

CHAPTER 16 – EX -16 A

a triangle is a type of polygon, which has three sides, and the two sides are joined end to end is called the vertex of the triangle.

Angles of Triangle

There are three angles in a triangle. These angles are formed by two sides of the triangle, which meets at a common point known as the vertex. The sum of all three interior angles is equal to 180 degrees.

Properties of Triangle

Each and every shape in Maths has some properties which distinguish them from each other. Let us discuss here some of the properties of triangles.

- 1 A triangle has three sides and three angles.
- 2 The sum of the angles of a triangle is always **180 degrees**.
- 3 The exterior angles of a triangle always add up to **360 degrees**.
- 4 The sum of consecutive interior and exterior angle is supplementary.
- 5 The sum of the lengths of any two sides of a triangle is greater than the length of the third side. Similarly, the difference between the lengths of any two sides of a triangle is less than the length of the third side.
- 6 The shortest side is always opposite the smallest interior angle. Similarly, the longest side is always opposite the largest interior angle

Types of Triangles

On the basis of length of the sides, triangles are classified into three categories:

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- 1 **Scalene Triangle** :- A scalene triangle is a type of triangle, in which all the three sides have different side measures. Due to this, the three angles are also different from each other
- 2 **Isosceles Triangle** :- In an isosceles triangle, two sides have equal length. The two angles opposite to the two equal sides are also equal to each other
- 3 **Equilateral Triangle** :- An equilateral triangle has all three sides equal to each other. Due to this all the internal angles are of equal degrees, ie. each of the angles is 60°

On the basis of measurement of the angles, triangles are classified into three categories:

- 1 **Acute Angle Triangle** :- An acute triangle has all of its angles less than 90°
- 2 **Right Angle Triangle** :- In a right triangle, one of the angles is equal to 90° or right angle.
- 3 **Obtuse Angle Triangle** :- An obtuse triangle has any of its one angles more than 90° .

Question 1:

Two angles of a triangle are 72° and 63° . Find the third angle.

Answer :

Two angles of a triangle are 72° and 63° But sum of three angles of a triangle = 180°

So , the third angle = $180 - (\text{sum of the two angles})$

$$= 180^\circ - (72^\circ + 63^\circ)$$

$$= 180 - 135$$

$$= 45^\circ$$

Question 2:

The angles of a triangle are in the ratio 2:3:5. Find the measure of each angle of the triangle

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Answer :

The angles of a triangle be $2x$, $3x$ and $5x$

$$2x + 3x + 5x = 180^\circ$$

$$\Rightarrow 10x = 180^\circ$$

$$\Rightarrow x = (180^\circ / 10)$$

$$= 18^\circ$$

So, Angles of a triangle

$$2x = 2 \times 18^\circ = 36^\circ$$

$$3x = 3 \times 18^\circ = 54^\circ$$

$$5x = 5 \times 18^\circ = 90^\circ$$

Question 3:

The acute angles of a right triangle are in the ratio 1:2. Find the angles of the triangle.

Answer :

The acute angles are x and $2x$

$$x + 2x = 90^\circ$$

$$\Rightarrow 3x = 90^\circ$$

$$\Rightarrow x = 90^\circ / 3$$

$$= 30^\circ$$

Acute angles $x = 30^\circ$

$2x = 2 \times 30^\circ = 60^\circ$ and 3rd angle = 90°

Question 5:

One of the angles of a triangle is 106° and the other two angles are equal. Find each of the equal angles.

Answer :

Each equal angle be 'x'

$$x + x + 106^\circ = 180^\circ$$

$$2x + 106^\circ = 180^\circ$$

$$2x = 180^\circ - 106^\circ$$

$$2x = 74^\circ$$

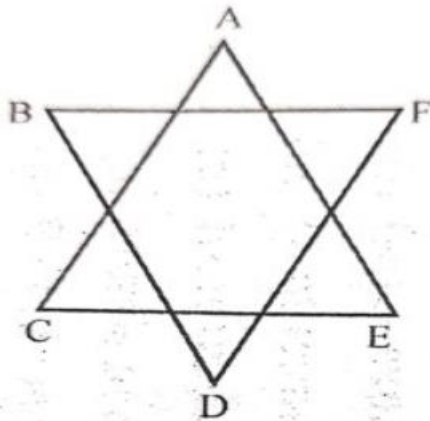
$$\Rightarrow x = 74^\circ/2$$

$$= 37^\circ$$

The each of equal angle be 37° .

