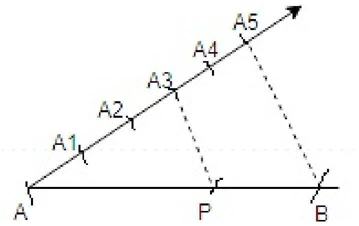
   a. 4 : 1
   b. 1 : 3
   c. 1/4
   d. 1 : 2
4. To divide a line segment AB internally in the ratio 4 : 7, first a ray AX is drawn so that $\angle BAX$ is an acute angle and then at equal distances, points are marked on ray AX such that the minimum number of these points are: **(1)**
   a. 9
   b. 11
   c. 10
   d. 12

5. A pair of tangents of 6cm long can be constructed from a point P to a circle of radius 8 cm situated at a distance of .... from the centre **(1)**
   a. 10 cm
   b. 8cm
   c. 7.5cm
   d. 2cm
6. The construction of a triangle, similar and larger to a given triangle as per given scale factor $m : n$, is possible only when **(1)**
   a. $m < n$
   b. $m = n$
   c. Independent of scale factor
   d. $m > n$
7. To divide a line segment AB in the ration 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}
8. To draw a pair of tangents to a circle which are at right angles to each other, it is required to draw tangents at end points of the two radii of the circle, which are inclined at an angle of **(1)**
   a. 45^o
   b. 120^o
   c. 60^o
   d. 90^o
9. In figure, $\triangle$ADE is constructed similar to $\triangle$ABC, write down the scale factor. **(1)**

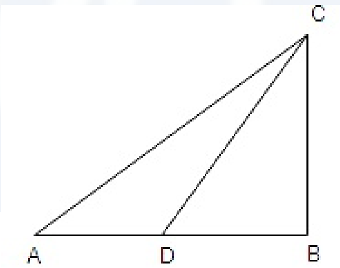


10. Find the ratio of division of the line segment AB by the point P from A in the following

figure. **(1)**



11. To divide the line segment AB in the ratio 2: 3, a ray AX is drawn such that ∠BAX is acute, AX is then marked at equal intervals. Find a minimum number of these marks. **(1)**
12. Draw a circle of radius 2.5 cm. Take a point P on it. Construct a tangent at the point P. **(2)**
13. Construct a triangle with sides 5 cm, 6 cm and 7 cm and then another triangle whose sides are of $\frac{7}{5}$ the corresponding sides of the first triangle. **(2)**
14. Draw two tangents to a circle of radius 3.5 cm from a point P at a distance of 6.2 cm from its centre. **(2)**
15. Draw a right angled ΔABC in which BC = 12 cm, AB = 5 cm, and ∠B = 90°. Construct a triangle similar to it and of scale factor $\frac{2}{3}$. Is the new triangle also a right triangle? **(2)**
16. In the given figure , if CD = 17 m , BD = 8 m and AD = 4 cm, find the value of AC. **(2)**



17. Construct a $\triangle ABC$ in which AB = 6.5cm $\angle B = 60^\circ$ and BC = 5.5 cm. Also, construct a $\triangle AB'C'$ similar to $\triangle ABC$ whose each side is $\frac{3}{2}$ times the corresponding sides of the $\triangle ABC$. **(3)**
18. Construct a tangent to a circle of radius 4cm from a point on the concentric circle of radius 6cm. **(3)**
19. Draw a right triangle in which the sides 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. **(3)**
20. Draw a line segment of length 7.6 cm and divide it in the ratio 5 : 8. Measure the two parts. **(3)**

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Solution

1. d. 10

   Explanation: According to the question, the minimum number of those points which are to be marked should be (Numerator + Denominator) i.e., 7 + 3 = 10

2. a. Basic Proportionality theorem

   Explanation: The intercept theorem, also known as Thales' theorem or basic proportionality theorem, is an important theorem in elementary geometry about the ratios of various line segments that are created if two intersecting lines are intercepted by a pair of parallels. It is equivalent to the theorem about ratios in similar triangles.

