RS Aggarwal Solutions for Class 7 Maths chapter 15
Properties of Triangles

EXERCISE 15A PAGE: 183

1. In a ΔABC, if ∠A = 72° and ∠B = 63°, find ∠C.
Solution:-
We know that the sum of the angles of a triangle is 180°.
∴ ∠A + ∠B + ∠C = 180°
= 72°+ 63°+ ∠C = 180°
= 135° + ∠C = 180°
= ∠C = 180°- 135°
= ∠C = 45°
Hence, the measures of ∠C is 45°.

2. In a ΔDEF, if ∠E = 105° and ∠F = 40°, find ∠D.
Solution:-
We know that the sum of the angles of a triangle is 180°.
∴ ∠D + ∠E + ∠F = 180°
= ∠D + 105°+ 40° = 180°
= 145° + ∠D = 180°
= ∠D = 180°- 145°
= ∠D = 35°
Hence, the measures of ∠D is 35°.

3. In a ΔXYZ, if ∠X = 90° and ∠Z = 48°, find ∠Y.
Solution:-
We know that the sum of the angles of a triangle is 180°.
∴ ∠X + ∠Y + ∠Z = 180°
= 90° + ∠Y + 48° = 180°
= 138° + ∠Y = 180°
= ∠Y = 180°- 138°
= ∠Y = 42°
Hence, the measures of ∠Y is 42°.

4. Find the angles of a triangle which are in the ratio 4: 3: 2.
Solution:-
Let the measures of the given angles of the triangles be (4x)°, (3x)° and (2x)° respectively.
Then,
= 4x + 3x + 2x = 180° … [∵sum of the angles of a triangle is 180°]
= 9x = 180°
= x = 180/9
= x = 20
So, the angle measures (4 × 20)°, (3 × 20)°, (2 × 20)°,
i.e., 80°, 60°, 40°.

Hence, the angles of the triangles are 80°, 60°, 40°.

5. One of the acute angles of right triangle is 36°, find the other.

Solution:-

Let the three angles be ∠A, ∠B, ∠C

And,

∠A = 36°

∠B = 90°

[∵from the question the given triangle is a right angled triangle. In this one of the angle is equal to 90°]

∠C = x

Now,

= ∠A + ∠B + ∠C = 180° … [∵sum of the angles of a triangle is 180°]

= 36° + 90° + ∠C = 180°

= 126° + ∠C = 180^0

= ∠C = 180° – 126°

= ∠C = 54°

Hence, the other angle is 54°.

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

Solution:-

Let the three angles be ∠A, ∠B, ∠C

And,

∠A = 2x°

∠B = 1x°

∠C = 90°

[∵from the question the given triangle is a right angled triangle. In this one of the angle is equal to 90°]

Now,

= ∠A + ∠B + ∠C = 180° … [∵sum of the angles of a triangle is 180°]

= 2x° + x° + 90° = 180°

= 3x° = 180^0- 90°

= 3x° = 90°

= x° = 90°/3

= x° = 30

Now, substitute the value of x in the given angles.

∠A = 2x° = 2 × 30 = 60°

∠B = 1x°= 1 × 60 = 30°

Hence, the other angles are 60° and 30°.

7. One of the angles of a triangle is 100° and the other two angles are equal. Find each of the equal angles.

Solution:-

Let the other two equal angles be x.

Then,

= $x + x + 100^\circ = 180^\circ$ … [∵sum of the angles of a triangle is 180°]

= $2x = 180^\circ – 100^\circ$

= $2x = 80^\circ$

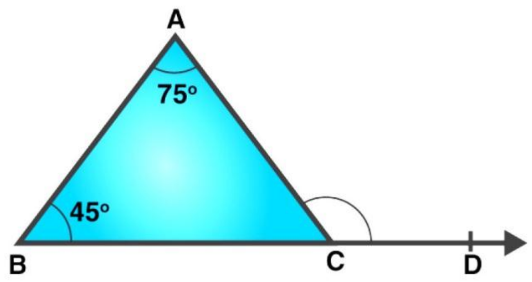
= $x = 80^\circ/2$

= $x = 40^\circ$

Hence, the other two equal angles are 40° and 40°.

EXERCISE 15B

1. In the figure given alongside, find the measure of ∠ACD.



Solution:-

In the given figure, side BC of ΔABC is produced to D.

Consider the ΔABC,

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.

