NCERT Solutions Class 10 Maths
Chapter 6: Triangles
Exercise 6.2

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Quick Summary: In NCERT Solutions Class 10 Maths Chapter 6 Exercise 6.2, students learn the fundamental concepts of similarity of triangles through the Basic Proportionality Theorem and its applications. This exercise covers parallel lines in triangles, proportional segments, and the converse of Thales' theorem, which are essential topics for CBSE Class 10 board exams and form the foundation for advanced geometry concepts.

Key Takeaways:

- Basic Proportionality Theorem (Thales): If a line is parallel to one side of a triangle, then it divides the other two sides proportionally: (AD)/(DB) = (AE)/(EC)
- Converse of Basic Proportionality Theorem: If a line divides two sides of a triangle proportionally, then it is parallel to the third side
- Applications in finding unknown lengths and proving parallelism in triangular figures
- Step-by-step solutions for all 10 questions with detailed explanations and figure references for better understanding

Complete Solutions

Question 1

QUESTION

In Fig. 6.17, (i) and (ii), DE \parallel BC. Find EC in (i) and AD in (ii).

SOLUTION

Since , in both figures we have similar triangles . So,

(I) FINDING EC

On side : and . So

On side : and is unknown, so

Using similarity,

Now, , so

(II) FINDING AD

On side : and . Hence

On side : and is unknown, say . Then

Using similarity,

Simplify the right-hand side:

So,

Thus

ANSWER

(i) 2\ \textcm

(ii) 2.4\ \textcm

Question 2

QUESTION

E and F are points on the sides PQ and PR respectively of a \triangle PQR. For each of the following cases, state whether EF \parallel QR:

1. PE = 3.9 cm, EQ = 3 cm, PF = 3.6 cm and FR = 2.4 cm
2. PE = 4 cm, QE = 4.5 cm, PF = 8 cm and RF = 9 cm
3. PQ = 1.28 cm, PR = 2.56 cm, PE = 0.18 cm and PF = 0.36 cm

SOLUTION

Concept used: Converse of Basic Proportionality Theorem (Thales' theorem).

If a line through the sides and of cuts them at points E and F such that

then . If the ratios are not equal, then is *not* parallel to .

(I) PE = 3.9 CM, EQ = 3 CM, PF = 3.6 CM, FR = 2.4 CM

First find full side lengths:

Compute the ratios:

Clearly,

Conclusion: The ratios are not equal, so is **not parallel** to . Answer: **No.**

(II) PE = 4 CM, QE = 4.5 CM, PF = 8 CM, RF = 9 CM

Find full side lengths:

Compute ratios:

So,

Conclusion: Ratios are equal, so by converse of BPT, . Answer: **Yes.**

(III) PQ = 1.28 CM, PR = 2.56 CM, PE = 0.18 CM, PF = 0.36 CM

Here entire side lengths are already given: , .

Compute the ratios:

So,

Conclusion: Ratios are equal, so . Answer: **Yes.**

ANSWER

(i) No

(ii) Yes

(iii) Yes

Question 3

QUESTION

In Fig. 6.18, if LM \parallel CB and LN \parallel CD, prove that

(AM)/(AB) = (AN)/(AD).

SOLUTION

Given: In Fig. 6.18, LM CB and LN CD.

1. USE LM CB

Consider with points on and on , and .

Then,

(corresponding angles)

(corresponding angles)

So, (AA similarity).

From similarity, corresponding sides are proportional:

2. USE LN CD

Now consider with points on and on , and .

Then,

(corresponding angles)

(corresponding angles)

So, (AA similarity).

Again, corresponding sides are proportional:

3. COMPARE THE TWO RATIOS

From (1):

From (2):

Since both are equal to , we get

Hence proved.

ANSWER

(AM)/(AB) = (AN)/(AD)

Question 4

QUESTION

In Fig. 6.19, DE \parallel AC and DF \parallel AE. Prove that

(BF)/(FE) = (BE)/(EC).

