

# Mathematics

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## (Chapter – 9) (Propositions and their Converses) (Assignment 1)

(Class – 9)

Name \_\_\_\_\_

Date \_\_\_\_\_

Answer all 15 questions. Choose one option for each MCQ. Show your reasoning wherever asked.

### Section A: Multiple Choice Questions

1. Which of the following is a proposition?  
(a) Please draw a triangle. (b) Is 7 a prime number?  
(c) Every square is a rectangle. (d) What is the value of x?
2. The converse of “If P, then Q” is:  
(a) If P, then not Q. (b) If Q, then P.  
(c) If not P, then not Q. (d) If not Q, then not P.
3. For real numbers x and y, which pair is a counterexample to “If  $x^2 = y^2$ , then  $x = y$ ”?  
(a)  $x = 3, y = 3$  (b)  $x = 0, y = 0$   
(c)  $x = 3, y = -3$  (d)  $x = 2, y = 3$
4. Two sticks of equal length are used as the diagonals of a quadrilateral. Which statement is correct?  
(a) It must be a square. (b) It must be a rectangle.  
(c) It must be a rhombus. (d) It need not be a square.
5. A positive integer has exactly three positive factors. It must be:  
(a) a prime number. (b) the square of a prime number.  
(c) a product of two unequal primes. (d) an even number.

### Section B: Very Short Answer Questions

6. What is a counterexample? Answer in one sentence.

**Answer:**

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7. Write the converse of “If two lines are parallel, then the corresponding angles formed by a transversal are equal.”

**Answer:**

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8. Give the smallest positive integer that is divisible by both 4 and 6 but is not divisible by 24.

**Answer:**

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9. For real numbers  $x$  and  $y$ , write the converse of “If  $x = y$ , then  $x^3 = y^3$ .” State whether the converse is true.

**Answer:**

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10. Find one non-negative integer  $n$  for which  $n^2 + n + 11$  is composite. Write the resulting number as a product of two integers greater than 1.

**Answer:**

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### Section C: Short and Long Answer Questions

11. Consider: “If  $a$  and  $b$  are perfect squares, then  $ab$  is a perfect square,” where  $a$  and  $b$  are positive integers.

(i) Write the converse.

(ii) Justify the original statement and give a counterexample to the converse.

**Answer:**

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**12.** Consider: “If two triangles have the same area, then they are congruent.”

(i) Write its converse.

(ii) Decide whether each statement is true or false. Justify the true statement and give a numerical counterexample to the false statement.

**Answer:**

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**13.** Express the divisibility rule for 3 as two “if-then” statements that are converses of each other. Use the rule to decide whether 582 is divisible by 3. Explain your conclusion.

**Answer:**

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**14.** Let  $n$  be a positive integer. Use factor-partner pairs to prove both statements:

(i) If  $n$  is a perfect square, then it has an odd number of positive factors.

(ii) If  $n$  has an odd number of positive factors, then it is a perfect square.

Illustrate your explanation by listing the factor-partner pairs of 36 and 24.

**Answer:**

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**(Class – 9)**

(iii) Use the converse to determine whether a triangle with side lengths 8 cm, 15 cm and 17 cm is right-angled. Show your calculation.

**Answer:**