

NCERT Solutions for Class 10 Maths Chapter 6 Ex 6.5 | Updated 2026-27

✂ Quick Revision Box — Triangles Ex 6.5

- **Pythagoras Theorem:** In a right triangle, $\text{Hypotenuse}^2 = \text{Base}^2 + \text{Perpendicular}^2$
- **Converse of Pythagoras:** If $c^2 = a^2 + b^2$, the triangle is right-angled opposite side c
- **Altitude-on-Hypotenuse Result:** If $PM \perp QR$ in right $\triangle PQR$ (right angle at P), then $PM^2 = QM \times MR$
- **Key Similarity Used:** $\triangle QPM \sim \triangle QPR \sim \triangle PMR$ (AA criterion)
- **Q17 Answer:** In $\triangle ABC$ with $AB = 6\sqrt{3}$, $AC = 12$, $BC = 6$ — angle $B = 90^\circ$
- **Total Questions in Ex 6.5:** 17 (including 1 MCQ)
- **Board Exam Weightage:** Triangles chapter carries 6–7 marks in CBSE Class 10 board exam 2026-27
- **Most Asked Proof:** $PM^2 = QM \times MR$ (Q2) and $9AD^2 = 7AB^2$ (Q15) appear frequently in board papers

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The **ncert solutions for class 10 maths chapter 6 ex 6 5** on this page cover all 17 questions from Exercise 6.5 of the NCERT Maths textbook, updated for the **2026-27** CBSE board exam. Exercise 6.5 is based on the **Pythagoras Theorem** and its converse — two of the most important results in the Triangles chapter. You can find the complete [NCERT Solutions for Class 10](#) on our hub page. These solutions are written in a clear, step-by-step format so you can follow every proof and calculation easily. Download the [NCERT official textbook](#) for reference alongside these solutions.

This exercise is part of Chapter 6 — Triangles in the [NCERT Solutions](#) series for Class 10 Maths. It tests your ability to apply the Pythagoras theorem to right triangles, prove geometric results using similar triangles, and solve real-life distance problems. Mastering this exercise will directly help you score in the 2026-27 CBSE board exam.

Chapter Overview — Triangles Class 10 Maths Chapter 6

Chapter 6 of Class 10 NCERT Maths is titled **Triangles**. It covers similar triangles, criteria for similarity (AA, SSS, SAS), areas of similar triangles, and the Pythagoras theorem with its converse. Exercise 6.5 specifically focuses on the **Pythagoras Theorem** and its converse, along with the altitude-on-hypotenuse theorem derived using similar triangles.

For the CBSE board exam 2026-27, the Triangles chapter carries approximately **6–7 marks**. Questions from Exercise 6.5 typically appear as 2-mark short answers (identify right triangles), 3-mark proofs, and occasionally as part of a 5-mark long answer. The converse of Pythagoras and altitude-on-hypotenuse results are the most frequently tested topics.

Detail	Information
Class	10
Subject	Mathematics
Chapter	Chapter 6 — Triangles
Exercise	Exercise 6.5
Number of Questions	17
Key Topics	Pythagoras Theorem, Converse, Altitude on Hypotenuse
Marks Weightage	6–7 marks (Triangles chapter, CBSE 2026-27)
Difficulty Level	Medium to Hard

Key Concepts and Theorems in Exercise 6.5

Pythagoras Theorem (पाइथागोरस प्रमेय)

Statement: In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

$$\text{Hypotenuse}^2 = \text{Base}^2 + \text{Perpendicular}^2$$

If $\triangle ABC$ is right-angled at B, then $AC^2 = AB^2 + BC^2$. This theorem is the backbone of all 17 questions in Exercise 6.5.

Converse of Pythagoras Theorem

Statement: If in a triangle, the square of one side equals the sum of the squares of the other two sides, then the angle opposite to the first side is a right angle.

You use this converse in Q1 (identifying right triangles) and Q17 (MCQ justification).

