1. Draw ∠POQ of measure 75° and find its line of symmetry.

Solutions:

Following steps are followed to construct an angle of 75^0 and its line of symmetry

(i) Draw a line l and mark two points O and Q on it. Draw an arc of convenient radius, while taking centre as O. Let this intersect line l at R

(ii) Taking R as centre and with same radius as before, draw an arc such that it is intersecting the previously drawn arc at S

(iii) By taking same radius as before and S as centre, draw an arc intersecting the arc at point T as shown in figure

(iv) Take S and T as centre, draw an arc of same radius such that they intersect each other at U

(v) Join OU. Let it intersect the arc at V. Now, take S and V as centres draw arcs with radius more than 1 / 2 SV. Let these intersect each other at P. Join OP. Now OP is the ray making 75^0 with the line l.

(vi) Let this ray intersect our major arc at point W. By taking R and W as centres, draw arcs with radius more than 1 / 2 RW in the interior angle of 75^0. Let these intersect each other at point X. Join OX

OX is the line of symmetry for the ∠POQ = 75^0
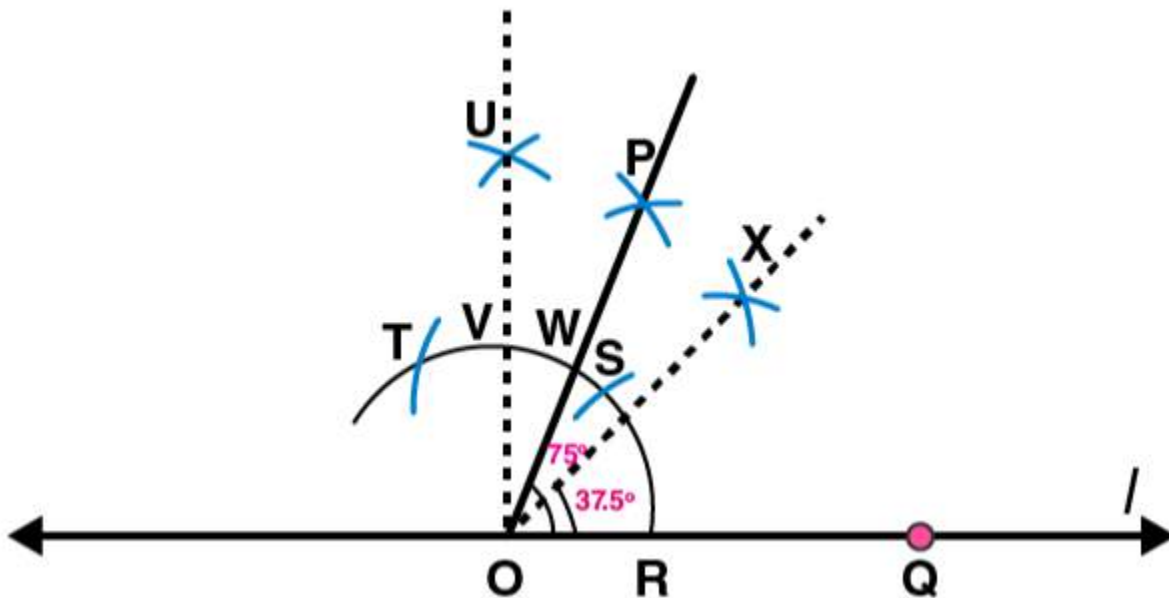
2. Draw an angle of measure 147° and construct its bisector.

Solutions:

Following steps are followed to construct an angle of measure 147^0 and its bisector

(i) Draw a line l and mark point O on it. Place the centre of protractor at point O and the zero edge along line l

(ii) Mark a point A at an angle of measure 147°. Join OA. Now OA is the required ray making 147° with line l

(iii) By taking point O as centre, draw an arc of convenient radius. Let this intersect both rays of angle 147° at points A and B.

(iv) By taking A and B as centres draw arcs of radius more than 1 / 2 AB in the interior angle of 147°. Let these intersect each other at point C. Join OC.