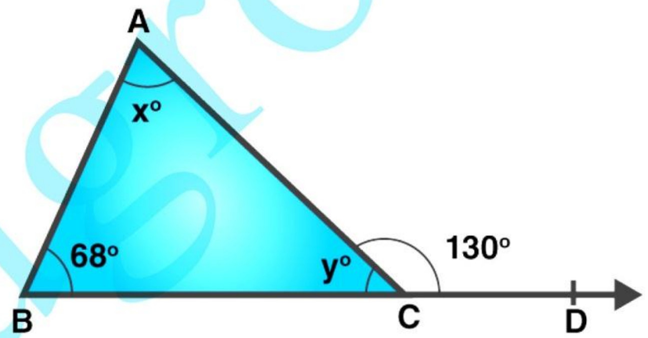
∴ ∠ACD = ∠ABC + ∠BAC

∠ACD = 45° + 75°

∠ACD = 120°

Hence, the measures of ∠ACD is 120°.

2. In the figure given alongside, find the values of x and y.



Solution:-

In the given figure, side BC of ΔABC is produced to D.

Consider the ΔABC,

We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.

∴ ∠ABC + ∠BAC = ∠ACD

= 68° + x = 130°

= x = 130° – 68°

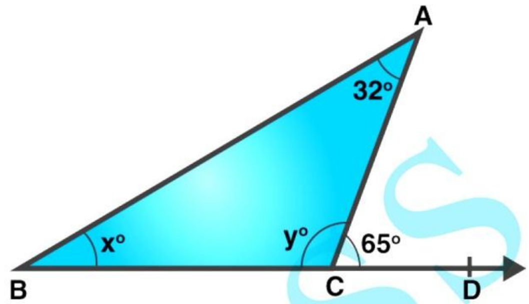
= x = 62°

Also, we know that the sum of all the angles of a triangles is 180°.

∴ x + y + 68° = 180°

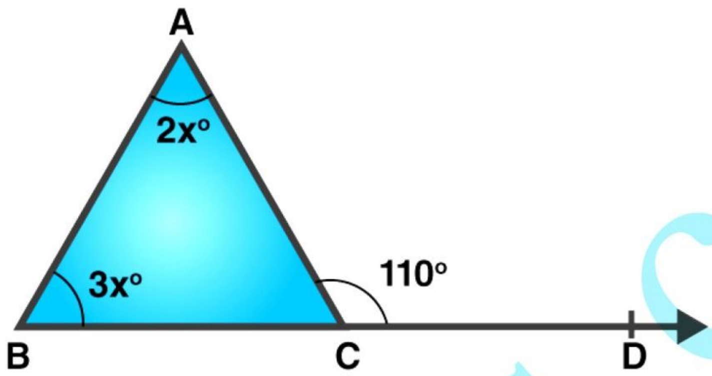
= 62° + y + 68° = 180°
= y + 130° = 180°
= y = 180° – 130°
= y = 50°
Hence, the value of x is 62° and value of y is 50°.

3. In the figure given alongside, find the values of x and y.



Solution:-
In the given figure, side BC of ΔABC is produced to D.
Consider the ΔABC,
We know that the exterior angle of a triangle is equal to the sum of its interior opposite angles.
∴ ∠ABC + ∠BAC = ∠ACD
= x° + 32° = 65°
= x = 65° – 32°
= x = 33°
Also, we know that the sum of all the angles of a triangles is 180°.
∴ A + B + C = 180°
= 32° + x° + y° = 180°
= 32° + 33° + y° = 180°
= y + 65° = 180°
= y = 180° – 65°
= y = 115°
Hence, the value of x is 33° and value of y is 115°.

4. An exterior angle of a triangle measures 110° and its interior opposite angles are in the ratio 2: 3. Find the angles of the triangle.



Solution:-

Let the given interior opposite angles be $(2x)^{o}$ and $(3x)^{o}$.

We know that an exterior angle of a triangle is equal to the sum of its interior opposite angles.