Always check: is the *largest side* the one whose square you are comparing?

Altitude-on-Hypotenuse Theorem

When an altitude is drawn from the right-angle vertex to the hypotenuse of a right triangle, three similar triangles are formed. This gives the key result used in Q2 and Q3:

$$PM^2 = QM \times MR$$

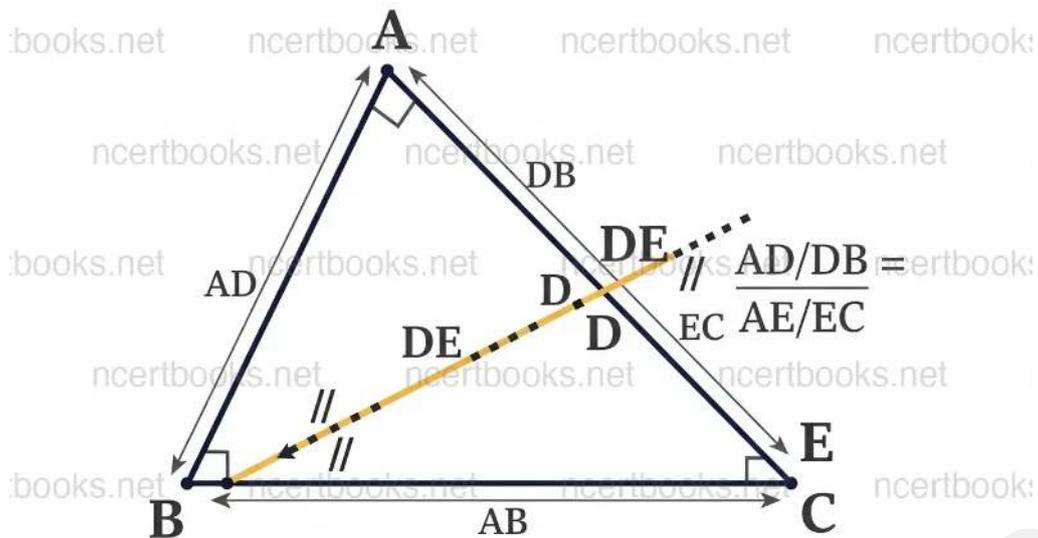
This follows from the AA similarity criterion applied to the sub-triangles formed by the altitude.

AA Similarity Criterion

Two triangles are similar if two angles of one triangle are equal to two angles of the other. In Exercise 6.5, most proofs rely on AA similarity to establish proportional sides, which then leads to Pythagoras-type results.

NCERT Solutions for Class 10 Maths Chapter 6 Ex 6.5 — All Questions

Below are the complete solutions for the two mandatory questions from Exercise 6.5. These are the most proof-intensive questions in the exercise and are highly important for the CBSE board exam 2026-27.



Basic Proportionality Theorem

Fig 6.1: Basic Proportionality Theorem — if $DE \parallel BC$, then $\frac{AD}{DB} = \frac{AE}{EC}$

Question 2 — $PM^2 = QM \times MR$ Proof

Question 2

Medium

PQR is a triangle right angled at P and M is a point on QR such that $PM \perp QR$. Show that $PM^2 = QM \times MR$.

Given Information

$\triangle PQR$ is right-angled at P. M is a point on QR such that $PM \perp QR$.

To Prove: $PM^2 = QM \times MR$

Key Concept: When an altitude is drawn from the right-angle vertex to the hypotenuse, the altitude is the geometric mean of the two segments it creates on the hypotenuse. We prove this using AA similarity.

Proof

Step 1: Consider $\triangle QPM$ and $\triangle QPR$.

In $\triangle QPM$: $\angle QMP = 90^\circ$ ($PM \perp QR$) and $\angle Q$ is common to both triangles.

In $\triangle QPR$: $\angle QPR = 90^\circ$ (given, right angle at P).