Question 7:

In the given figure, find $\angle A + \angle B + \angle C + \angle D + \angle E + \angle F$



Answer :

In $\triangle ACE$

$$\angle A + \angle C + \angle E = 180^\circ \dots(i)$$

In $\triangle BDF$

$$\angle B + \angle D + \angle F = 180^\circ \dots(ii)$$

Adding (i) and (ii), we get

$$\angle A + \angle C + \angle E + \angle B + \angle D + \angle F$$

$$180^\circ + 180^\circ = 360^\circ$$

$$\angle A + \angle B + \angle C + \angle D + \angle E + \angle F = 360^\circ$$

Q. 9

Can a triangle have:

- (i) each angle less than 60° ?
- (ii) each angle greater than 60° ?
- (iii) two obtuse angles ?
- (iv) two right angles ?
- (v) two acute angles ?

Answer :

- (i) Each angle less than 60°

No, it is also not possible as the sum of three angles of a triangle cannot be less than 180° .

- (ii) Each angle is greater than 60°

No, it is not possible, as in this triangle sum of angles is greater than 180° .

- (iii) Two obtuse angles.

No, it is possible as a triangle has at the most one obtuse angle.

- (iv) Two right angles.

No, it is not possible as a triangle has at the most one right angle.

- (v) Two acute angles.

Yes, it is possible.

Question 10:

Which of the following can possibly be the angles of a triangle ?

- (i) $50^\circ, 30^\circ, 100^\circ$
- (ii) $90^\circ, 50^\circ, 50^\circ$

Answer :

- (i) Yes, Sum of angles = $50^\circ + 30^\circ + 100^\circ$

$$= 180^\circ$$

It is a triangle.

- (ii) Sum of angles = $90^\circ + 50^\circ + 50^\circ$

$$= 190^\circ \neq 180^\circ.$$

It is not a triangle.

Q. 12

(iv) 3.5 cm, 4.5 cm, 6.5 cm

$3.5 \text{ cm} + 4.5 \text{ cm} = 8 \text{ cm}$

and $8 \text{ cm} > 6.5 \text{ cm}$

The triangle is possible.

(v) 6 cm, 8 cm, 10 cm

$6 \text{ cm} + 8 \text{ cm} = 14 \text{ cm}$ and $14 \text{ cm} > 10 \text{ cm}$

The triangle is possible.

(vi) 3 cm, 7 cm, 3 cm

Sum of the small sides $3 + 3$

$= 6 \text{ cm}$

Since, sum of the small sides $<$ the third side

i.e, $6 \text{ cm} < 7 \text{ cm}$

So, triangle is not possible .

Question 13:

(i) Can a right triangle be equilateral ?

(ii) Can an isosceles triangle be right-angled ?

(iii) Can a right triangle be scalene ?

Answer :

(i) No

(ii) No

(iii) Yes

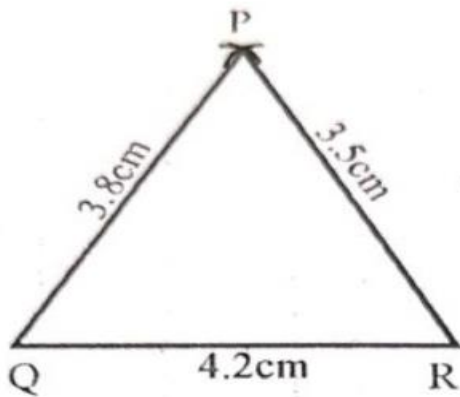
Q. 14.

- (i) A triangle has **3** Vertices, **3** sides and **3** angles.
- (ii) The sum of the angles of a triangle is **180°**.
- (iii) Each angle of an equilateral triangle measures **60°**.
- (iv) The sum of any two sides of a triangle is **greater** than the third side.
- (v) A right triangle cannot have an **Obtuse** angle.

