Geometry Unit 1 quiz 4: Conditionals, converse, inverse, contrapositive, Biconditional, Converses and biconditional definitions

Name _____ Date _____ Period _____

7 questions, 20 points

1. Points A, B and C lie on a line in that order, with $AB = 5$ and $BC = 7$. Let P be "B is the midpoint of $\overline{AC}$" and let Q be "$AC = 12$". Give the truth value of P, of Q, of $P \to Q$, and of its converse, inverse and contrapositive. (2 points)

2. Let S be the statement "the distance from $(a, 0)$ to $(0, 4)$ is 5 if and only if $a > 0$." For each value of a, name the row of the table S falls on and say whether S is true.

(a) $a = -3$ (b) $a = 0$ (c) $a = 3$ (d) $a = 5$

(2 points)

3. Claim: "For every point (x, y), if $x > 3$ or $y > 3$, then $x + y > 3$." (3 points)

(a) Show that the claim is false with a counterexample.

(b) Write the contrapositive of the claim, negating the "or" correctly. Is the contrapositive true?

(c) Write the converse, and decide whether it is true.

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4. Rewrite each sentence as an if-then statement. Then decide whether it is true, and give a counterexample if it is false. (3 points)

(a) For points A, B and C on a line, B lying between A and C is sufficient for $AB + BC = AC$.

(b) Two different planes share a point only if they share a whole line.

(c) For two lines in space to be skew, it is sufficient that they do not intersect.

5. Two angles form a **linear pair** when they share a side and their other sides are opposite rays. Someone proposes instead: "Two angles form a linear pair if they share a vertex and a side." (3 points)

(a) Test the forward direction of the proposal.

(b) Test the backward direction. If it fails, give a counterexample with angle measures.

(c) Is the proposal too loose, too tight or both? Which part of the true definition does it leave out?

6. For two angles, each with a positive measure, take the statement: "If the two angles are complementary, then each of them is acute." Write its converse, inverse and contrapositive. Say which of the four statements are true, and give a counterexample to each false one. (3 points)

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7. **Given:** $\overrightarrow{OM}$ bisects $\angle LON$, and $m\angle LOM = 45°$. **Prove:** $\angle LON$ is a right angle.

Jin's proof has four reasons missing.

	Statement	**Reason**
1	$\overrightarrow{OM}$ bisects $\angle LON$	given
2	$\angle LOM \cong \angle MON$	(i)
3	$m\angle MON = m\angle LOM$	(ii)
4	$m\angle LOM = 45°$	given
5	$m\angle MON = 45°$	substitution
6	M is in the interior of $\angle LON$	(iii)
7	$m\angle LON = m\angle LOM + m\angle MON$	angle addition postulate
8	$m\angle LON = 90°$	substitution
9	$\angle LON$ is a right angle	(iv)

Give reasons (i) to (iv). Each is a definition: say whether it runs forward or backward. (4 points)

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