SOLUTION

Given: In , points lies on , and lie on . Lines are drawn so that and .

To prove: .

STEP 1: USE SIMILARITY IN

Since and is on , is on , we have:

So the corresponding sides are proportional:

STEP 2: USE SIMILARITY IN

Since and is on , is on , we have:

Thus,

STEP 3: RELATE AND USING (1) AND (2)

From (1) and (2), the common ratio is . Hence,

So,

STEP 4: EXPRESS SEGMENTS ON

Points lie on the same straight line in that order, so:

From (3):

Substitute :

But , so:

Comparing with the previous expression:

Cancel from both sides:

STEP 5: FORM THE REQUIRED RATIO

Divide both sides by (non-zero):

Hence proved.

ANSWER

(BF)/(FE) = (BE)/(EC)

Question 5

QUESTION

In Fig. 6.20, DE \parallel OQ and DF \parallel OR. Show that EF \parallel QR.

SOLUTION

Given: In , point lies on . On segments and , points and are taken, and on point is taken such that

and .

To prove: .

STEP 1: USE DE OQ IN

In , we have on , on and .

So, (AA similarity).

Thus, corresponding sides are proportional:

STEP 2: USE DF OR IN

In , we have on , on and .

So, (AA similarity).

Hence,

STEP 3: COMPARE THE RATIOS

From (1) and (2):

Thus,

STEP 4: APPLY CONVERSE OF BASIC PROPORTIONALITY THEOREM

In , points and lie on and respectively, and we have shown that

By the **Converse of Basic Proportionality Theorem**, if a line through two sides of a triangle divides them in the same ratio, that line is parallel to the third side.

Therefore, line is parallel to .

Hence proved that .

ANSWER

EF \parallel QR

Question 6

QUESTION

In Fig. 6.21, A, B and C are points on OP, OQ and OR respectively such that AB \parallel PQ and AC \parallel PR. Show that BC \parallel QR.

SOLUTION

Given: In , point lies inside the triangle. Points , and lie on segments , and respectively, such that and .

To prove: .

STEP 1: USE AB PQ IN

In , with on , on and , by the Basic Proportionality Theorem,

STEP 2: USE AC PR IN

In , with on , on and , again by the Basic Proportionality Theorem,

STEP 3: RELATE THE RATIOS ON OQ AND OR

From (1) and (2), the left-hand sides are equal, so

STEP 4: APPLY THE CONVERSE OF BASIC PROPORTIONALITY THEOREM IN

In , points and lie on and respectively, and from (3) we have

By the **converse of the Basic Proportionality Theorem**, if a line cuts two sides of a triangle in the same ratio, then that line is parallel to the third side.

Therefore, the line joining and is parallel to :

Hence proved.

ANSWER

BC \parallel QR

Question 7

QUESTION

Using Theorem 6.1, prove that a line drawn through the mid-point of one side of a triangle parallel to another side bisects the third side. (Recall that you have proved it in Class IX).

SOLUTION

Statement to prove: In a triangle, a line drawn through the mid-point of one side and parallel to another side bisects the third side.

CONSTRUCTION AND NOTATION

Let be any triangle. Let be the mid-point of side , so

Through , draw a line parallel to which meets at . We must prove that is the mid-point of , i.e. .

USE THEOREM 6.1 (BASIC PROPORTIONALITY THEOREM)

Theorem 6.1: If a line is drawn parallel to one side of a triangle to intersect the other two sides, then it divides those two sides in the same ratio.

Here, in , line is drawn parallel to , meeting at and at . So, by Theorem 6.1:

USE THE MID-POINT CONDITION

Since is the mid-point of , we have

Substitute (2) into (1):

This implies

CONCLUSION

Thus, point divides side into two equal parts, i.e. is the mid-point of .

Therefore, **a line drawn through the mid-point of one side of a triangle and parallel to another side bisects the third side**.

ANSWER

A line drawn through the mid-point of one side of a triangle and parallel to another side bisects the third side.