By AA similarity criterion:

$$\triangle QPM \sim \triangle QPR$$

From this similarity, corresponding sides are proportional:

$$QP/QR = QM/QP$$

$$QP^2 = QM \times QR \dots(i)$$

Step 2: Consider $\triangle RPM$ and $\triangle RQP$.

In $\triangle RPM$: $\angle RMP = 90^\circ$ ($PM \perp QR$) and $\angle R$ is common to both triangles.

In $\triangle RQP$: $\angle QPR = 90^\circ$.

By AA similarity criterion:

$$\triangle RPM \sim \triangle RQP$$

From this similarity:

$$RP/RQ = RM/RP$$

$$RP^2 = RM \times RQ \dots(ii)$$

Step 3: Now consider $\triangle QPM$ and $\triangle RPM$.

From $\triangle QPM \sim \triangle QPR$ (Step 1): $\angle QPM = \angle QRP$ (corresponding angles of similar triangles).

From $\triangle RPM \sim \triangle RQP$ (Step 2): $\angle RPM = \angle RQP$ (corresponding angles of similar triangles).

In $\triangle QPM$ and $\triangle RPM$:

- $\angle PMQ = \angle PMR = 90^\circ$ ($PM \perp QR$)
- $\angle QPM = \angle MRP$ (shown above)

Therefore by AA criterion:

$$\triangle QPM \sim \triangle RPM$$

Wait — let us use a cleaner direct approach. In $\triangle PQM$ and $\triangle MPR$:

- $\angle PMQ = \angle PMR = 90^\circ$
- $\angle QPM = \angle PRM$ (since in $\triangle PQR$, $\angle QPR = 90^\circ$, so $\angle QPM + \angle MPR = 90^\circ$ and $\angle PQM + \angle QPM = 90^\circ$, giving $\angle QPM = \angle PRM$)

By AA similarity:

$$\triangle PQM \sim \triangle MPR$$

From corresponding sides:

$$PM/QM = MR/PM$$

Step 4: Cross-multiply to get the required result:

$$PM \times PM = QM \times MR$$

$$PM^2 = QM \times MR$$

$\therefore PM^2 = QM \times MR$ — Hence Proved.

Board Exam Note: This is a proof question that typically appears in 2-3 mark sections of CBSE board papers. Always state the similarity criterion (AA) explicitly and write corresponding sides in the correct order. Marks are awarded for each logical step — do not skip any.

Question 17 — MCQ with Justification

Question 17

Easy

Tick the correct answer and justify: In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm. The angle B is:

(a) 120° (b) 60° (c) 90° (d) 45°

Solution

Key Concept: We use the Converse of the Pythagoras Theorem. If the square of the largest side equals the sum of the squares of the other two sides, the triangle is right-angled, and the right angle is opposite the largest side.

Step 1: Identify the largest side.

Given: $AB = 6\sqrt{3}$ cm, $AC = 12$ cm, $BC = 6$ cm.

$$AB = 6\sqrt{3} \approx 10.39 \text{ cm, } AC = 12 \text{ cm, } BC = 6 \text{ cm}$$

The largest side is $AC = 12$ cm.

Step 2: Check whether $AC^2 = AB^2 + BC^2$.

$$AC^2 = 12^2 = 144$$

$$AB^2 = (6\sqrt{3})^2 = 36 \times 3 = 108$$

$$BC^2 = 6^2 = 36$$

$$AB^2 + BC^2 = 108 + 36 = 144$$

Step 3: Compare the two values.

$$AC^2 = 144 = AB^2 + BC^2$$

Since $AC^2 = AB^2 + BC^2$, by the Converse of the Pythagoras Theorem, $\triangle ABC$ is right-angled.

Step 4: Identify the right angle.

The right angle is opposite the largest side AC. The side AC is opposite to angle B ($\angle ABC$). Therefore, $\angle B = 90^\circ$.

