2. Geometry

Exercise 2.1

1 A. Question

The point of concurrency of the medians of a triangle is known as

A. incentre

B. circle center

C. orthocentre

D. Centroid

Answer

We know that the point of concurrency of the medians of a triangle is known as centroid which is denoted as G.

1 B. Question

The point of concurrency of the altitudes of a triangle is known as

A. incentre

B. circle center

C. orthocentre

D. centroids

Answer

We know that the point of concurrency of the altitudes of a triangle is known as orthocentre.

1 C. Question

The point of concurrency of the angle bisectors of a triangle is known as

A. incentre

B. circle centre

C. orthocentre

D. centroid

Answer

We know that the point of concurrency of the angle bisectors of a triangle is known as incentre.

1 D. Question

The point of concurrency of the perpendicular bisectors of a triangle is known as

A. incentre

B. circumcentre

C. orthocentre

D. centroid

Answer

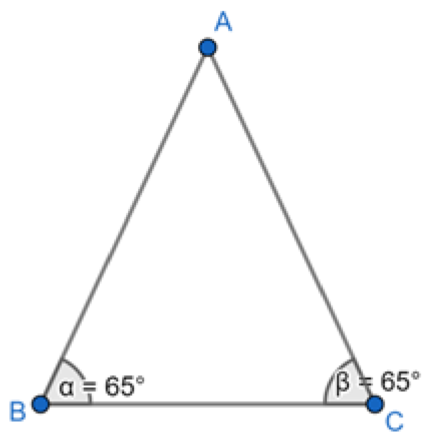
We know that the point of concurrency of the perpendicular bisectors of a triangle is known as circumcentre.

2. Question

In an isosceles triangle AB = AC and ∠B = 65°. Which is the shortest side?

Answer

In an isosceles triangle, AB = AC and ∠B = 65°.



We know that angles opposite to equal sides are equal.

∴ ∠B = ∠C = 65°

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

⇒ ∠A + ∠B + ∠C = 180°

⇒ ∠A + 65° + 65° = 180°

⇒ ∠A = 180° - 130°

∴ ∠A = 50°

We know that the side opposite to the shortest angle is the shortest.

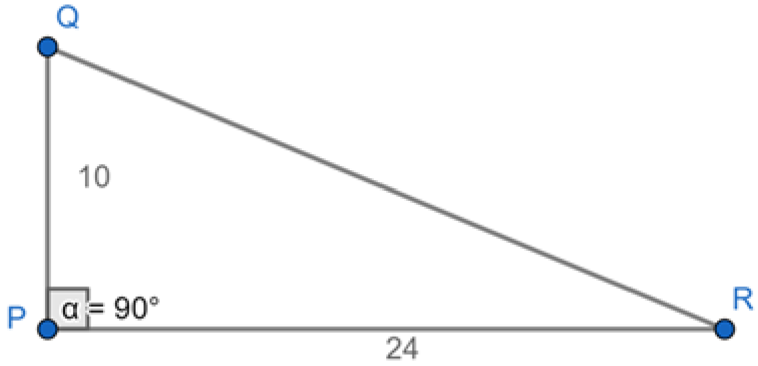
∴ BC is the shortest side.

3. Question

PQR is a triangle right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

Answer

Given in a right-angled ΔPQR, ∠P = 90°, PQ = 10 cm and PR = 24 cm.



We know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

⇒ In ΔPQR, $QR^2 = PQ^2 + PR^2$

⇒ $QR^2 = 10^2 + 24^2$

= 100 + 576

= 676

∴ QR = √676 = 26 cm

4. Question

Check whether the following can be the sides of a right angled triangle AB = 25 cm, BC = 24 cm, AC = 7cm.

Answer

In a right angled ΔABC, AB = 25 cm, BC = 24 cm and AC = 7 cm.

We know that in a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

⇒ In ΔABC, $AB^2 = BC^2 + AC^2$

⇒ $25^2 = 24^2 + 7^2$

⇒ 625 = 576 + 49

⇒ 625 = 625

∴ The given sides can be the sides of a right angled triangle.

5. Question

∠Q and ∠R of a triangle PQR are 25° and 65°. Is △PQR a right-angled triangle? Moreover, PQ is 4cm and PR is 3 cm. Find QR.

Answer

In ΔPQR, ∠Q = 25° and ∠R = 65°.

We know that sum of angles of a triangle = 180°.