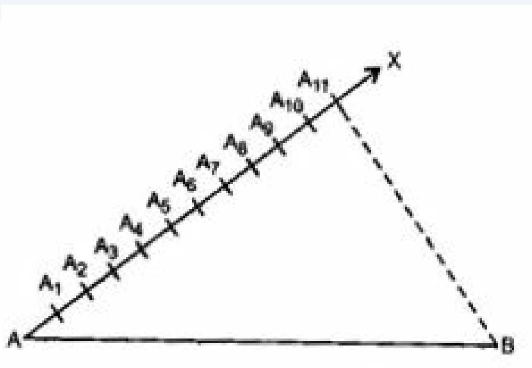
3. c. 1/4

   Explanation: In the figure, $AA_1 = A_1\ A_2 = A_2A_3 = A_3C$

   = 1/4

4. b. 11

   Explanation: According to the question, the minimum number of those points which are to be marked should be (Numerator + Denominator) i.e. 4 + 7 = 11



5. a. 10cm

   Explanation: As the tangent makes right angled triangle with the distance from centre and the radius at the point of touching it makes 90° .now the distance from centre is hypotenous= $\sqrt{8^2+6^2}cm = \sqrt{100}cm = 10cm$

6. d. m > n

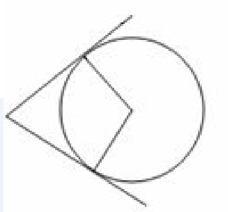
   Explanation: The construction of a triangle, similar and larger to a given triangle as per given scale factor, m:n is possible only when.

Because We have to construct a similar and larger triangle so that side of this triangle should be larger to the given triangle.

7. d. A_{11}

Explanation: To divide a line segment AB in the ratio m:n (when m > n), a ray AX is drawn such that $\angle$BAX is an acute angle and then points A_1, A_2, A_3...A_m, ...A_n.... are located at equal distances on the ray AX and then the point B is joined to

8. d. 90^o

Explanation: 

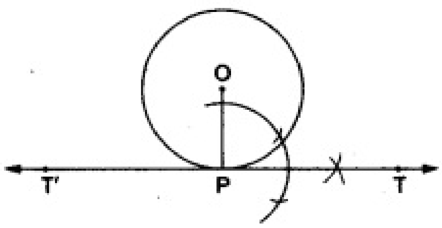
According to the question, the tangents are inclined at an angle of 180^o - 90^o = 90^o

9. $\triangle$ADE is constructed similar to $\triangle$ABC, we have to write down the scale factor.
Scale factor = $\frac{3}{4}$

10. $\frac{AP}{PB} = \frac{3}{2}$
AP : PB = 3 : 2

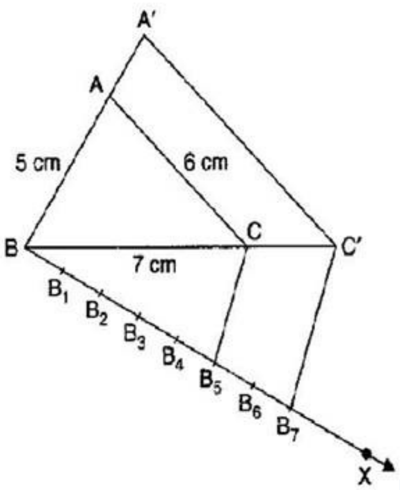
11. The line segment AB in the ratio 2: 3.
So, minimum number of marks = 2 + 3 = 5

12. **STEPS OF CONSTRUCTION**
    1. Draw a circle of radius 2.5 cm taking a point O as its centre.
    2. Mark a point P on this circle.
    3. Join OP.



4. Construct ∠OPT = 90°
5. Produce TP to T'.

Then T'PT is the required tangent.

13. 

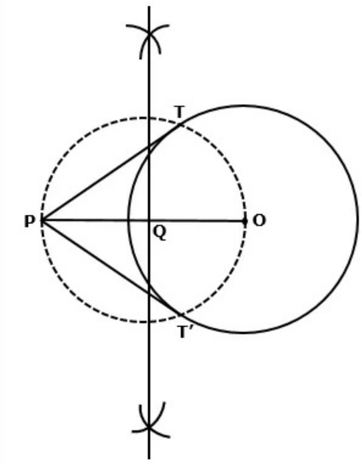
To construct: To construct a triangle of sides 5 cm, 6 cm and 7 cm and then a triangle similar to it whose sides are of $\frac{7}{5}$ the corresponding sides of the first triangle.

Steps of construction:

i. Draw a triangle ABC of sides 5 cm, 6 cm and 7 cm.
ii. From any ray BX, making an acute angle with BC on the side opposite to the vertex A.
iii. Locate 7 points B_1, B_2, B_3, B_4, B_5, B_6 and B_7 on BX such that $BB_1 = B_1 B_2 = B_2 B_3 = B_3 B_4 = B_4 B_5 = B_5 B_6 = B_6 B_7$.
iv. Join B_5 C and draw a line through the point B_7, draw a line parallel to B_5 C intersecting BC at the point C'.
v. Draw a line through C' parallel to the line CA to intersect BA at A'.
Then, A'BC' is the required triangle.
Justification :
$\because CA || C'A'$ [By construction]
$\therefore \triangle ABC \sim \triangle A'BC'$ [AA similarity]
$\therefore \frac{A'B}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC}$ [By Basic Proportionality Theorem]
$\because B_7C' || B_5C$ [By construction]
$\therefore \triangle BB_7C' \sim \triangle BB_5C$ [AA similarity]
But $\frac{BB_5}{BB_7} = \frac{5}{7}$ [By construction]