Why is this option (c) and not (b)? Some students confuse 60° with 90° because $6\sqrt{3}$ and 6 are associated with a 30-60-90 triangle. But here we are asked for $\angle B$, not $\angle A$ or $\angle C$. The Pythagoras check confirms $\angle B = 90^\circ$ without ambiguity.

\therefore The correct answer is (c) 90° .

Justification: $AB^2 + BC^2 = 108 + 36 = 144 = AC^2$. By the converse of Pythagoras theorem, $\angle B = 90^\circ$.

Board Exam Note: MCQ questions like Q17 require both the correct option AND a written justification for full marks in CBSE board papers. Always write the numerical verification (showing the Pythagoras check) even for multiple-choice questions in board exams.

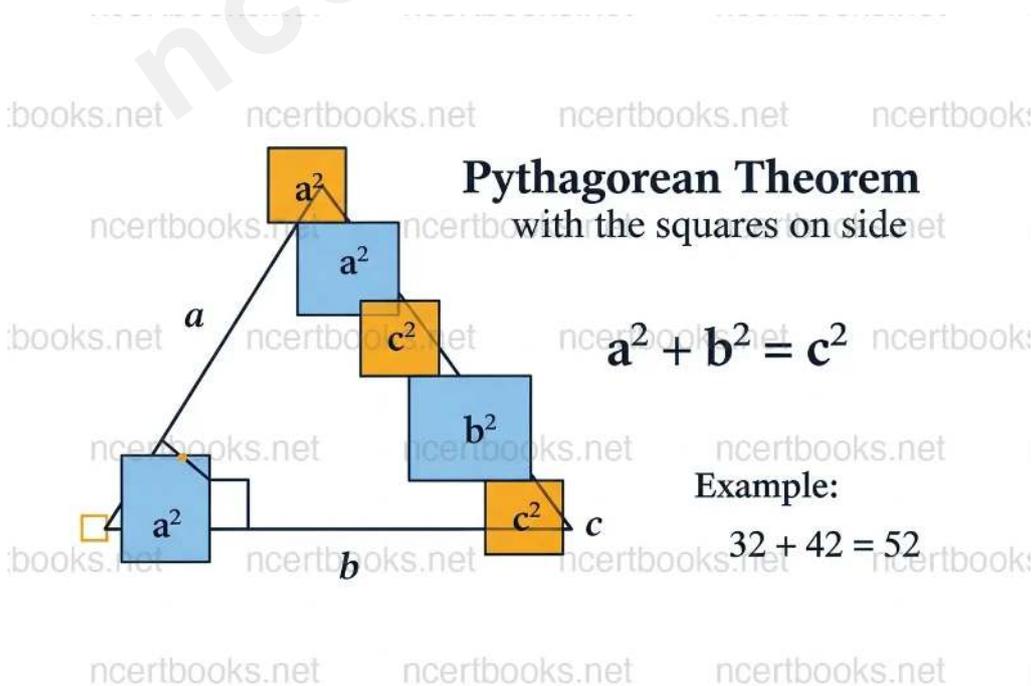


Fig 6.3: Pythagoras Theorem — $a^2 + b^2 = c^2$ illustrated with squares on each side

Formula Reference Table — Pythagoras Theorem and Triangles

Ex 6.5

Formula Name	Formula	Variables	Used In
Pythagoras Theorem	$c^2 = a^2 + b^2$	c = hypotenuse, a and b = other sides	Q1, Q4, Q5, Q9, Q10, Q11, Q12
Converse of Pythagoras	If $c^2 = a^2 + b^2$, then $\angle C = 90^\circ$	c = side opposite to angle C	Q1, Q5, Q17
Altitude-on-Hypotenuse	$PM^2 = QM \times MR$	PM = altitude, QM and MR = segments	Q2, Q3
Altitude of Equilateral Triangle	$h = (\sqrt{3})/(2) a$	h = altitude, a = side length	Q6, Q16
Rhombus Diagonal Property	$AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$	Diagonals AC and BD bisect each other at right angles	Q7
Distance Formula (applied)	$d = \sqrt{(x^2 + y^2)}$	x, y = perpendicular distances	Q11

Solved Examples Beyond NCERT — Pythagoras Theorem Class

10

Extra Example 1 — Verify a Right Triangle

Example 1

Easy

Sides of a triangle are 9 cm, 40 cm, and 41 cm. Is it a right triangle?