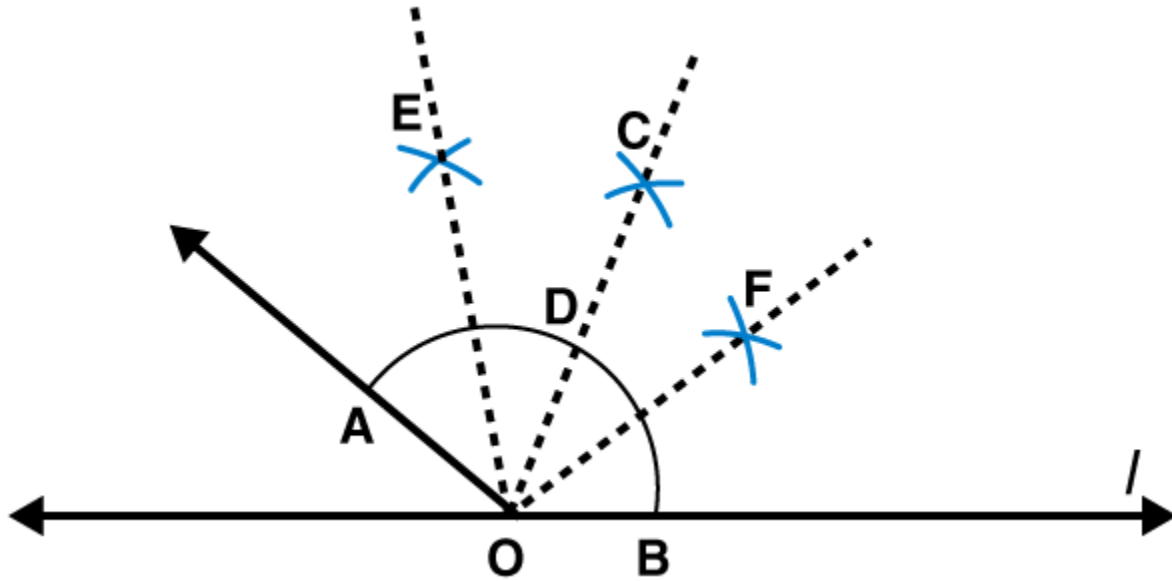OC is the required bisector of 147° angle
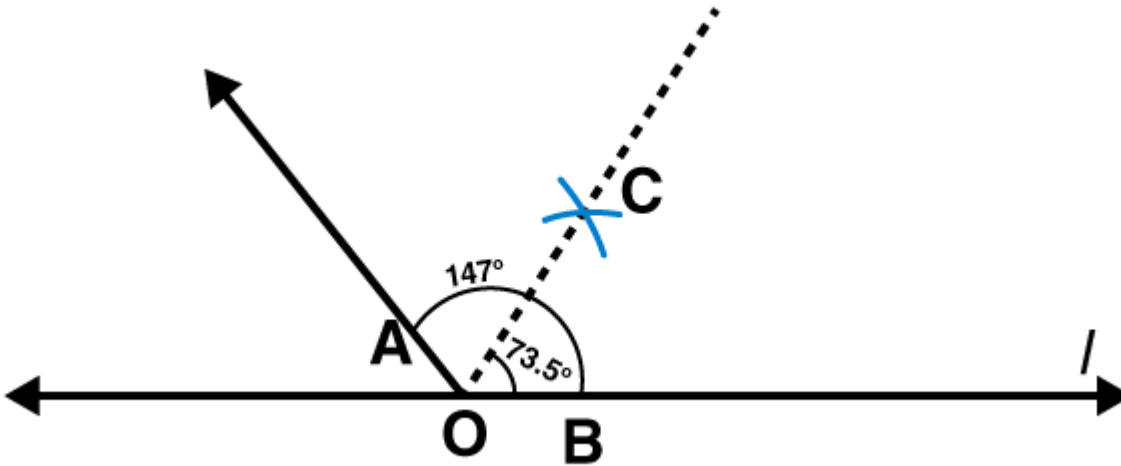
3. Draw a right angle and construct its bisector.

Solutions:

Following steps are followed to construct a right angle and its bisector.

(i) Draw a line l and mark a point P on it. Draw an arc of convenient radius by taking point P as centre. Let this intersect line l at R

(ii) Draw an arc by taking R as centre and with the same radius as before such that it is intersecting the previously drawn arc at S

(iii) Take S as centre and with the same radius as before, draw an arc intersecting the arc at T as shown in figure

(iv) By taking S and T as centres draw arcs of same radius such that they are intersecting each other at U.

(v) Join PU. PU is the required ray making a right angle with the line l. Let this intersect major arc at point V.

(vi) Now take R and V as centres, draw arcs with radius more than 1 / 2 RV to intersect each other at point W. Join PW.

PW is the required bisector of this right angle.

4. Draw an angle of measure 153° and divide it into four equal parts.

Solutions:

Following steps are followed to construct an angle of measure 153° and its bisector

(i) Draw a line l and mark a point O on it. Place the centre of protractor at point O and the zero edge along line l

(ii) Mark a point A at the measure of angle 153°. Join OA. Now OA is the required ray making 153° with line l

(iii) Draw an arc of convenient radius by taking point O as centre. Let this intersects both rays of angle 153° at points A and B.

(iv) Take A and B as centres and draw arcs of radius more than 1 / 2 AB in the interior of angle of 153°. Let these intersect each other at C. Join OC

(v) Let OC intersect major arc at point D. Draw arcs of radius more than 1 / 2 AD with A and D as centres and also D and B as centres. Let these are intersecting each other at points E and F respectively. Now join OE and OF

OF, OC, OE are the rays dividing 153° angle into four equal parts.

