Practical Geometry

- A line parallel to a given line, through a point not on the line, can be constructed by using the properties of transversal and parallel lines.

- **Construction of line parallel to given line:**
  - **Using ruler and compass:**

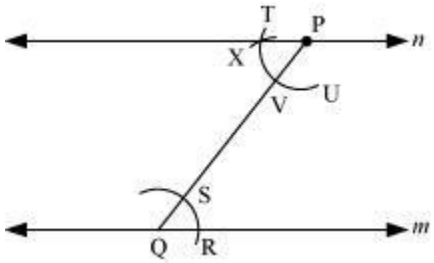
Steps of construction to draw a line parallel to a given line *m*, through a point P, outside the line *m*:

1.
1. Take any point Q on *m* and join PQ.

2.
2. With Q as centre and convenient radius, draw an arc cutting *m* at R and PQ at S.

3.
3. With P as centre and the same radius, draw an arc TU cutting PQ at V; then with V as centre and radius equal to RS, draw an arc cutting TU at X.

4.
4. Join PX to draw a line *n*.



Now, the line *n* is parallel to *m*. [Corresponding pairs of angles are equal]

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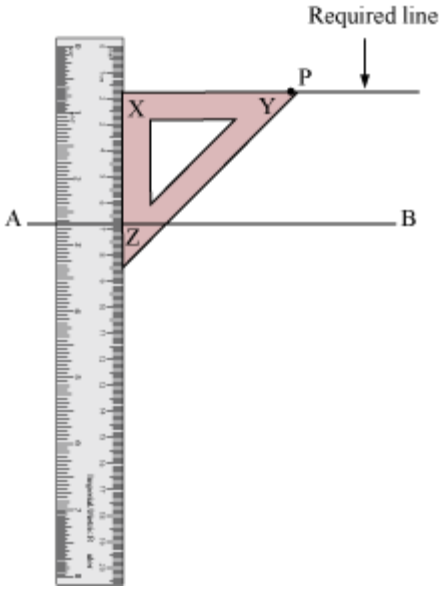
  - **Using ruler and set square:**

Steps of construction of a line parallel to $\overleftrightarrow{AB}$ through point P:

1. Place your set square such that one of its shorter edges i.e., XY lies just along line AB.

2. Place your ruler such that one of its edges lies just along the shorter edge i.e., XZ of the set square. Hold the ruler firmly and slide the set square along the ruler until the edge XY of the set square passes through P.

3. Draw a line along the edge XY of the set square. This is the required line through point P. Note that it is parallel to line AB.



- A triangle can be constructed if all its sides are known.

  Example:

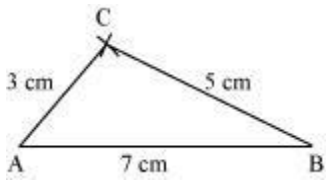
  Construct a triangle whose sides are 3 cm, 5cm and 7 cm.

  Solution:

1. Draw a line segment AB of length 7 cm. With A as centre and radius equal to 3 cm, draw an arc.

2. With B as centre and radius 5 cm, draw another arc cutting the earlier drawn arc at C.

3. Join AC and BC to get ΔABC.



- A triangle can be constructed if the length of two sides and angle between them are given.

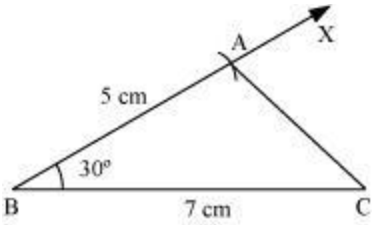
Example:
Construct ΔABC where BC = 7 cm, AB = 5 cm and ∠ABC = 30°

Solution:

1.
1. Draw a line segment BC of length 7 cm and at B draw a ray BX, making an angle of 30° with BC.

2.
2. With B as centre and radius equal to 5 cm, draw an arc cutting BX at A.

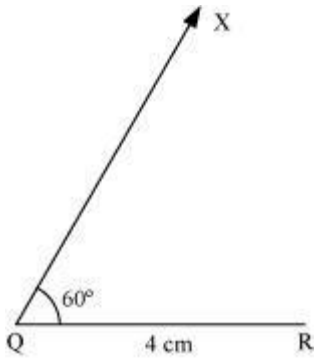
3.
3. Join AC to get the required ΔABC.



Example: Construct ΔPQR, where ∠PQR = 60°, ∠PRQ = 45° and QR = 4 cm.

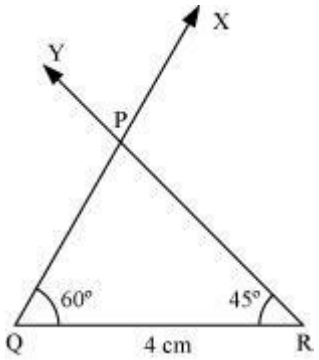
Solution:

1.
1. Draw a line segment QR of length 4 cm and draw a ray QX, making an angle of 60° with QR



2.

2. Now, draw ray RY, making an angle of 45° with QR and intersecting QX at P. The resulting ΔPQR is the required triangle.



- A right-angled triangle can be constructed if the length of one of its sides or arms and the length of its hypotenuse are known.

Example:

Construct ΔXYZ, right-angled at Y, with XZ = 5 cm and YZ = 3 cm.

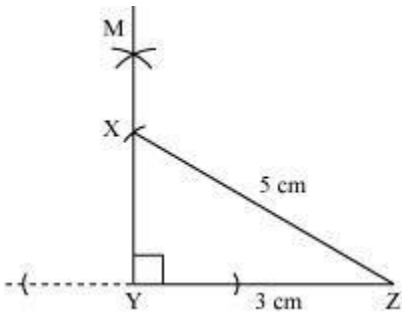
Solution:

1.

1. Draw a line segment YZ of length 3 cm. At Y, draw MY⊥YZ.

2.

2. With Z as centre and radius equal to 5 cm, draw an arc intersecting MY at X. Join XZ to get the required ΔXYZ.


M
X
5 cm
Y
3 cm
Z