

Ch 2 Study Guide**Multiple Choice**

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

- _____ 1. Which statement is a counterexample for the following conditional?
If you live in Springfield, then you live in Illinois.
- Sara Lucas lives in Springfield.
 - Jonah Lincoln lives in Springfield, Illinois.
 - Billy Jones lives in Chicago, Illinois.
 - Erin Naismith lives in Springfield, Massachusetts.
- _____ 2. Which conditional has the same truth value as its converse?
- If $x = 7$, then $|x| = 7$.
 - If a figure is a square, then it has four sides.
 - If $x - 17 = 4$, then $x = 21$.
 - If an angle has a measure of 80, then it is acute.
- _____ 3. Which statement is the Law of Detachment?
- If $p \rightarrow q$ is a true statement and q is true, then p is true.
 - If $p \rightarrow q$ is a true statement and q is true, then $q \rightarrow p$ is true.
 - If $p \rightarrow q$ and $q \rightarrow r$ are true, then $p \rightarrow r$ is a true statement.
 - If $p \rightarrow q$ is a true statement and p is true, then q is true.
- _____ 4. Which statement is the Law of Syllogism?
- If $p \rightarrow q$ is a true statement and p is true, then q is true.
 - If $p \rightarrow q$ is a true statement and q is true, then p is true.
 - If $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $p \rightarrow r$ is a true statement.
 - If $p \rightarrow q$ and $q \rightarrow r$ are true statements, then $r \rightarrow p$ is a true statement.
- _____ 5. Which statement is an example of the Addition Property of Equality?
- | | |
|--|--------------------------------------|
| a. If $p = q$ then $p \cdot s = q \cdot s$. | c. If $p = q$ then $p - s = q - s$. |
| b. If $p = q$ then $p + s = q + s$. | d. $p = q$ |

Short Answer

6. Based on the pattern, what are the next two terms of the sequence?
9, 15, 21, 27, . . .
7. Based on the pattern, what are the next two terms of the sequence?
 $5, \frac{5}{3}, \frac{5}{9}, \frac{5}{27}, \frac{5}{81}, \dots$

8. What conjecture can you make about the sum of the first 10 positive even numbers?
- $$\begin{aligned}2 &= 2 = 1 \cdot 2 \\2 + 4 &= 6 = 2 \cdot 3 \\2 + 4 + 6 &= 12 = 3 \cdot 4 \\2 + 4 + 6 + 8 &= 20 = 4 \cdot 5 \\2 + 4 + 6 + 8 + 10 &= 30 = 5 \cdot 6\end{aligned}$$
9. 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.
10. What is a counterexample for the conjecture?
Conjecture: Any number that is divisible by 4 is also divisible by 8.
11. Identify the hypothesis and conclusion of this conditional statement:
If two lines intersect at right angles, then the two lines are perpendicular.
12. Write this statement as a conditional in *if-then* form:
All triangles have three sides.
13. Draw a Venn diagram to illustrate this conditional:
Cars are motor vehicles.
14. What is the converse of the following conditional?
If a point is in the first quadrant, then its coordinates are positive.
15. For the following true conditional statement, write the converse. If the converse is also true, combine the statements as a biconditional.
If $x = 3$, then $x^2 = 9$.
16. 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 an angle is a right angle, its measure is 90.
If an angle measure is 90, the angle is a right angle.
17. 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.
18. Use the Law of Syllogism to draw a conclusion from the two given statements.
If two lines intersect and form right angles, then the lines are perpendicular.
If two lines are perpendicular, then they intersect and form 90° angles.

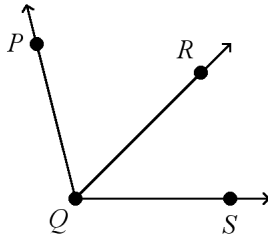
19. Use the Law of Detachment and the Law of Syllogism to draw a conclusion from the three given statements.

If it is Friday night, then there is a football game.

If there is a football game, then Josef is wearing his school colors.

It is Friday night.

20. What is the value of x ? Identify the missing justifications.
 $m\angle PQR = x + 7$, $m\angle SQR = x + 3$, and $m\angle PQS = 100$.



Drawing not to scale

$$m\angle PQR + m\angle SQR = m\angle PQS$$

$$x + 7 + x + 3 = 100$$

$$2x + 10 = 100$$

$$2x = 90$$

$$x = 45$$

a. _____

b. Substitution Property

c. Simplify

d. _____

e. Division Property of Equality

21. \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.

22. Transitive Property of Congruence

If $\overline{CD} \cong \overline{EF}$ and $\overline{EF} \cong \overline{GH}$, then _____.

