Name: KEY! Date: _____ Hour: _____

Unit A Review: Logic

1. Let p = "Joe goes to the movies" and q = "Joe cleans his room." Write p ⇔ q in words.

   if & only if

   Joe goes to the movies if & only if he cleans his room.

2. Consider this conditional: "All fish swim." → If its a fish, then it swims.

   a. Write the proposition. "if" part If its a fish

   b. Write the implication. "then" part then it swims

3. Consider this conditional: "If $x \leq 11$, then $x < 10$."

   a. Give an instance of the conditional. T, T $x = 9$

   b. Give a counterexample of the conditional. T, F $x = 10.5$

4. **True or False.** If the converse of a statement is false, then the statement itself must be false.

   False

5. Refer to the statement: "Every equilateral triangle is a polygon with three sides of equal length."

   a. Write the statement as a conditional. "if... then..." $p \to q$

   If its an equilateral triangle, then it has 3 sides of equal length.

   b. Write the inverse of the conditional. $\sim p \to \sim q$

   If its not an equilateral triangle, then it does not have 3 sides of equal length.

Name: _____ Date: _____ Hour: _____

6. Refer to the statement: "If a triangle is equilateral, then it has all three sides equal."

   a. Write the converse of the conditional. $q \to p$

   If it has 3 sides equal, then its an equilateral $\triangle$.

   b. Write the contrapositive of the conditional. $\sim q \to \sim p$

   If it does not have 3 sides equal, then its not an equilateral $\triangle$.

7. Shane's brother told him "If I get a job delivering newspapers, I will loan you $15." Later that day, Shane had $15 to spend on clothes. Did his brother get a job delivering newspapers? Explain your reasoning.

   No, we don't know if the "if part" happened. He could've gotten $15 from his mom.

8. Refer to the statement: "If the measure of an angle is 90 degrees, then that angle is a right angle."

   a. Write the converse of the statement. $q \to p$

   If an angle is right, then it measures 90°.

   b. Is the converse true or false?

   True

In 9-11, use all of the statements.
a) What (if anything) can you conclude?
b) What laws of reasoning did you use?

9. (1) If a figure is a rectangle, then it is a trapezoid. $p \to q$
   (2) LOVE is a trapezoid. q

   no conclusion

Name: _____ Date: _____ Hour: _____

10. (1) If corresponding angles formed by a transversal are congruent, then two lines are parallel.
(2) If alternate interior angles formed by a transversal are congruent, then so are corresponding angles.

p→q
r→p

If alternate interior angles are congruent, then the lines are parallel.

11. (1) If $n \perp m$, then $m\angle A = 90$.
(2) $m\angle A = 75$.

~q
p→q
~q } conclude: ~p

c. n is not ⊥ to m

~~Write the contrapositives~~

In 12 & 13, write a) the converse, b) the inverse, c) the contrapositive, and d) tell which of the statements (if any) are true.

12. If $x = 3$, then $x^2 = 9$. p→q

q→p a. If $x^2 = 9$, then $x = 3$.

~p→~q b. If $x \neq 3$, then $x^2 \neq 9$.

~q→~p c. If $x^2 \neq 9$, then $x \neq 3$.

d. C

13. If a figure is a rectangle, then it is a square. p→q

q→p a. If its a square, then its a rectangle.

~p→~q b. If its not a rectangle, then its not a square.

~q→~p c. If its not a square, then its not a rectangle.

d. a, b

14. Give an indirect proof to show that $\sqrt{2400} \neq 49$.

(1) Assume $\sqrt{2400} = 49$

(2) $48.99 = 49$ ← contradiction

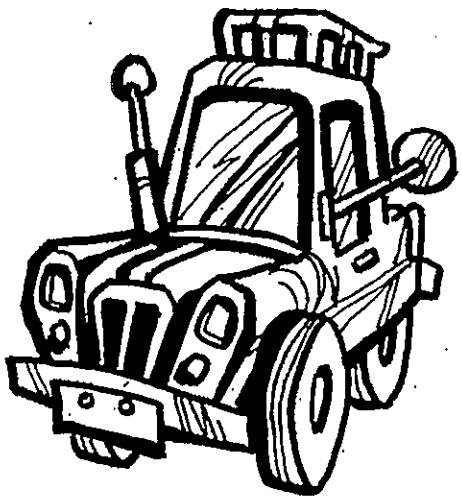
(3) Since $48.99 \neq 49$, we know $\sqrt{2400} \neq 49$.

Name: _____ Date: _____ Hour: _____

15. Complete the following logic puzzle.

PARKING LOT

Mr. Smith, Mr. Jones, Mr. Brown, Mr. Johnson, and Mr. Black work for the Tinyburg Electric Company. Their cars are different colors: red, yellow, green, blue, and white. As it happens, each man also drives a different type of car: a sedan, a station wagon, a sports car, a coupe, and a convertible. From the clues given try to determine the owner, color, and type of each car.



Given

1. Neither Mr. Johnson nor Mr. Jones owns the red car, but one of them owns the convertible.
2. Mr. Jones, Mr. Brown, and the owner of the sedan sometimes go on camping trips with the owner of the yellow station wagon.
3. The coupe and the white car are owned by the men with the colorful last names.
4. Mr. Smith used to own the sports car but then he changed its original white color and sold it to one of the other men who did not paint it green.
5. Mr. Johnson owns a green car.

	SMITH	JONES	BROWN	JOHNSON	BLACK	RED	YELLOW	GREEN	BLUE	WHITE
SEDAN	X	X	X	✓	X	X	X	✓	X	X
STA. WAGON	✓	X	X	X	X	X	✓	X	X	X
SPORTS CAR	X	X	X	X	✓	X	X	X	X	✓
COUPE	X	X	✓	X	X	✓	X	X	X	X
CONVERT.	X	✓	X	X	X	X	X	X	✓	X
RED	X	X	✓	X	X					
YELLOW	✓	X	X	X	X					
GREEN	X	X	X	✓	X					
BLUE	X	✓	X	X	X					
WHITE	X	X	X	X	✓