



ST. MARY'S CO-ED SCHOOL, HARDA

[2020-21]

CLASS- VI

SUBJECT- MATHS

CHAPTER- 16

TRIANGLES

Question 1:

Take three noncollinear points A, B and C on a page of your notebook. Join AB, BC and CA. What figure do you get?

Name:

- (i) the side opposite to $\angle C$
- (ii) the angle opposite to the side BC
- (iii) the vertex opposite to the side CA
- (iv) the side opposite to the vertex B

ANSWER:

We get a triangle by joining the three non-collinear points A, B and C.

- (i) The side opposite to $\angle C$ is AB.
- (ii) The angle opposite to the side BC is $\angle A$.
- (iii) The vertex opposite to the side CA is B.
- (iv) The side opposite to the vertex B is AC.

Question 2:

The measures of two angles of a triangle are 72° and 58° . Find the measure of the third angle.

ANSWER:

The measures of two angles of a triangle are 72° and 58° .

Let the third angle be x.

Now, the sum of the measures of all the angles of a triangle is 180° .

$$\therefore x + 72^\circ + 58^\circ = 180^\circ$$

$$\Rightarrow x + 130^\circ = 180^\circ$$

$$\Rightarrow x = 180^\circ - 130^\circ$$

$$\Rightarrow x = 50^\circ$$

The measure of the third angle of the triangle is 50° .

Question 3:

The angles of a triangle are in the ratio $1 : 3 : 5$. Find the measure of each of the angles.

ANSWER:

The angles of a triangle are in the ratio $1:3:5$.

Let the measures of the angles of the triangle be $(1x)$, $(3x)$ and $(5x)$

Sum of the measures of the angles of the triangle = 180°

$$\therefore 1x + 3x + 5x = 180^\circ$$

$$\Rightarrow 9x = 180^\circ$$

$$\Rightarrow x = 20^\circ$$

$$1x = 20^\circ$$

$$3x = 60^\circ$$

$$5x = 100^\circ$$

The measures of the angles are 20° , 60° and 100° .

Question 4:

One of the acute angles of a right triangle is 50° . Find the other acute angle.

ANSWER:

In a right angle triangle, one of the angles is 90° .

It is given that one of the acute angles of the right angled triangle is 50° .

We know that the sum of the measures of all the angles of a triangle is 180° .

Now, let the third angle be x .

Therefore, we have:

$$90^\circ + 50^\circ + x = 180^\circ$$

$$\Rightarrow 140^\circ + x = 180^\circ$$

$$\Rightarrow x = 180^\circ - 140^\circ$$

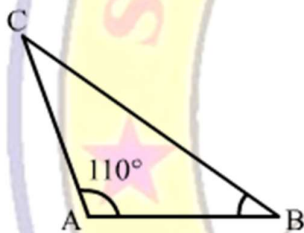
$$\Rightarrow x = 40^\circ$$

The third acute angle is 40° .

Question 5:

One of the angles of a triangle is 110° and the other two angles are equal. What is the measure of each of these equal angles?

ANSWER:



Given:

$$\angle A = 110^\circ \text{ and } \angle B = \angle C$$

Now, the sum of the measures of all the angles of a triangle is 180° .

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow 110^\circ + \angle B + \angle B = 180^\circ$$

$$\Rightarrow 110^\circ + 2\angle B = 180^\circ$$

$$\Rightarrow 2\angle B = 180^\circ - 110^\circ$$

$$\Rightarrow 2\angle B = 70^\circ$$

$$\Rightarrow \angle B = 70^\circ / 2$$

$$\Rightarrow \angle B = 35^\circ$$

$$\therefore \angle C = 35^\circ$$

The measures of the three angles:

$$\angle A = 110^\circ, \angle B = 35^\circ, \angle C = 35^\circ$$

Question 6:

If one angle of a triangle is equal to the sum of other two, show that the triangle is a right triangle.

ANSWER:

Given:

$$\angle A = \angle B + \angle C$$

We know:

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow \angle B + \angle C + \angle B + \angle C = 180^\circ$$

$$\Rightarrow 2\angle B + 2\angle C = 180^\circ$$

$$\Rightarrow 2(\angle B + \angle C) = 180^\circ$$

$$\Rightarrow \angle B + \angle C = 180^\circ / 2$$

$$\Rightarrow \angle B + \angle C = 90^\circ$$

$$\therefore \angle A = 90^\circ$$

This shows that the triangle is a right angled triangle.

Question 7:

In a $\triangle ABC$, if $3\angle A = 4\angle B = 6\angle C$, calculate the angles.

ANSWER:

Let $3\angle A = 4\angle B = 6\angle C = x$

Then, we have:

$$\angle A = x/3, \angle B = x/4, \angle C = x/6$$

$$\text{But, } \angle A + \angle B + \angle C = 180^\circ$$

$$\therefore x/3 + x/4 + x/6 = 180^\circ$$

$$\text{or } 4x + 3x + 2x = 180^\circ \times 12$$

$$\text{or } 9x = 180^\circ \times 12 = 2160^\circ$$

$$\text{or } x = 240^\circ$$

$$\therefore \angle A = 240/3 = 80^\circ, \angle B = 240/4 = 60^\circ, \angle C = 240/6 = 40^\circ$$

Question 8:

Look at the figures given below. State for each triangle whether it is acute, right or obtuse.

ANSWER:

(i) It is an obtuse angle triangle as one angle is 130° , which is greater than 90° .

(ii) It is an acute angle triangle as all the angles in it are less than 90° .

(iii) It is a right angle triangle as one angle is 90° .

(iv) It is an obtuse angle triangle as one angle is 92° , which is greater than 90° .

Question 9:

In the given figure some triangles have been given. State for each triangle whether it is scalene, isosceles or equilateral.

ANSWER:

Equilateral Triangle: A triangle whose all three sides are equal in length and each of the three angles measures 60° .

Isosceles Triangle: A triangle whose two sides are equal in length and the angles opposite them are equal to each other.

Scalene Triangle: A triangle whose all three sides and angles are unequal in measure.

(i) Isosceles

$$AC = CB = 2 \text{ cm}$$

(ii) Isosceles

$$DE = EF = 2.4 \text{ cm}$$

(iii) Scalene

All the sides are unequal.

(iv) Equilateral

$$XY = YZ = ZX = 3 \text{ cm}$$

(v) Equilateral

All three angles are 60° .

(vi) Isosceles

Two angles are equal in measure.

(vii) Scalene

All the angles are unequal.

Question 10:

Draw a $\triangle ABC$. Take a point D on BC. Join AD. How many triangles do you get? Name them.

ANSWER:

In $\triangle ABC$, if we take a point D on BC, then we get three triangles, namely $\triangle ADB$, $\triangle ADC$ and $\triangle ABC$.

Question 11:

Can a triangle have

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

ANSWER:

(i) No

If the two angles are 90° each, then the sum of two angles of a triangle will be 180° , which is not possible.

(ii) No

For example, let the two angles be 120° and 150° . Then, their sum will be 270° , which cannot form a triangle.

(iii) Yes

For example, let the two angles be 50° and 60° , which on adding, gives 110° . They can easily form a triangle whose third angle is $180^\circ - 110^\circ = 70^\circ$.

(iv) No

For example, let the two angles be 70° and 80° , which on adding, gives 150° . They cannot form a triangle whose third angle is $180^\circ - 150^\circ = 30^\circ$, which is less than 60° .

(v) No

For example, let the two angles be 50° and 40° , which on adding, gives 90° . Thus, they cannot form a triangle whose third angle is $180^\circ - 90^\circ = 90^\circ$, which is greater than 60° .

(vi) Yes

Sum of all angles = $60^\circ + 60^\circ + 60^\circ = 180^\circ$

Question 12:

Fill in the blanks.

(i) A triangle has 3 sides 3 angles and 3 vertices.

- (ii) The sum of the angles of a triangle is 180° .
- (iii) The sides of a scalene triangle are of different lengths.
- (iv) Each angle of an equilateral triangle measures 60° .
- (v) The angles opposite to equal sides of an isosceles triangle are equal.
- (vi) The sum of the lengths of the sides of a triangle is called its perimeter.

EXERCISE 16 B

OBJECTIVE QUESTIONS:

Question 1:

How many parts does a triangle have?

- (a) 2
- (b) 3
- (c) 6
- (d) 9

ANSWER:

Correct option: (c)

A triangle has 6 parts: three sides and three angles.

Question 2:

With the angles given below, in which case the construction of triangle is possible?

- (a) 30° , 60° , 70°
- (b) 50° , 70° , 60°
- (c) 40° , 80° , 65°
- (d) 72° , 28° , 90°

ANSWER:

Correct option: (b)

(b) $\text{Sum} = 50^\circ + 70^\circ + 60^\circ = 180^\circ$

Hence, it is possible to construct a triangle with these angle

Question 3:

The angles of a triangle are in the ratio 2 : 3 : 4. The largest angle is

- (a) 60°
- (b) 80°
- (c) 76°
- (d) 84°

ANSWER:

- (b) 80°

Let the measures of the given angles be $(2x)^\circ$, $(3x)^\circ$ and $(4x)^\circ$.

$$\therefore (2x)^\circ + (3x)^\circ + (4x)^\circ = 180^\circ$$

$$\Rightarrow (9x)^\circ = 180^\circ$$

$$\Rightarrow x = 180 / 9$$

$$\Rightarrow x = 20^\circ$$

$$\therefore 2x = 40^\circ, 3x = 60^\circ, 4x = 80^\circ$$

Hence, the measures of the angles of the triangle are 40° , 60° , 80° .

Thus, the largest angle is 80° .

