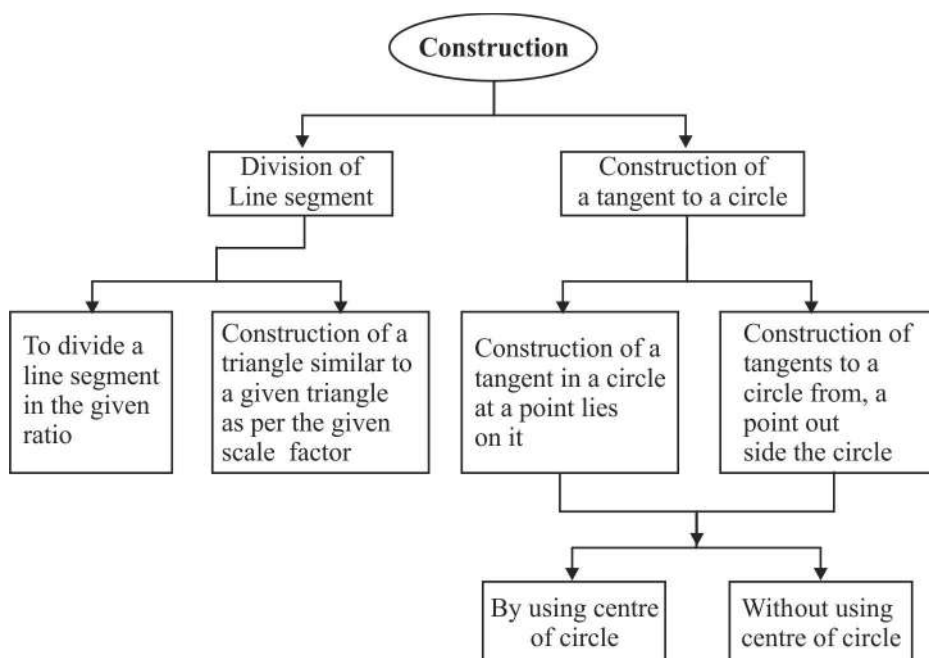# 11 Constructions

TOPICS

- Division of a line segment.
- Construction of a Triangle.
- Construction of Tangents of a Circle.

MIND MAPING

KEY POINTS

1. Construction should be neat and clean and there should be no doubling.

2. Construction should be as per a given scale factor which may be less than 1 or greater than 1 for a triangle similar to a given triangle.

3. Steps of construction should be provided only when it is mentioned in the question.

Mathematics-X

4. We make use of compass and ruler only for angles which are multiple of 15° but in case of non-standard angles, protractor can be used.

5. Divide a line segment in the given ratio means to determine a point on the given line segment which divides it in the the given ratio.

6. A tangent to a circle is a straight line which touches the circle at exactly one point. This point is called the point of contact and the radius through the point of contact is perpendicular to the tangent.

7. Tangents drawn from an external point to a circle are equal.

VERY SHORT ANSWER TYPE QUESTIONS

1. Construct a triangle similar to a given ΔABC with its sides $\frac{5}{3}$ of the corresponding sides of ΔABC, a ray BX is drawn such that CBX is an acute angle and X is on the opposite side of A with respect to BC. What is the minimum no. of points to be located at equal distances on ray BX.

2. Draw a pair of tangents to a circle which are inclined to each other at an angle of 30°. What should be the angle between two radii?

3. Construct a triangle similar to a given ΔABC with its sides $\frac{2}{5}$ of the corresponding sides of ΔABC , firstly a ray BX is drawn such that CBX is an acute angle and X lies on the opposite side of A with respect to BC then points B_1, B_2, B_3, B_4, B_5 are located on BX at equal distances Which two points will be joined in the next step.

4. Divide a line segment AB in the ratio 3:7. What is the minimum number of points marked on a ray AX at equal distances?

5. How many tangents can be drawn from a point lying inside a circle?

6. Divide a line segment AB in the ratio 4:5, 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 which should be joined to B?

7. Divide a line segment AB in the ratio 4:5, the points $A_1, A_2, A_3,....$and $B_1, B_2, B_3,....$ are located at equal distances on the ray AX and BY respectively. Which two points should be joined to divide a line segment?

8. Draw a line segment of length 6 cm. Find a point P on it which divides it in the ratio 3 : 4. **(Delhi-2011)**

9. Draw a line segment AB = 8 cm and divide it internally in the ratio 3 : 2.

10. Draw a line segment AB of length 6.5 cm. Find a point P on it such that $\dfrac{AP}{AB} = \dfrac{3}{5}$

11. Geometrically divide a line segment of length 8.4 cm in the ratio 5 : 2. (Foreign–2011)

12. Draw a line segment of length 7.6 cm and divide it in the ratio 3 : 2. (Foreign – 2011)

13. Write True or False.
By geometrical construction, it is possible to divide a line segment in the ratio $\sqrt{3} : \dfrac{1}{\sqrt{3}}$. **(NCERT Exampler)**

14. Is it possible to construct a pair of tangents from point P to circle of radius 5 cm situated at a distance of 4.9 cm from the centre?

