CLASS 1(January 29)

Angles, similarity and congruence, pythagoras

Would you rather?

Be as big as an elephant or as small as an ant?

Lesson 1 Angles

1) What is an angle?

—> The space between two lines is called an angle.

2) What is a right angle?

—> The angle which is 90 degrees.

3) What is an acute angle?

—> Angle less than 90 degrees.

4) What is an obtuse angle?

—> Angle more than 90 degrees.

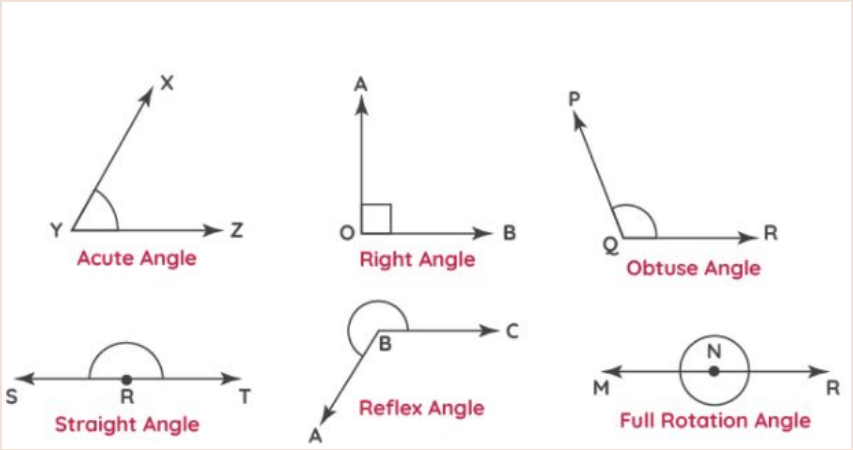
5) What are complementary angles?

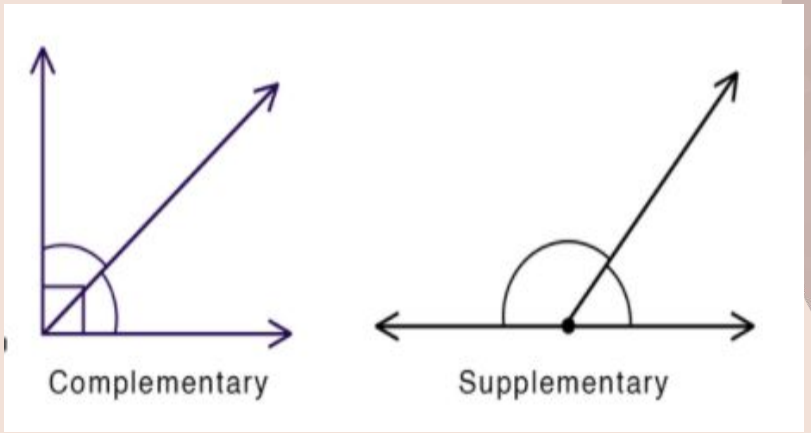
—> Two angles which sum to 90 degrees.

6) What is a supplementary angles?

—> Two angles which sum to 180 degrees.

Types of angles:



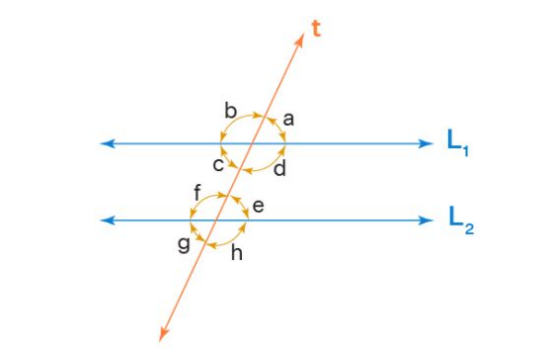


What are parallel lines?

—> Always at an equal distance apart.

—> These lines never intersect.