⇒ ∠P + ∠Q + ∠R = 180°

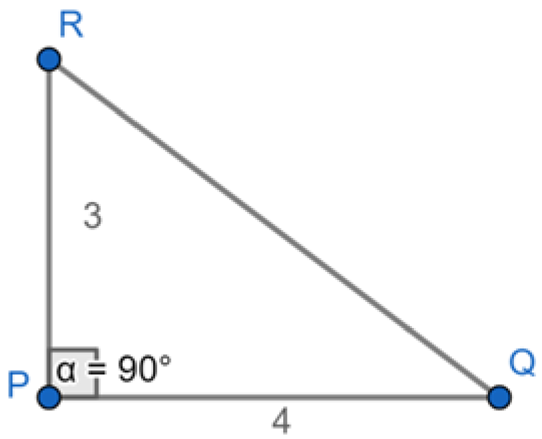
⇒ ∠P + 25° + 65° = 180°

⇒ ∠P = 180° - 90°

∴ ∠P = 90°

∴ Δ PQR is a right angled triangle which is right angled at P.

Given, PQ = 4 cm and PR = 3 cm



We know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

⇒ In ΔPQR, $QR^2 = PQ^2 + PR^2$

⇒ $QR^2 = 4^2 + 3^2$

= 16 + 9

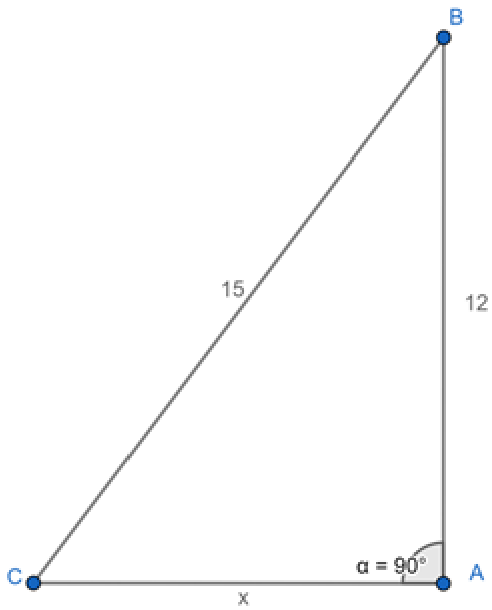
= 25

∴ QR = √25 = 5 cm

6. Question

A 15 m long ladder reached a window 12m high from the ground. On placing it against a wall at a distance x m. Find x.

Answer



Let BC be the length of ladder i.e. 15 cm and the height of the window from the ground be AB i.e. 12 cm.

<u>We know that in a right angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.</u>

⇒ In ΔABC, $BC^2 = AB^2 + AC^2$

⇒ $15^2 = 12^2 + x^2$

⇒ $225 = 144 + x^2$

⇒ $x^2 = 225 - 144 = 81$

∴ $x = \sqrt{81} = 9$ cm

7. Question

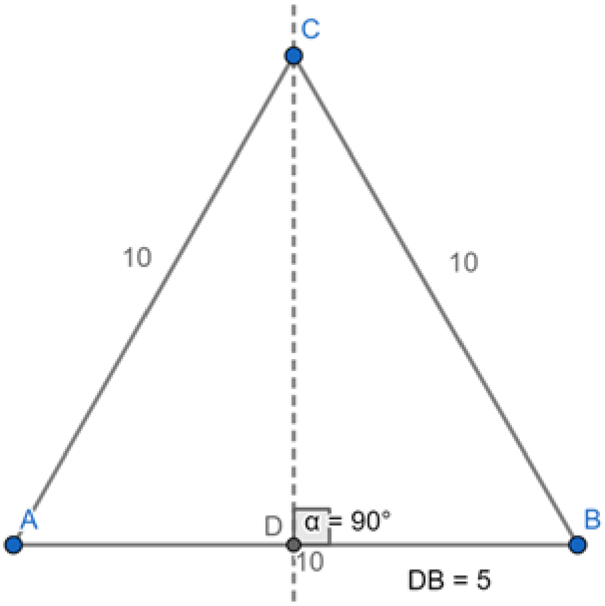
Find the altitude of an equilateral triangle of side 10 cm.

Answer

Let us consider ΔABC an equilateral triangle with side 10 cm.

<u>Construction:</u> Draw a perpendicular bisector at C to AB such that AD = DB = 5 cm and the triangle is cut into two halves.

We have to find the altitude i.e. CD.



Consider ΔBCD,

We know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

$\Rightarrow BC^2 = BD^2 + CD^2$

$\Rightarrow 10^2 = 5^2 + CD^2$

$\Rightarrow 100 = 25 + CD^2$

$\Rightarrow CD^2 = 100 - 25 = 75$

$\therefore CD = \sqrt{75} = \sqrt{3 \times 5 \times 5} = 5\sqrt{3}$ cm

$\therefore$ Altitude = $5\sqrt{3}$ cm

8. Question

Are the numbers 12, 5 and 13 form a Pythagorean Triplet?