15. Is it possible to construct a pair of tangents from point A lying on the circle of radius 4 cm and centre O.

16. Compare the length of the tangents drawn from the external point to circle.

LONG ANSWER TYPE QUESTIONS

17. AB is a line segment of length 8 cm. Locate a point C on AB such that $AC = \dfrac{1}{3} CB$.

18. Construct a ∆ABC in which AB = 6.5 cm, ∠B = 60° and BC = 5.5 cm. Also construct a triangle A′BC′ similar to ∆ABC, whose each side is $\dfrac{3}{2}$ times the corresponding sides of ∆ABC.

19. Construct a ∆ABC in which BC = 5 cm, CA = 6 cm and AB = 7. Construct a ∆A′BC′ similar to ∆ABC, each of whose side are times $\dfrac{7}{5}$ the corresponding sides of ∆ABC.

20. Construct a triangle with side 4 cm, 5 cm, 6 cm. Then construct a triangle similar to it whose sides are $\dfrac{2}{3}$ of the corresponding sides of the given triangle.

(NCERT)

21. Construct a $\triangle ABC$ in which BC = 8 cm, $\angle B = 45°$ cm and $\angle C = 30°$. Construct another triangle similar to $\triangle ABC$ such that each side are $\dfrac{3}{4}$ of the corresponding sides of $\triangle ABC$

22. A triangle ABC is given such that AB = 4 cm, BC = 7 cm and $\angle BAC = 50°$. Draw another triangle A′BC′ similar to $\triangle ABC$ with sides BA′ and BC′ equal to 6 cm and 10.5 cm respectively. Find the scale factor.

23. Construct an isosceles $\triangle ABC$ in which AB = 8 cm and attitude CD = 4 cm. Construct another triangle similar to $\triangle ABC$ where sides are 1.5 times that of the corresponding sides of isosceles $\triangle ABC$.

24. Draw an isosceles $\triangle ABC$ with AB=AC and base BC=7cm, vertical angle is 120°. Construct $\triangle AB′C′ \sim \triangle ABC$ with its sides $1\dfrac{1}{3}$ times of the corresponding sides of $\triangle ABC$.

25. Draw a circle of radius 3 cm. From a point 5 cm from the centre of the circle, draw two tangents to the circle. Measure the length of each tangent.

26. Draw a circle of radius 4 cm with centre O. Draw a diameter POQ. Through P or Q draw a tangent to the circle.

27. Draw two circle of radius 5 cm and 3 cm with their centres 9 cm apart. From the centre of each circle, draw tangents to other circles.

28. Draw two concentric circles of radii 6 cm and 4 cm. From a point on the outer circle, draw a tangent to the inner circle and measure its length.

29. 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 centre. Draw tangents to the circle from these two points.

Mathematics-X

30. Draw a line segment PQ = 10 cm. Take a points A on PQ such that $\dfrac{PA}{PQ} = \dfrac{2}{5}$

Measure the length of PA and AQ

31. Draw an equilateral triangle PQR with side 5cm. Now construct $\Delta PQ'R' \sim \Delta PQR$ such that $\dfrac{PQ}{PQ'} = \dfrac{1}{2}$.

32. Draw a line segment AB of length 7 cm. Taking A as centre draw a circle of radius 3 cm and taking B as centre draw another circle of radius 2 cm. Construct tangents to each circle from the centre of other circle. **(CBSE 2020)**

33. Draw a ΔABC with BC = 6 cm, AB = 5 cm and $\angle ABC = 60°$. Then construct a triangle whose sides are $\dfrac{3}{4}$ of the corresponding sides of ΔABC.

(CBSE 2018)

34. Draw a ΔABC with side BC = 7 cm, $\angle B = 45°$, $\angle A = 105°$. Then construct another triangle whose sides are $\dfrac{3}{4}$ times the corresponding sides of ΔABC.

(CBSE 2017)

35. Draw a circle of radius 4 cm. Draw two tangents to the circle inclined at angle of 60° to each other. **(CBSE 2016)**

36. Construct a ΔABC in which AB = 6 cm, $\angle A = 30°$ and $\angle B = 60°$. Construct another $\Delta AB'C'$ similar to ΔABC with base AB' = 8 cm. **(CBSE 2015)**

37. Write the steps of construction of ΔABC in which BC = 6.5 cm, $\angle B = 60°$ and $\angle C = 45°$. Again write the steps of construction of another triangle whose sides are $\dfrac{4}{5}$ of the corresponding sides of ΔABC. **(CBSE 2020, Standard)**

38. Draw an equilateral triangle of side length 7 cm. Then construct a triangle whose sides are $\dfrac{2}{3}$ of the corresponding sides of ΔABC.

