

Exercise 11.1 Question

1:

Construct an angle of 90° at the initial point of a given ray and justify the construction.

Answer:

The below given steps will be followed to construct an angle of 90°.

- (i) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.
- (ii) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (iii) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (iv)Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (v) Join PU, which is the required ray making 90° with the given ray PQ.



Justification of Construction:

We can justify the construction, if we can prove $\angle UPQ = 90^{\circ}$.

For this, join PS and PT.



We have, \angle SPQ = \angle TPS = 60°. In (iii) and (iv) steps of this construction, PU was drawn as the bisector of \angle TPS.

 $\frac{1}{2} = \frac{1}{2} \times 60^{\circ} = 30^{\circ}$ $\therefore \ \angle \text{ UPS} = 2^{\circ} \text{ TPS}$ Also, $\angle \text{UPQ} = 2^{\circ} \text{ SPQ} + 2^{\circ} \text{ UPS}$ $= 60^{\circ} + 30^{\circ}$ $= 90^{\circ}$ Question 2:

Construct an angle of 45° at the initial point of a given ray and justify the construction.

Answer:

The below given steps will be followed to construct an angle of 45°.

- (i) Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.
- (ii) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (iii) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (iv)Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (v) Join PU. Let it intersect the arc at point V.
- (vi)From R and V, draw arcs with radius more than 2 RV to intersect each other at W. Join PW.

1

PW is the required ray making 45° with PQ.



Justification of Construction:

We can justify the construction, if we can prove \angle WPQ = 45°. For this, join PS and PT.



We have, \angle SPQ = \angle TPS = 60°. In (iii) and (iv) steps of this construction, PU was drawn as the bisector of \angle TPS.

$$\therefore \angle \text{UPS} = \frac{1}{2}$$
 $= \frac{60^\circ}{2} = 30^\circ$ TPS

Also,
$$\angle UPQ = \angle SPQ + \angle UPS$$

 $= 60^{\circ} + 30^{\circ}$

= 90°

In step (vi) of this construction, PW was constructed as the bisector of \angle UPQ.

$$\therefore \ \angle \ \mathsf{WPQ} = \frac{1}{2} \ \angle \ \mathsf{UPQ} = \frac{90^{\circ}}{2} = 45^{\circ}$$

Question 3:

Construct the angles of the following measurements:

(i) 30° (ii)
$$22\frac{1}{2}^{\circ}$$
 (iii) 15° Answer:

(i)30°

The below given steps will be followed to construct an angle of 30°.

Step I: Draw the given ray PQ. Taking P as centre and with some radius, draw an arc of a circle which intersects PQ at R.

Step II: Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point S.

Step III: Taking R and S as centre and with radius more than 2 RS, draw arcs to intersect each other at T. Join PT which is the required ray making 30° with the

1

22-0

1





(ii)

The below given steps will be followed to construct an angle of 2

- Take the given ray PQ. Draw an arc of some radius, taking point P as its centre, which intersects PQ at R.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at point V.

(6) From R and V, draw arcs with radius more than 2 RV to intersect each other at W. Join PW.

1

(7) Let it intersect the arc at X. Taking X and R as centre and radius more than 2

RX, draw arcs to intersect each other at Y.

Joint PY which is the required ray making

with the given ray PQ.

1



(iii) 15°

The below given steps will be followed to construct an angle of 15°.

Step I: Draw the given ray PQ. Taking P as centre and with some radius, draw an arc of a circle which intersects PQ at R.

 $22\frac{1}{2}^{\circ}$

Step II: Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point S.

Step III: Taking R and S as centre and with radius more than 2^{2} RS, draw arcs to intersect each other at T. Join PT.

Step IV: Let it intersect the arc at U. Taking U and R as centre and with radius more $\underline{1}$

than

2

ray making 15° with the given ray PQ.

Question 4: other at V.

RU, draw an arc to intersect each

Join PV which is the required

Construct the following angles and verify by measuring them by a protractor:

(i) 75° (ii) 105° (iii) 135° Answer:

1

(i) 75°

The below given steps will be followed to construct an angle of 75°.

- Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at V. Taking S and V as centre, draw arcs with

radius more than $\overline{2}$ SV. Let those intersect each other at W. Join PW which is the required ray making 75° with the given ray PQ.



The angle so formed can be measured with the help of a protractor. It comes to be 75°.

(ii) 105°

The below given steps will be followed to construct an angle of 105°.

- Take the given ray PQ. Draw an arc of some radius taking point P as its centre, which intersects PQ at R.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at V. Taking T and V as centre, draw arcs with

 $\frac{1}{2}$ TV. Let these arcs intersect each other at W. Join PW which is the required ray making 105° with the given ray PQ.



The angle so formed can be measured with the help of a protractor. It comes to be 105° .

(iii) 135°

The below given steps will be followed to construct an angle of 135°.

- (1) Take the given ray PQ. Extend PQ on the opposite side of Q. Draw a semi-circle of some radius taking point P as its centre, which intersects PQ at R and W.
- (2) Taking R as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at S.
- (3) Taking S as centre and with the same radius as before, draw an arc intersecting the arc at T (see figure).
- (4) Taking S and T as centre, draw an arc of same radius to intersect each other at U.
- (5) Join PU. Let it intersect the arc at V. Taking V and W as centre and with radius

more than 2 VW, draw arcs to intersect each other at X. Join PX, which is the required ray making 135° with the given line PQ.