5. Construct with ruler and compasses, angles of following measures:

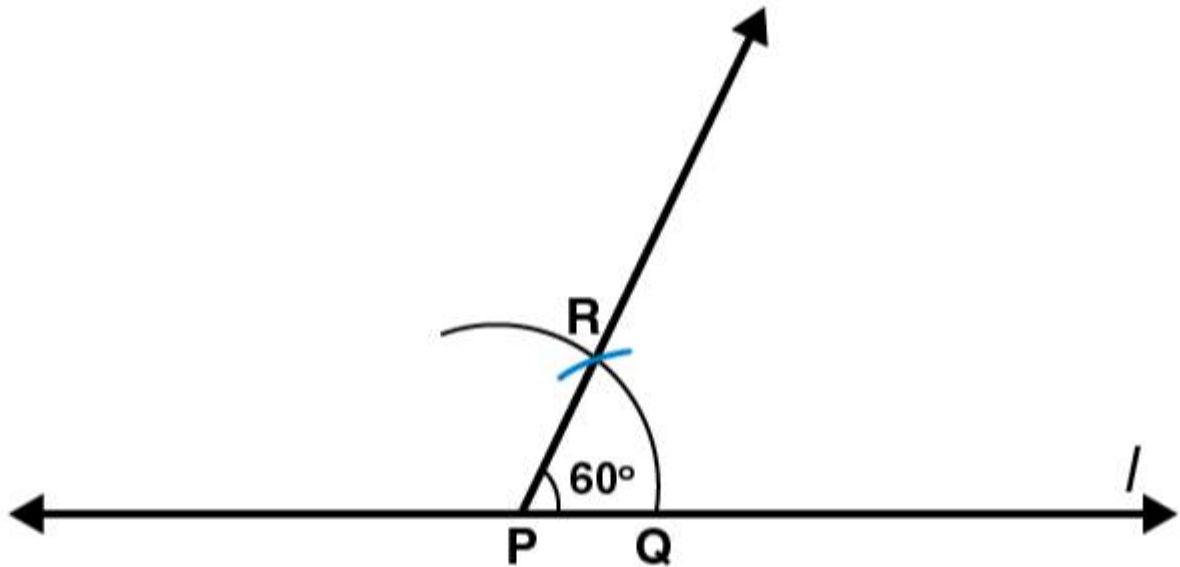(a) 60°

(b) 30°

(c) 90°

(d) 120°

(e) 45°

(f) 135°

Solutions:
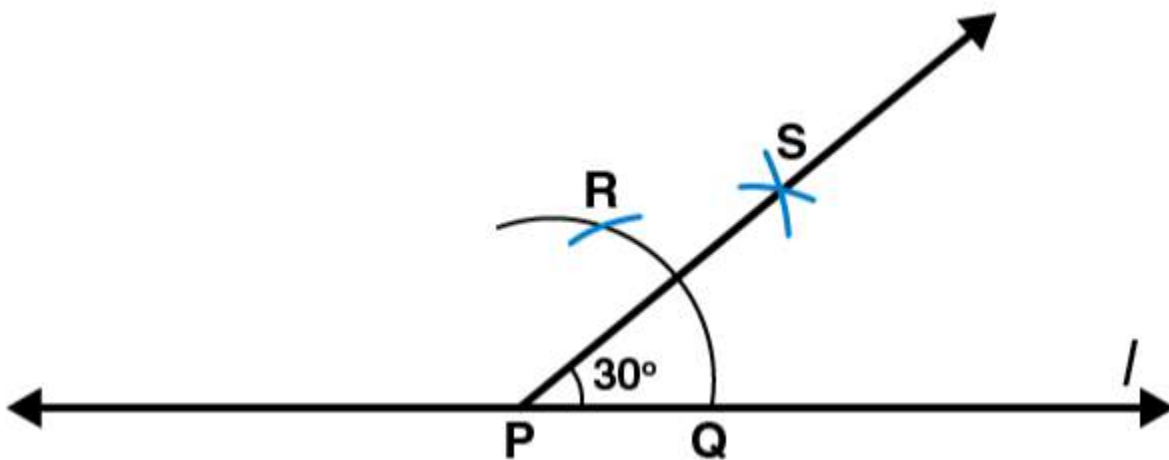
(a) 60⁰

Following steps are followed to construct an angle of 60⁰

(i) Draw a line l and mark a point P on it. Take P as centre and with convenient radius, draw an arc of a circle such that it intersects the line l at Q.

