RS Aggarwal Solutions for Class 10 Maths Chapter 4 Exercise 4.5: RS Aggarwal Solutions for Class 10 Maths Chapter 4 Triangles Exercise 4.5 are designed to help students understand triangles better. This exercise covers how to identify similar triangles using rules like AA, SSS, and SAS. Each problem is solved step-by-step, making it easy for students to follow and learn.

These solutions are created by experts to ensure clarity and accuracy, helping students build confidence in solving geometry problems. Practicing these exercises will strengthen students' understanding of triangles and prepare them well for exams.

RS Aggarwal Solutions for Class 10 Maths Chapter 4 Exercise 4.5 Overview

The RS Aggarwal Solutions for Class 10 Maths Chapter 4 Exercise 4.5, prepared by subject experts of Physics Wallah, explain triangle concepts clearly. These solutions show how to identify similar triangles using rules like AA, SSS, and SAS step-by-step.

They are designed to help students understand these concepts easily and solve problems confidently. By using these solutions, students can improve their geometry skills and feel more prepared for their exams.

RS Aggarwal Solutions for Class 10 Maths Chapter 4 Exercise 4.5 PDF

Here we have provided RS Aggarwal Solutions for Class 10 Maths Chapter 4 Triangles Exercise 4.5 for the ease of students so that they can prepare better for their upcoming exams –

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RS Aggarwal Solutions for Class 10 Maths Chapter 4 Triangles Exercise 4.5

Below we have provided RS Aggarwal Solutions for Class 10 Maths Chapter 4 Triangles Exercise 4.5 for the ease of the students –

Question 1 .

Solution:

Two triangles are similar, if

(i) their corresponding angles are equal and

(ii) their corresponding sides are in the same ratio (or proportion).

Question 2 .

Solution:

Basic Proportionality Theorem: If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

Question 3 .

Solution:

Converse of Thales' Theorem: If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

Question 4 .

Solution:

Midpoint Theorem: The line joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.

Question 5 .

Solution:

If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar. This criterion is referred to as the AAA (Angle–Angle–Angle) criterion of similarity of two triangles.

Question 6 .

Solution:

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar. This is referred to as the AA-similarity criterion for two triangles.

Question 7 .

Solution:

If in two triangles, sides of one triangle are proportional to (i.e., in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar. This criterion is referred to as the SSS (Side–Side–Side)-similarity criterion for two triangles.

Question 8 .

Solution:

If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar. This criterion is referred to as the SAS (Side–Angle–Side) similarity criterion for two triangles.

Question 9.

Solution:

Pythagoras' Theorem: In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Question 10 .

Solution:

Converse of Pythagoras' Theorem: In a triangle, if square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is a right angle.

Question 11.

Solution:

We know that the midpoint theorem states that the line joining the mid-points of any two sides of a triangle is parallel to the third side and equal to half of it.

Since D, E and F are respectively the midpoints of sides AB, BC and CA of ΔABC,

$DE = AB/2$; $EF = BC/2$; $DF = AC/2$

$\Rightarrow DE/AB = 1/2$; $EF/BC = 1/2$; $DF/AC = 1/2$

$\Rightarrow DE/AB = EF/BC = DF/AC = 1/2$

We know that if in two triangles, sides of one triangle are proportional to (i.e., in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar (SSS criteria).

So $\Delta ABC \sim \Delta DEF$.

We know that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

$\therefore ar(\Delta ABC)/ar(\Delta DEF) = (AB/DE)^2$

$\Rightarrow ar(\Delta ABC)/ar(\Delta DEF) = (2DE/DE)^2$

$\Rightarrow ar(\Delta ABC)/ar(\Delta DEF) = (2/1)^2$

$\Rightarrow ar(\Delta ABC)/ar(\Delta DEF) = (4/1)$

But we need to find the ratio of the areas of ΔDEF and ΔABC.

