

## Practice Test - Chapter 2

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### Multiple Choice

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

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

- \_\_\_\_\_ 1. 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. A dog owner owns a pet. True
  - c. If you are a pet owner, then you have a dog. False; you could own a hamster.
  - d. If you have a dog, then you are a pet owner. True

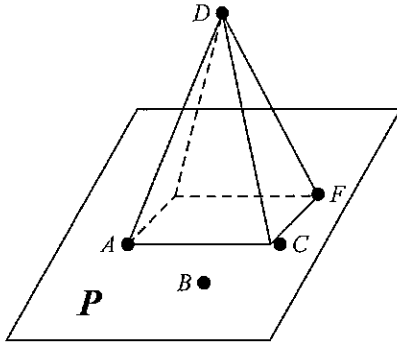
*Write the inverse of the conditional statement. Determine whether the inverse is true or false. If it is false, find a counterexample.*

- \_\_\_\_\_ 2. People who live in Texas live in the United States.
- a. ~~People who do not live in the United States do not live in Texas. True~~
  - b. People who do not live in Texas do not live in the United States. False; they could live in Oklahoma.
  - c. People who live in the United States live in Texas. False; they could live in Oklahoma.
  - d. People who do not live in Texas live in the United States. True

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

- \_\_\_\_\_ 3. If you are 16 years old, then you are a teenager.
- a. If you are not a teenager, then you are not 16 years old. True
  - b. If you are not 16 years old, then you are not a teenager. False; you could be 17 years old.
  - c. If you are not a teenager, then you are 16 years old. True
  - d. If you are a teenager, then you are 16 years old. False; you could be 17 years old.

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.



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

5. What is a counterexample for the conjecture?  
 Conjecture: The product of two positive numbers is greater than the sum of the two numbers.
- 3 and 5
  - 2 and 2
  - A counterexample exists, but it is not shown above.
  - There is no counterexample. The conjecture is true.

### Short Answer

Make a conjecture about the next item in the sequence.

6. 6, 8, -32, -30, 120

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  $90^\circ$

$r$ : Four points are always coplanar.

$s$ : A decagon has 12 sides.

7.  $p$  and  $r$
8.  $p \vee q$

9.  $r \wedge (q \vee s)$

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.

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

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

11. If it is a spider, then it can walk on walls.  
 12. Two angles measuring  $90^\circ$  are complementary.

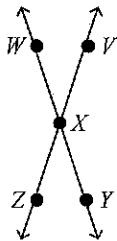
Write the contrapositive of the conditional statement. Determine whether the contrapositive is true or false. If it is false, find a counterexample.

13. Vertical angles are two nonadjacent angles formed by two intersecting lines.

Write a two-column proof.

14. If  $-\frac{1}{6}r - 5 = 38$ , then  $r = -258$ .

15.  $\overleftrightarrow{WY}$  and  $\overleftrightarrow{VZ}$  intersect at point  $X$ ,  $m\angle WXV = 4s - 9$ , and  $m\angle ZXY = 2s + 17$ . Prove  $s = 13$ .



16. If  $ZY = 7XY$ , then  $ZX = 8XY$ .



17. In a group of 230 people, 100 people like music, 70 like art, and 30 like both. Draw a Venn diagram to represent the data.

18. The table shows the population 65 years and over by age and sex according to the US Census Bureau, Census 2000 Summary file. Make a conjecture based on the data.

Population 65 Years and Over by Age and Sex: 2000 (numbers in thousands)			
	65 to 74 years	75 to 84 years	85 years and over
Women	10,088	7,482	3,013
Men	8,303	4,879	1,227

19. Show that the conjecture is false by finding a counterexample.

If  $a > b$ , then  $\frac{a}{b} > 0$ .

20. Identify the hypothesis and conclusion of the conditional statement.

If it is raining then it is cloudy.

21. Write a conditional statement from the statement.

A horse has 4 legs.

22. Determine if the conditional statement is true. If false, give a counterexample. If a figure has four sides, then it is a square.

23. Write the converse, inverse, and contrapositive of the conditional statement.

If an animal is a bird, then it has two eyes.

24. 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?