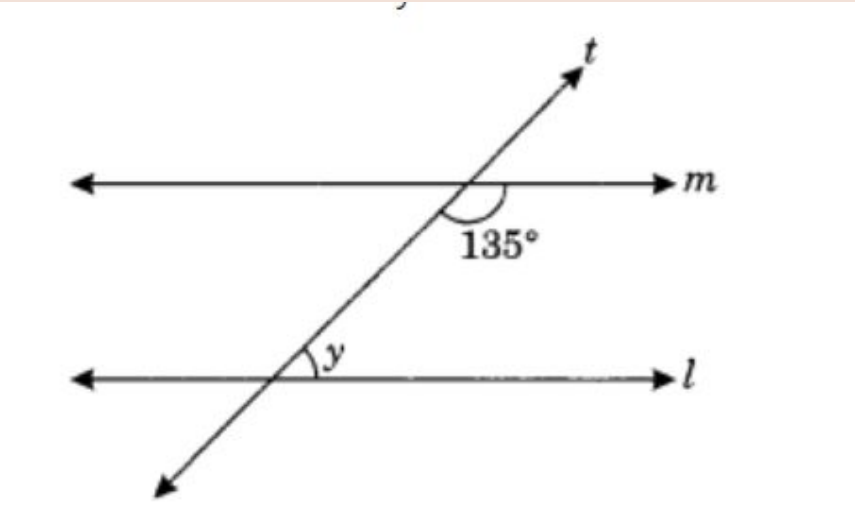
Parallel lines and transversal



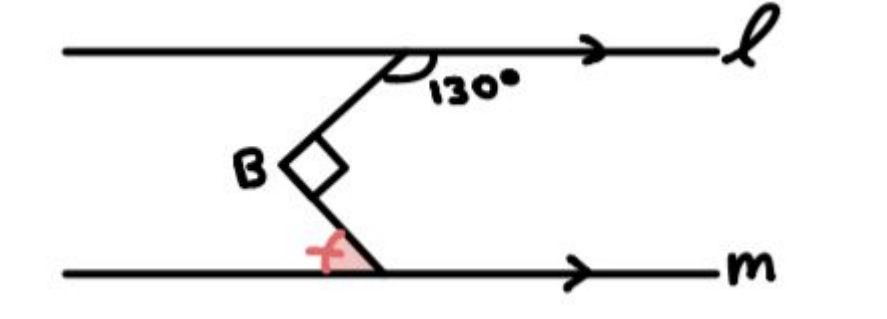
- When any two parallel lines are intersected by another line called a transversal, many pairs of angles are formed.

- Corresponding Angles: It should be noted that the pair of corresponding angles are equal in measure. In the given figure, there are four pairs of corresponding angles, that is, $\angle a = \angle e$, $\angle b = \angle f$, $\angle c = \angle g$, and $\angle d = \angle h$.
- Alternate Interior Angles: Alternate interior angles are formed on the inside of two parallel lines that are intersected by a transversal. They are equal in measure. In this figure, $\angle c = \angle e$, $\angle d = \angle f$.
- Alternate Exterior Angles: Alternate exterior angles are formed on either side of the transversal and they are equal in measure. In this figure, $\angle a = \angle g$, $\angle b = \angle h$.
- Consecutive Interior Angles: Consecutive interior angles or co-interior angles are formed on the inside of the transversal and they are supplementary. Here, $\angle c + \angle f = 180°$, and $\angle d + \angle e = 180°$.
- Vertically Opposite Angles: Vertically opposite angles are formed when two straight lines intersect each other and they are equal in measure. Here, $\angle a = \angle c$, $\angle b = \angle d$, $\angle e = \angle g$, $\angle f = \angle h$.

Find the value of y here:



Lines l and m are parallel, what is the measure of the marked angle?

