

Mathematics

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(Chapter – 9) (Propositions and their Converses) (Assignment 3)

(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. If $x = y$, then $x^2 = y^2$.

For real numbers x and y , choose the correct assessment of the proposition and its converse.

- (a) Both are false. (b) Only the converse is true.
(c) Both are true. (d) Only the proposition is true.

2. If n is a product of two unequal prime numbers, then it has exactly 4 divisors.

Let n be a positive integer. Which number disproves the converse?

- (a) 6 (b) 8
(c) 10 (d) 15

3. All numbers of the form $4n^2 + 1$ are prime.

Which positive integer n gives a counterexample?

- (a) 1 (b) 2
(c) 3 (d) 4

4. Which case is a counterexample to the claim “If P , then Q ”?

- (a) P is true and Q is false. (b) P and Q are both true.
(c) P is false and Q is true. (d) P and Q are both false.

5. A positive integer has the factor-partner pairs (1, 18), (2, 9) and (3, 6). Which statement is correct?

- (a) It has three positive factors. (b) It has an odd number of factors.
(c) It has six positive factors. (d) It is a perfect square.

Section B: Very Short Answer Questions

6. All numbers of the form $4^n + 3$ are prime.

Find a positive integer n that disproves this claim.

Answer:

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7. If the road is wet, then it has rained.

Is the statement necessarily true? Give a reason.

Answer:

8. Proposition P: If n is a perfect square, then it has an odd number of factors.

Converse Q: If n has an odd number of factors, then it is a perfect square.

If a number has an odd number of factors, there must be a factor-partner pair in which the same number repeats (e.g., the partner factor of 5 in 25). If not, the given number will have an even number of factors since each factor can be paired with its factor pair.

Thus, if a number has an odd number of factors, then it is a perfect square.

What does this argument prove? Statement P or Q?

Answer:

9. Write a false “if-then” statement about multiples of 7 and 14. Give one counterexample.

Answer:

10. Can one counterexample disprove a statement about all triangles? Can one confirming example prove it? Answer both parts.

Answer:

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Section C: Short and Long Answer Questions

- 11.** If n and $n + 3$ have no factors in common, then n is not a multiple of 3.

Here n is a positive integer; “no factors in common” means no common factor other than 1. Write the converse and justify both statements.

Answer:

- 12.** Consider: “If the product of two positive integers is odd, then both integers are odd.” Write its converse and justify both statements.

Answer:

- 13.** Riya says, “If two rectangles have the same perimeter, then they have the same area.” Test her statement and its converse using rectangles with whole-number side lengths. Show your calculations.

Answer:

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- Now extend the bisectors beyond I till they meet the opposite sides at E and F respectively, as shown.

A diagram of a triangle with vertices labeled A, B, and C. The triangle is shaded in light orange. Three medians are drawn from each vertex to the midpoint of the opposite side: from A to side BC at point F, from B to side AC at point E, and from C to side AB at point D. The medians intersect at a central point labeled I, which represents the centroid of the triangle.

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15. It can also happen that both the proposition and converse are false! Can you give an example?

Answer:
