

Triangles

Exercise 16A

Q1

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.

Q2

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° .

$$\begin{aligned}\therefore x + 72^\circ + 58^\circ &= 180^\circ \\ \Rightarrow x + 130^\circ &= 180^\circ \\ \Rightarrow x &= 180^\circ - 130^\circ \\ \Rightarrow x &= 50^\circ\end{aligned}$$

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

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°

$$\begin{aligned}\therefore 1x + 3x + 5x &= 180^\circ \\ \Rightarrow 9x &= 180^\circ \\ \Rightarrow x &= 20^\circ\end{aligned}$$

$$1x = 20^\circ$$

$$3x = 60^\circ$$

$$5x = 100^\circ$$

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

Q4

Answer :

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

It is given that one of the acute angled 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 .

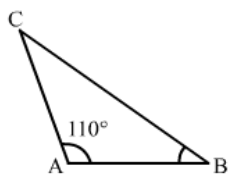
Therefore, we have:

$$\begin{aligned}90^\circ + 50^\circ + x &= 180^\circ \\ \Rightarrow 140^\circ + x &= 180^\circ \\ \Rightarrow x &= 180^\circ - 140^\circ \\ \Rightarrow x &= 40^\circ\end{aligned}$$

The third acute angle is 40° .

Q5

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° .

$$\begin{aligned}\angle A + \angle B + \angle C &= 180^\circ \\ \Rightarrow 110^\circ + \angle B + \angle B &= 180^\circ \\ \Rightarrow 110^\circ + 2\angle B &= 180^\circ \\ \Rightarrow 2\angle B &= 180^\circ - 110^\circ \\ \Rightarrow 2\angle B &= 70^\circ \\ \Rightarrow \angle B &= 70^\circ / 2 \\ \Rightarrow \angle B &= 35^\circ\end{aligned}$$

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

The measures of the three angles:

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

Q6

Answer :

Given:

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

We know:

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

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

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

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

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

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

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

This shows that the triangle is a right angled triangle.

Q7

Answer :

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

Then, we have:

$$\angle A = \frac{x}{3}, \angle B = \frac{x}{4}, \angle C = \frac{x}{6}$$

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

$$\therefore \frac{x}{3} + \frac{x}{4} + \frac{x}{6} = 180^\circ$$

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

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

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

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

Q9

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.

Q10

Answer :

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

Q11

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 = $60^\circ + 60^\circ + 60^\circ = 180^\circ$

Q12

Answer :

(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.

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Triangles

Exercise 16B

Q1

Answer :

Correct option: (c)

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

Q2

Answer :

Correct option: (b)

(a) Sum = $30^\circ + 60^\circ + 70^\circ = 160^\circ$

This is not equal to the sum of all the angles of a triangle.

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

Hence, it is possible to construct a triangle with these angles.

(c) Sum = $40^\circ + 80^\circ + 65^\circ = 185^\circ$

This is not equal to the sum of all the angles of a triangle.

(d) Sum = $72^\circ + 28^\circ + 90^\circ = 190^\circ$

This is not equal to the sum of all the angles of a triangle.

Q3

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° .

Q4

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° .

Q5

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° .

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

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

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

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

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

Q6

Answer :

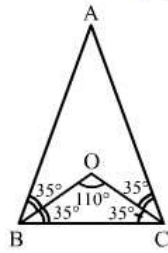
Correct option: (c)

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

Q7

Answer :

Correct option: (a)



In the isosceles 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 $\triangle BOC$:

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

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

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

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

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

Q8

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

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

$$\Rightarrow 10x = 30$$

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

$$= 3$$

$$\Rightarrow x = 3$$

$$\text{First side} = 3x = 9 \text{ cm}$$

$$\text{Second side} = 2x = 6 \text{ cm}$$

$$\text{Third side} = 5x = 15 \text{ cm}$$

The length of the longest side is 15 cm.

Q9

Answer :

Correct option: (d)

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

Let the third angle be x .

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

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

$$x = 125^\circ$$

Q10

Answer :

Correct option: (c)

Each angle of an equilateral triangle measures 60° .

Q11

Answer :

Correct option: (c)

Point P lies on $\triangle ABC$.