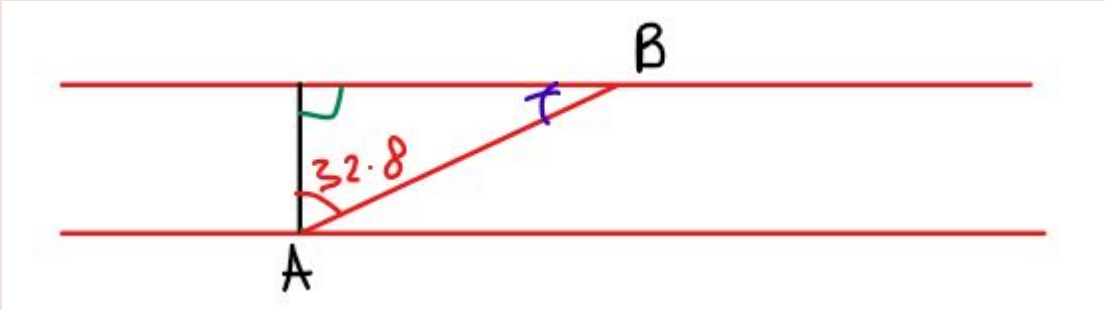


Lesson 2- Triangles

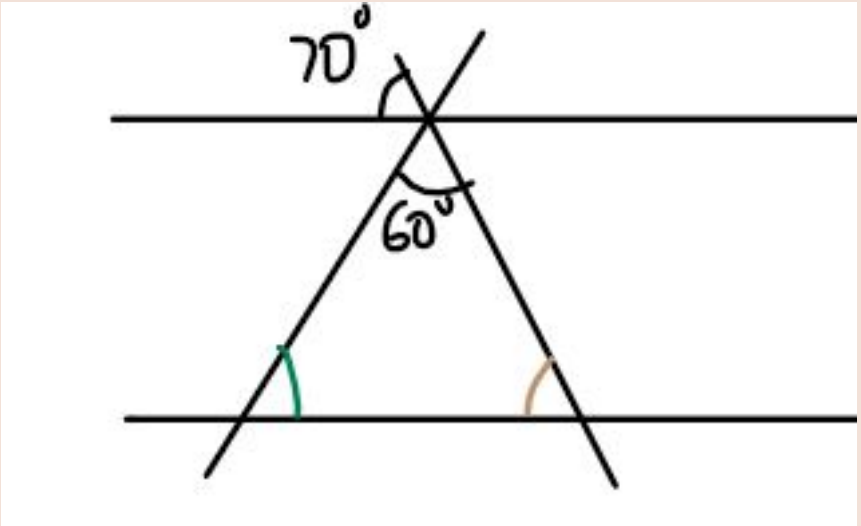
Triangles —> The angles in the triangle always sum up to 180 degrees.

Question 1) If an angle of a triangle is 100.5 degree, is the triangle acute, right or obtuse?

Question 2) If a person wants to go from B to A, at what angle should they walk?



Question 3) Find the value of the green and the brown angle.



Lesson 3-Congruence

In geometry, two figures are congruent if they have the same shape and size.

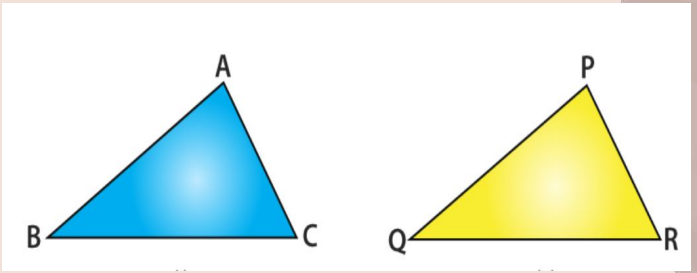
- Two line segments are congruent if they have the same length.
- Two angles are congruent if they have the same measure.
- Two circles are congruent if they have the same diameter.

In this sense, two figures are congruent if their corresponding parts are equal.

Congruence in triangles

Both the triangles in the figure have the same size and shape and they are said to be congruent. We express it this way:

$$\Delta ABC \cong \Delta PQR$$



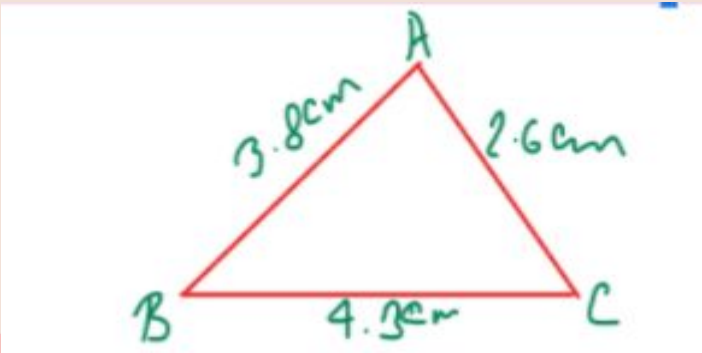
- It is noted that, when you place a triangle PQR on triangle ABC, P falls on A, Q falls on B and R falls on C, also the side PQ falls alongside AB, QR falls along BC and PR falls along AC.
- Under a correspondence property, when two triangles are congruent, then their corresponding sides and angles match with one another are it must be equal. So, in these two congruent triangles, we have the congruences as follows:
- Corresponding vertices are A = P, B = Q, C = R.
- Corresponding sides are AB = PQ, BC = QR , AC = PR .
- Corresponding angles : $\angle A = \angle P$, $\angle B = \angle Q$, $\angle C = \angle R$.