Therefore, $\frac{BC}{BC'} = \frac{5}{7} \Rightarrow \frac{BC'}{BC} = \frac{7}{5}$

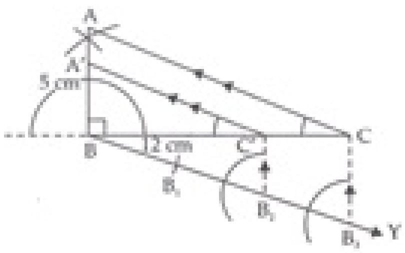
$\therefore \frac{AB}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{7}{5}$

14. 

Steps of construction:

1. Take a point O on the plane of the paper and draw a circle of radius 3.5 cm.
2. Mark a point P at a distance of 6.2 cm from the centre O and join OP.
3. Draw a right bisector of OP, intersecting OP at Q.
4. Taking Q as centre and OQ = PQ as radius, draw a circle to intersect the given circle at T and T'.
5. Join PT and PT' to get the required tangents.

15. Here, scale factor or ratio factor is $\frac{2}{3} < 1$, so triangle to be constructed will be smaller than given ΔABC.



Step of construction:

i. Draw BC = 12 cm.
ii. Draw ∠CBA = 90° with scale and compass.
iii. Cut BA = 5 cm such that ∠ABC = 90°.
iv. Join AC. ΔABC is the given triangle.
v. Draw an acute ∠CBY such that A and Y are in opposite direction with respect to BC.

vi. Divide BY in 3 equal segments by marking arc at same distance at B_1, B_2, and B_3.

vii. Join B_3C.

viii. Draw B_2C' || B_2C by making equal alternate angles at B_2 and B_3.

ix. From point C’, draw C’ A' || CA by making equal alternate angles at C and C’.

ΔA’BC’ is the required triangle of scale factor $\frac{2}{3}$. This triangle is also a right triangle.

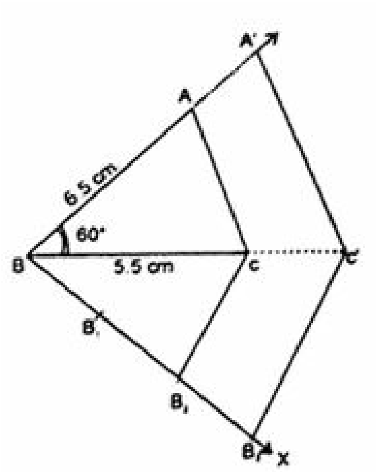
16. Using Pythagoras theorem in $\triangle DBC$,

$CD^2 = BD^2 + BC^2$
$\Rightarrow 17^2 = 8^2 + BC^2$
$\Rightarrow BC^2 = 17^2 - 8^2$
$\Rightarrow BC^2 = 289 - 64$
$\Rightarrow BC^2 = 225$
$\Rightarrow BC = 15$ m.

Now, to find AC, apply pythagoras theorem in $\triangle ABC$

$AC^2 = AB^2 + BC^2$
$\Rightarrow AC^2 = (AD + DB)^2 + BC^2$
$\Rightarrow AC^2 = (4 + 8)^2 + (15)^2$
$\Rightarrow AC^2 = (12)^2 + (15)^2$
$\Rightarrow AC^2 = 144 + 225$
$\Rightarrow AC^2 = 369$
$\Rightarrow AC = \sqrt{369}$ m

17.



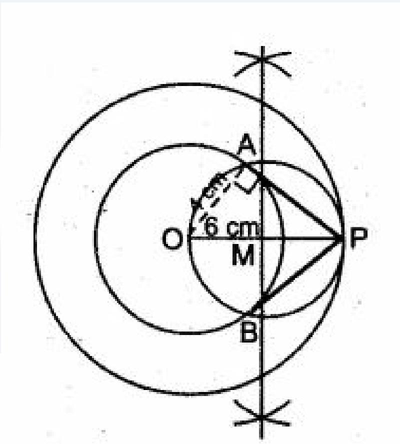
Steps of construction:

i. Construct a $\triangle$ABC in which AB = 6.5 cm, $\angle$B = 60°, BC = 5.5 cm.

ii. At B draw an acute angle CBX below base BC.
iii. Along BX, mark off points BB1 = B_1B_2 = B_2B_3.
iv. Join B_2 to C.
v. From B_3 draw B_3C' | | B_2C at C.
vi. At C' draw C'A' | | CA intersecting AB at C.
vii. $\triangle AB'C'$ is required triangle similar to $\triangle ABC$

18. Steps of construction:

i. Draw two circles with radius OA = 4cm and OP = 6cm with O as centre.
ii. Draw perpendicular bisector of OP at M. Taking M as centre and OM as radius draw another circle intersecting the smaller circle at A and B touching the bigger circle at P.
iii. Join PA and PB.
iv. PA and PB are the required tangents.

