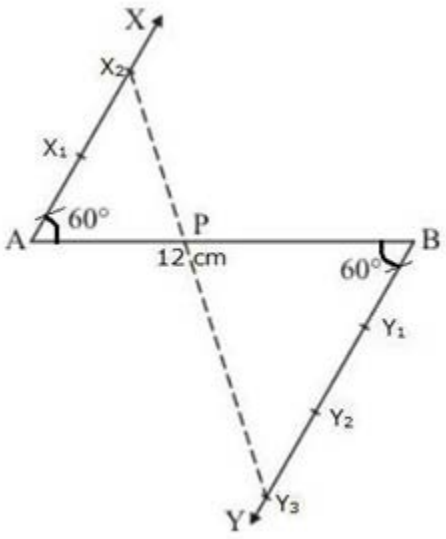
Exercise – 11.1

1.

Sol:



Steps of construction:

(i) Draw a line segment AB of 12 cm

(ii) Through the points A and B draw two parallel line on the opposite side of AB

(iii) Cut 2 equal parts on AX and 3 equal parts on BY such that $AX_1 = X_1X_2 \; and \; BY_1 - Y_1Y_2 - Y_2Y_3$

(iv) Join x_2y_3 which intersect AB at P $\frac{AP}{PB} = \frac{2}{3}$

Justification:

In ΔAX_2P and ΔBY_3P

$\angle APX_2 = \angle BPY_3P$ [Vertically opposite angles]

$\angle X_2AP = \angle Y_3BP$ [alternate interior angles]

Then $\Delta AX_2P \sim \Delta BY_3P$ [by AA similarity]

$\therefore \frac{AP}{BP} = \frac{AX_2}{BY_3} = \frac{2}{3}$ (c.p.c.t)

2.

Sol:

Steps of construction

(i) Draw a line segment AB of 9 cm.

(ii) Through the points A and B, draw two parallel lines AX and BY on the opposite side of AB.

(iii) Cut 4 equal parts on AX and 3 equal parts on BY such that $AX_1 = X_1X_2 = X_2X_3 = X_3X_4 and \; BY_1 = Y_1Y_2 = Y_2Y_3$

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(iv) Join X_4Y_3 which intersect AB at P

$\therefore \frac{AP}{PB} = \frac{4}{3}$

Justification:

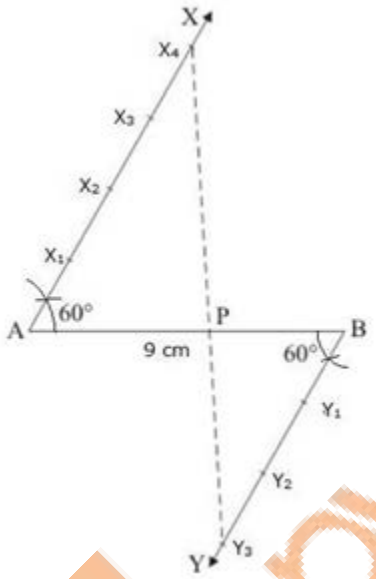
In ΔAPX_4 and ΔBPY_3

$\angle APX_4 = \angle BPY_3$ (vertically opposite angles)

$\angle PAX_4 = \angle PBY_3$ (alternate interior angle)

Then $\Delta APX_4 \sim \Delta BPY_3$ (by AA similarity)

$\therefore \frac{PA}{PB} = \frac{AX_4}{BY_3} = \frac{4}{3}$ (c.p.c.t.)



3.

Sol:

Steps of construction

(i) Draw a line segment AB of 14 cm.

(ii) Through the points A and B, draw two parallel lines AX and BY on the opposite side of AB

(iii) Starting from A cut 2 equal parts on AX and starting from B cut 5 equal parts on BY such that $AX_1 = X_1X_2$ and $BY_1 = Y_1Y_2 = Y_2Y_3 = Y_3Y_4 = Y_4Y_5$

(iv) Join X_2Y_5 which intersect AB at P

$\frac{AP}{PB} = \frac{2}{5}$

Justification

In $\Delta APX_2 = \angle BPY_5$

$\angle APX_2 = \angle BPY_5$ (vertically opposite angles)

$\angle PAX_2 = \angle PBY_5$ (alternate interior angles)

then $\Delta APX_2 \sim \Delta BPY_5$ (by AA similarity)

$\therefore \frac{AP}{PB} = \frac{AX_2}{BY_5} = \frac{2}{5}$ (by c.p.c.t)

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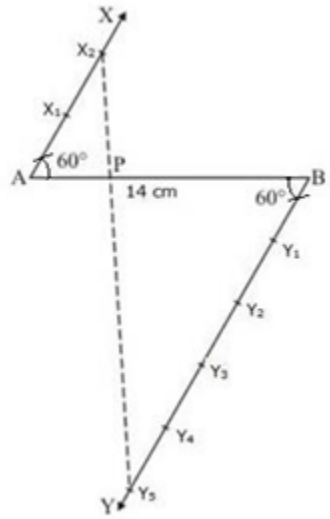
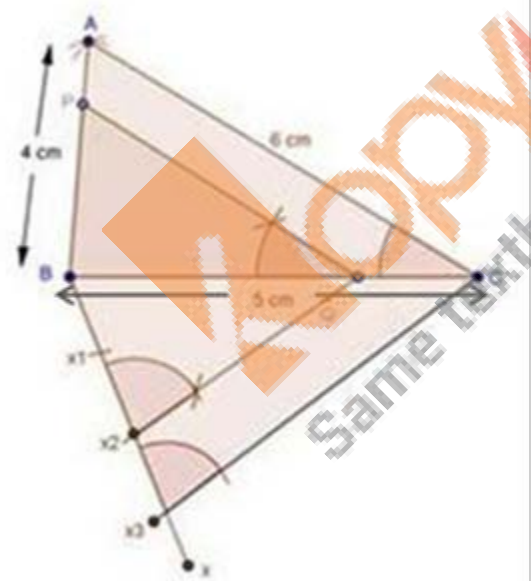


Exercise – 11.2

1.

Sol:



Steps of construction

(i) Draw a line segment BC of 5 cm.

(ii) With centres B and C, and radii 4 cm and 6 cm respectively, draw two arcs which intersect each other at A.

(iii) Join AB and AC.

(iv) At the point B drawn an angle CBX of any measure.

(v) Starting from B cut 3 equal parts on BX such that $BX_1 = X_1X_2 = X_2X_3$

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(vi) Join CX_3

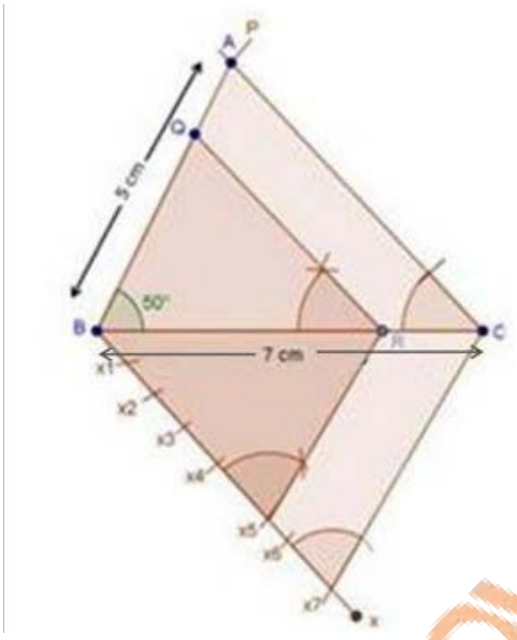
(vii) Through $X_2, draw\ X_2Q \parallel X_3C$.

(viii) Through Q, draw QP || CA

$\therefore \Delta PBQ \sim \Delta ABC$

2.

Sol:



Steps of construction

(i) Draw a line segment BC of 7cm.

(ii) At B, draw ∠PBC = 50°

(iii) With centre B and radius 5 cm draw an arc which intersect PB at A.

(iv) Join AC

(v) At B, draw ∠CBX of any measure

(vi) Starting from B, cut 7 equal parts on BX such that

$BX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4X_5 = X_5X_6 = X_6X_7$

(vii) Join x_7C.

(viii) Through $x_5, draw\ x_5R \,||\, x_7C$

(ix) Through R, draw RQ || CA

$\therefore \Delta QBR \sim \Delta ABC$

3.

Sol:

Steps of construction

(i) Draw a line segment BC of 6 cm.

(ii) At the points B and C draw two angles of 50° and 60° respectively which intersect each other at A.

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(iii) At B, draw ∠CBX of any measure

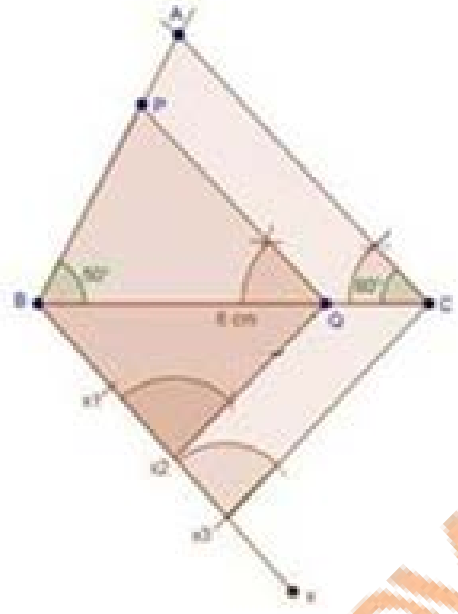
(iv) Starting from B, cut 3 equal parts on BX such that $BX_1 = X_1X_2 = X_2X_3$

(v) Join X_3C

(vi) Through $x_2, draw\ x_2Q \parallel QP$

(vii) Through Q, draw QP || CA

∴ ΔPBQ ~ ΔABC



4.

Sol:

Steps of construction

(i) Draw a line segment BC of 6 cm

(ii) With centres B and C, and radii 4 cm and 6 cm respectively, draw two arcs which intersect each other at A.

(iii) Join AB and AC

(iv) At B, draw ∠CBX of any measure.

(v) Starting from B, cut 4 equal parts on BX such that $BX_1 = X_1X_2 = X_2X_3 = X_3X_4$

(vi) Join X_4C

(vii) Through $X_3, draw\ X_3\ Q \parallel X_4C$

(viii) Through Q, draw QP || CA

∴ ΔPBQ ~ ΔABC

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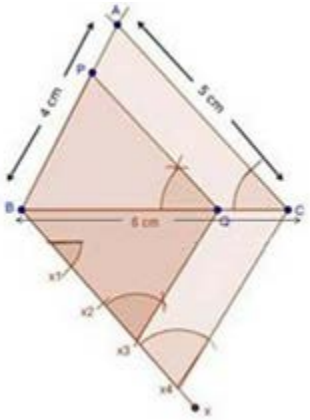
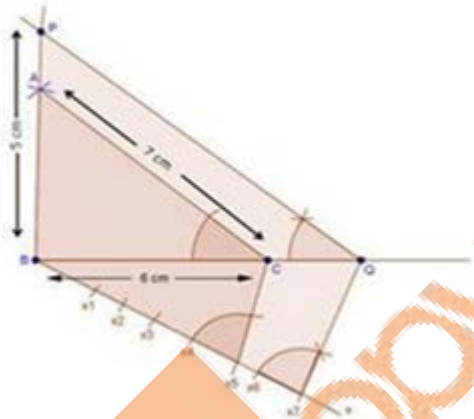


5.

Sol:



Steps of construction:

(i) Draw a line segment BC of 6 cm.

(ii) With centres B and C and radii 5cm draw two arcs which intersect each other at A.

(iii) Join AB and AC

(iv) At B, draw ∠CBx of any measure

(v) Starting from B, cut 7 equal parts on Bx such that
$BX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4X_5 = X_5X_6 = X_6X_7$

(vi) Join x_5C

(vii) Through $x_7, draw\ x_7Q \parallel x_5C$

(viii) Through Q, draw QP || CA

∴ ΔPBQ ~ ΔABC

6.

Sol:

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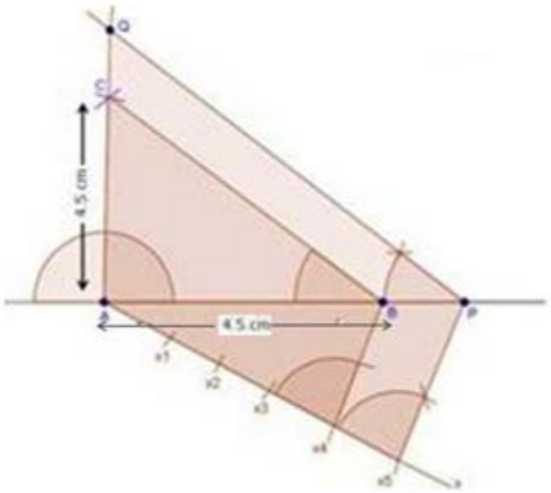

Steps of construction:

(i) Draw a line segment AB of 4.5 cm

(ii) At A draw an angle of 90°.

(iii) With centre A and radius 4.5 cm, draw an arc which intersect the line of angle at C.

(iv) Join CB.

(v) At B, draw ∠BAx of any measure

(vi) Starting from A, cut 5 equal parts on Ax such that

$AX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4X_5$

(vii) Join X_4B.

(viii) Through $x_5, draw\ x_5P \parallel x_4B$

(ix) Through P, draw PQ || BC

∴ ΔQAP ~ ΔCAB

7.

Sol:

Steps of construction:

(i) Draw a line segment BC of 5 cm.

(ii) At B, draw an angle of 90°.

(iii) With centre B and radius 4 cm, draw an arc which intersect line of angle at A.

(iv) Join AC

(v) At B, draw ∠CBx of any measure

(vi) Starting from B, cut 5 equal parts on Bx such that

$BX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4X_5$

(vii) Join x_3C

(viii) Through $x_5, draw\ x_5\ Q \parallel x_3C$

(ix) Through C, draw CA || QP

∴ ΔPBQ ~ ΔABC

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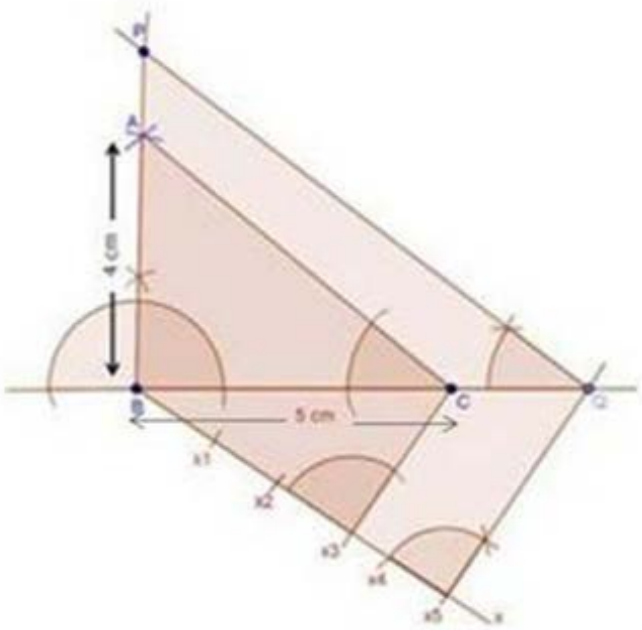
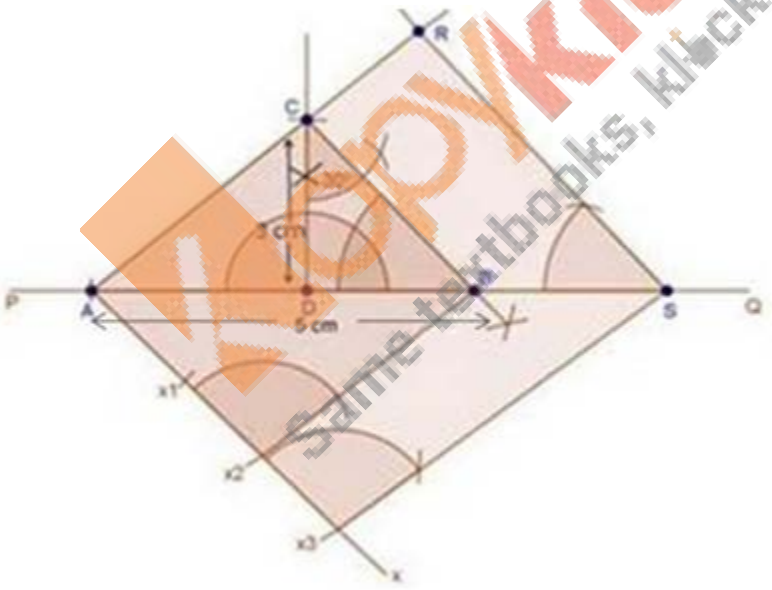


8.

Sol:



(i) Draw a line segment PQ.
(ii) Take a point D, on PQ
(iii) At, D draw an angle of 90°
(iv) With centre D and radius 3 cm, draw an arc which intersect line of angle at C.
(v) At C draw ∠BCD of 30° which intersect PQ at B.
(vi) With centre B and radius 5 cm draw an arc which intersect PQ at A.
(vii) Join AC.

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(viii) At a draw an angle BAx of any measure.

(ix) Starting from A, cut three equal parts on Ax such that $AX_1 = X_1X_2 = X_2X_3$

(x) Join x_2B

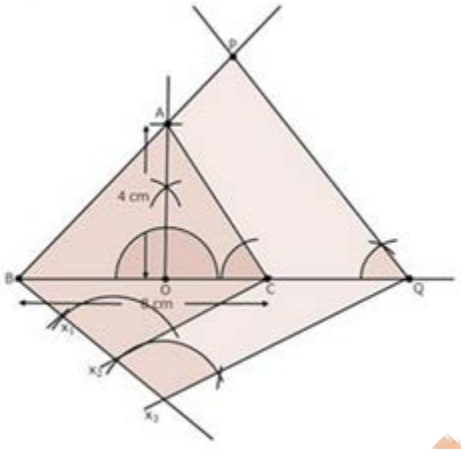
(xi) Through $x_3, draw\ x_3\ S\ ||\ x_2B$

(xii) Through S, draw SR || BC

∴ ΔRAS ~ ΔCAB

9.

Sol:



Steps of construction

(i) Draw a line segment BC of 8 cm

(ii) Take a mid-point D of BC

(iii) At D, draw an angle of 90°

(iv) With centre D, radius 4 cm, draw an arc which intersect line of angle at A.

(v) Join AB and AC

(vi) At B, draw an angle CBx of any measure

(vii) Starting from B, cut there equal parts on Bx such that $BX_1 = X_1X_2 = X_2X_3$

(viii) Join x_2C

(ix) Through $x_3, Draw\ x_3\ Q\ ||\ x_2C$

(x) Through Q, Draw QP || CA

∴ ΔPBQ ~ ΔABC.

10.

