

## Chapter 10

### Practical Geometry

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#### Practical Geometry

Here, we will learn how to draw parallel lines and some types of triangles.

Construction of line parallel to the given line through a point not lying on the line

We can follow the given steps to construct a line parallel to the given line:-

Step 1: Take a line ' $l$ ' and a point ' $A$ ' outside ' $l$ '

Step 2: Take any point  $B$  on  $l$  and join  $B$  to  $A$

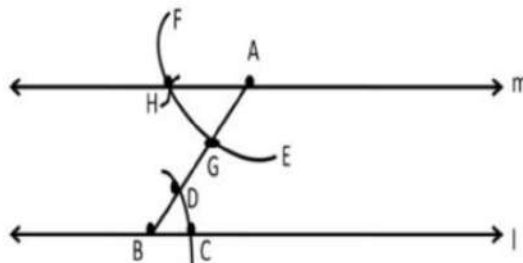
Step 3: With  $B$  as center and a convenient radius; draw an arc cutting  $l$  at  $C$  and  $BA$  at  $D$ .

Step 4: Now with  $A$  as the center and the same radius as in Step 3, draw an arc  $EF$  cutting  $AB$  at  $G$ .

Step 5: Place the pointed tip of the compasses at  $C$  and adjust the opening so that the pencil tip is at  $D$ .

Step 6: With the same opening as in Step 5 and with  $G$  as the center, draw an arc cutting the arc  $EF$  at  $H$ .

Step 7: Now, join  $AH$  to draw a line ' $m$ '.



## Construction of triangles

### Construction of Triangles

A triangle can be drawn if any one of the following sets of measurements is given:

- (i) Three sides.
- (ii) Two sides and the angle between them.
- (iii) Two angles and the side between them.
- (iv) The hypotenuse and a leg in the case of a right-angled triangle.

### CONSTRUCTING A TRIANGLE WHEN THE LENGTHS OF ITS THREE SIDES ARE KNOWN (SSS CRITERION)

Construct a triangle ABC, given that  $AB = 5$  cm,  $BC = 6$  cm, and  $AC = 7$  cm.

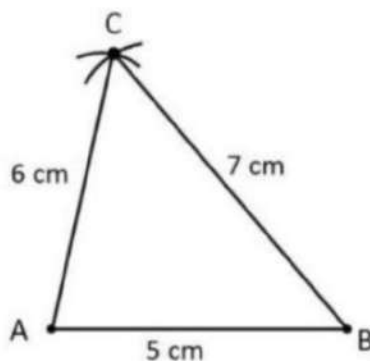
(REFERENCE: NCERT)

Step 1 Draw a line segment BC of length 6 cm

Step 2 From B, point A is at a distance of 5 cm. So, with B as center, draw an arc of radius 5 cm. (Now A will be somewhere on this arc. Our job is to find where exactly A is)

Step 3 From C, point A is at a distance of 7 cm. So, with C as centre, draw an arc of radius 7 cm. (A will be somewhere on this arc, we have to fix it)

Step 4 A has to be on both the arcs drawn. So, it is the point of intersection of arcs. Mark the point of intersection of arcs as A. Join AB and AC.  $\triangle ABC$  is now ready.



CONSTRUCTING A TRIANGLE WHEN THE LENGTHS OF TWO SIDES AND THE MEASURE OF THE ANGLE BETWEEN THEM ARE KNOWN. (SAS CRITERION)

EXAMPLE: Construct a triangle PQR, given that  $PQ = 3\text{ cm}$ ,  $QR = 5.5\text{ cm}$  and  $\angle PQR = 60^\circ$ .

(REFERENCE: NCERT)

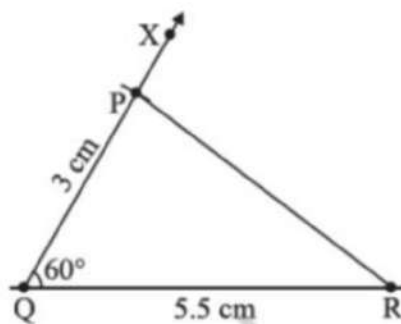
Step 1 First, we draw a rough sketch with given measures. (This helps us to determine the procedure in construction)

Step 2 Draw a line segment QR of length 5.5 cm

Step 3 At Q, draw QX making  $60^\circ$  with QR. (The point P must be somewhere on this ray of the angle)

Step 4 (To fix P, the distance QP has been given). With Q as center, draw an arc of radius 3 cm. It cuts QX at the point P

Step 5 Join PR.  $\triangle PQR$  is now obtained.



CONSTRUCTING A TRIANGLE WHEN THE MEASURES OF TWO OF ITS ANGLES AND THE LENGTH OF THE SIDE INCLUDED BETWEEN THEM IS GIVEN. (ASA CRITERION)

EXAMPLE : Construct  $\triangle XYZ$  if it is given that  $XY = 6\text{ cm}$ ,  $m\angle ZXY = 30^\circ$  and  $m\angle XYZ = 100^\circ$ .

(REFERENCE: NCERT)

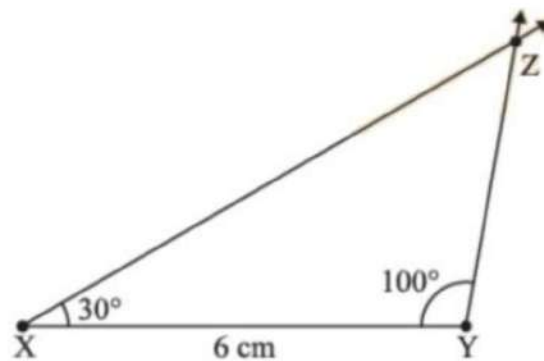
Step 1 we draw a rough sketch with measures marked on it. (This is just to get an idea as to how to proceed)

Step 2 Draw XY of length 6 cm.

Step 3 At X, draw a ray XP making an angle of  $30^\circ$  with XY. By the given condition Z must be somewhere on the XP.

Step 4 At Y, draw a ray YQ making an angle of  $100^\circ$  with YX. By the given condition, Z must be on the ray YQ also.

Step 5 Z has to lie on both the rays XP and YQ. So, the point of intersection of the two rays is Z.  $\triangle XYZ$  is now completed.



CONSTRUCTING A RIGHT-ANGLED TRIANGLE WHEN THE LENGTH OF ONE LEG AND ITS HYPOTENUSE ARE GIVEN (RHS CRITERION)

EXAMPLE: Construct  $\triangle LMN$ , right-angled at M, given that  $LN = 5$  cm and  $MN = 3$  cm.

(REFERENCE: NCERT)

SOLUTION

Step 1 Draw a rough sketch and mark the measures. Remember to mark the right angle

Step 2 Draw MN of length 3 cm.

Step 3 At M, draw MX perpendicular to MN. (L should be somewhere on this perpendicular)

Step 4 With N as center, draw an arc of radius 5 cm. (L must be on this arc since it is at a distance of 5 cm from N)

Step 5 L has to be on the perpendicular line MX as well as on the arc drawn with centre N.

Therefore, L is the meeting point of these two.

$\triangle LMN$  is now obtained.

