

Reasoning and Proof: math test, Grade 10 – download the PDF

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Conditional statements

/ 4 pts

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

- Write the converse, inverse and contrapositive, and give the truth value of each.
- Write the statement as a biconditional if possible.

2 Reasoning and counterexamples

/ 3 pts

- You compute $3 \cdot 1 = 3$, $3 \cdot 3 = 9$, $3 \cdot 5 = 15$, $3 \cdot 7 = 21$ and conjecture that 3 times an odd number is odd. What type of reasoning is this?
- Disprove: "If a number is a multiple of 5, then it is odd."
- Disprove: "The sum of two prime numbers is prime."

3 Algebra proof

/ 4 pts

Given: $4(x + 3) = 2x + 30$. Prove: $x = 9$. Write a two-column proof.

4 Angle addition

/ 4 pts

Ray BD lies inside $\angle ABC$, $m\angle ABC = 108^\circ$, $m\angle ABD = (4x - 6)^\circ$, $m\angle DBC = (2x + 12)^\circ$. Find x , $m\angle ABD$ and $m\angle DBC$, naming the postulate used.

5 Paragraph and flow proof

/ 5 pts

Given: $\angle 1$ and $\angle 3$ are complementary, and $\angle 2$ and $\angle 3$ are complementary. Prove: $\angle 1 \cong \angle 2$.

- Write a paragraph proof.
- List the boxes of a flow proof with the reason under each.



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