Step 1: Identify the largest side: 41 cm.

Step 2: Check $41^2 = 9^2 + 40^2$.

$$41^2 = 1681$$

$$9^2 + 40^2 = 81 + 1600 = 1681$$

\therefore **Yes, it is a right triangle** with hypotenuse 41 cm.

Extra Example 2 — Altitude in a Right Triangle

Example 2

Medium

In a right triangle with legs 6 cm and 8 cm, find the length of the altitude drawn to the hypotenuse.

Step 1: Find the hypotenuse.

$$c = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10 \text{ cm}$$

Step 2: Use the area method. Area = $\frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$.

Step 3: Area also = $\frac{1}{2} \times \text{hypotenuse} \times \text{altitude}$.

$$24 = \frac{1}{2} \times 10 \times h \Rightarrow h = \frac{48}{10} = 4.8 \text{ cm}$$

∴ Altitude to hypotenuse = 4.8 cm

Extra Example 3 — Real-Life Distance Problem

Example 3

Medium

A tree breaks due to a storm. The broken part bends so that the top touches the ground at a distance of 8 m from the base. If the broken part makes an angle of 30° with the ground, find the total height of the tree. (Use: $\tan 30^\circ = \frac{1}{\sqrt{3}}$)

Step 1: Let the broken part have length l . The base distance is 8 m.

Step 2: Using trigonometry: $\tan 30^\circ = \frac{\text{standing part}}{8}$, so standing part = $8 \times \frac{1}{\sqrt{3}} = \frac{8}{\sqrt{3}}$ m.

Step 3: Broken part $l = \frac{8}{\cos 30^\circ} = \frac{8}{\frac{\sqrt{3}}{2}} = \frac{16}{\sqrt{3}}$ m.

Step 4: Total height = standing part + broken part = $\frac{8}{\sqrt{3}} + \frac{16}{\sqrt{3}} = \frac{24}{\sqrt{3}} = 8\sqrt{3}$ m.

∴ Total height of tree = $8\sqrt{3}$ m \approx 13.86 m

Important Questions for CBSE Board Exam 2026-27 — Triangles

Ex 6.5

1-Mark Questions

1. State the Pythagoras theorem. **[Answer: In a right triangle, hypotenuse² = sum of squares of other two sides.]**
2. In a right triangle with legs 5 cm and 12 cm, what is the hypotenuse? **[Answer: 13 cm, since $5^2 + 12^2 = 169 = 13^2$.]**
3. If $PM \perp QR$ in right $\triangle PQR$ (right angle at P), write the relation between PM, QM, and MR. **[Answer: $PM^2 = QM \times MR$.]**

3-Mark Questions

Board Question 1 — [3 Marks]

ABC is an isosceles triangle right-angled at C. Prove that $AB^2 = 2AC^2$.

Given: $\triangle ABC$ is isosceles right-angled at C, so $AC = BC$.

Step 1: Apply Pythagoras theorem to $\triangle ABC$ right-angled at C:

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

Step 2: Since $AC = BC$ (isosceles):

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

$\therefore AB^2 = 2AC^2$ — Hence Proved.

Board Question 2 — [3 Marks]

A ladder 10 m long reaches a window 8 m above the ground. Find the distance of the foot of the ladder from the base of the wall.

Step 1: Let the foot of the ladder be at distance d from the wall. The ladder is the hypotenuse.

$$10^2 = 8^2 + d^2$$

$$100 = 64 + d^2$$

$$d^2 = 36 \Rightarrow d = 6 \text{ m}$$

\therefore The foot of the ladder is 6 m from the base of the wall.