Question 8

QUESTION

Using Theorem 6.2, prove that the line joining the mid-points of any two sides of a triangle is parallel to the third side. (Recall that you have done it in Class IX).

SOLUTION

Statement to prove: In any triangle, the line segment joining the mid-points of two sides is parallel to the third side.

CONSTRUCTION / NOTATION

Consider .

Let be the mid-point of side and be the mid-point of side .

So,

STEP 1: EXPRESS THE EQUALITIES AS RATIOS

Since is the mid-point of :

Since is the mid-point of :

Thus,

STEP 2: USE THEOREM 6.2 (CONVERSE OF BASIC PROPORTIONALITY THEOREM)

Theorem 6.2: If a line intersects two sides of a triangle such that it divides those sides in the same ratio, then the line is parallel to the third side.

In , line segment cuts sides and at and respectively, and we have just shown

Therefore, by Theorem 6.2,

CONCLUSION

The line joining the mid-points and of sides and is parallel to the third side . Hence, the line joining the mid-points of any two sides of a triangle is parallel to the third side.

ANSWER

The line joining the mid-points of any two sides of a triangle is parallel to the third side.

Question 9

QUESTION

ABCD is a trapezium in which AB \parallel DC and its diagonals intersect each other at the point O. Show that

(AO)/(BO) = (CO)/(DO).

SOLUTION

Goal: Prove that the point of intersection of the diagonals of a trapezium (with one pair of parallel sides) divides the two diagonals in the same ratio, i.e. .

The hint suggests a construction, but the result can be proved neatly using coordinate geometry, keeping the geometry of a trapezium intact.

STEP 1: PLACE THE TRAPEZIUM ON THE COORDINATE PLANE

Since AB DC, we can place the trapezium so that these bases are horizontal.

- Let and , for some .
- Let and , for some and any real (in general).

Thus, AB is the segment from to and DC is the segment from to ; clearly AB DC.

STEP 2: FIND THE COORDINATES OF O, THE INTERSECTION OF DIAGONALS

Diagonal AC joins and . A general point on AC can be written in parametric form as:

Diagonal BD joins and . A general point on BD can be written as:

At the intersection point O, these coordinates must be equal, so:

Since , from we get

Thus, the same parameter (say) describes O on both diagonals:

STEP 3: EXPRESS THE RATIOS ALONG EACH DIAGONAL

On diagonal AC, parameter tells us how O divides AC:

- From A to O is a fraction of AC, and from O to C is a fraction .

Therefore,

On diagonal BD, parameter again measures the fraction from B to D:

- From B to O is a fraction of BD.
- From O to D is a fraction of BD.

Hence,

STEP 4: COMPARE THE RATIOS AND DERIVE THE REQUIRED RESULT

From (1) and (2),

This implies

Divide both sides by (non-zero since O lies strictly between the endpoints on each diagonal):

Thus, we have shown

Conclusion: In a trapezium with one pair of parallel sides, the diagonals intersect each other in such a way that they are divided in the same ratio, as required.

ANSWER

Through O, draw a line parallel to DC, intersecting AD and BC at E and F respectively.

Question 10

QUESTION

The diagonals of a quadrilateral ABCD intersect each other at the point O such that

(AO)/(BO) = (CO)/(DO).

Show that ABCD is a trapezium.

SOLUTION

Given: In quadrilateral ABCD, diagonals AC and BD intersect at O and

To prove: is a trapezium, i.e. one pair of opposite sides is parallel (here we shall show).

STEP 1: CONSIDER TRIANGLES AOB AND COD

Look at and :

- They share a pair of vertical angles: (vertically opposite angles).
- We are given the ratio of the sides around these angles:

So we have: an equality of the ratios of the two sides including the angle and the included angle is equal.

Therefore, by the **SAS similarity criterion**,

STEP 2: USE SIMILARITY TO RELATE ANGLES ON AB AND CD

From the similarity , corresponding angles are equal. With the correspondence , , , we get in particular:

STEP 3: CONCLUDE THAT AB IS PARALLEL TO CD

Note that:

- and lie on lines AB and CD with the transversal BD.
- and lie on lines AB and CD with the transversal AC.