25. Determine if the conjecture is valid by the Law of Detachment.

**Given:** If Tommy makes cookies tonight, then Tommy must have an oven. Tommy has an oven.

**Conjecture:** Tommy made cookies tonight.

26. Determine if the conjecture is valid by the Law of Syllogism.

**Given:** If you are in California, then you are in the west coast. If you are in Los Angeles, then you are in California.

**Conjecture:** If you are in Los Angeles, then you are in the west coast.

27. Draw a conclusion from the given information.

**Given:** If two lines are perpendicular, then they form right angles. If two lines meet at a  $90^\circ$  angle, then they are perpendicular. Two lines meet at a  $90^\circ$  angle.

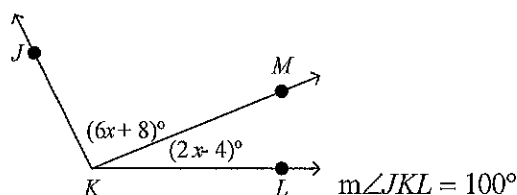
28. For the conditional statement, write the converse and a biconditional statement.

If a figure is a right triangle with sides  $a$ ,  $b$ , and  $c$ , then  $a^2 + b^2 = c^2$ .

29. Determine if the biconditional is true. If false, give a counterexample.

A figure is a square if and only if it is a rectangle.

30. Write a justification for each step.



$$m\angle JKL = m\angle JKM + m\angle MKL$$

$$100^\circ = (6x + 8)^\circ + (2x - 4)^\circ$$

$$100 = 8x + 4$$

$$96 = 8x$$

$$12 = x$$

$$x = 12$$

[1]

Substitution Property of Equality

Simplify.

Subtraction Property of Equality

[2]

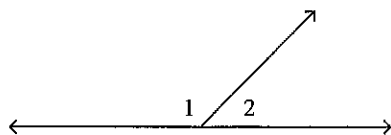
Symmetric Property of Equality

31. Identify the property that justifies the statement.

$\overline{AB} \cong \overline{CD}$  and  $\overline{CD} \cong \overline{EF}$ . So  $\overline{AB} \cong \overline{EF}$ .

32. Fill in the blanks to complete the two-column proof.

**Given:**  $\angle 1$  and  $\angle 2$  are supplementary,  $m\angle 1 = 135^\circ$



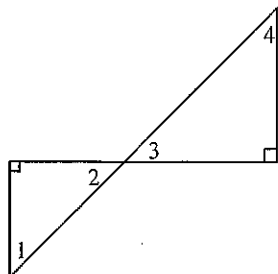
**Prove:**  $m\angle 2 = 45^\circ$

**Proof:**

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are supplementary.	1. Given
2. [1]	2. Given
3. $m\angle 1 + m\angle 2 = 180^\circ$	3. [2]
4. $135^\circ + m\angle 2 = 180^\circ$	4. Substitution Property
5. $m\angle 2 = 45^\circ$	5. [3]

33. Use the given plan to write a two-column proof.

**Given:**  $m\angle 1 + m\angle 2 = 90^\circ$ ,  $m\angle 3 + m\angle 4 = 90^\circ$ ,  $m\angle 2 = m\angle 3$



**Prove:**  $m\angle 1 = m\angle 4$

**Plan:** Since both pairs of angle measures add to  $90^\circ$ , use substitution to show that the sums of both pairs are equal. Since  $m\angle 2 = m\angle 3$ , use substitution again to show that sums of the other pairs are equal. Use the Subtraction Property of Equality to conclude that  $m\angle 1 = m\angle 4$ .

Complete the proof.

**Proof:**

Statements	Reasons
1. $m\angle 1 + m\angle 2 = 90^\circ$	1. Given
2. [1]	2. Given
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. Substitution Property
4. $m\angle 2 = m\angle 3$	4. Given
5. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 4$	5. [2]
6. $m\angle 1 = m\angle 4$	6. [3]

34. Based on the pattern, what is the next figure in the sequence?



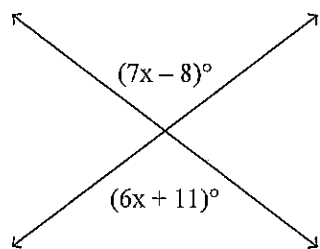
35. Alfred is practicing typing. The first time he tested himself, he could type 23 words per minute. After practicing for a week, he could type 26 words per minute. After two weeks he could type 29 words per minute. Based on this pattern, predict how fast Alfred will be able to type after 4 weeks of practice.