$\therefore 2x + 3x = 110^{o}$

$= 5x = 110$

$= x = 110/5$

$= x = 22$

$\therefore \angle A = 2x = 2 \times 22 = 44^{o}$

$\angle B = 3x = 3 \times 22 = 66^{o}$

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

$\therefore 44^{o} + 66^{o} + \angle C = 180^{o}$

$= 110 + \angle C = 180^{o}$

$= \angle C = 180 - 110$

$= \angle C = 70^{o}$

$\therefore \angle A = 44^{o}, \angle B = 66^{o}, \angle C = 70^{o}$

EXERCISE 15C

1. Is it possible to draw a triangle, the lengths of whose sides are given below?

(i). 1 cm, 1cm, 1cm

Solution:-

Consider the number1, 1, 1

It is clear that the sum of any two of these numbers is greater than the third.

Hence, it is possible to draw a triangle whose sides are 1cm, 1cm and 1cm.

(ii). 2 cm, 3 cm, 4 cm

Solution:-

Clearly, we have:

$(2 + 3) > 4$

$(3 + 4) > 2$

$(2 + 4) > 3$

Thus, the sum of any two of these numbers is greater than the third.

Hence, it is possible to draw a triangle whose sides are 2 cm, 3 cm and 4 cm.

(iii). 7 cm, 8 cm, 15 cm

Solution:-

Clearly, we have:

$(7 + 8) = 15$

Thus, the sum of any two of these numbers is not greater than the third.

Hence, it is not possible to draw a triangle whose sides are 7 cm, 8 cm and 15 cm.

(iv). 3.4 cm, 2.1 cm, 5.3 cm

Solution:-

Clearly, we have:

$(3.4 + 2.1) > 5.3$

$(2.1 + 5.3) > 3.4$

$(3.4 + 5.3) > 2.1$

Thus, the sum of any two of these numbers is greater than the third.

Hence, it is possible to draw a triangle whose sides are 3.4 cm, 2.1 cm and 5.3 cm.

(iv). 6 cm, 7 cm, 14 cm

Solution:-

Clearly, we have:

$(6 + 7) < 14$

Thus, the sum of any two of these numbers is less than the third.

Hence, it is not possible to draw a triangle whose sides are 6 cm, 7 cm and 14 cm.

2. Two sides of a triangle are 5 cm and 9 cm long. What can be the length of its third side?

Solution:-

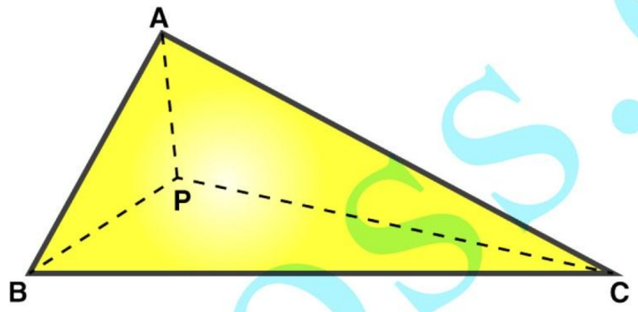
Let us Assume the length of the third side be x.

Then,

$(5 + 9) > x$

∴the length of its third side is less than 14 cm

3. If P is appoint in the interior of ΔABC then fill in the blanks with > or < or =.



(i). PA + PB……. AB

Solution:-

PA + PB > AB

Because, the sum of any two side of triangle is greater than the third side.

(ii). PB + PC…… BC

Solution:-

PB + PC > BC

Because, the sum of any two side of triangle is greater than the third side.

(iii). AC …… PA + PC

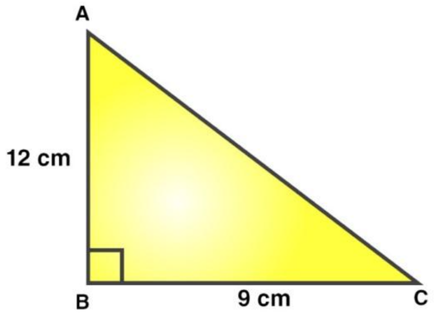
Solution:-

AC < PA + PC

Because, the sum of any two side of triangle is greater than the third side.