Since these pairs of corresponding angles are equal, they are **alternate interior angles**. Hence,

Conclusion: One pair of opposite sides of quadrilateral ABCD is parallel, so ABCD is a **trapezium** with .

ANSWER

ABCD is a trapezium with AB \parallel CD.

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Key Formulas

Important Formulas for Exercise 6.2

Formula / Concept	Description
Similarity of Triangles	Two triangles are similar if their corresponding angles are equal and their corresponding sides are in the same ratio.
Basic Proportionality Theorem (BPT) or Thales Theorem	If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then the other two sides are divided in the same ratio.
\textIf in a \triangle ABC, DE \parallel BC, \text then (AD)/(DB) = (AE)/(EC)	This is the mathematical representation of the Basic Proportionality Theorem.
Converse of Basic Proportionality Theorem	If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.
\textIf in a \triangle ABC, (AD)/(DB) = (AE)/(EC), \text then DE \parallel BC	This is the mathematical representation of the converse of the Basic Proportionality Theorem.
Pythagoras Theorem	In a right-angled triangle, the square of the hypotenuse (the side opposite the right angle) is equal to the sum of the squares of the other two sides.
c^2 = a^2 + b^2	Where c is the length of the hypotenuse and a and b are the lengths of the other two sides of a right-angled triangle.
Converse of Pythagoras Theorem	In a triangle, if the square of the length of the longest side is equal to the sum of the squares of the other two sides, then the triangle is a right-angled triangle.
\textIf in a \triangle ABC, AC^2 = AB^2 + BC^2, \text then \angle B = 90^\circ	This is the mathematical representation of the converse of the Pythagoras Theorem.

❓ Top FAQs

Q1. How many questions are included in NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 for CBSE board exam 2025-26?

NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 contains exactly 10 questions. These questions are primarily based on the Basic Proportionality Theorem (Thales Theorem) and its converse, which are crucial topics for CBSE board exam 2025-26. All 10 questions with step by step solutions are available for free PDF download on various educational platforms.

Q2. Where can I download free PDF of NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 with step by step solutions?

You can download the free PDF of NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 from the official NCERT website, CBSE academic portal, and trusted educational websites. These PDFs contain detailed step by step solutions for all 10 questions and are updated according to the CBSE syllabus 2025-26. The solutions are prepared by expert mathematics teachers to help students prepare effectively for board exams.

Q3. How many marks does Chapter 6 Triangles carry in CBSE Class 10 Maths board exam 2025-26 and what is the weightage of Exercise 6.2?

Chapter 6 Triangles falls under Unit V - Geometry, which carries approximately 6 marks in the CBSE Class 10 Maths board exam 2025-26. Exercise 6.2 focuses on the Basic Proportionality Theorem and similarity concepts, which are frequently asked in the board exam. Students should thoroughly practice NCERT Solutions for Class 10 Maths Chapter 6 Exercise 6.2 to score well in geometry-based questions.

Q4. Which is the most difficult question in NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 for CBSE board exam 2025-26?

Questions 9 and 10 in NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2 are considered the most challenging by students. These questions require application of the Basic Proportionality Theorem along with construction and proof-based problems. Students are advised to practice these questions with step by step solutions multiple times and refer to free PDF downloads for detailed explanations.

Q5. What is the Basic Proportionality Theorem (Thales Theorem) explained in NCERT Solutions for Class 10 Maths Chapter 6 Triangles Exercise 6.2?

The Basic Proportionality Theorem (Thales Theorem) in NCERT Class 10 Maths Chapter 6 states that if a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides those sides in the same ratio. Exercise 6.2 contains 10 questions specifically designed to help students understand and apply this theorem. This concept is crucial for CBSE board exam 2025-26 and forms the foundation for understanding similarity of triangles.

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