¹



The angle so formed can be measured with the help of a protractor. It comes to be 135°.

Question 5:

Construct an equilateral triangle, given its side and justify the construction Answer:

Let us draw an equilateral triangle of side 5 cm. We know that all sides of an equilateral triangle are equal. Therefore, all sides of the equilateral triangle will be 5 cm. We also know that each angle of an equilateral triangle is 60°.

The below given steps will be followed to draw an equilateral triangle of 5 cm side. Step I: Draw a line segment AB of 5 cm length. Draw an arc of some radius, while taking A

as its centre. Let it intersect AB at P.

Step II: Taking P as centre, draw an arc to intersect the previous arc at E. Join AE. Step III: Taking A as centre, draw an arc of 5 cm radius, which intersects extended line segment AE at C. Join AC and BC. \triangle ABC is the required equilateral triangle of side 5 cm.





Justification of Construction:

We can justify the construction by showing ABC as an equilateral triangle i.e., AB = BC = AC = 5 cm and $\angle A = \angle B = \angle C = 60^{\circ}$.

In $\triangle ABC$, we have AC = AB = 5 cm and $\angle A = 60^{\circ}$.

Since AC = AB,

 $\angle B = \angle C$ (Angles opposite to equal sides of a triangle)

In ∆ABC,

 $\angle A + \angle B + \angle C = 180^{\circ}$ (Angle sum property of a triangle)

 $\angle 60^{\circ} + \angle C + \angle C = 180^{\circ}$

 $\angle 60^{\circ} + 2 \angle C = 180^{\circ}$

 $\angle 2 \ \angle C = 180^{\circ} - 60^{\circ} = 120^{\circ}$

∠ ∠C = 60°

$$\angle \angle B = \angle C = 60^{\circ}$$

We have, $\angle A = \angle B = \angle C = 60^{\circ} \dots (1)$

 $\angle \angle A = \angle B$ and $\angle A = \angle C$

 \angle BC = AC and BC = AB (Sides opposite to equal angles of a triangle)

 $\angle AB = BC = AC = 5 \text{ cm} \dots (2)$

From equations (1) and (2), ΔABC is an equilateral triangle.

Exercise 11.2

Question 1:

Construct a triangle ABC in which BC = 7 cm, $\angle B = 75^{\circ}$ and AB + AC = 13 cm. Answer: The below given steps will be followed to construct the required triangle.

Step I: Draw a line segment BC of 7 cm. At point B, draw an angle of 75°, say \angle XBC.

Step II: Cut a line segment BD = 13 cm (that is equal to AB + AC) from the ray BX. Step III: Join DC and make an angle DCY equal to \angle BDC.

Step IV: Let CY intersect BX at A. \triangle ABC is the required triangle.



Question 2:

Construct a triangle ABC in which BC = 8 cm, $\angle B = 45^{\circ}$ and AB - AC = 3.5 cm.

Answer:

The below given steps will be followed to draw the required triangle.

Step I: Draw the line segment BC = 8 cm and at point B, make an angle of 45°, say $\angle XBC$.

Step II: Cut the line segment BD = 3.5 cm (equal to AB - AC) on ray BX. Step III: Join DC and draw the perpendicular bisector PQ of DC.

Step IV: Let it intersect BX at point A. Join AC. \triangle ABC is the required triangle.



Question 3:

Construct a triangle PQR in which QR = 6 cm, \angle Q = 60° and PR - PQ = 2 cm

Answer:

The below given steps will be followed to construct the required triangle.

Step I: Draw line segment QR of 6 cm. At point Q, draw an angle of 60°, say \angle XQR. Step II: Cut a line segment QS of 2 cm from the line segment QT extended in the opposite side of line segment XQ. (As PR > PQ and PR - PQ = 2 cm). Join SR. Step III: Draw perpendicular bisector AB of line segment SR. Let it intersect QX at point P.

Join PQ, PR.

 Δ PQR is the required triangle.



Question 4:

Construct a triangle XYZ in which $\angle Y = 30^{\circ}$, $\angle Z = 90^{\circ}$ and XY + YZ + ZX = 11 cm. Answer:

The below given steps will be followed to construct the required triangle.

Step I: Draw a line segment AB of 11 cm.

(As XY + YZ + ZX = 11 cm)

Step II: Construct an angle, \angle PAB, of 30° at point A and an angle, \angle QBA, of 90° at point B.

Step III: Bisect \angle PAB and \angle QBA. Let these bisectors intersect each other at point X.

Step IV: Draw perpendicular bisector ST of AX and UV of BX.

Step V: Let ST intersect AB at Y and UV intersect AB at Z.

Join XY, XZ.

 ΔXYZ is the required triangle.



Question 5:

Construct a right triangle whose base is 12 cm and sum of its hypotenuse and other side is 18 cm.

Answer:

The below given steps will be followed to construct the required triangle.

Step I: Draw line segment AB of 12 cm. Draw a ray AX making 90° with AB. Step II:

Cut a line segment AD of 18 cm (as the sum of the other two sides is 18) from ray AX.

Step III: Join DB and make an angle DBY equal to ADB.

Step IV: Let BY intersect AX at C. Join AC, BC.

 ΔABC is the required triangle.

Cbse-spot.blogspot.com

