Geometry Unit 1 worksheet: Statements and negation

Name _____ Date _____ Period _____

1. Decide whether each sentence is a statement. If it is, say whether it is true or false. If it is not, say why.

(a) Every square is a rectangle.

(b) Draw the perpendicular bisector of $\overline{AB}$.

(c) A triangle can have two right angles.

(d) The slope of the line through (1, 2) and (3, 8) is 3.

(e) Equilateral triangles are the most beautiful triangles.

(f) The point $(x, 7)$ lies on the line $y = 2x + 1$.

(g) Are the points (0, 0), (1, 1) and (2, 2) collinear?

(h) $\angle 1$ and $\angle 2$ are supplementary when $m\angle 1 = 65°$ and $m\angle 2 = 115°$.

(i) Through any two points there is exactly one line.

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2. Write the negation of each statement. Then give the truth value of the statement and of its negation.

(a) The midpoint of the segment from (2, 5) to (8, −1) is (5, 2).

(b) The points (1, 2), (3, 6) and (4, 9) are collinear.

(c) An angle that measures 90° is acute.

(d) The segment from (−3, 1) to (3, 9) has length 10.

(e) The point (4, −1) lies on the line $y = -2x + 7$.

3. Let P be "the distance from (1, 1) to (4, 5) is 5", and let Q be "the midpoint of the segment from (−3, 2) to (5, 6) is (1, 3)".

First decide whether P and Q are true. Then give the truth value of each statement.

(a) $\neg P \wedge Q$ (b) $\neg(P \wedge Q)$ (c) $\neg P \vee \neg Q$

(d) $\neg(\neg P \vee Q)$ (e) $\neg(P \vee Q)$

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4. $\angle B$ is one particular angle, with $0^\circ < m\angle B < 180^\circ$.

(a) Is "$\angle B$ is obtuse" the negation of "$\angle B$ is acute"? Test the case $m\angle B = 90^\circ$ and explain.

(b) Write "$\angle B$ is acute" as an inequality about $m\angle B$, and write its negation as an inequality.

(c) Do the same for "$\angle B$ is obtuse".

(d) Do the same for "$\angle B$ is a right angle", and say in words what kind of angle the negation describes.

5. Diego writes the negation of "M is the midpoint of $\overline{AB}$" as "M is not on $\overline{AB}$".

(a) Take $A = (0, 0)$, $B = (8, 0)$ and $M = (2, 0)$. Give the truth value of the original sentence and of Diego's sentence.

(b) Explain why part (a) shows that Diego's sentence is not the negation.

(c) Write the correct negation.

6. Each statement below uses the letters P and Q once each, one $\neg$ and one other connective. Its column is given in the usual row order P, Q = TT, TF, FT, FF. Find the statement, and show the columns of the other choices you ruled out.

(a) The connective is $\wedge$ and the column is F, T, F, F.

(b) The connective is $\vee$ and the column is T, T, F, T.

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