36.  $\overline{BD}$  bisects  $\angle ABC$ .  $m\angle ABC = 7x$ .  $m\angle ABD = 3x + 25$ . Find  $m\angle DBC$ .

**Use the given property to complete the statement.**

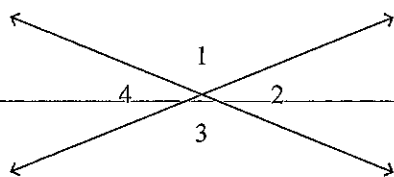
37. Substitution Property of Equality  
If  $y = 3$  and  $8x + y = 12$ , then \_\_\_\_\_.

38. What is the value of  $x$ ?



Drawing not to scale

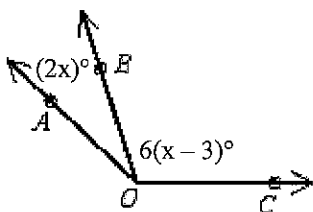
39.  $m\angle 3 = 37$ . Find  $m\angle 1$ .



Drawing not to scale



40. What is the value of  $x$ ? Identify the missing justifications.



Drawing not to scale

$$m\angle AOC = 150$$

$$m\angle AOB + m\angle BOC = m\angle AOC \quad \text{a. } \underline{\hspace{2cm}}$$

$$2x + 6(x - 3) = 150 \quad \text{b. } \underline{\hspace{2cm}}$$

$$2x + 6x - 18 = 150 \quad \text{c. } \underline{\hspace{2cm}}$$

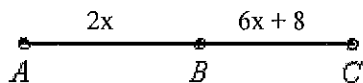
$$8x - 18 = 150 \quad \text{d. } \underline{\hspace{2cm}}$$

$$8x = 168 \quad \text{e. } \underline{\hspace{2cm}}$$

$$x = 21 \quad \text{f. } \underline{\hspace{2cm}}$$

41. What is the value of  $x$ ? Justify each step.

$$AC = 32$$



Drawing not to scale

$$AB + BC = AC \quad \text{a. } \underline{\hspace{2cm}}$$

$$2x + 6x + 8 = 32 \quad \text{b. } \underline{\hspace{2cm}}$$

$$8x + 8 = 32 \quad \text{c. } \underline{\hspace{2cm}}$$

$$8x = 24 \quad \text{d. } \underline{\hspace{2cm}}$$

$$x = 3 \quad \text{e. } \underline{\hspace{2cm}}$$

Complete the truth table.

42.

$p$	$q$	$r$	$\sim q$	$r \wedge \sim q$
$T$	$T$	$T$		
$T$	$T$	$F$		
$T$	$F$			
$T$	$F$			
$F$				
$F$				
$F$				
$F$				

## Practice Test - Chapter 2

### Answer Section

#### MULTIPLE CHOICE

1. C
2. B
3. A
4. B
5. B

#### SHORT ANSWER

6. 122
7. An isosceles triangle has two congruent sides and four points are always coplanar; false.
8. An isosceles triangle has two congruent sides or a right angle measures  $90^\circ$ ; true.
9. Four points are always coplanar, and a right angle measures  $90^\circ$  or a decagon has 12 sides; false.
10. yes; Law of Detachment
11. Sample: If it is not a spider, then it cannot walk on walls. False; it could be a fly.
12. Sample: Two angles not measuring  $90^\circ$  are not complementary. True.
13. Sample: Two adjacent angles formed by two intersecting lines are not vertical angles. True.
14. Sample:

**Given:**  $-\frac{1}{6}r - 5 = 38$

**Prove:**  $r = -258$

**Proof:**

Statements	Reasons
1. $-\frac{1}{6}r - 5 = 38$	1. Given
2. $-\frac{1}{6}r = 43$	2. Addition Property
3. $-r = 258$	3. Multiplication Property
4. $r = -258$	4. Multiplication Property

15. Sample:

**Given:**  $\overleftrightarrow{WY}$  and  $\overleftrightarrow{VZ}$  intersect at point  $X$ ;  $m\angle WXV = 4s - 9$ ;  $m\angle ZXY = 2s + 17$ .

