

Mathematics

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(Chapter – 9) (Propositions and their Converses) (Assignment 4)

(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 n is divisible by 24, then it is divisible by both 4 and 6.
For a positive integer n , which value disproves the converse?
(a) 8 (b) 12
(c) 24 (d) 48
2. If n is the square of a prime number, then it has exactly 3 factors.
If $n = p^2$, where p is prime, which list contains exactly its positive factors?
(a) 1, p , p^2 (b) 1, 2, p
(c) p , $2p$, p^2 (d) 1, p^2 , p^3
3. If two triangles are congruent, then they have the same area.
Which fact justifies this proposition?
(a) Their perimeters are even. (b) Their angles are all right angles.
(c) Their bases and heights are equal. (d) Every triangle has the same area.
4. Which pair shows that an integer can be divisible by 3 and 9 without being divisible by 27?
(a) $n = 27$, $n = 54$ (b) $n = 9$, $n = 18$
(c) $n = 3$, $n = 6$ (d) $n = 2$, $n = 4$
5. Which positive integer has an unpaired factor when different factor partners are grouped together?
(a) 20 (b) 30
(c) 42 (d) 49

Section B: Very Short Answer Questions

6. If n is an even number, then $2^n + 1$ is a prime number.
Find a counterexample with n a positive even integer.

Answer:

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7. Construct another right triangle $\triangle XYZ$ whose perpendicular sides YZ and XZ have sidelengths a and b .

What can we say about the length of XY ?

(Hint: Use the Baudhāyana–Pythagoras Theorem.)

Answer:

8. A number has an odd number of factors when it is a perfect square.

Rewrite this statement in “if–then” form without changing its meaning.

Answer:

9. State whether “If a number is divisible by 18, then it is divisible by 9” is true. Give one counterexample to its converse.

Answer:

10. A student writes: “If a shape is a square, then it is a rectangle. Therefore, if a shape is not a square, it is a rectangle.” Has the student written the converse? Write the correct converse.

Answer:

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Section C: Short and Long Answer Questions

- 11.** Statement 2: If two angles of a triangle are equal, then the sides opposite the equal angles have equal lengths.

Is the second statement true? Can you prove it?

(Hint: Draw the altitude from the vertex containing the third angle.)

Answer:

- 12.** For positive integers a and b , consider: “If a divides b , then a^2 divides b^2 .” Write its converse. Decide whether both statements are true, using prime factors to explain the converse.

Answer:

- 13.** Consider: “If two positive integers have an odd sum, then their product is even.” Is it true? Is the converse true? Support both decisions.

Answer:

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- 14.** Give more examples from geometry as well as number theory in which a proposition is true but not its converse. Give appropriate counterexamples.

Answer:

- 15.** We have identified different types of quadrilaterals — squares, rectangles, parallelograms, rhombi, kites and trapezia. One can identify more types (e.g., we could create a category of quadrilaterals that have equal-length opposite sides).

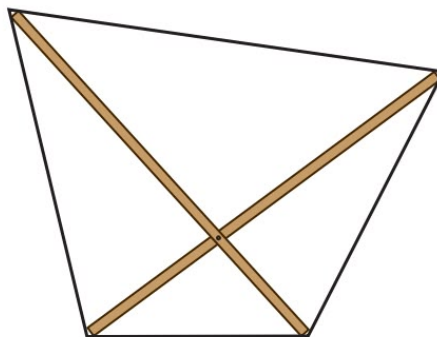
Suppose we have identified a category of quadrilaterals called Q, and we have to construct a quadrilateral of this type. For this, we are to use two thin sticks, put them together as diagonals so that the quadrilateral obtained by joining their endpoints is of type Q (see figure).

Suppose Q satisfies the following property.

If a quadrilateral is of type Q, then it has equal-length diagonals.

(a) Should the two sticks be of equal length? Why or why not?

(b) Will it matter how the two sticks are put together?



Answer:

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