Sol:

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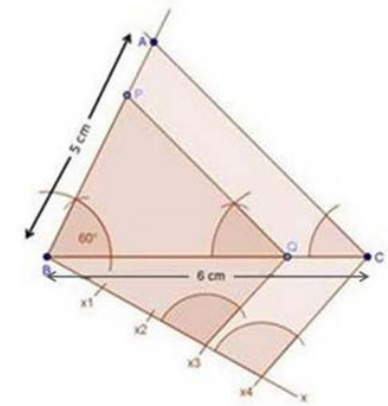


Steps of construction

(i) Draw a line segment BC of 6 cm

(ii) At point B, draw an angle of 60°

(iii) With centre B and radius 5 cm draw an arc which intersect the line of angle at A.

(iv) Join AC

(v) At B draw angle CBx of any measure

(vi) Starting from B, cut 4 equal parts on Bx such that $BX_1 = X_1X_2 = X_2X_3 = X_3X_4$

(vii) Join x_4C

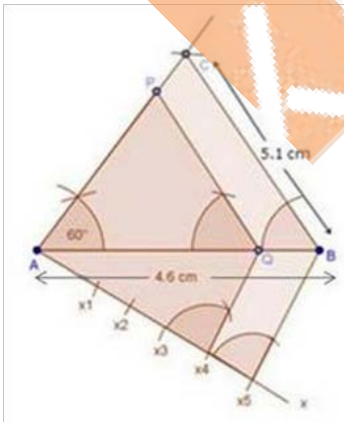
(viii) Through $x_3, Draw\ x_3\ Q\ ||\ x_4C$

(ix) Through Q, Draw QP || CA

$\therefore \Delta PBQ \sim \Delta ABC$

11.

Sol:



Steps of construction

(i) Draw a line segment AB of 4.5 cm

(ii) At a draw an angle of 60°

(iii) With center B and radius 5.1 cm draw an arc which intersect line of angle at C.

(iv) Join BC.

(v) At A draw an angle BAX of any measure

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(vi) Starting from A, cut 5 equal parts on AX such that $AX_1 = X_1X_2 = X_2X_3 = X_3X_4 = X_4X_5$

(vii) Join x_5B

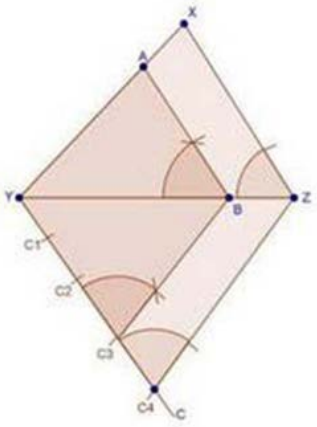
(viii) Through x_4, Draw $x_4Q \,||\, x_5B$

(ix) Through Q, Draw QP || BC

$\therefore \Delta$ PAQ ~ ΔCAB

12.

Sol:



Steps of construction

(i) Draw a ΔXYZ

(ii) At Y draw an angle ZYC of any measure

(iii) Starting from Y, cut 4 equal parts on YC

Such that $YC_1 = C_1C_2 = C_2C_3 = C_3C_4$

(iv) Join C_4Z

(v) Through C_3, Draw $C_3B \,||\, C_4Z$

(vi) Through B, Draw BA || ZX

$\therefore \Delta$AYB ~ ΔXYZ

13.

Sol:

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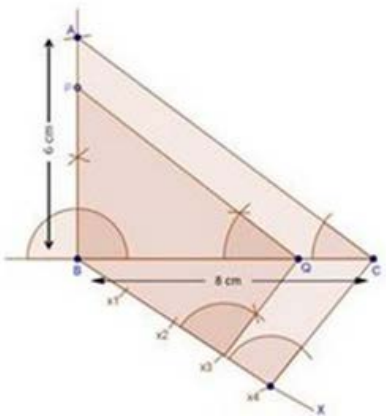


Steps of construction:

(i) Draw a line segment BC of 8 cm.

