Class 9 Maths Chapter 9: Propositions and their Converses - Notes, Important Questions and MCQs (2026-27)

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These Class 9 Maths Chapter 9 notes (Part II, Chapter 9) cover “Propositions and their Converses” from the new NCERT textbook Ganita Manjari (Part II, 2026-27): what a proposition is, “if P then Q” statements, forming converses, why a true statement may have a false converse, counterexamples, the converse of the Baudhāyana–Pythagoras theorem and “if and only if” statements – with tables, worked examples, Q&A, 10 MCQs and a free PDF.

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Chapter Overview

Mathematics is built from precise statements. A proposition is a statement that is either true or false – not both. Many mathematical results have the form “If P, then Q”, where P is the hypothesis and Q the conclusion.

Swapping them gives the converse, “If Q, then P”. A proposition and its converse need not have the same truth value: both may be true, both false, or one true and the other false. A single counterexample is enough to show that a statement is false, while proving a statement true needs a general argument.

Important Topics and Concepts

Propositions

- A proposition is a declarative statement that is either true or false.
- “7 is a prime number” – a true proposition; “Every even number is divisible by 4” – a false proposition.
- Questions, commands and opinions (“Close the door”, “Maths is fun”) are not propositions.
- In mathematics we must decide the truth of a proposition by reasoning, not by belief.

If–Then Statements

- Form: “If P, then Q” – P is the hypothesis (assumption), Q is the conclusion.
- Can also be written “P implies Q”, “Q whenever P”, “P only if Q”.
- Example: “If two sides of a triangle are equal, then the angles opposite them are equal.”
- Sometimes the hypothesis has a fixed setting, e.g. “Let a, b, c be the sides of a triangle. If …”.

Converse

- The converse of “If P, then Q” is “If Q, then P”.
- Example: converse of “If a number is divisible by 4, then it is even” is “If a number is even, then it is divisible by 4” – false (6).
- Example: converse of the isosceles-triangle statement – “If two angles of a triangle are equal, then the sides opposite them are equal” – true.
- When rewriting, keep the setting sentence and swap only the if and then parts.

Counterexamples

- A counterexample is a specific case where the hypothesis holds but the conclusion fails.
- One counterexample is enough to prove a general statement false.
- Example: “All prime numbers are odd” – counterexample 2.
- No number of examples can prove a general statement true; a proof is needed.

Both Directions: If and Only If

- When a proposition and its converse are both true, we write “P if and only if Q” ($P \Leftrightarrow Q$).
- Baudhāyana–Pythagoras: in a triangle with sides a, b, c, if the triangle is right-angled (at the angle opposite c), then $a^2 + b^2 = c^2$; the converse is also true (proved by constructing a right triangle and using SSS congruence).
- “A quadrilateral is a parallelogram if and only if its diagonals bisect each other.”
- Classifying quadrilaterals is a rich source of statements and converses.

Truth of Statements and Converses

Examples of all four cases.

Statement	Converse	Truth
If a triangle is equilateral, all its angles are 60°.	If all angles are 60°, the triangle is equilateral.	Both true

Statement	Converse	Truth
If a number is divisible by 4, it is even.	If a number is even, it is divisible by 4.	Statement true, converse false
If a quadrilateral has 4 equal sides, it is a square.	If a quadrilateral is a square, it has 4 equal sides.	Statement false (rhombus), converse true
If $x^2 = 4$, then $x = 3$.	If $x = 3$, then $x^2 = 4$.	Both false

Is it a Proposition?

Sentence	Proposition?	Truth value
13 is a prime number.	Yes	True
The sum of angles of a triangle is 200°.	Yes	False
Solve $x + 2 = 5$.	No (command)	—
Is 9 a square?	No (question)	—
Mathematics is beautiful.	No (opinion)	—

Important Terms and Formulas

Term	Meaning
Proposition	Statement that is either true or false
Hypothesis	The “if” part
Conclusion	The “then” part
Implication	“If P, then Q” or “P implies Q”
Converse	“If Q, then P”
Counterexample	Case where hypothesis holds but conclusion fails
If and only if	Statement and converse both true (⇔)
Proof	General argument showing a statement is always true
Theorem	Proven proposition
Truth value	True or false

Short Answer Questions

Q1. What is a proposition?

A statement that is either true or false.

Q2. Is “Close the window” a proposition?

No, it is a command.

Q3. Identify hypothesis and conclusion: “If n is even, then n^2 is even.”

Hypothesis: n is even. Conclusion: n^2 is even.

Q4. Write the converse of “If it rains, the ground is wet.”

Q5. Give a counterexample to “Every prime number is odd.”

2.

Q6. Can a true proposition have a false converse?

Yes, e.g. “If divisible by 4 then even” is true but its converse is false.

