#452515

To construct a triangle similar to given ΔABC with sides equal to $\frac{7}{5}$ of the sides of ΔABC, a ray BX is drawn such that $\angle CBX$ is acute angle and $B_1, B_2, B_3, \ldots$ are marked at equ distances on BX. The points to be joined in the next step are:

A B_{12}, C

B B_5, C

C B_7, C

D B_2, C

Solution

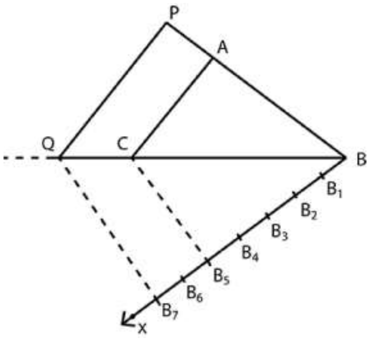
$\triangle PQB$ is the required triangle.

Since side BQ is $\frac{7}{5}$ times side BC.

$BC + CQ = \frac{7}{5} \times BC \Rightarrow CQ = \frac{2}{5} \times BC \Rightarrow \frac{CQ}{BC} = \frac{2}{5}$

Therefore, C divides BQ in ratio $5:2$.

So, point B_5 should be connected to C, and B_7P should be drawn parallel to B_6C.



#465197

Draw a line segment of length $7.6\ cm$ and divide it in the ratio $5:8$.

Solution

Step 1: Draw segment AB of length $7.6\ cm$ using a ruler.

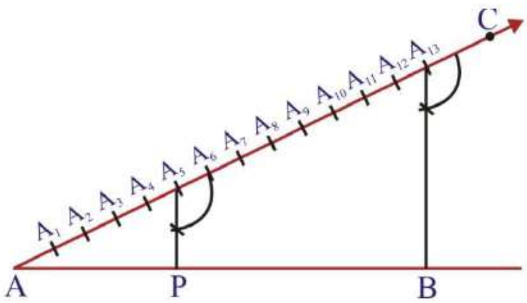
Step 2: Draw a ray AC having an acute angle with line AB.

Step 3: Mark 13 equidistant points on ray AC, $A_1, A_2, A_3, \ldots, A_{13}$

Step 4: Join A_{13} to B

Step 5: Draw A_5P parallel to $A_{13}B$.

Point P divides AB in the ratio $5:8$. Measuring the lengths, we get $AP = 2.9\ cm$ and $PB = 4.7\ cm$.



#465199

Construct a triangle of sides $4cm$, $5cm$ and $6cm$ and then a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

Solution

Steps of construction:

1. Draw a base BC of length $6\ cm$.

2. Place the pointed end of the compass on B and mark an arc of radius $5\ cm$. Now, place the pointed end on C and mark an arc of radius $4\ cm$ intersecting with the previous arc. Mark this intersection point as A.

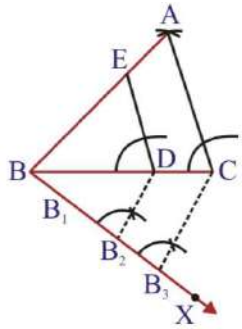
3. Join $A-B$ and $A-C$. $\triangle ABC$ is the first triangle.

4. Draw a ray BX from point B on opposite side of A to line BC.

5. Mark three equidistant points on ray BX and name them B_1, B_2 and B_3.

6. Join B_3-C. From B_2, draw a line parallel to B_3C and let it intersect BC in D. From D draw a line parallel to AC and let it intersect AB in E.

$\triangle BED$ is the required similar triangle.



#465202

Construct a triangle with sides $5\ cm$, $6\ cm$ and $7\ cm$ and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

Solution

Constructing the first triangle:

Step 1: Draw base AB of length $7\ cm$

Step 2: Place a compass on A and draw an arc of radius $5\ cm$

Step 3: Place the compass on B and draw an arc of radius $6\ cm$ such that it intersects the arc drawn in step 2.

Step 4: Mark the intersection of the two arcs as C and join $A-C$ and $B-C$

$\triangle ABC$ is the given triangle.

Let $\triangle PAQ$ be the required triangle.

Step 1: Draw a ray AX from point A on the opposite side of C, making an acute angle with AB.

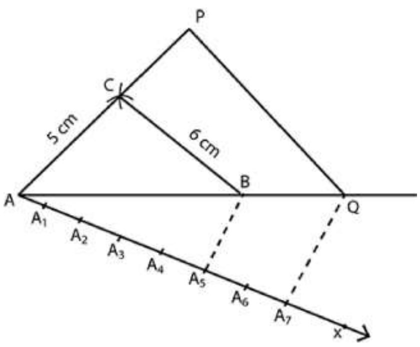
Step 2: Mark 7 equidistant points $A_1, A_2, A_3, \ldots, A_7$ on ray AX.