(ii) At B, draw an angle of 90°

(iii) With center B and radius 6cm draw an arc which intersect line of angle at A.

(iv) Join AC

(v) At B, draw an angle CBX of any measure

(vi) Starting from B, cut 4 equal parts on BX such that
$BX_1 = X_1X_2 = X_2X_3 = X_3X_4$

(vii) Join x_4C

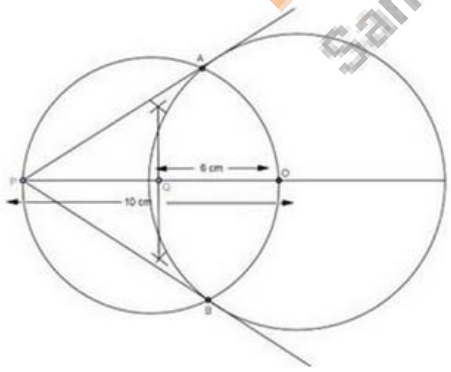
(viii) Through $x_3, Draw\ x_3\ Q \mid\mid x_4C$

(ix) Through Q, Draw QP | | CA
∴ Δ PBQ ~ ΔABC

Exercise – 11.3

1.

Sol:



Steps of construction

(i) Draw a line segment PO of 10 cm.

(ii) Draw the perpendicular bisector of PO which intersect PO at Q.

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(iii) With center Q and radius QP draw a circle

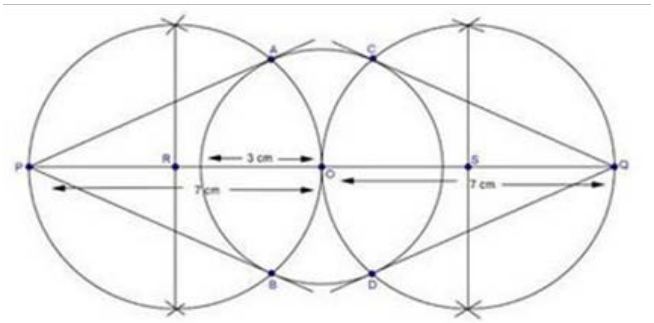
(iv) With center O and radius 6 cm draw another circle which intersect the previous circle at points A and B.

(v) Join PA and PB

∴ PA and PB are the required tangents

2.

Sol:



Steps of construction

(i) Draw a line segment PQ of 14 cm.

(ii) Take the midpoint O of PQ.

(iii) Draw the perpendicular bisectors of PO and OQ which intersects at points R and S.

(iv) With center R and radius RP draw a circle

(v) With center S and radius SQ draw a circle

(vi) With center O and radius 3 cm draw another circle which intersect the previous circles at the points A, B, C and D.

(vii) Join PA, PB, QC and QD

∴ PA, PB, QC and QD are the required tangents.

3.

Sol:

Steps of construction

(i) Draw a line segment AB of 8cm

(ii) Draw the perpendicular of AB which intersects it at C.

(iii) With center C and radius CA draw a circle

(iv) With centers A and B radius 4 cm and 3 cm draw two circle which intersect the previous at the points P, Q, R and S

(v) Join AR, AS, BP and BQ

∴ AR, AS, BP and BQ are the required tangents.

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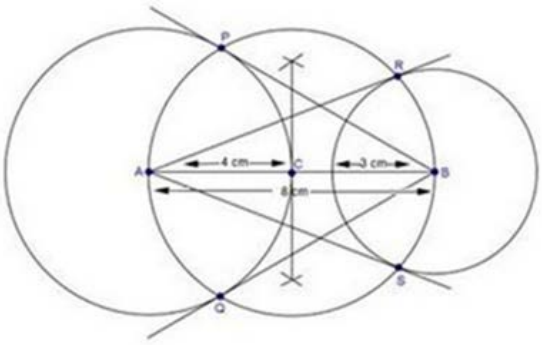

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