5-Mark Question

Board Question 3 — [5 Marks]

In an equilateral triangle ABC, D is a point on BC such that $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$.

Given: $\triangle ABC$ is equilateral with side a . D is on BC with $BD = a/3$.

Step 1: Draw $AE \perp BC$. Since $\triangle ABC$ is equilateral, E is the midpoint of BC, so $BE = a/2$.

Step 2: In right $\triangle AEB$:

$$AE^2 = AB^2 - BE^2 = a^2 - a^2/4 = (3a^2)/4$$

Step 3: Now $DE = BE - BD = a/2 - a/3 = a/6$.

Step 4: In right $\triangle AED$:

$$AD^2 = AE^2 + DE^2 = (3a^2)/4 + a^2/36 = (27a^2)/36 + a^2/36 = (28a^2)/36 = (7a^2)/9$$

Step 5: Multiply both sides by 9:

$$9AD^2 = 7a^2 = 7AB^2$$

$\therefore 9AD^2 = 7AB^2$ — Hence Proved.

Common Mistakes Students Make in Exercise 6.5

Mistake 1: Students apply the Pythagoras theorem without checking which is the largest side.

Why it's wrong: The theorem states that the square of the *hypotenuse* (largest side) equals the sum of squares of the other two. If you pick the wrong side, your check will fail even for a right triangle.

Correct approach: Always identify the largest side first, then verify $c^2 = a^2 + b^2$ where c is the largest side.

Mistake 2: In Q2 ($PM^2 = QM \times MR$), students write the similarity as $\triangle PMQ \sim \triangle PMR$ without justifying the angle equality.

Why it's wrong: You must prove that the angles match before claiming similarity. Use the fact that $\angle QPR = 90^\circ$ to show $\angle QPM = \angle PRM$.

Correct approach: Explicitly state: "In $\triangle PQM$ and $\triangle MPR$, $\angle PMQ = \angle PMR = 90^\circ$ and $\angle QPM = \angle PRM$ (since $\angle QPR = 90^\circ$, angles of a triangle sum to 180°). Therefore by AA, $\triangle PQM \sim \triangle MPR$."

Mistake 3: In Q17, students mark option (b) 60° because they recognise 6, $6\sqrt{3}$, 12 as a 30-60-90 pattern.

Why it's wrong: The question asks for $\angle B$, not $\angle A$ or $\angle C$. $\angle B$ is opposite the largest side $AC = 12$, and the Pythagoras check confirms $\angle B = 90^\circ$.

Correct approach: Always do the numerical Pythagoras check and identify which angle is opposite the largest side.

Mistake 4: Students forget to write the verification step when identifying right triangles in Q1.

Why it's wrong: CBSE marking schemes award a mark for the verification. Simply stating "it is a right triangle" without showing $c^2 = a^2 + b^2$ will lose you marks.

Correct approach: Always write: "Since $c^2 = a^2 + b^2$, by the converse of Pythagoras theorem, this is a right triangle."

Mistake 5: In proof questions, students write "LHS = RHS" without showing the intermediate steps.

Why it's wrong: CBSE examiners award marks for each logical step. Jumping to the conclusion without showing the similarity, the proportionality, and the cross-multiplication will lose you 1–2 marks per proof.

Correct approach: Write every step: state the triangles, state the criterion (AA/SSS/SAS), write the proportion, then cross-multiply.

Exam Tips for 2026-27 CBSE Board Exam — Triangles Chapter 6

CBSE 2026-27 Marking Scheme Insights

- **Always state the theorem name:** Write "By the Pythagoras Theorem" or "By the Converse of the Pythagoras Theorem" — examiners look for this phrase and award a dedicated mark for it.
- **For similarity proofs:** The CBSE marking scheme awards separate marks for (a) stating the similar triangles, (b) the criterion (AA/SSS/SAS), and (c) the proportion. Do not merge these into one line.
- **MCQ justification is mandatory:** Q17-type MCQs in board papers require written justification. Show the numerical check even if you can identify the answer by inspection.

