

Geometry · Logic and Two-Column Proofs · Quiz

Common Core G-CO.C.9 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

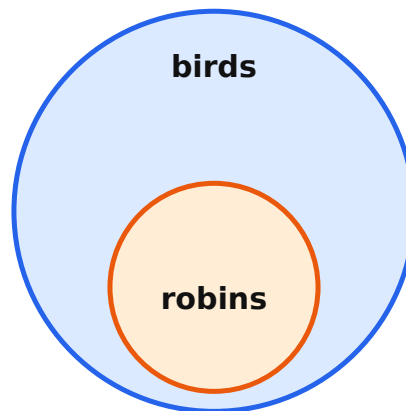
Ten multiple-choice questions check conditional statements, converse and contrapositive, counterexamples, inductive and deductive reasoning, properties of equality and vertical angles (G-CO.C.9). Choose one answer, then read the explanation.

GeometryCommon Core: G-CO.C.9

Questions

Question 1

Which conditional statement does the diagram show?



Robins are inside birds.

- A. If an animal is a bird, then it is a robin.
- B. If an animal is not a bird, then it is a robin.
- C. If an animal is not a robin, then it is not a bird.
- D. If an animal is a robin, then it is a bird.

Question 2

What is the converse of “If $x > 5$, then $x > 3$ ”?

- A. If $x \leq 5$, then $x \leq 3$.
- B. If $x \leq 3$, then $x \leq 5$.
- C. If $x > 3$, then $x > 5$.

D. If $x > 5$, then $x \leq 3$.

Question 3

What is the contrapositive of “If a polygon is a triangle, then it has three sides”?

- A. If a polygon has three sides, then it is a triangle.
- B. If a polygon does not have three sides, then it is not a triangle.
- C. If a polygon is not a triangle, then it does not have three sides.
- D. If a polygon is not a triangle, then it has three sides.

Question 4

Which number is a counterexample to “If a number is odd, then it is prime”?

- A. 9
- B. 7
- C. 13
- D. 2

Question 5

Liam measures the angles of six triangles, finds that every angle sum is 180° , and concludes that all triangles have that angle sum. What type of reasoning is this?

- A. Deductive reasoning
- B. Inductive reasoning
- C. Proof by definition
- D. Reasoning with a counterexample

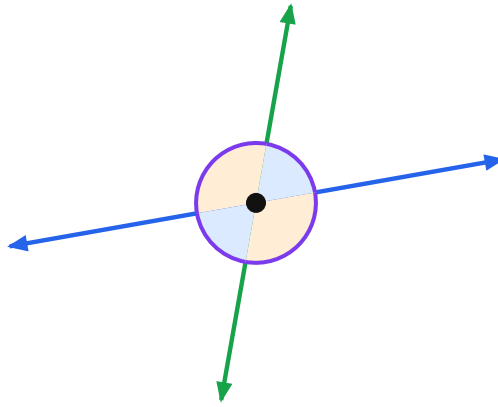
Question 6

If $AB = 7$ and $AB + BC = 20$, then $7 + BC = 20$. Which property justifies this step?

- A. Reflexive Property of Equality
- B. Symmetric Property of Equality
- C. Substitution Property of Equality
- D. Division Property of Equality

Question 7

Angles 1 and 3 are vertical angles with $m\angle 1 = (3x + 5)^\circ$ and $m\angle 3 = (5x - 15)^\circ$. What is x ?

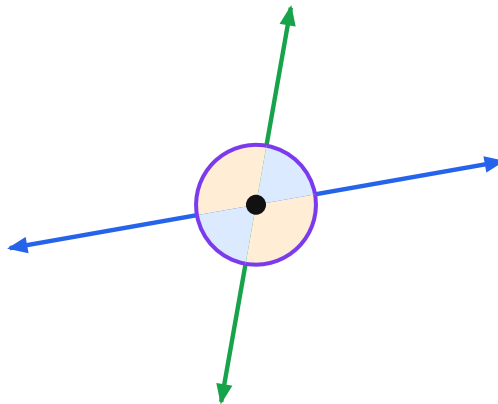


Angles 1 and 3 are opposite each other.

- A. $x = 5$
- B. $x = 20$
- C. $x = 40$
- D. $x = 10$

Question 8

In the proof that vertical angles are congruent, why are $\angle 1$ and $\angle 2$ supplementary?



Angles 1 and 2 are next to each other on a line.

- A. They are vertical angles.
- B. They form a linear pair.
- C. They are complementary.
- D. They are congruent by definition.

Question 9

What is the next number in the pattern 4, 7, 12, 19, 28?

- A. 39
- B. 37
- C. 35
- D. 41

Question 10

Which statement is a true biconditional?

- A. A number is even if and only if it is divisible by 4.
- B. An angle is acute if and only if its measure is less than 100° .
- C. A figure is a rectangle if and only if it is a square.
- D. A figure is a triangle if and only if it has exactly three sides.

Answer key

1. **D** – The inner set (robins) is the hypothesis and the outer set (birds) is the conclusion. Reversing them gives the false converse.
2. **C** – The converse swaps hypothesis and conclusion. Negating both parts gives the inverse, and swapping and negating gives the contrapositive.
3. **B** – The contrapositive swaps and negates both parts. Only swapping gives the converse, and only negating gives the inverse.
4. **A** – The number 9 is odd but equals 3×3 , so it is not prime. The numbers 7 and 13 are odd primes, and 2 is not odd.
5. **B** – He generalized from specific cases, which is inductive reasoning. A deductive argument would start from a proven theorem.
6. **C** – The value 7 replaces AB, which is substitution. No quantity was swapped sides or divided.
7. **D** – Vertical angles are congruent, so $3x + 5 = 5x - 15$, giving $20 = 2x$ and $x = 10$. Forgetting to divide by 2 gives 20.
8. **B** – Angles 1 and 2 are adjacent and their outer sides form a straight line, so they are a linear pair and supplementary.
9. **A** – The differences are 3, 5, 7, 9, so the next difference is 11 and $28 + 11 = 39$. Repeating the last difference gives 37.
10. **D** – A biconditional is true only when the statement and its converse are both true. The other choices each fail in one direction (for example, 6 is even but not divisible by 4).

Remember:

- A conditional "If p, then q" has a hypothesis (p) and a conclusion (q).
- The converse swaps p and q, the inverse negates both, and the contrapositive does both.
- A statement and its contrapositive always have the same truth value.
- One counterexample disproves a conditional; inductive patterns are not proofs.
- Vertical angles are congruent, proved with linear pairs and the Subtraction Property of Equality.