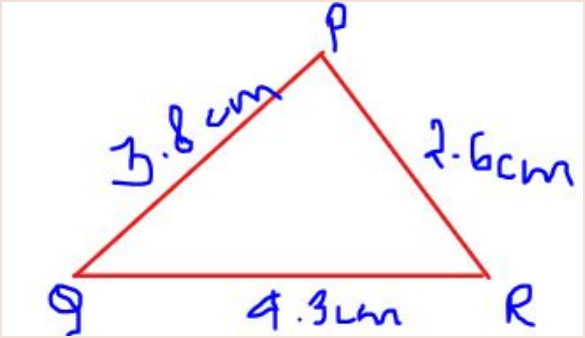
Congruence for triangles

SSS Congruence Rule (Side – Side – Side)

The triangles are said to be congruent if all the three sides of one triangle are equal to the three corresponding sides of another triangle.

1) In the given triangles ABC and PQR, AB = 3.8 cm, BC = 4.3cm, AC = 2.6 cm, PQ = 3.8 cm, QR = 4.3cm and PR = 2.6cm. So, both of these figures are congruent.

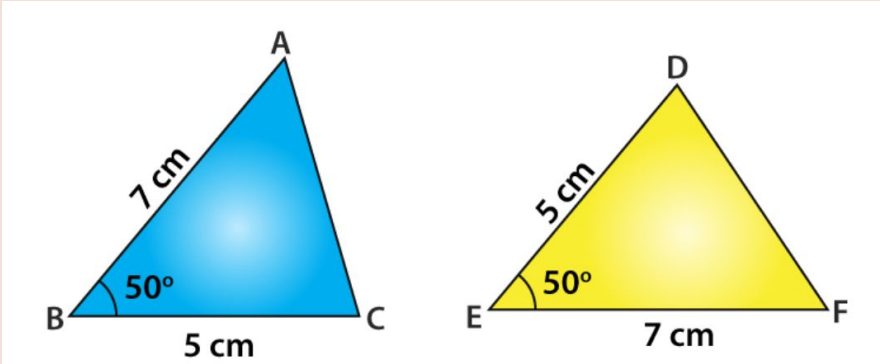




SAS Congruence Rule(Side – Angle – Side)

The triangles are said to be congruent if the correspondence, two sides and the angle included between them of a triangle are equal to two corresponding sides and the angle included between them of another triangle.

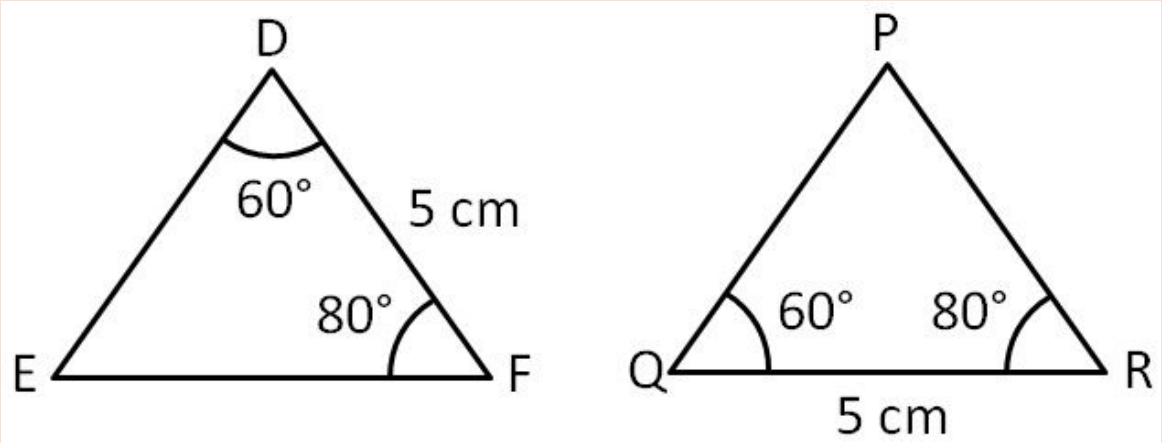
In this figure, triangle ABC is congruent to triangle FED.



ASA Congruence Rule (Angle – Side – Angle)

The triangles are said to be congruent if two angles and the included side of a triangle are equal to two corresponding angles and the included side of another triangle.