**Prove:**  $s = 13$

**Proof:**

Statements	Reasons
1. $m\angle WXV = 4s - 9$ ; $m\angle ZXY = 2s + 17$	1. Given
2. $\angle WXV \cong \angle ZXY$	2. Vertical Angle Theorem
3. $m\angle WXV = m\angle ZXY$	3. Definition of congruent angles
4. $4s - 9 = 2s + 17$	4. Substitution Property
5. $4s = 2s + 26$	5. Addition Property
6. $2s = 26$	6. Subtraction Property
7. $s = 13$	7. Division Property

16. Sample:

**Given:**  $ZY = 7XY$

**Prove:**  $ZX = 8XY$

**Proof:**

**Statements**

**Reasons**

1.  $ZY = 7XY$

1. Given

2.  $XY = XY$

2. Reflexive Property

3.  $ZX = XY + ZY$

3. Segment Addition Postulate

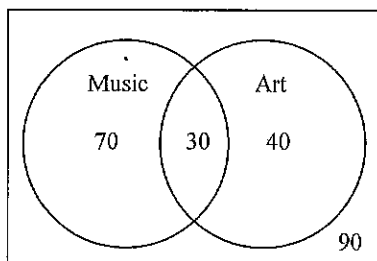
4.  $ZX = XY + 7XY$

4. Substitution Property

5.  $ZX = 8XY$

5. Substitution

17.



Find the number of people who like music only, the number of people who like art only, and the number of people who like neither music nor art. Plot all these calculated values together with the number of people who like both on the Venn diagram to represent the data.

18. Women outnumbered men in the 65 years and over population.

19.  $a = 11$ ,  $b = -3$

20. Hypothesis: It is raining.

Conclusion: It is cloudy.

21. If it is a horse then it has 4 legs.

22. False; A rectangle has four sides, and it is not a square.

23. Converse: If an animal has two eyes, then it is a bird.

Inverse: If an animal is not a bird, then it does not have two eyes.

Contrapositive: If an animal does not have two eyes, then it is not a bird.

24. Since the conclusion is based on a pattern of observation, it is a result of inductive reasoning.

25. The conjecture is not valid, because Tommy could have an oven but he could make something besides cookies tonight.

26. Yes, the conjecture is valid.

27. Conclusion: The lines form a right angle.

28. Converse: If  $a^2 + b^2 = c^2$ , then the figure is a right triangle with sides  $a$ ,  $b$ , and  $c$ .

Biconditional: A figure is a right triangle with sides  $a$ ,  $b$ , and  $c$  if and only if  $a^2 + b^2 = c^2$ .

29. The biconditional is false. A rectangle does not necessarily have four congruent sides.

30. [1] Angle Addition Postulate

[2] Division Property of Equality


31. Transitive Property of Congruence

32. [1]  $m\angle 1 = 135^\circ$

[2] Definition of supplementary angles

[3] Subtraction Property of Equality

33. [1]  $m\angle 3 + m\angle 4 = 90^\circ$   
 [2] Substitution Property  
 [3] Subtraction Property of Equality

34. 

35. 35 words per minute

36. 175

37.  $8x + 3 = 12$

38. 19

39. 37

40. **a.** Angle Addition Postulate  
**b.** Substitution Property  
**c.** Distributive Property  
**d.** Simplify  
**e.** Addition Property of Equality  
**f.** Division Property of Equality

41. **a.** Segment Addition Postulate  
**b.** Substitution  
**c.** Simplify  
**d.** Subtraction Property of Equality  
**e.** Division Property of Equality

42.

$p$	$q$	$r$	$\sim q$	$r \wedge \sim q$
$T$	$T$	$T$	$F$	$F$
$T$	$T$	$F$	$F$	$F$
$T$	$F$	$T$	$T$	$T$
$T$	$F$	$F$	$T$	$F$
$F$	$T$	$T$	$F$	$F$
$F$	$T$	$F$	$F$	$F$
$F$	$F$	$T$	$T$	$T$
$F$	$F$	$F$	$T$	$F$