EXERCISE 15D PAGE: 193

1. Find the length of the hypotenuse of a right triangle, the other two sides of which measures 9 cm and 12 cm.
Solution:-



Let ΔABC be right angled at B.
Let AB = 12 cm and BC = 9cm,
Hypotenuse (AC) =?
Then, by Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$AC^2 = 12^2 + 9^2$

$AC^2 = 144 + 81$

$AC^2 = 225$

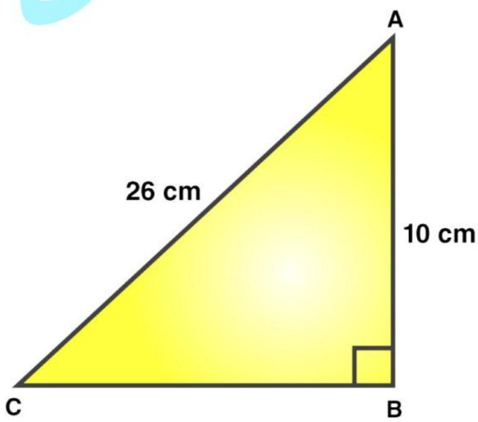
Sending power2 from LHS to RHS it becomes square root

$AC = \sqrt{(225)}$

AC = 15 cm

∴The length of the hypotenuse of a triangle is 15 cm.

2. The hypotenuse of a right triangle is 26 cm long. If one of the remaining two sides is 10 cm long, find the length of the other side.



Solution:-

Let ΔABC be right angled at B.
Let AB = 10 cm
Hypotenuse (AC) = 26 cm
BC =?
Then, by Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$BC^2 = (AC^2 - AB^2)$

$BC^2 = (26^2 – 10^2)$

$BC^2 = (676 – 100)$

$BC^2 = 576$

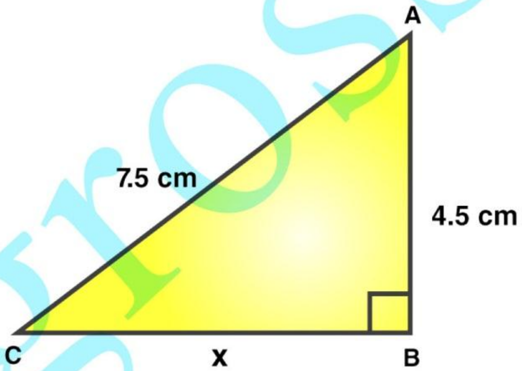
Sending power2 from LHS to RHS it becomes square root

$BC = \sqrt{(576)}$

BC = 24 cm

∴The length of other the side of a triangle is 24 cm.

3. The length of one side of a right triangle is 4.5cm and the length of its hypotenuse is 7.5 cm. Find the length of its third side.
Solution:-



From the question,
Let ΔABC be right angled at B.
Let AB = 4.5 cm
Hypotenuse (AC) = 7.5 cm
BC = x
Then, by Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$BC^2 = (AC^2 - AB^2)$

$x^2 = (7.5^2 – 4.5^2)$

$x^2 = (56.25 – 20.25)$

$x^2 = 36$

Sending power2 from LHS to RHS it becomes square root

$x = \sqrt{(36)}$

x = 6 cm

∴The length of other the side of a triangle is 6 cm.

4. The two legs of a right triangle are equal and the square of its hypotenuse is 50. Find the length of its third side.

Solution:-

Let the two legs of a right triangle be x.

Then,

$= x^2 + x^2 = 50$

$= 2x^2 = 50$

$= x^2 = (50/2)$

$= x^2 = 25$

Sending power2 from LHS to RHS it becomes square root

$= x = \sqrt{(25)}$

$= x = 5$

∴The length of two legs of a right triangle is 5 cm.

5. The sides of a triangle is measures 15 cm. 36 cm and 39 cm. Show that it is a right-angled triangle.

Solution:-

Let us assume the largest value is the hypotenuse side i.e. 39 cm.

Then, by Pythagoras theorem,

$= 39^2 = 36^2 + 15^2$

$= 1521 = 1296 + 225$

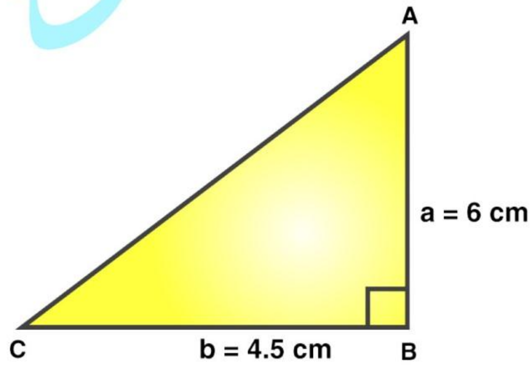
$= 1521 = 1521$

The sum of square of two side of triangle is equal to the square of third side,

∴The given triangle is right –angled triangle.

6. In right ΔABC, the lengths of its legs are given as a = 6 cm and b = 4.5 cm. Find the length of its hypotenuse.

Solution:-



Let ΔABC be right angled at B.