(ii) Take Q as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point R.
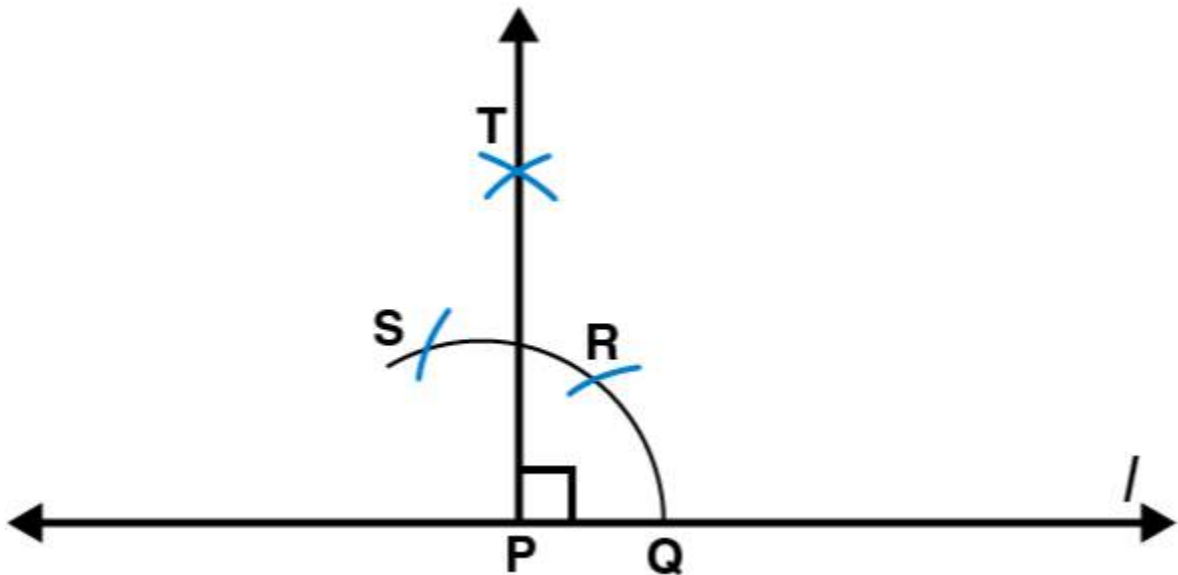
(iii) Join PR. PR is the required ray making 60⁰ with the line l.

(b) 30⁰

Following steps are followed to construct an angle of 30⁰

(i) Draw a line l and mark a point P on it. By taking P as centre and with convenient radius, draw an arc of a circle such that it is intersecting the line l at Q.

(ii) Take Q as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at point R.

(iii) By taking Q and R as centres and with radius more than 1 / 2 RQ draw arcs such that they are intersecting each other at S. Join PS which is the required ray making 30⁰ with the line l.

(c) 90⁰

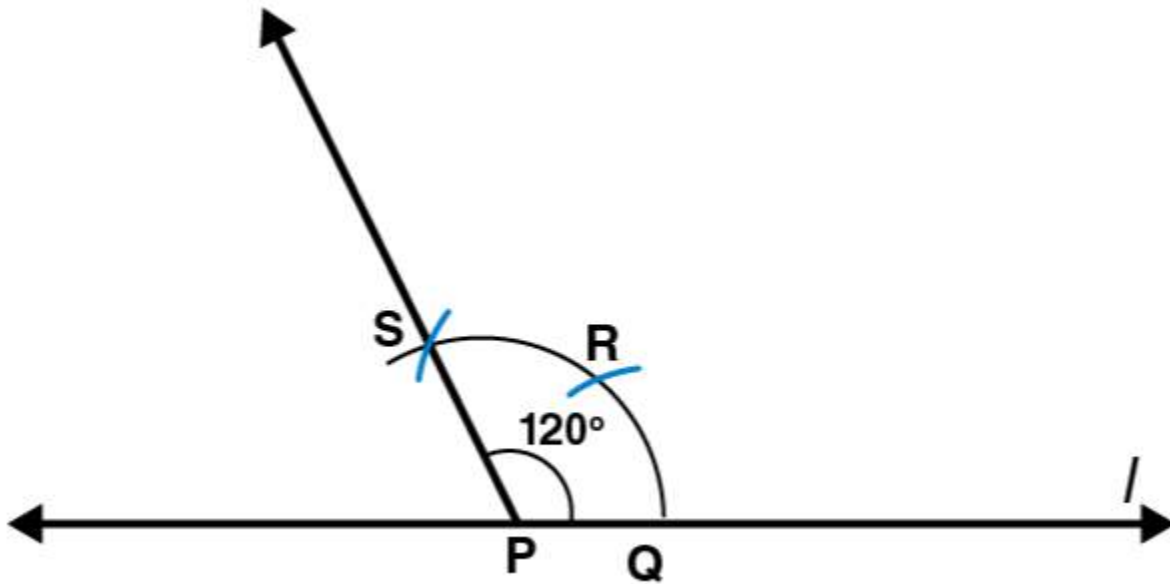Following steps are followed to construct an angle of measure 90°

(i) Draw a line l and mark a point P on it. Take P as centre and with convenient radius, draw an arc of a circle such that it is intersecting the line l at Q.