$\therefore ar(\Delta DEF)/ar(\Delta ABC) = (1/4)$

$\therefore ar(\Delta ABC):ar(\Delta DEF) = 1:4$

Question 12 .

Solution:

We know that if one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar (SAS criteria).

Here in the given triangles, $\angle A = \angle P = 70°$.

And AB/PQ = AC/PR

i.e. 6/4.5 = 6/9

⇒ 2/3 = 2/3

Hence ΔABC ~ ΔPQR.

SAS-similarity

Question 13 .

Solution:

Given: ΔABC ~ΔDEF such that 2AB = DE and BC = 6 cm.

From SSS-similarity criterion,

We get

AB/DE = BC/EF

Substituting the given values,

AB/2AB = 6cm/EF

1/2 = 6cm/EF

EF = 2 × 6cm

EF = 12cm

12cm

Question 14 .

Solution:

We know that the basic proportionality theorem states that

"If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio."

So if DE || BC,

Then AD/DB = AE/EC

By substituting the given values,

⇒ x cm/(3x + 4)cm = (x + 3)cm/(3x + 19)cm

Cross multiplying, we get

⇒ $3x^2 + 19x = 3x^2 + 9x + 4x + 12$

⇒ $3x^2 + 19x - 3x^2 - 9x - 4x = 12$

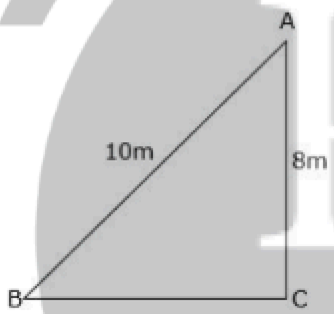
$\Rightarrow 6x = 12$

$\Rightarrow x = 2$

$\underline{x = 2}$

Question 15 .

Solution:



Let AB be the ladder and CA be the wall with the window at A.

Let the distance of foot of ladder from base of wall BC be x.

Also, AB = 10m and CA = 8m

From Pythagoras Theorem,

we have: $AB^2 = BC^2 + CA^2$

$\Rightarrow (10)^2 = x^2 + 8^2$

$\Rightarrow x^2 = 100 - 64$

$\Rightarrow x^2 = 36$

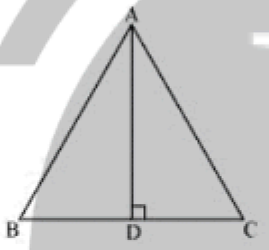
⇒ x = 6m

So, BC = 6m.

Length of the ladder is 6m.

Question 16.

Solution:



Let △ABC be the equilateral triangle whose side is 2a cm.

Let us draw altitude AD such that AD ⊥ BC.

We know that altitude bisects the opposite side.

So, BD = DC = a cm.

In △ADC, ∠ADC = 90°.

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

So, by applying Pythagoras Theorem,

$AC^2 = AD^2 + DC^2$

$(2a\ cm)^2 = AD^2 + (a\ cm)^2$

$4a^2\ cm^2 = AD^2 + a^2\ cm^2$

$AD^2 = 3a^2\ cm^2$

$AD = \sqrt{3}\ a\ cm$

The length of altitude is $\sqrt{3}$ a cm.

Question 17.

Solution:

We know that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

i.e. $ar(\triangle ABC)/ar(\triangle DEF) = (BC/EF)^2$

Substituting the given values, we get

$\Rightarrow 64cm^2/169cm^2 = (4cm/EF\ cm)^2$

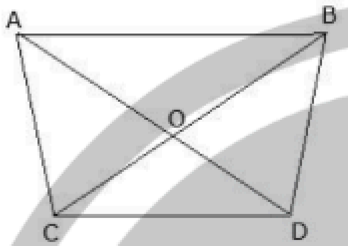
$\Rightarrow 64/169 = 16/EF^2$

$\Rightarrow EF^2 = 42.25$

$\Rightarrow EF = 6.5cm$

Question 18 .