Let AB = 10 cm

Hypotenuse (AC) = 26 cm

BC =?
Then, by Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$c^2 = (a^2 + b^2)$

$c^2 = (6^2 + 4.5^2)$

$c^2 = (36 + 20.25)$

$c^2 = 56.25$

Sending power2 from LHS to RHS it becomes square root

$c = \sqrt{(56.25)}$

$c = 7.5$ cm

∴The length of hypotenuse of a triangle is 7.5 cm.

7. The length of the sides of some triangles are given below. Which of them are right-angled?

(i). a = 15 cm, b = 20 cm and c = 25 cm

Solution:-

Let us assume the largest value is the hypotenuse side i.e. c = 25 cm.
Then, by Pythagoras theorem,

$= c^2 = a^2 + b^2$

$= 25^2 = 15^2 + 20^2$

$= 625 = 225 + 400$

$= 625 = 625$

The sum of square of two side of triangle is equal to the square of third side,
∴The given triangle is right-angled triangle.

(ii). a = 9 cm, b = 12 cm and c = 16 cm

Solution:-

Let us assume the largest value is the hypotenuse side i.e. c = 16 cm.
Then, by Pythagoras theorem,

$= c^2 = a^2 + b^2$

$= 16^2 = 9^2 + 12^2$

$= 256 = 81 + 144$

$= 256 \neq 225$

The sum of square of two side of triangle is not equal to the square of third side,
∴The given triangle is not right –angled triangle.

(iii). a = 10 cm, b = 24 cm and c = 26 cm

Solution:-

Let us assume the largest value is the hypotenuse side i.e. c = 26 cm.
Then, by Pythagoras theorem,

$= c^2 = a^2 + b^2$

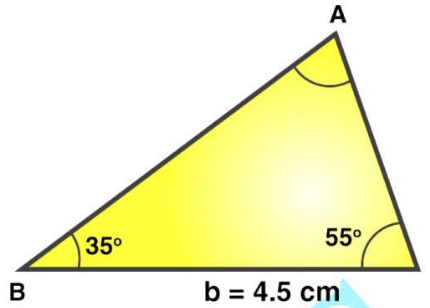
$= 26^2 = 10^2 + 24^2$

$= 676 = 100 + 576$

$= 676 = 676$

The sum of square of two side of triangle is equal to the square of third side,
∴The given triangle is right-angled triangle.

8. In a ΔABC, ∠B = 35° and ∠C = 55°. Write which of the following is true:
(i). $AC^2 = AB^2 + BC^2$
(ii). $AB^2 = BC^2 + AC^2$
(iii). $BC^2 = AB^2 + AC^2$

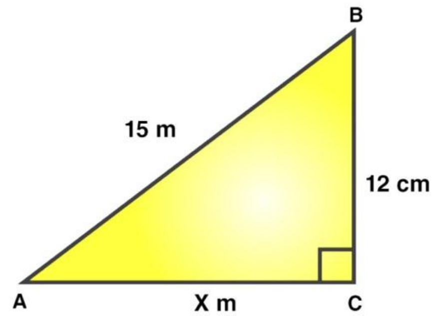


Solution:-
Given that ∠B = 35°, ∠C = 55°
Then, ∠A =?
We know that sum of the angle of three sides of triangle is equal to 180°.

= ∠A + ∠B + ∠C = 180°
= ∠A + 35° + 55° = 180°
= ∠A + 90° = 180°
= ∠A = 180 – 90
= ∠A = 90°

Also, we know that side opposite to the right angle is the hypotenuse.
∴ $BC^2 = AB^2 + AC^2$
Hence, (iii) is true

9. A 15-m-long ladder is placed against a wall to reach a window 12 m high. Find the distance of the foot of the ladder from the wall.



Solution:-
Let BC be the wall and AB be the ladder.
Then, AB = 15 m and BC = 12 m.

Now, ΔABC being right-angled at C, we have:

$AB^2 = BC^2 + AC^2$

$AC^2 = (AB^2 - BC^2)$

$AC^2 = (15^2 – 12^2)$

$AC^2 = (225 – 144)$

$AC^2 = (81)$

Sending power2 from LHS to RHS it becomes square root

$AC = \sqrt{(81)}$

AC = 9 cm

∴The distance of the foot of the ladder from the wall is 9 cm.