(ii) Take Q as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at R

(iii) By taking R as centre and with the same radius as before, draw an arc intersecting the arc at S as shown in figure

(iv) Now take R and S as centre, draw arc of same radius to intersect each other at T.

(v) Join PT, which is the required ray making 90° with the line l.

(d) 120°

Following steps are followed to construct an angle of measure 120°

(i) Draw a line l and mark a point P on it. Taking P as centre and with convenient radius, draw an arc of circle such that it is intersecting the line l at Q.

(ii) By taking Q as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at R.
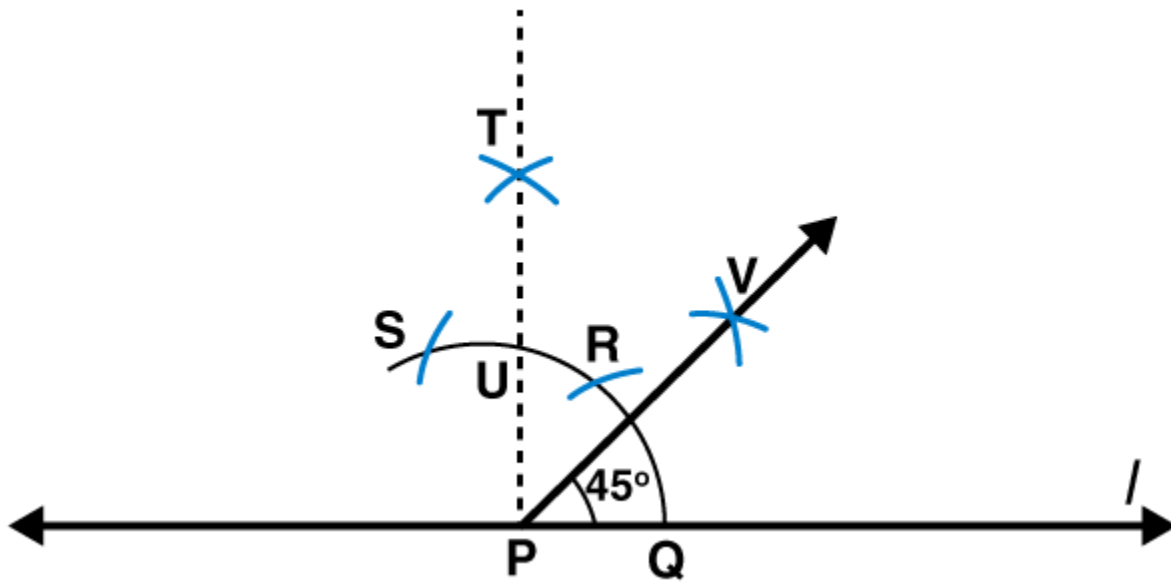
(iii) Take R as centre and with the same radius as before, draw an arc such that it is intersecting the arc at S as shown in figure.

(iv) Join PS, which is the required ray making 120° with the line l

(e) 45⁰

Following steps are followed to construct an angle of measure 45⁰

(i) Draw a line l and mark a point P on it. Take P as centre and with convenient radius, draw an arc of a circle such that it is intersecting the line l at Q.

(ii) Take Q as centre and with the same radius as before, draw an arc intersecting the previously drawn arc at R

(iii) By taking R as centre and with the same radius as before, draw an arc such that it is intersecting the arc at S as shown in figure.

(iv) Take R and S as centres and draw arcs of same radius such that they are intersecting each other at T

(v) Join PT. Let this intersect the major arc at point U.

(vi) Now take Q and U as centres and draw arcs with radius more than 1 / 2 QU to intersect each other at point V. Join PV.

PV is the required ray making 45⁰ with the line l

(f) 135⁰

Following steps are followed to construct an angle of measure 135⁰

(i) Draw a line l and mark a point P on it. Taking P as centre and with convenient radius, draw a semicircle which intersects the line l at Q and R respectively.

(ii) By 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 such that it is intersecting the arc at T as shown in figure

(iv) Take S and T as centres, draw arcs of same radius to intersect each other at U.

(v) Join PU. Let this intersect the arc at V. Now take Q and V as centres and with radius more than 1 / 2 QV, draw arcs to intersects each other at W.

