Name: _____ **Class:** _____ **Date:** _____ **ID: A**

Chapter 2 Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

Write the contrapositive of the conditional statement. Determine whether the contrapositive is true *or* false. *If it is false, find a counterexample.*

1. Two angles measuring 180 are supplementary.
   a. Non-supplementary angles are not two angles measuring 180. True
   b. Two angles not measuring 180 are supplementary. True
   c. More than two angles measuring 180 are non-supplementary. True
   d. Non-supplementary angles are two angles measuring 180. False; supplementary angles must measure 180.

Determine whether the conjecture is true *or* false. *Give a counterexample for any false conjecture.*

2. **Given:** points A, B, C, and D
   Conjecture: A, B, C, and D are coplanar.
   a. False; three points are always coplanar but four are not.
   b. False; two points are always coplanar but four are not.
   c. False; the four points do not have to be in a straight line.
   d. True

3. **Given:** Point B is in the interior of $\angle ADC$.
   Conjecture: $\angle ADB \cong \angle BDC$
   a. True
   b. False; $m\angle ADB$ may be obtuse.
   c. False; just because it is in the interior does not mean it is on the bisecting line.
   d. False; $m\angle ADB + m\angle BDC = 90$.

Make a conjecture about the next item in the sequence.

4. 6, 8, – 32, – 30, 120
   a. 122
   b. 116
   c. –480
   d. –488

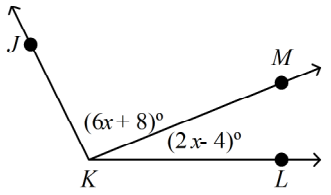
5. Which statement is the Law of Detachment?
   a. If $p \rightarrow q$ is a true statement and p is true, then q is true.
   b. If $p \rightarrow q$ and $q \rightarrow r$ are true, then $p \rightarrow r$ is a true statement.
   c. If $p \rightarrow q$ is a true statement and q is true, then $q \rightarrow p$ is true.
   d. If $p \rightarrow q$ is a true statement and q is true, then p is true.

Write the inverse of the conditional statement. Determine whether the inverse is true *or* false. *If it is false, find a counterexample.*

6. An equilateral triangle has three congruent sides.
   a. A non-equilateral triangle does not have three congruent sides. True
   b. A non-equilateral triangle has three congruent sides. False; an isosceles triangle has two congruent sides.
   c. A figure that has three non-congruent sides is not an equilateral triangle. True
   d. A figure with three congruent sides is an equilateral triangle. True

7. What is the converse and the truth value of the converse of the following conditional?
   If an angle is a right angle, then its measure is 90.
   a. If an angle has measure 90, then it is a right angle.
      True
   b. If an angle is not a right angle, then its measure is 90.
      False
   c. If an angle is not a right angle, then its measure is not 90.
      True
   d. If an angle has measure 90, then it is a right angle.
      False

8. Write a justification for each step.



$m\angle JKL = 100°$

$m\angle JKL = m\angle JKM + m\angle MKL$	[1]
$100° = (6x + 8)° + (2x - 4)°$	Substitution Property of Equality
$100 = 8x + 4$	Simplify.
$96 = 8x$	Subtraction Property of Equality
$12 = x$	[2]
$x = 12$	Symmetric Property of Equality

   a. [1] Transitive Property of Equality
      [2] Division Property of Equality
   b. [1] Angle Addition Postulate
      [2] Division Property of Equality
   c. [1] Angle Addition Postulate
      [2] Simplify.
   d. [1] Segment Addition Postulate
      [2] Multiplication Property of Equality

9. Determine whether the conditional and its converse are both true. If both are true, combine them as a biconditional. If either is false, give a counterexample.
   If two lines are parallel, they do not intersect.
   If two lines do not intersect, they are parallel.
   a. Both statements are true. Two lines are not parallel if and only if they do not intersect.
   b. Both statements are true. Two lines are parallel if and only if they do not intersect.
   c. One statement is false. If two lines do not intersect, they could be skew..
   d. One statement is false. If two lines are parallel, they may intersect twice.

10. Use the Law of Detachment to draw a conclusion from the two given statements.

    If two angles are congruent, then they have equal measures.