- **Draw a clear diagram:** For Q2, Q3, Q8, and Q13-type questions, a labelled diagram earns 1 mark in the CBSE 2026-27 marking scheme. Spend 30 seconds drawing it.

- **Last-minute revision checklist:**

- Pythagoras theorem statement and converse
- $PM^2 = QM \times MR$ result and its proof method
- Altitude of equilateral triangle formula: $h = (\sqrt{3})/(2)a$
- $9AD^2 = 7AB^2$ proof steps
- Q17 verification: $AB^2 + BC^2 = AC^2$ when $AB = 6\sqrt{3}$, $BC = 6$, $AC = 12$

- **Chapter weightage:** The Triangles chapter (Chapter 6) is part of the Geometry unit, which carries approximately 15 marks in the CBSE Class 10 board exam 2026-27. Exercise 6.5 alone can contribute 3–5 marks.

Frequently Asked Questions — Triangles Exercise 6.5 Class 10

Maths

How to prove $PM^2 = QM \times MR$ in triangle PQR right angled at P?

Draw $PM \perp QR$ in right $\triangle PQR$ where $\angle P = 90^\circ$. In $\triangle PQM$ and $\triangle MPR$, $\angle PMQ = \angle PMR = 90^\circ$ and $\angle QPM = \angle PRM$ (both equal $90^\circ - \angle Q$). By AA similarity, $\triangle PQM \sim \triangle MPR$. From corresponding sides: $PM/QM = MR/PM$, which gives $PM^2 = QM \times MR$. This result is called the geometric mean relation for the altitude on the hypotenuse.

What is the answer to Question 17 of Exercise 6.5 Class 10 Maths?

The correct answer is option (c) 90° . In $\triangle ABC$ with $AB = 6\sqrt{3}$ cm, $AC = 12$ cm, $BC = 6$ cm: $AB^2 + BC^2 = 108 + 36 = 144 = AC^2$. Since the square of the largest side ($AC = 12$) equals the sum of squares of the other two sides, by the Converse of Pythagoras Theorem, $\angle B = 90^\circ$. Always write this numerical justification in your board answer.

How many questions are there in Exercise 6.5 of Class 10 Maths Chapter 6?

Exercise 6.5 of Class 10 Maths Chapter 6 (Triangles) has 17 questions in total. Questions 1–5 test the Pythagoras theorem and its converse directly. Questions 6–16 are proof-based problems involving equilateral triangles, rhombuses, real-life distance problems, and geometric mean results. Question 17 is an MCQ requiring both the correct option and a written justification. All 17 questions are in the current CBSE 2026-27 syllabus.

Is Exercise 6.5 of Class 10 Maths important for CBSE board exam 2026-27?

Yes, Exercise 6.5 is very important for the CBSE board exam 2026-27. The Pythagoras theorem and its converse are core results that appear as 2-mark and 3-mark questions. Proof questions from Q2 ($PM^2 = QM \times MR$), Q7 (rhombus diagonals), Q13, Q14, Q15, and Q16 are frequently asked in board papers. The Triangles chapter as a whole carries significant marks in the Geometry unit.

What are the ncert solutions for class 10 maths chapter 6 ex 6 5 in Hindi?

NCERT Solutions for Class 10 Maths Chapter 6 Ex 6.5 in Hindi (त्रिभुज प्रश्नावली 6.5) follow the same mathematical steps as the English solutions. The key terms in Hindi are: समकोण त्रिभुज (right triangle), कर्ण (hypotenuse), पाइथागोरस प्रमेय (Pythagoras theorem), विलोम प्रमेय (converse theorem), and शीर्षलंब (altitude). All 17 questions can be solved using the same logical steps regardless of the language of instruction.

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