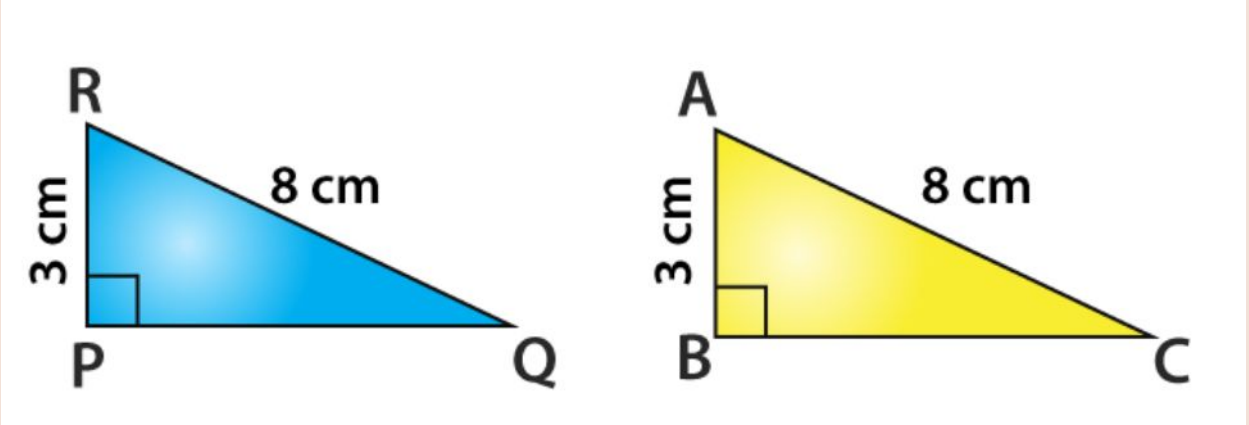
$\Delta DEF \cong \Delta QPR$ (with A-S-A criteria)



RHS Congruence Rule

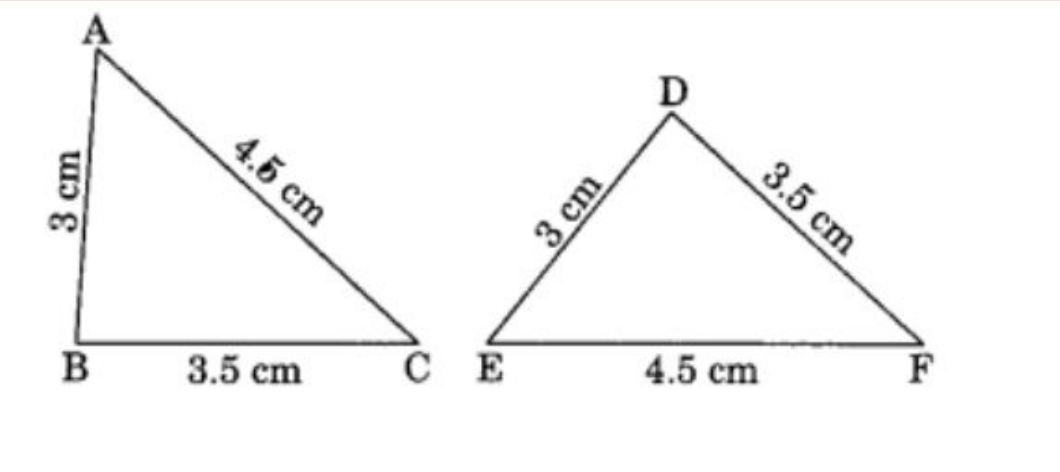
The triangles are said to be congruent, then the hypotenuse and one side of a right-angled triangle are respectively equal to the hypotenuse and one side of another right-angled triangle.

$\Delta ABC \cong \Delta RPQ$ (By R-H-S criteria)

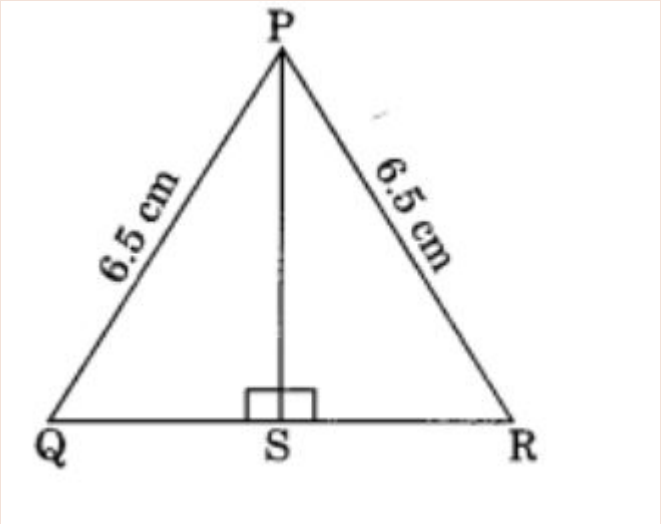


Some problems!

