

Geometry · Logic and Two-Column Proofs · Test

Common Core G-CO.C.9 · mathovore.fr

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

This 45-minute test covers conditional statements, related statements, counterexamples, inductive reasoning, properties of equality and proofs of the vertical angles theorem (G-CO.C.9). It has 8 questions worth 20 points. Justify every proof step.

Test information

- **Grade:** Geometry
- **Chapter:** Logic and Two-Column Proofs
- **Common Core:** G-CO.C.9
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 3 pts; Question 3: 2 pts; Question 4: 2 pts; Question 5: 2 pts; Question 6: 3 pts; Question 7: 4 pts; Question 8: 2 pts)

Question 1: Parts of a conditional (2 points)

Consider: "If a quadrilateral has four right angles, then it is a rectangle."

- Identify the hypothesis and the conclusion. (1 point)
- Write the converse and state whether it is true or false. (1 point)

Question 2: Related statements (3 points)

Consider: "If a figure is a rhombus, then it is a parallelogram." For each part, write the statement and state whether it is true or false. Give a counterexample if it is false.

- The converse (1 point)
- The inverse (1 point)
- The contrapositive (1 point)

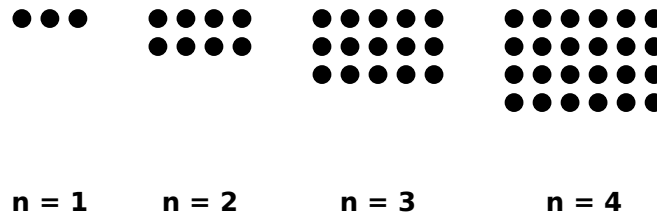
Question 3: Reasoning types and counterexample (2 points)

- Priya notices that the school bus was late on each of the last five Mondays and concludes

- it will be late next Monday. Is this inductive or deductive reasoning? (1 point)
- b. Find a counterexample to: "If $x^2 > x$, then $x > 1$." (1 point)

Question 4: Inductive pattern (2 points)

The figure shows the first four patterns of dots.



The first four dot patterns.

- a. How many dots are in Pattern 5 and in Pattern 6? (1 point)
- b. Write a rule for the number of dots in Pattern n . (1 point)

Question 5: Properties of equality (2 points)

Name the property that justifies each statement.

- a. If $7x = 63$, then $x = 9$. (1 point)
- b. If $AB = CD$ and $CD = EF$, then $AB = EF$. (1 point)

Question 6: Completing a proof (3 points)

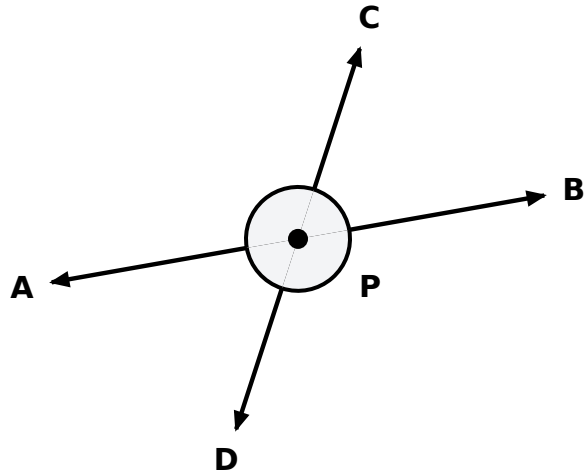
Given: $\angle A$ and $\angle B$ are supplementary; $m\angle A = 72^\circ$. Prove: $m\angle B = 108^\circ$. Write the missing reason or statement for (a), (b) and (c).

Statements	Reasons
1. $\angle A$ and $\angle B$ are supplementary; $m\angle A = 72^\circ$	1. Given
2. $m\angle A + m\angle B = 180^\circ$	2. (a) ____
3. (b) ____	3. Substitution Property of Equality
4. $m\angle B = 108^\circ$	4. (c) ____

(1 point each)

Question 7: Vertical angles proof (4 points)

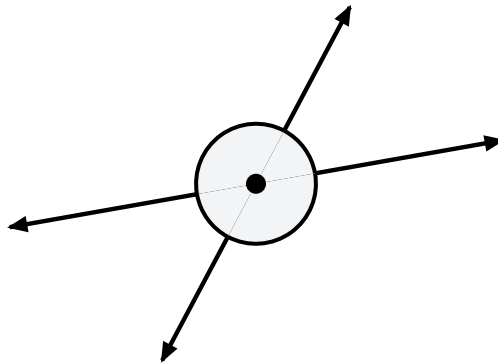
Lines AB and CD intersect at P. Write a two-column proof. Given: lines AB and CD intersect at P. Prove: $\angle APD \cong \angle BPC$.



Lines AB and CD intersect at P.

Question 8: Vertical angles with algebra (2 points)

Two lines intersect. $m\angle 1 = (7x + 3)^\circ$ and $m\angle 3 = (10x - 18)^\circ$.



Angles 1 and 3 are opposite each other.

- Find x and name the theorem you used. (1 point)
- Find $m\angle 2$ and give a reason. (1 point)