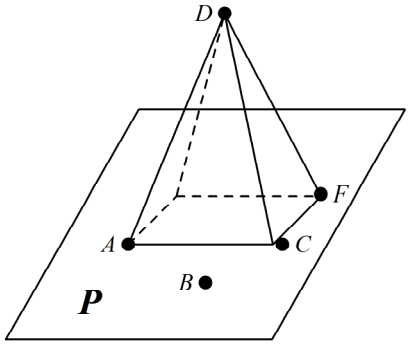
    $\angle P$ and $\angle Q$ are congruent.
    a. $m\angle P + m\angle Q = 90$
    b. $\angle P$ is the complement of $\angle Q$.
    c. $m\angle P \neq m\angle Q$
    d. $m\angle P = m\angle Q$

Write the converse of the conditional statement. Determine whether the converse is true *or* false. *If it is false, find a counterexample.*

11. If you have a dog, then you are a pet owner.
    a. If you are a pet owner, then you have a dog. True
    b. If you are a pet owner, then you have a dog. False; you could own a hamster.
    c. A dog owner owns a pet. True
    d. If you have a dog, then you are a pet owner. True

12. Which statement is the Law of Syllogism?
    a. if $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $p \rightarrow r$ is a true statement.
    b. If $p \rightarrow q$ is a true statement and p is true, then q is true.
    c. If $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $r \rightarrow p$ is a true statement.
    d. If $p \rightarrow q$ is a true statement and q is true, then p is true.

In the figure below, points A, B, C, *and* F *lie on plane* ***P****. State the postulate that can be used to show each statement is true.*



13. *A* and *B* are collinear.
    a. If two lines intersect, then their intersection is exactly one point.
    b. Through any two points there is exactly one line.
    c. If two points lie in a plane, then the entire line containing those points lies in that plane.
    d. A line contains at least two points.

Use the following statements to write a compound statement for the conjunction or disjunction. Then find its truth value.
p: An isosceles triangle has two congruent sides.
q: A right angle measures 90º
r: Four points are always coplanar.
s: A decagon has 12 sides.

14. $r \wedge (q \vee s)$
    a. Four points are always coplanar, or a right angle measures 90º and a decagon has 12 sides; false.
    b. Four points are always coplanar, and a right angle measures 90º or a decagon has 12 sides; true.
    c. Four points are always coplanar, and a right angle measures 90º or a decagon has 12 sides; false.
    d. Four points are always coplanar, or a right angle measures 90º and a decagon has 12 sides; true.

Short Answer

15. Identify the hypothesis and conclusion of this conditional statement:
If two lines intersect at right angles, then the two lines are perpendicular.

16. There is a myth that a duck's quack does not echo. A group of scientists observed a duck in a special room, and they found that the quack does echo. Therefore, the myth is false.
Is the conclusion a result of inductive or deductive reasoning?

17. Show that the conjecture is false by finding a counterexample.
If $a > b$, then $\frac{a}{b} > 0$.

18. What is the conclusion of the following conditional?
A number is divisible by 3 if the sum of the digits of the number is divisible by 3.

19. Find the next item in the pattern 2, 3, 5, 7, 11, ...

20. Solve the equation $4x - 6 = 34$. Write a justification for each step.

$4x - 6 = 34$	Given equation
$\underline{+6} \quad \underline{+6}$	[1]
$4x = 40$	Simplify.
$\frac{4x}{4} = \frac{40}{4}$	[2]
$x = 10$	Simplify.

21. Construct a truth table for the compound statement $\sim a \wedge \sim b$.

Complete the truth table.

22.

p	q	r	$\sim p$	$\sim r$	$\sim p \vee (\sim r \wedge q)$
T	T	T			
T	T	F			
T	F				
T	F				
F					
F					
F					
F					

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

23. (1) You are in ninth grade.
(2) People who are in ninth grade floss their teeth regularly.
(3) You floss your teeth regularly.

24. Use the Law of Syllogism to draw a conclusion from the two given statements.
If a number is a multiple of 64,then it is a multiple of 8.
If a number is a multiple of 8, then it is a multiple of 2.

25. Write this statement as a conditional in *if-then* form:
All triangles have three sides.