Question 1) Examine whether the two triangles are congruent or not.

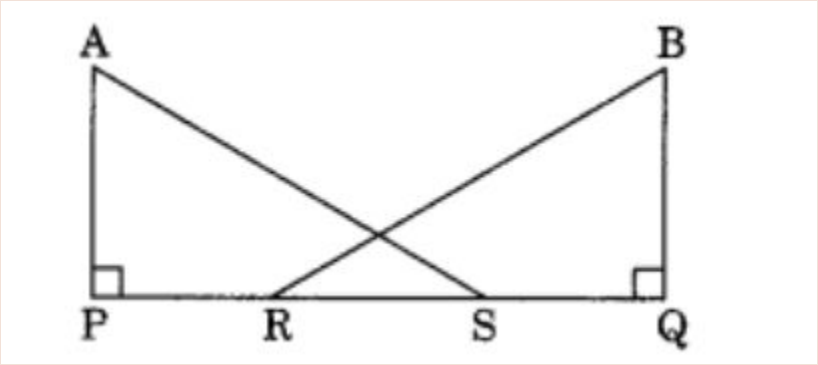


2) In the following figure, show that ΔPSQ ≅ ΔPSR.



3) Can two equilateral triangles always be congruent?

4) In the given figure, AP = BQ , PR = QS. Show that $\Delta APS \cong \Delta BQR$.

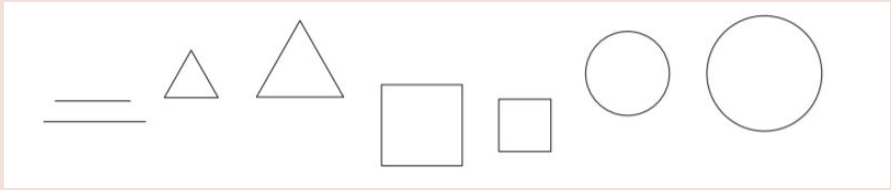


Lesson 4-Similarity

Two figures are said to be similar if they have the same shape but not the same size.

Examples:

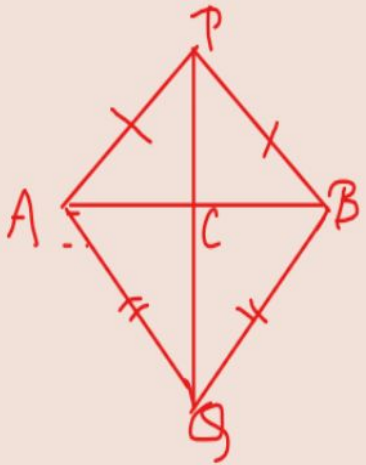
- Any two line segments are similar.
- Any two equilateral triangles are similar.
- Any two squares are similar.
- Any two circles are similar.



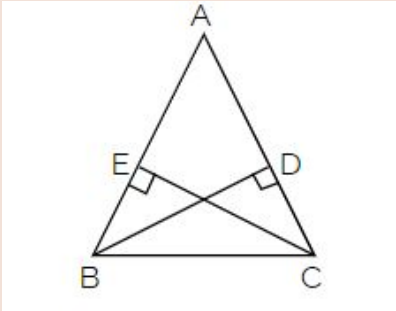
Some more problems!

1) In a ΔABC, ∠A-∠B=33 degrees and ∠B-∠C=18 degrees. Find the angles of the triangle.

2)In the given figure, AP=PB and AQ=BQ. Prove that ∠APQ=∠BPQ.

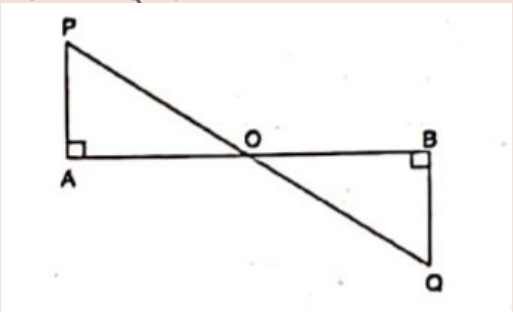


3) In the given figure, AB=AC and ∠CEB=90 degrees and ∠BDC=90 degrees. Prove that BD=CE.



4)In the given figure, ∠PAO=90° and ∠QBO=90° and PA=QB.

Prove that ΔOAP≅ ΔOBQ.



Challenge problem

In the figure, triangle ABC is isosceles in which AB=AC. If AB and AC are produced to D and E such that BD=CE. Prove that BE=CD.