

Reasoning, Logic and Two-Column Proofs

Grade 10 – Geometry math · Test · Standards: G-CO.C.9

Name: _____ Date: _____ Class: _____

Eight questions, 20 points, 45 minutes. Write a reason beside every step of a proof and label every answer. The figures are not drawn to scale.

Standards: G-CO.C.9 · **Level:** Grade 10 Geometry

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Converse and contrapositive (2 points)

Consider the statement: "If a whole number is divisible by 6, then it is divisible by 3."

- Write the converse. (1 point)
- Write the contrapositive. (1 point)

Question 2 Types of reasoning (2 points)

Label each argument inductive or deductive and explain in one sentence.

- A city bus arrived at 7:42 a.m. every school day for five weeks, so a rider concludes it always arrives at 7:42. (1 point)
- Every square has four right angles. Shape $WXYZ$ is a square. So $WXYZ$ has four right angles. (1 point)

Question 3 Properties of equality (2 points)

Identify the property of equality behind each statement.

- If $3x = 24$, then $x = 8$. (1 point)
- If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$. (1 point)

Question 4 Solve and justify (3 points)

Solve $3(x + 4) - 7 = 2x + 15$ and give a reason for every step.

Question 5 Quarter of a segment (4 points)

Given: M is the midpoint of AB , and N is the midpoint of AM . Prove: $AN = \frac{1}{4}AB$. Complete a two-column proof.



Figure for Question 5.

Question 6 Vertical angles (3 points)

Two lines intersect. A pair of vertical angles measures $(9x - 14)^\circ$ and $(6x + 16)^\circ$.

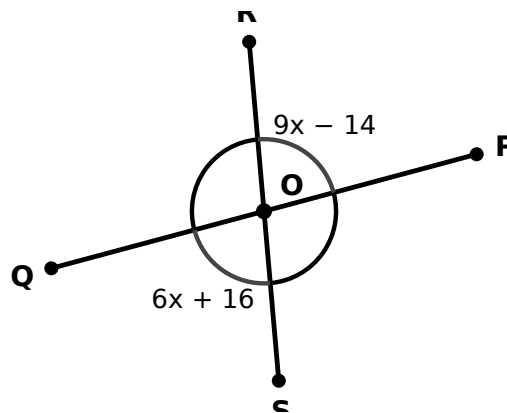


Figure for Question 6.

- Find x . (1 point)
- Find the measure of each vertical angle. (1 point)
- Find the measure of a neighboring angle. (1 point)

Question 7 Using a true statement (2 points)

Assume the statement "If a shape is a square, then it is a rectangle" is true.

- Shape $ABCD$ is not a rectangle. What can be concluded? (1 point)
- Shape $PQRS$ is a rectangle. Can it be concluded that $PQRS$ is a square? Explain. (1 point)

Question 8 Counterexamples (2 points)

Give a counterexample for each statement.

- If $x^2 > 9$, then $x > 3$. (1 point)
- If two angles are congruent, then they are vertical angles. (1 point)