Q7. What does “if and only if” mean?

Both the proposition and its converse are true.

Q8. Write the converse of the Baudhāyana–Pythagoras theorem.

If $a^2 + b^2 = c^2$ for the sides of a triangle, then the triangle is right-angled.

Long Answer Questions

Q1. State the four possible combinations of truth values of a proposition and its converse, with examples.

Both true: equilateral triangle ⇔ all angles 60°.

Proposition true, converse false: divisible by 4 ⇒ even.

Proposition false, converse true: four equal sides ⇒ square.

Both false: $x^2 = 4 \Rightarrow x = 3$.

So the converse must always be checked separately.

Q2. Outline the proof of the converse of the Baudhāyana–Pythagoras theorem.

Take △ABC with sides a, b, c and $a^2 + b^2 = c^2$.

Construct right triangle XYZ with legs a and b.

By the theorem, its hypotenuse$^2 = a^2 + b^2 = c^2$, so hypotenuse = c.

△ABC ≅ △XYZ by SSS.

So △ABC has a right angle – the converse is true.

Q3. Explain why examples cannot prove a general statement but one counterexample can disprove it.

A general statement claims something for infinitely many cases.

Checking a few cases leaves others unchecked.

A proof must use reasoning valid for every case.

A single case where it fails shows the claim is not always true.

Example: $n^2 + n + 41$ is prime for n = 0 to 39, but not for n = 40.

MCQs with Answers

1. Which is a proposition?(a) Shut the door (b) 5 + 3 = 9 (c) How are you? (d) Wow!Answer: (b) 5 + 3 = 9

2. Converse of “If P then Q” is(a) If not P then not Q (b) If Q then P (c) P and Q (d) Q

3. Counterexample to “all prime numbers are odd”(a) 3 (b) 2 (c) 9 (d) 1Answer: (b) 2

4. “If divisible by 4, then even” – its converse is(a) true (b) false (c) not a proposition (d) always trueAnswer: (b) false

5. Both statement and converse true is written as(a) implies (b) if and only if (c) or (d) notAnswer: (b) if and only if

6. The “if” part is called the(a) conclusion (b) hypothesis (c) converse (d) theoremAnswer: (b) hypothesis

7. To prove a general statement false we need(a) many examples (b) one counterexample (c) no example (d) a diagramAnswer: (b) one counterexample

8. Converse of Baudhāyana–Pythagoras theorem is(a) false (b) true (c) sometimes true (d) not a propositionAnswer: (b) true

9. “Mathematics is easy” is(a) a true proposition (b) a false proposition (c) not a proposition (d) a theoremAnswer: (c) not a proposition

10. “If $x = 2$, then $x^2 = 4$” – its converse(a) true (b) false ($x = -2$) (c) not defined (d) same statementAnswer: (b) false ($x = -2$)

Quick Revision Points

- Proposition: true or false.
- If P then Q: hypothesis, conclusion.
- Converse: if Q then P.
- Four truth combinations.
- Counterexamples disprove; proofs prove.
- If and only if; converse of Baudhāyana–Pythagoras is true.

Chapter Summary

A proposition is a statement that is either true or false. Mathematical statements often take the form “If P, then Q”, and their converse is “If Q, then P”.

A proposition and its converse may both be true, both false, or differ, so each must be checked. Counterexamples show falsity, proofs establish truth, and when both directions hold we say “if and only if”, as with the Baudhāyana–Pythagoras theorem and its converse.

Exam Tips and PYQ Pattern

- Underline the hypothesis and conclusion before writing a converse.
- Always test converses with simple examples.
- Give one clear counterexample when disproving.
- Use quadrilateral properties for practice.
- Learn the four-case table.

Frequently Asked Questions

Is this chapter in the 2026-27 CBSE syllabus?

Yes. It is part of the new NCERT Class 9 Maths textbook “Ganita Manjari” (Part II), prescribed for the 2026-27 session.

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Yes. Use the free PDF link at the top of this page – no signup needed.

What is the converse of a statement?

For “If P, then Q”, the converse is “If Q, then P”.

What is a counterexample?

A specific case where the hypothesis is true but the conclusion is false, proving a statement false.

Conclusion

Propositions and their Converses builds the logical thinking behind every proof. Learn the tables, practise the Q&A here and save the free PDF for revision.

More Notes: Class 9 Maths Chapter 8: Predicting What Comes Next: Exploring Sequences and Progressions notes | Class 9 Maths Chapter 10: How Quantities Combine: Understanding Data notes | All Class 9 Maths notes

Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE mathematics educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

Freshness Note: These notes follow the NCERT Class 9 Maths textbook, Ganita Manjari (Parts I and II, first edition 2026, NCF-SE 2023), and the CBSE syllabus for the 2026-27 session. Last checked on 24 November 2026.