(vi) Join PW which is the required ray making 135⁰ with the line l
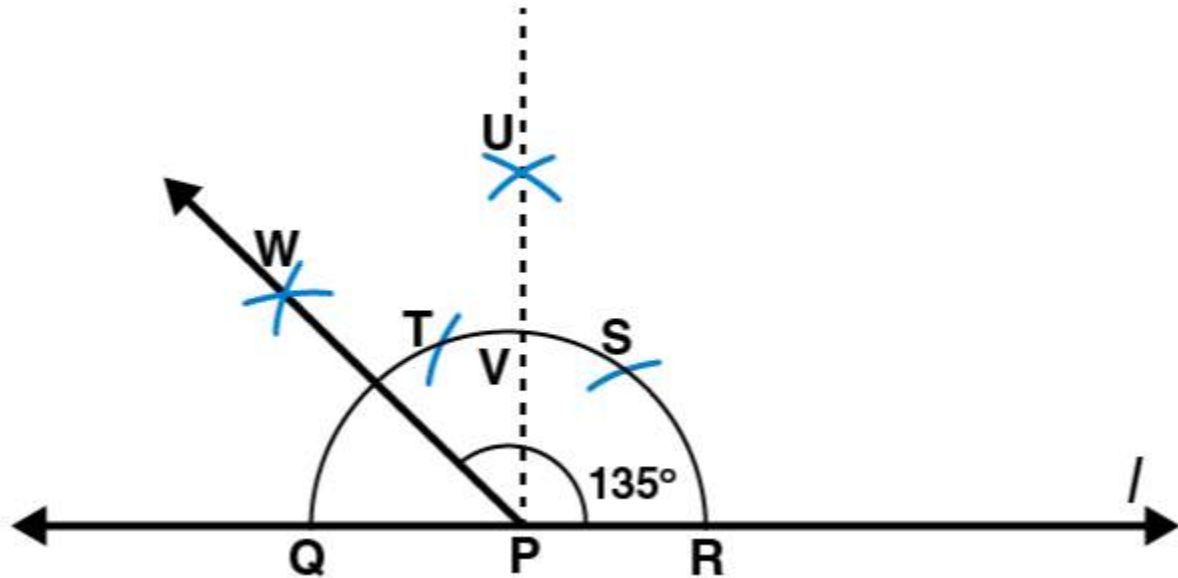
6. Draw an angle of measure 45° and bisect it.
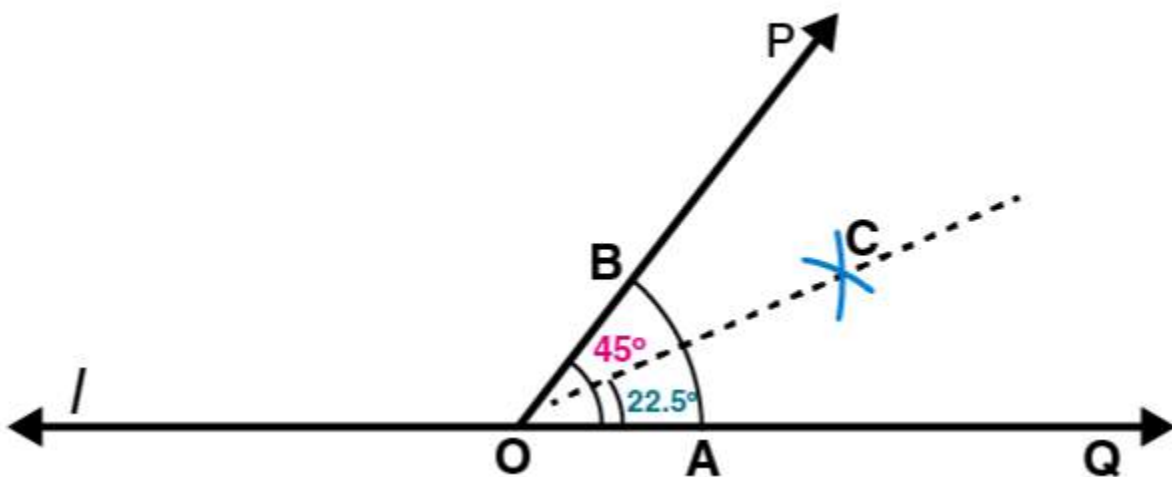
Solutions:

Following steps are followed to construct an angle of measure 45⁰ and its bisector.

(i) Using the protractor ∠POQ of 45⁰ measure may be formed on a line l

(ii) Draw an arc of convenient radius with centre as O. Let this intersects both rays of angle 45⁰ at points A and B

(iii) Take A and B as centres, draw arcs of radius more than 1 / 2 AB in the interior of angle of 45⁰. Let these intersect each other at C. Join OC