Answer

We know that the numbers which are satisfying the Pythagoras theorem are called the Pythagorean triplets.

We know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

In ΔPQR,

$\Rightarrow QR^2 = PQ^2 + PR^2$

$\Rightarrow 13^2 = 12^2 + 5^2$

$\Rightarrow 169 = 144 + 25$

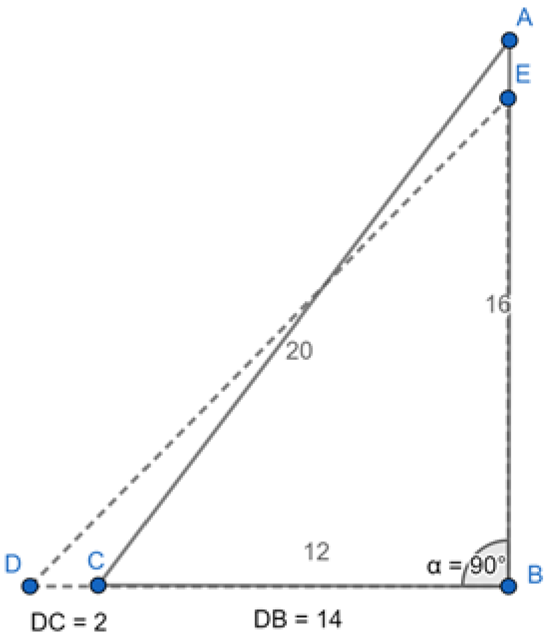
∴ 169 = 169

Since the above numbers satisfy the Pythagoras Theorem, 15, 5 and 13 form a Pythagorean Triplet.

9. Question

A painter sets a ladder up to reach the bottom of a second storey window 16 feet above the ground. The base of the ladder is 12 feet from the house. While the painter mixes the paint a neighbour's dog bumps the ladder which moves the base 2 feet farther away from the house. How far up side of the house does the ladder reach?

Answer



We know that in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Consider ΔABC,

⇒ $BC^2 = AB^2 + AC^2$

⇒ $BC^2 = 16^2 + 12^2$

$\Rightarrow BC^2 = 256 + 144$

$\Rightarrow BC^2 = 400$

$\therefore BC = \sqrt{400} = 20$ cm (Length of ladder)

Now after the ladder being pushed 2 feet farther, consider ΔBDE,

$\Rightarrow DE^2 = BD^2 + BE^2$

$\Rightarrow 20^2 = 14^2 + BE^2$

$\Rightarrow BE^2 = 400 - 196 = 204$

$\Rightarrow BE = \sqrt{204} = \sqrt{2 \times 2 \times 3 \times 17} = 2\sqrt{51}$ cm

$\therefore$ The ladder reaches $2\sqrt{51}$ cm far up side the house.

Exercise 2.2

1 A. Question

The ______ of a circle is the distance from the centre to the circumference.

A. sector

B. segment

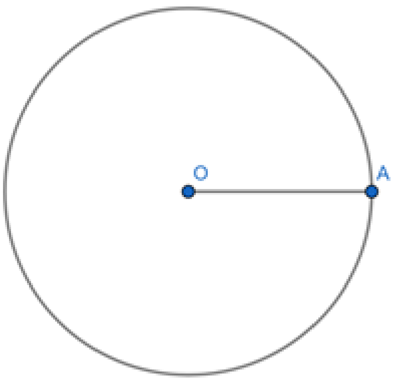
C. diameters

D. radius

Answer

We know that the constant distance from the centre of the circle is known as the radius.

In the figure, OA = radius.



1 B. Question

The relation between radius and diameter of a circle is _____

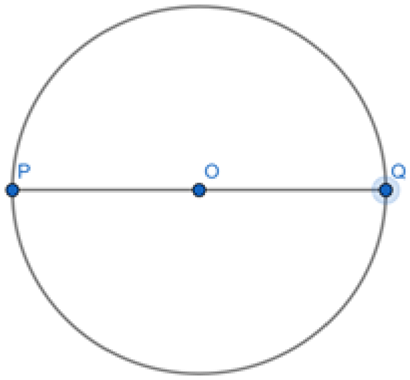
A. radius = 2 × diameters

B. radius = diameter + 2

C. diameter = radius + 2

D. diameter = 2 (radius)

Answer



In the figure, POQ is a diameter of the circle.

O is the midpoint of PQ and OP = OQ = radius of circle

∴ Diameter = 2 × Radius

1 C. Question

The longest chord of a circle is

A. radius

B. secant

C. diameter

D. tangent

Answer

A diameter is a chord that passes through the center of the circle.