Step 3: Join A_5 to B.

Step 4: Draw A_7Q parallel to A_5B and mark the point on the extension of line AB as Q.

Step 5: Draw PQ parallel to BC and mark the intersection point on the extension of AC as P.

$\triangle PAQ$ is the required triangle.



#465204

Construct an isosceles triangle whose base is $8cm$ and altitude $4cm$ and then another triangle whose sides are $1\frac{1}{2}$ times the corresponding sides of the isosceles triangle.

Solution

Steps of construction:

1. Draw a base BC of length 8 cm.

2. Draw the perpendicular bisector of BC and name it PQ. Let it intersect BC in M.

3. From M, mark an arc A at a distance of 4 cm on PQ.

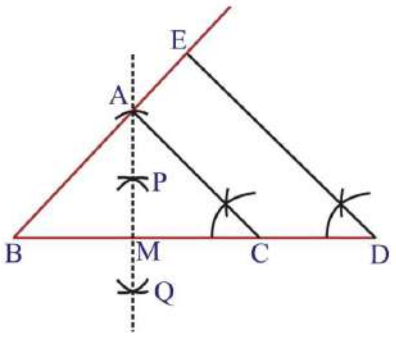
4. Join $B - A$ and $C - B$. $\triangle ABC$ is the first isosceles triangle.

5. Extend BC and BA. Place the pointed end of the compass at C and mark an arc of radius CM on the opposite side of M on the extended segment BC. Mark the point as D

(Since CM is half of BC, BD will be $BC + 0.5BC = 1.5BC$)

6. From D, draw a line parallel to AC and let it intersect the extended segment AB at E.

$\triangle EBD$ is the required similar triangle.



#465206

Draw a $\triangle ABC$ with side $BC = 6$ cm, $AB = 5$ cm and $\angle ABC = 60°$. Then construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the $\triangle ABC$.

Solution

Constructing $\triangle ABC$:

Step 1: Draw base BC of length 6 cm using a ruler.

Step 2: Draw a ray from point B at an angle of $60°$.

Step 3: Mark an arc of radius 5 cm on the ray is drawn from B and label the intersection point as A. Join $A - C$

$\triangle ABC$ is the given triangle.

Constructing $\triangle EBD$ with sides $\frac{3}{4}$ times the sides of $\triangle ABC$

Step 1: Draw a ray BX on the opposite side of A.

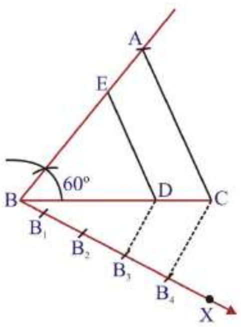
Step 2: Mark 4 equidistant points B_1, B_2, B_3, B_4 on ray BX

Step 3: Join B_4 to point C.

Step 4: Draw B_3D parallel to B_4C and mark the intersection point with line BC as D.

Step 5: Draw DE parallel to CA and mark the intersection point with AB as E.

$\triangle EBD$ is the required triangle.



#465209

Draw a $\triangle ABC$ with side $BC = 7$ cm, $\angle B = 45°$, $\angle A = 105°$. Then, construct a triangle whose sides are $\frac{4}{3}$ times the corresponding sides of $\triangle ABC$.

Solution

In $\triangle ABC$, $\angle A + \angle B + \angle C = 180^\circ$

$\therefore 105^\circ + 45^\circ + \angle C = 180^\circ$

$\therefore \angle C = 30^\circ$

Constructing $\triangle ABC$:

Step 1: Draw base BC of length $7\ cm$.

Step 2: Draw a ray at an angle of 45° with line BC from point B.

Step 3: Draw a ray at an angle of 30° from line CB from point C and mark the intersection point of the rays from B and C as A.

Step 4: Join $A - B$ and $A - C$.

$\triangle ABC$ is the required triangle.

For constructing $\triangle EBD \sim \triangle ABC$

Step 1: Draw a ray BX at an acute angle to line BC on the opposite side of A.

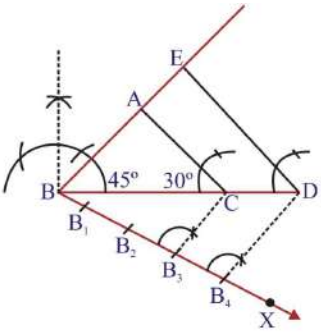
Step 2: Mark 4 equidistant points B_1, B_2, B_3, B_4 on ray BX.

Step 3: Join B_3 and C.

Step 4: Draw B_4D parallel to B_3C and label the intersection on the extension of BC as D.

Step 5: Draw DE parallel to BA and label the intersection with the extension of BA as E

$\triangle EBD$ is the required triangle.