OC is the required bisector of 45⁰ angle

7. Draw an angle of measure 135° and bisect it.
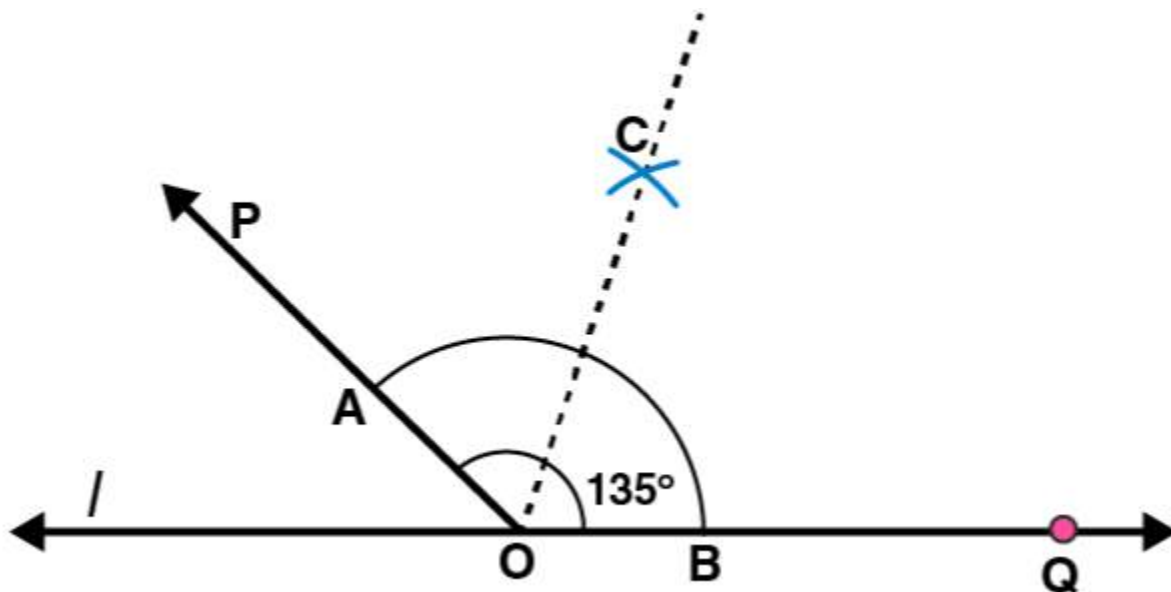
Solutions:

Following steps are followed to construct an angle of measure 135º and its bisector.

(i) By using a protractor ∠POQ of 135º measure may be formed on a line l

(ii) Draw an arc of convenient radius by taking O as centre. Let this intersect both rays of angle 135º at points A and B respectively.

(iii) Take A and B as centres, draw arcs of radius more than 1 / 2 AB in the interior of angle of 135º. Let these intersect each other at C. Join OC.

OC is the required bisector of 135º angle

8. Draw an angle of 70º. Make a copy of it using only a straight edge and compasses.

Solutions:

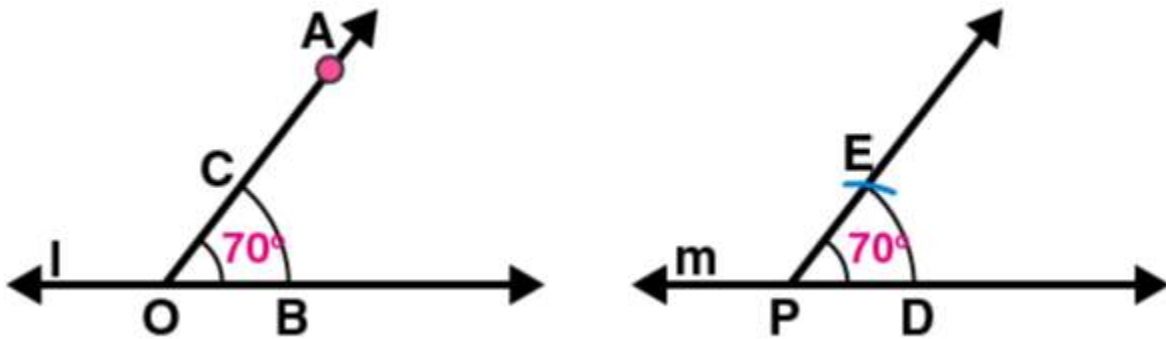Following steps are followed to construct an angle of measure 70º and its copy.

(i) Draw a line l and mark a point O on it. Now place the centre of protractor at point O and the zero edge along line l.

(ii) Mark a point A at an angle of measure 70º. Join OA. Now OA is the ray making 70º with line l. With point O as centre, draw an arc of convenient radius in the interior of 70º angle. Let this intersects both rays of angle 70º at points B and C respectively

(iii) Draw a line m and mark a point P on it. Again draw an arc with same radius as before and P as centre. Let it cut the line m at point D

(iv) Adjust the compasses up to the length of BC. With this radius draw an arc taking D as centre which intersects the previously drawn arc at point E.