(CBSE 2020, Standard and Basic)

39. Draw a circle of radius 2.5 cm. Take a point P outside the circle at a distance of 7 cm from the centre. Then construct a pair of tangents to the circle from point P.

(CBSE 2020, Standard)

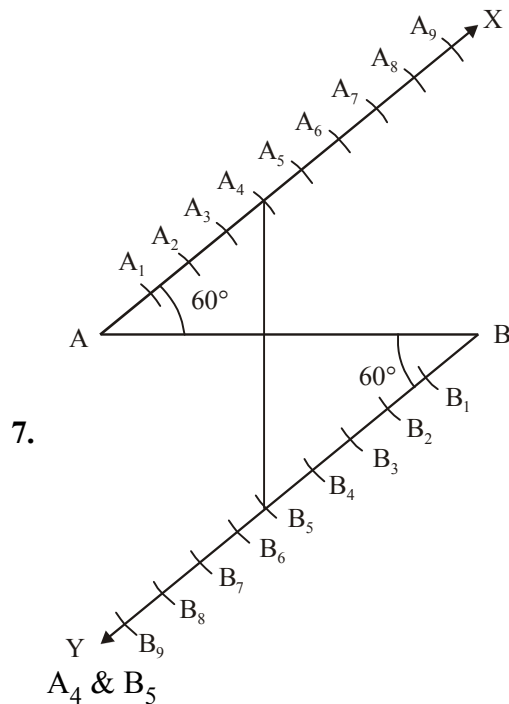1. Since the ratio is $\frac{5}{3}$, 5 is the larger number so Answer is 5.

2.
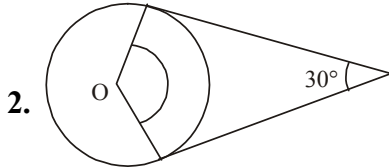
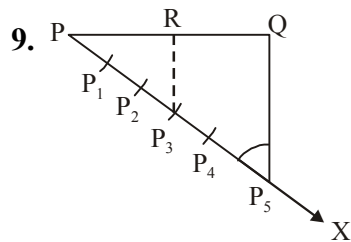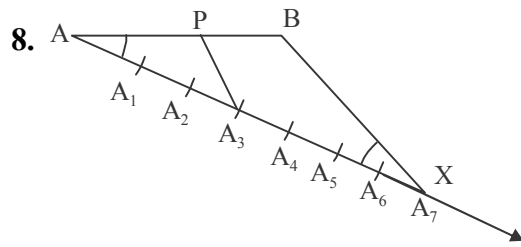   Sum of both the angles shown in figure is 180° if one is 30° the other will be 150°.

3. B_5 to C
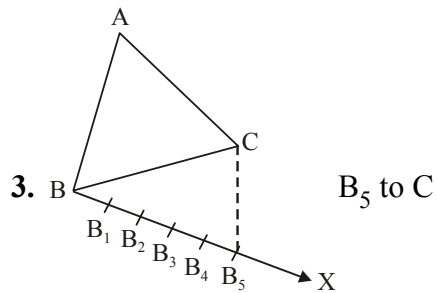
4. $3 + 7 = 10$

5. 0

6. As shown in question (3) above it should be A_9

7.

   A_4 & B_5

8.

9.

10. Similar to Example 1 (NCERT)

11. As above Question-9.

12. As above question No. 9.

13. True as $\sqrt{3} : \dfrac{1}{\sqrt{3}}$ can be simplified as 3 : 1.

14. No

15. No

16. Equal.

Questions No. 17 to 39.

Questions are similar to examples given in NCERT. Please refer NCERT example.

PRACTICE-TEST

CONSTRUCTIONS

Time : 1 Hrs.   *M.M.: 20*

SECTION-A

1. Draw a perpendicular bisector of line segment AB = 8cm.   **1**

2. Draw a line parallel to a given line.   **1**

3. Draw the tangent to a circle of diameter 4 cm at a point *P* on it.   **1**

4. Draw two tangents to a circle of radius 4 cm from a point T at a distance of 6 cm from its centre.   **1**

SECTION-B

5. Draw a pair of tangents to a circle of radius 5 cm, which are inclined to each other at an angle of 60°.   **(Foreign - 2014) 2**

6. Draw an angle bisector of 75°.   **2**

7. Draw a line segment of 5.6cm. Divide it in the ratio 2:3.   **2**

SECTION-C

8. Draw two tangents to a circle of radius 3.5cm from a point P at a distance of 5.5cm from its centre. Measure its length.   **3**

9. Draw a circle of radius 3.5cm. Draw two tangents to the circle such that they include an angle of 120°.   **3**

SECTION-D

10. Construct a ΔABC of sides AB = 4cm, BC = 5cm and AC = 7 cm. Construct another triangle similar to ΔABC such that each of its sides is $\frac{5}{7}$ of the corresponding sides of ΔABC.   **4**

Mathematics-X