#465211

Draw a right triangle which the sides (other than hypotenuse) are of lengths $4\ cm$ and $3\ cm$. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides o

the given triangle.

Solution

Construct $\triangle ABC$, the given right angled triangle, as follows:

Step 1: Draw base BC of length $4\ cm$.

Step 2: Draw a right angle at point B.

Step 3: Draw an arc of radius $3\ cm$ on the right angle drawn from B and label that point as A

Step 4: Join $A-C$.

$\triangle ABC$ is the given triangle.

To construct $\triangle EBD \sim \triangle ABC$:

Step 1: Draw a ray BX at an acute angle to line BC on the opposite side of A.

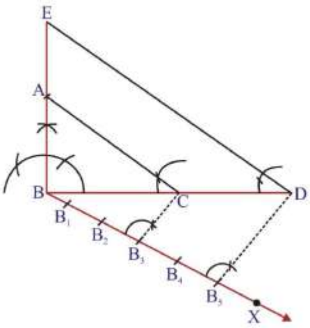
Step 2: Mark 5 equidistant points B_1, B_2, B_3, B_4, B_5 on ray BX.

Step 3: Join B_3 and C.

Step 4: Draw B_5D parallel to B_3C and label the intersection on the extension of BC as D.

Step 5: Draw DE parallel to BA and label the intersection with the extension of BA as E

$\triangle EBD$ is the required triangle.



#465212

Draw a circle of radius $6cm$. From a point $10cm$ away from its centre, construct the pair of tangents to the circle and measure their lengths.

Solution

Construct a circle with radius $=6cm$ and centre be C

Locate a point A which is 10 cm from C

Then find the perpendicular bisector of line joining points C and A. lets say the mid point will be M.

Now draw an 'another circle with centre at M and radius $=6cm\left(\frac{CA}{2}\right)$ and lets say this circle cuts the previous circle at points N and Q then draw the lines AB and AN which are our external tangents.

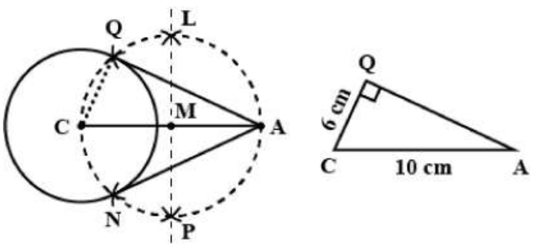
Sinces $\triangle CSA$ is right angle triangle at $L.\ S=90^o$

Therefore using pythagoras theorem

$(CQ)^2+(SN)^2=(CA)^2$

$(10)^2-(6)^2=(QN)^2$

$QN=8cm,\ log3h$ of tangent



#465214

Construct a tangent to a circle of radius $4cm$ from a point on the concentric circle of radius $6cm$ and measure its length. Also verify the measurement by actual calculation.

Solution

Construction the two conuntric circle with to $r_1 = 4cm$ and $r_2 = 6cm$ with centre be C

locate a point p on outer circle such that $CP = 6cm$ and lets assume M be the mid point of CP such that $CM = MP = 3cm$

Now draw a circle with centre M and radius $= 3cm = cm$ and lets say its intersect the inner circle at point A and B.

Now join the points A,P and BP so we get our tangents AP and BP

Since $\triangle CAP$ is a right angled triangle with $\angle A = 90^o$

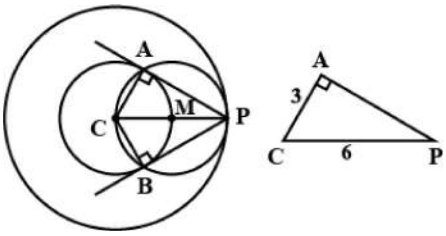
therefore using pythogorus therom

$(CA)^2 + (AP)^2 = (CP)^2$

$(PA)^2 = 36 - 9$

$AP = 3\sqrt{3}cm$

verify it by measuring with scale.



#465215

Draw a circle of radius 3 cm. Take two points P and Q on one of its extended diameter each at a distance of 7 cm from its centre. Draw tangents to the circle from these two points P and Q

Solution

Step 1: Draw a circle with centre O and radius 3 cm using a compass.

Step 2: Draw a secant passing through the centre. Mark points P and Q on opposite sides of the centre at a distance of 7 cm from O.

Step 3: Place the compass on P and draw two arcs on opposite sides of OP. Now place the compass on O and draw two arcs intersecting the arcs drawn from point P.