(v) Join PE. Here PE is the required ray which makes same angle of measure 70⁰ with the line m

9. Draw an angle of 40⁰. Copy its supplementary angle.

Solutions:

Following steps are followed to construct an angle of measure 45⁰ and a copy of its supplementary angle

(i) Draw a line segment
$\overline{PQ}$ and mark a point O on it. Place the centre of protractor at point O and the zero edge along line segment $\overline{PQ}$.

(ii) Mark a point A at an angle of measure 40⁰. Join OA. Here OA is the required ray making 40⁰ with $\overline{PQ}$. ∠POA is the supplementary angle of 40⁰

(iii) With point O as centre, draw an arc of convenient radius in the interior of ∠POA. Let this intersects both rays of ∠POA at points B and C respectively**.**

(iv) Draw a line m and mark a point S on it. Again draw an arc by taking S as centre with the same radius as used before. Let it cut the line m at point T.

(v) Now adjust the compasses up to the length of BC. Taking T as centre draw an arc with this radius which will intersect the previously drawn arc at point R**.**

(vi) Join RS. Here RS is the required ray which makes same angle with the line m, as the supplementary of 40⁰ [i.e 140⁰]
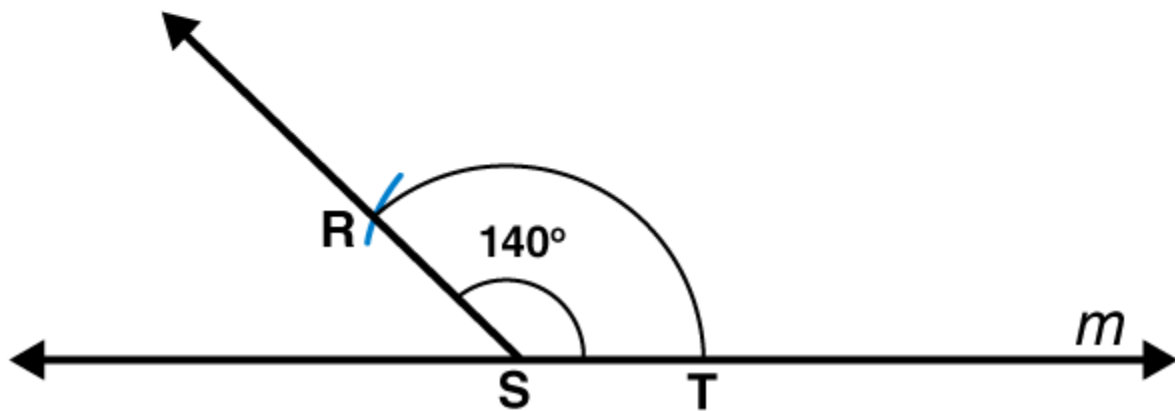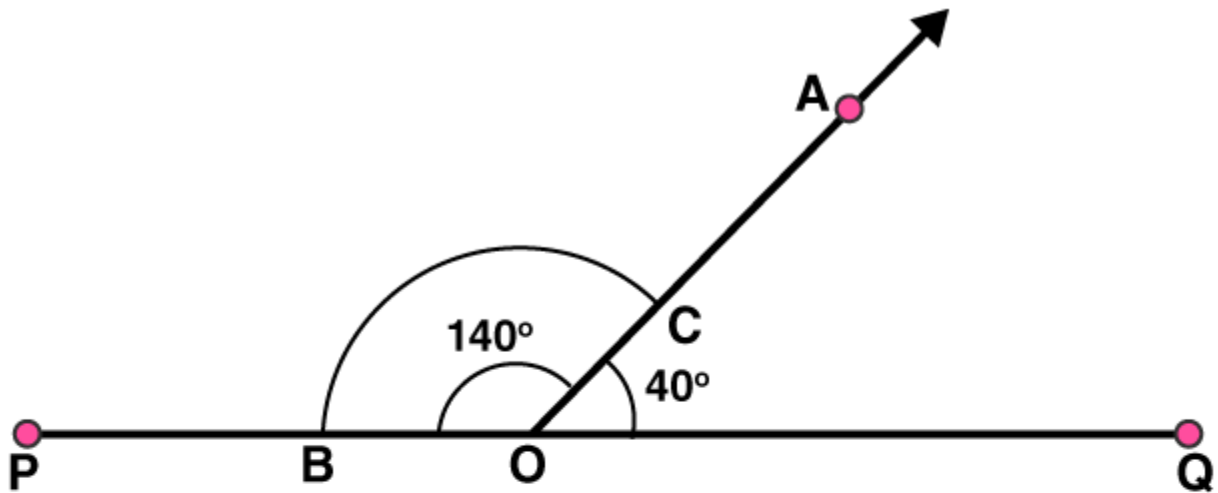
Disclaimer:

Dropped Topics – 14.1 Introduction, 14.2 The circle, 14.3 A line segment, 14.4 Perpendiculars, 14.5 Angles.