Hence, the diameter is the longest chord of a circle.

2. Question

If the sum of the two diameters is 200 mm, find the radius of the circle in cm.

Answer

In a circle, the sum of two diameters = 200 mm

Let diameter be d and radius be r of a circle.

⇒ d + d = 200 mm

⇒ 2d = 200 mm

∴ d = 100 mm

We know that Diameter = 2(Radius).

⇒ 100 = 2r

⇒ r = 100 ÷ 2

∴ r = 50 mm

We know that 1 cm = 10 mm.

⇒ r = 50 ÷ 10 = 5 cm

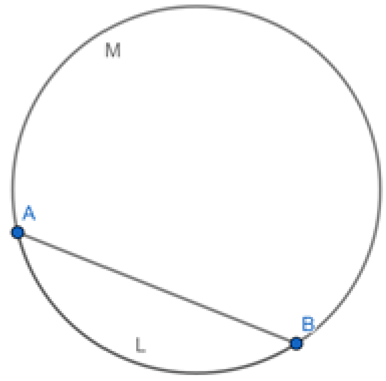
∴ The radius of the circle is 5 cm.

3. Question

Define the circle segment and sector of a circle.

Answer

Circle Segment: A chord of a circle divides the circular region into two parts. Each part is called as segment of a circle.

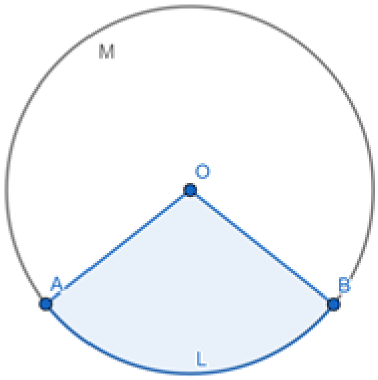


The segment containing minor arc is called the minor segment.

The segment containing major arc is called the major segment.

Sector of a Circle:

The circular region enclosed by an arc of a circle and the two radii at its end points is known as sector of a circle.



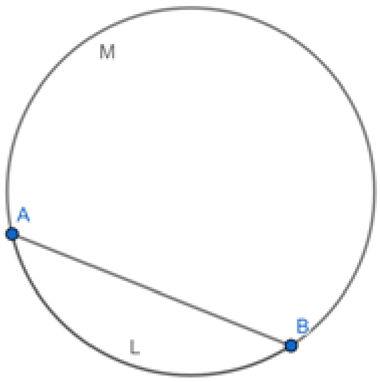
The smaller sector OALB is called the minor sector.

The greater sector OAMB is called the major sector.

4. Question

Define the arc of a circle.

Answer



Here, in the figure, AB is the chord. The chord AB divides the circle into two parts.

The curved parts ALB and AMB are known as arcs.

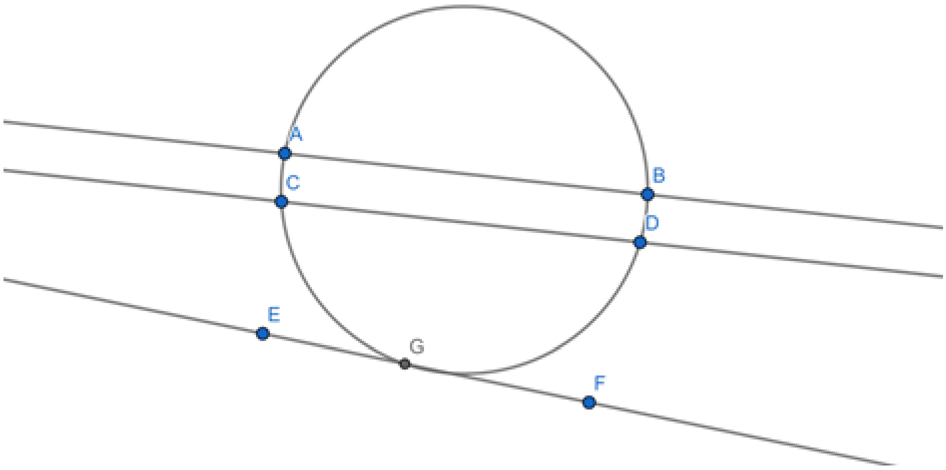
The smaller arc ALB is the minor arc.

The greater arc AMB is the major arc.

5. Question

Define the tangent of a circle and secant of a circle.

Answer



Tangent:

Tangent is a line that touches a circle at exactly one point, and the point is known as point of contact.

In the figure, EF is a tangent and G is the point of contact.

Secant:

A line passing through a circle and intersecting the circle at two points is called the secant of a circle.

In the figure AB and CD are secants.