Step 4: Join the intersection points of the arcs to obtain the perpendicular bisector of OP. Mark the mid point of OP as M_1

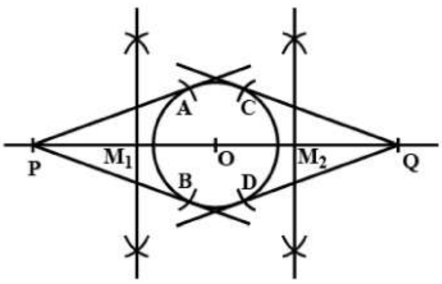
Step 5: From M_1 draw a circle with radius $= M_1P = M_1O$

Step 6: Mark the intersection points of the circle drawn from M_1 with the circle drawn from O as A and B.

Step 7: Join $P-A$ and $P-B$

Step 8: Repeat steps 3 to 7 for point Q and obtain tangents QC and QD

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



#465217

Draw a pair of tangents to a circle of radius $5cm$ which are inclined to each other at an angle of 60^o

Solution

Lets assume a circle with radius =r

and AP and AQ are two external tangents and $20 = 60^o$ be the angle between them.

therefore $\angle CAP = \theta$ and $\angle CPA = 90^o$

So in $\triangle CAP$, $\sin\theta = \sin\left(\frac{60^o}{2}\right) = \frac{CP}{CA}$

$\sin(30^o) = \frac{5}{CA}$

$CA = 10cm$

Now lets construct this pair of tangents.

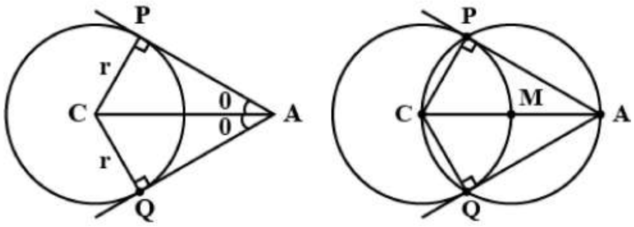
Construct a circle with centre c and radius $= 5cm$

d locate a point A, which is 10 cm for C such that $CA = 10cm$

Now locate the midpoint of CA be M so that $CM = MA = 5cm$

Now draw a circle with centre M and radius $= CM = 5cm$ and assume that this circle intersects the previous circle at points P and Q and join the points P,A and Q,A

So that PA and QA are our desire tangents such that $\angle PAQ = 60^o$



#465218

Draw a line segment AB of length $8cm$. Taking A as centre, draw a circle of radius $4cm$ and taking B as centre, draw another circle of radius $3cm$. Construct tangents to each circle from the centre of the other circle.

Solution

construct a line AB=8cm and mid point AB. be M such that $AM = MB = 4cm$

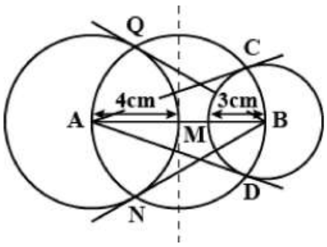
construct n circle with centre A and radius $= 4cm$ and draw another circle with centre B and radius $= 3cm$

Now draw a circle with centre M and radius $= 4cm = AM$

and lets assume that this circle intersects the first circle $(r = 4cm)$

at points Q and N it intersects the second circle $(r = 3m)$ at points c and D.

Now join the point Q,B and N,B which are tangents to first circle and join points C, A and A,D. tangent to second circle.



#465220

Let ABC be right triangle in which $AB = 6cm$, $BC = 8cm$ and $\angle B = 90^o$, BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle.

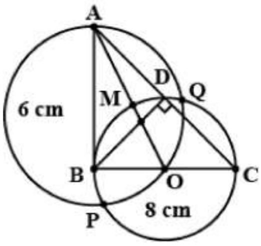
Solution

Construct the $\triangle ABC$ and $BD \perp AC$ then draw a circle with centre O such that $BO = OC = 4cm$

join the point O and A and locate M be the midpoint of AO. and draw a circle with centre M and radius $= MO = AM$

let this circle cuts the previous circle at P and Q

Now join AP and AQ which are the desire tangents.



#465222

Draw a circle with the help of a bangle. Take a point outside the circle. Construct the pair of tangents from this point to the circle.

Solution

Step 1: Draw a circle by tracing the surface of a bangle.

Step 2: Take a point P outside the circle. Draw secant $P-R-Q$

Step 3: Place the compass on P and mark two arcs on opposite side of PQ. Now, place the compass on Q and draw two arcs intersecting the arcs drawn from P.

Step 4: Join the intersection points of the arcs to obtain the perpendicular bisector of PQ. Mark the mid point of PQ as M.

Step 5: Place the compass on M and taking PM as radius draw a semicircle passing through P and Q.

Step 6: From point R, draw a perpendicular to PQ and let it intersect the semicircle drawn in step 5 at C.

Step 7: Place the compass at P and with PC as radius, mark two arcs on the original circle and mark them as A and B.

Step 8: Join $P-A$ and $P-B$

PA and PB are the required tangents.