EX – 16 B

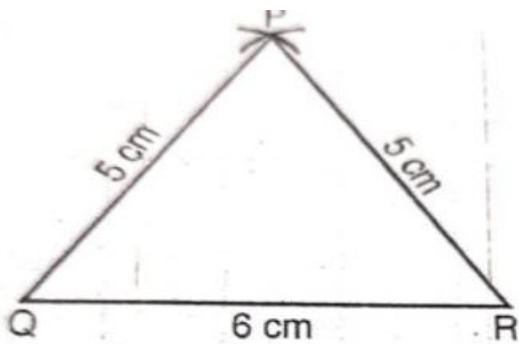
Question 1:

Construct a $\triangle PQR$ in which $PQ = 3.8$ cm, $QR = 4.2$ cm and $PR = 3.5$ cm.



Question 4:

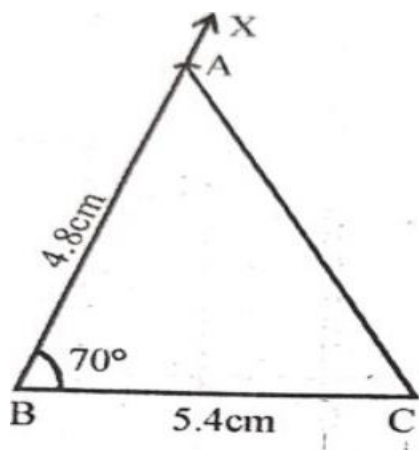
Construct a $\triangle PQR$ in which $PQ = PR = 5$ cm and $QR = 6$ cm. Measure $\angle Q$ and $\angle R$. What do you observe ?



$\angle Q = \angle R$

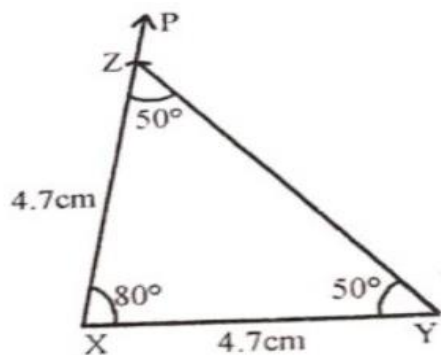
Question 5:

Construct a $\triangle ABC$ in which $AB = 4.8$ cm, $BC = 5.4$ cm and $\angle B = 70^\circ$



Question 7:

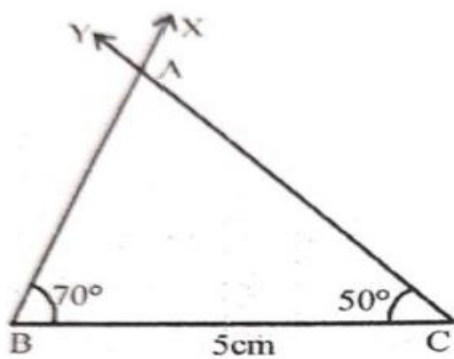
Construct a $\triangle XYZ$ in which $XY = XZ = 4.7$ cm and $\angle X = 80^\circ$. Measure $\angle Y$ and $\angle Z$.



$$\angle Y = \angle Z = 50^\circ$$

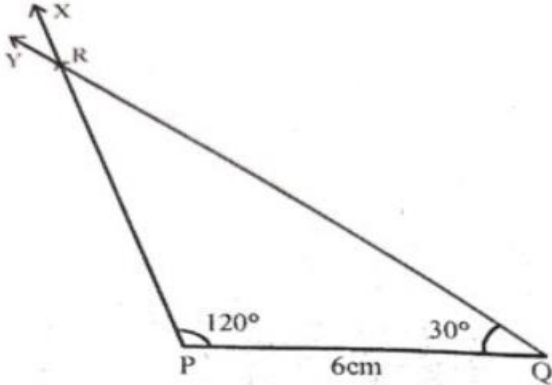
Question 8:

Construct a $\triangle ABC$ in which $BC = 5$ cm, $\angle B = 70^\circ$ and $\angle C = 50^\circ$.



Question 9:

Construct a $\triangle PQR$ in which $PQ = 6\text{ cm}$, $\angle P = 120^\circ$ and $\angle Q = 30^\circ$. Measure $\angle R$.



$\angle R = 30\text{ degree}$