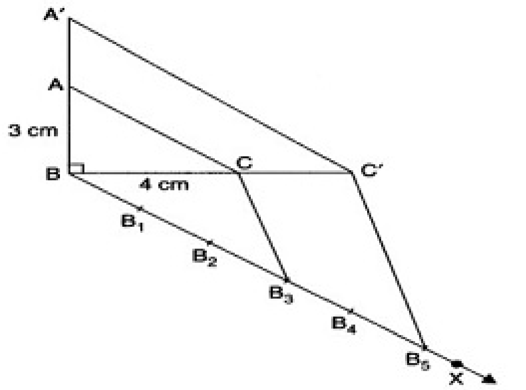


Verification:
In right angle triangle OAP,
$OA^2 + AP^2 = OP^2$ ---[Pythagoras theorem]
$4^2 + (AP)^2 = 6^2$
$(AP)^2 = 36 – 16 = 20$
AP = $\sqrt{20} = 2\sqrt{5}$ = 2 (2.236) = 4.472 = 4.5 cm
By measurement, PA = PB = 4.5 cm

19. Required:
To draw a right triangle in which the sides(other than hypotenuse) are of lengths 4 cm

and 3 cm and then construct another whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.
Steps of construction:

i. Draw a right triangle ABC in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm

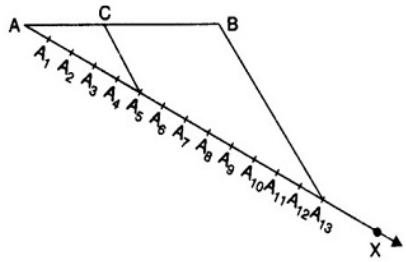


ii. Draw any ray BX making an ACute angle with BC on the side opposite to the vertex A.
iii. Locate 5 points B_1.B_2,B_3,B4 and B_5 on BX such that BB_1=$B_2$1B_2=B_3B_4=B_4B_5.
iv. Join B_3 to C draw a line through B_5 parallel to B_3C, intersecting the extended line segment BC at C'.
v. Draw a line through C' parallel to CA intersecting the extended line segment BA at A'.

Then, △ A'B'C is the required triangle.
Justification:
∴ C'A||CA [By Construction]
∴ △ ABC ∼ △ A'B'C' [AA similarity criterion]
$\Rightarrow \frac{A'B}{AB} = \frac{A'C}{AC} = \frac{BC'}{BC}$ [∴ corresponding sides of two similar triangle are proportional]
∴ $B_6C'||B_3C$ [By constryction]
∴ △ BB_5C' ∼ △ BB_3C [AA similarity criterion]
$\therefore \frac{BC'}{BC} = \frac{BB^5}{BB^3}$ [By basic proportionality theorem]
But $\frac{BB^5}{BB^3} = \frac{5}{3}$ [By construction]
$\therefore \frac{BC'}{BC} = \frac{5}{3}$
$\therefore \frac{A'B}{AB} = \frac{A'C'}{AC} = \frac{BC'}{BC} = \frac{5}{3}$

20. Given: A line segment of length 7.6 cm.

Required: To divide it in the ratio 5 : 8 and to measure the two parts.



Steps of construction :

i. From any ray AX, making an acute angle with AB.

ii. Locate 13 (= 5 + 8) points A_1, A_2, A_3,..... and A_{13} on AX such that

$AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5 = A_5A_6 = A_6A_7 = A_7A_8 = A_8A_9 = A_9A_{10} = A_{10}A_{11} = A_{11}A_{12} = A_{12}A_{13}$

iii. Join BA_{13}

iv. Through the point A_5, draw a line parallel to $A_{13}B$ intersecting AB at the point C.

Then, AC : CB = 5 : 8

On measurement, AC = 3.1 cm, CB = 4.5 cm.

Justification :

$\because A_5C \parallel A_{13}B$ [By Construction]

$\because \frac{AA_5}{A_5A_{13}} = \frac{AC}{CB}$ [By the Basic proportionality theorem]

But, $\frac{AA_5}{A_5A_{13}} = \frac{5}{8}$ [By Construction[

Therefore, $\frac{AC}{CB} = \frac{5}{8}$

This shows that C divides AB in the ratio 5 : 8.