Solution:



Let us consider $\triangle AOB$ and $\triangle COD$.

$\angle AOB = \angle COD$ ($\because$ vertically opposite angles)

$\angle OBA = \angle ODC$ ($\because$ alternate interior angles)

$\angle OAB = \angle OCD$ ($\because$ alternate interior angles)

We know that if in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar (AAA criteria).

So, $\Delta AOB \cong \Delta COD$.

Given, AB = 2CD and ar(ΔAOB) = 84 cm^2

We know that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

$\therefore ar(\triangle AOB)/ar(\triangle COD) = (AB/CD)^2$

$\Rightarrow 84cm^2/ar(\Delta COD) = (2CD/CD)^2$

$\Rightarrow 84cm^2/ar(\Delta COD) = 4$

$\Rightarrow ar(\Delta COD) = 84cm^2/4$

$\Rightarrow ar(\Delta COD) = 21cm^2$

Question 19.

Solution:

Let the smaller triangle be $\triangle ABC$ and larger triangle be $\triangle DEF$.

We know that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

i.e. $ar(\triangle ABC)/ar(\triangle DEF) = (AB/DE)^2$

Substituting the given values, we get

$\Rightarrow 48cm^2/ ar(\triangle DEF) = (2/3)^2$

$\Rightarrow 48cm^2/ ar(\triangle DEF) = 4/9$

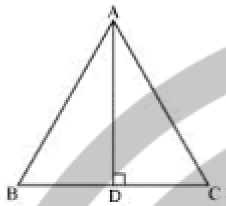
$\Rightarrow ar(\triangle DEF) = (48 \times 9)/4 \ cm^2$

$\Rightarrow ar(\triangle DEF) = 108cm^2$

<u>$108cm^2$</u>

Question 20 .

Solution:



Let $\triangle ABC$ be the equilateral triangle whose side is a cm.

Let us draw altitude AD(h) such that $AD \perp BC$.

We know that altitude bisects the opposite side.

So, BD = DC = a cm.

In $\triangle ADC$, $\angle ADC = 90°$.

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

So, by applying Pythagoras Theorem,

$AC^2 = AD^2 + DC^2$

$(a \text{ cm})^2 = AD^2 + (a/2 \text{ cm})^2$

$a^2 \text{ cm}^2 = AD^2 + a^2/4 \text{ cm}^2$

$AD^2 = 3a^2/4 \text{ cm}^2$

$AD = \sqrt{3}\, a/2 \text{ cm} = h$

We know that area of a triangle = 1/2 × base × height

$Ar(\Delta ABC) = 1/2 \times a \text{ cm} \times \sqrt{3}\, a/2 \text{ cm}$

$\Rightarrow ar(\Delta ABC) = \sqrt{3}\, a^2/4 \text{ cm}^2$

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Benefits of RS Aggarwal Solutions for Class 10 Maths Chapter 4 Exercise 4.5

- **Concept Clarity**: These solutions provide clear explanations and step-by-step methods to solve problems related to triangles, helping students understand the concepts thoroughly.
- **Expert Guidance**: Prepared by subject experts, the solutions ensure accuracy and alignment with the curriculum, giving students reliable resources for study.
- **Enhanced Problem-Solving Skills**: By practicing these solutions, students can improve their ability to analyze and solve triangle-related problems efficiently.
- **Confidence Building**: Regular practice with these solutions builds students confidence in tackling geometry problems and prepares them effectively for exams.
- **Comprehensive Coverage**: The solutions cover all topics and types of questions in Exercise 4.5, ensuring comprehensive preparation for assessments.
- **Foundation Strengthening**: By mastering the concepts in this exercise, students strengthen their foundation in geometry, which is crucial for advanced math studies.
- **Accessible Learning**: The solutions are presented in a simple and accessible language, making it easier for students to grasp complex mathematical concepts.