Name: _____

Unit 2: Reasoning and Proof
Review
(pages 7-14)

1. Make a conjecture. Draw a diagram to illustrate your conjecture. (2 points)

   Given: M is the midpoint of $\overline{BC}$.

2. Determine whether the conjecture is *true* or *false*. Provide a counterexample if the conjecture is false. Counterexamples may be drawn or written (2 points)

   Given: Point B is in the interior of $\angle ADC$.
   Conjecture: $\angle ADB \cong \angle BDC$

Use the following statements for questions 3-6.

p = Line a is a transversal to lines x and y.
q = Lines x and y are parallel.
r = The consecutive interior angles created by the transversal are supplementary.
s = The corresponding angles created by the transversal are congruent.

Translate the following into verbal sentences. Please use correct grammar and punctuation. (2 points each)

3. $(p \wedge q) \rightarrow s$

4. $r \leftrightarrow q$

Translate the following into logic symbols. (2 points each)

5. If the consecutive interior angles created by the transversal are not supplementary, then lines x and y are not parallel.

6. Line a is a transversal to lines x and y and the consecutive interior angles created by the transversal are supplementary, or lines x and y are not parallel.

7. Write the inverse of the following statement. If the statement is true, write *true*. If the statement is false, provide a counterexample. (2 points)

   If two angles form a linear pair, then they are supplementary.

8. Write the converse of the following statement. If the statement is true, write *true*. If the statement is false, provide a counterexample. (2 points)

   If a quadrilateral is a square, then it is a rectangle.

9. Write the contrapositive of the following statement. If the statement is true, write *true*. If the statement is false, provide a counterexample. (2 points)

   If a quadrilateral has four congruent sides, then it is a rhombus.

Determine if each statement can be written as a biconditional statement. If so, write it in biconditional form. If not, write *not reversible* and explain why not. (2 points each)

10. If a quadrilateral is a square, then it has four congruent sides and four congruent angles.

Determine if each statement can be written as a biconditional statement. If so, write it in biconditional form. If not, write *not reversible* and explain why not. (2 points each)

11. If a number is divisible by 8, then it is divisible by 2.

Use the following statements for questions 12-14.

It is October.
I watch the World Series.
I eat hot dogs.

12. Use the statements above to create a valid argument using of the Law of Detachment. (2 points)

(1) _____
(2) _____
(3) _____

13. Use the statements above to create a valid argument using of the Law of Syllogism. (2 points)

(1) _____
(2) _____
(3) _____

14. Use the statements above to create a valid argument using of the Law of Contrapositive. (2 points)

(1) _____
(2) _____
(3) _____

Determine whether statement (3) follows from statements (1) and (2) by the Law of Detachment, Law of Syllogism, or Law of Contrapositive. If it does, state which law was used. If it does not, write invalid and explain why not. (2 points each)

15. (1) If you exercise regularly, then you will have a healthier heart.
    (2) Cam does not exercise regularly.
    (3) Cam does not have a healthier heart.

16. (1) If you miss more than five days of math class, then you will not get a good grade.
    (2) If you do not get a good grade, then you will not be on the honor roll.
    (3) If you miss more than five days of math class, then you will not be on the honor roll.

If possible, use the Law of Detachment, Law of Syllogism, or Law of Contrapositive to make any possible conclusion. Identify the law of deductive reasoning that you used to write valid conclusions. If a valid conclusion is not possible, write *not possible* and explain why not. (2 points each)

17. If you buy the newest video game, then you will not have enough money for lunch.
    You had enough money for lunch.

18. If the fuel gauge on a car is pointing to "E," then it is time to fill up the gas tank.
    The fuel gauge in Jan's car is pointing to "E."

Write the property, postulate, or definition that justifies the statement. (1 point each)

19. If $3x = 6$, then $x = 2$.

20. If $m\angle A = 10$ and $m\angle B = 10$, then $m\angle A = m\angle B$.

21. If $\overline{PS} \cong \overline{WX}$, then PS = WX.

22. $AD + DF = AF$

23. Write a two-column proof. (4 points)

Given: $\angle ABC$ and $\angle CBD$ are supplementary angles. $m\angle ABC = (4x + 7)°$, $m\angle CBD = (2x - 1)°$.
Prove: $m\angle ABC = 123°$

24. Write a two-column proof. (4 points)

Given: E is the midpoint of $\overline{HA}$; $\overline{HE} \cong \overline{AT}$
Prove: A is the midpoint of $\overline{ET}$