Question 4:

The two angles of a triangle are complementary. The third angle is

- (a) 60°
- (b) 45°
- (c) 36°
- (d) 90°

ANSWER:

Correct option: (d)

The measure of two angles are complimentary if their sum is 90° degrees.

Let the two angles be x and y , such that $x + y = 90^\circ$.

Let the third angle be z .

Now, we know that the sum of all the angles of a triangle is 180° .

$$x + y + z = 180^\circ$$

$$\Rightarrow 90^\circ + z = 180^\circ$$

$$\Rightarrow z = 180^\circ - 90^\circ$$

$$= 90^\circ$$

The third angle is 90° .

Question 5:

One of the base angles of an isosceles triangle is 70° . The vertical angle is

- (a) 60°
- (b) 80°
- (c) 40°
- (d) 35°

ANSWER:

Correct option: (c)

Let $\angle A = 70^\circ$

The triangle is an isosceles triangle.

We know that the angles opposite to the equal sides of an isosceles triangle are equal.

$$\therefore \angle B = 70^\circ$$

We need to find the vertical angle $\angle C$.

Now, sum of all the angles of a triangle is 180° .

$$\angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow 70^\circ + 70^\circ + \angle C = 180^\circ$$

$$\Rightarrow 140^\circ + \angle C = 180^\circ$$

$$\Rightarrow \angle C = 180^\circ - 140^\circ$$

$$\Rightarrow \angle C = 40^\circ$$

Question 6:

A triangle having sides of different lengths is called

- (a) an isosceles triangle
- (b) an equilateral triangle
- (c) a scalene triangle
- (d) a right triangle

ANSWER:

Correct option: (c)

A triangle having sides of different lengths is called a scalene triangle.

Question 7:

In an isosceles $\triangle ABC$, the bisectors of $\angle B$ and $\angle C$ meet at a point O . If $\angle A = 40^\circ$, then $\angle BOC =$?

- (a) 110°
- (b) 70°
- (c) 130°
- (d) 150°

ANSWER:

Correct option: (a)



In the isosceles $\triangle ABC$, the bisectors of $\angle B$ and $\angle C$ meet at point O .
Since the triangle is isosceles, the angles opposite to the equal sides are equal.

$$\angle B = \angle C$$

$$\therefore \angle A + \angle B + \angle C = 180^\circ$$

$$\Rightarrow 40^\circ + 2\angle B = 180^\circ$$

$$\Rightarrow 2\angle B = 140^\circ$$

$$\Rightarrow \angle B = 70^\circ$$

Bisectors of an angle divide the angle into two equal angles.

So, in $\triangle BOC$:

$$\angle OBC = 35^\circ \text{ and } \angle OCB = 35^\circ$$

$$\angle BOC + \angle OBC + \angle OCB = 180^\circ$$

$$\Rightarrow \angle BOC + 35^\circ + 35^\circ = 180^\circ$$

$$\Rightarrow \angle BOC = 180^\circ - 70^\circ$$

$$\Rightarrow \angle BOC = 110^\circ$$

Question 8:

The sides of a triangle are in the ratio 3 : 2 : 5 and its perimeter is 30 cm. The length of the longest side is

(a) 20 cm

(b) 15 cm

(c) 10 cm

(d) 12 cm

ANSWER:

Correct option: (b)

The sides of a triangle are in the ratio 3:2:5.

Let the lengths of the sides of the triangle be $(3x)$, $(2x)$, $(5x)$.

We know:

Sum of the lengths of the sides of a triangle = Perimeter

$$(3x) + (2x) + (5x) = 30$$

$$\Rightarrow 10x = 30$$

$$\Rightarrow x = \frac{30}{10}$$

$$= 3$$

$$\Rightarrow x = 3$$

First side = $3x = 9$ cm

Second side = $2x = 6$ cm

Third side = $5x = 15$ cm

The length of the longest side is 15 cm.

Question 9:

Two angles of a triangle measure 30° and 25° respectively. The measure of the third angle is

- (a) 35°
- (b) 45°
- (c) 65°
- (d) 125°

ANSWER:

Correct option: (d)

Two angles of a triangle measure 30° and 25° , respectively.

Let the third angle be x .

$$x + 30^\circ + 25^\circ = 180^\circ$$

$$x = 180^\circ - 55^\circ$$

$$x = 125^\circ$$

Question 10:

Each angle of an equilateral triangle measures

- (a) 30°
- (b) 45°
- (c) 60°
- (d) 80°

ANSWER:

Correct option: (c)

Each angle of an equilateral triangle measures 60° .

Question 11:

In the adjoining figure, the point P lies

- (a) in the interior of $\triangle ABC$
- (b) in the exterior of $\triangle ABC$
- (c) on $\triangle ABC$
- (d) outside $\triangle ABC$

ANSWER:

Correct option: (c)

Point P lies on $\triangle ABC$.