23. Multiplication Property of Equality

If $6x \div 8 = 40$, then _____.

24. Substitution Property of Equality

If $y = 3$ and $8x + y = 12$, then _____.

25. Name the Property of Congruence that justifies the statement:

If $\overline{XY} \cong \overline{WX}$, then $\overline{WX} \cong \overline{XY}$.

26. Name the Property of Congruence that justifies this statement:

If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.

27. Complete the two-column proof.

Given: $\frac{x}{6} + 2 = 15$

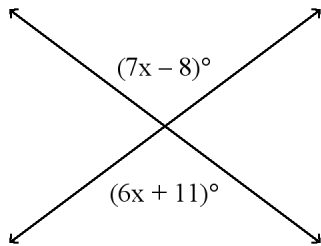
Prove: $x = 78$

$\frac{x}{6} + 2 = 15$ a. _____

$\frac{x}{6} = 13$ b. _____

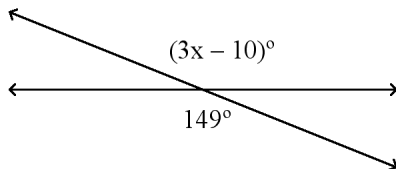
$x = 78$ c. _____

28. What is the value of x ?



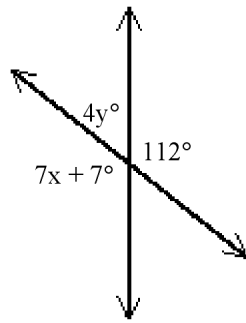
Drawing not to scale

29. What is the value of x ?



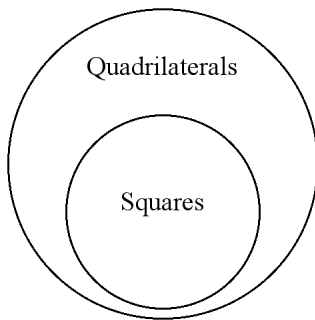
Drawing not to scale

30. Find the values of x and y .



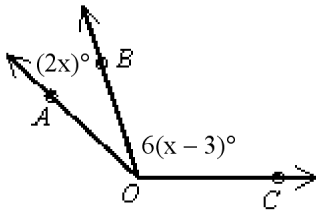
Drawing not to scale

31. 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.
32. Write the conditional statement that the Venn diagram illustrates.



33. Write the converse of the statement. If the converse is true, write *true*; if not true, provide a counterexample.
If $x = 4$, then $x^2 = 16$.

34. What is the value of x ? Identify the missing justifications.



Drawing not to scale

$$m\angle AOC = 150$$

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

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

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

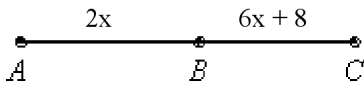
$$8x - 18 = 150 \quad \text{d. } \underline{\hspace{2cm}}$$

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

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

35. What is the value of x ? Justify each step.

$$AC = 32$$



Drawing not to scale

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

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

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

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

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

Essay

36. What are the converse, inverse, and contrapositive of the following true conditional? What are the truth values of each? If a statement is false, give a counterexample.
If a figure is a rectangle, then it is a parallelogram.

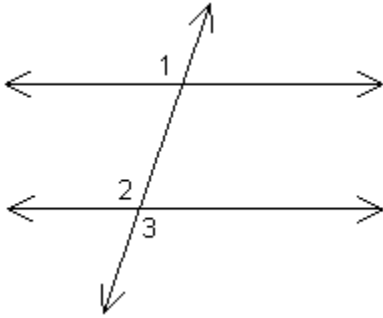
Name: _____

ID: A

37. Complete the two-column proof.

Given: $\angle 1 \cong \angle 2$, $m\angle 1 = 130$

Prove: $m\angle 3 = 130$



Drawing not to scale

$\angle 1 \cong \angle 2$, $m\angle 1 = 130$ a. _____

$m\angle 2 = 130$ b. _____

$m\angle 2 = m\angle 3$ c. _____

$m\angle 3 = 130$ d. _____

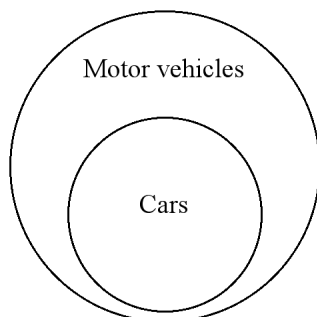
Ch 2 Study Guide Answer Section

MULTIPLE CHOICE

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

SHORT ANSWER

6. 33, 39
7. $\frac{5}{243}, \frac{5}{729}$
8. The sum is $10 \cdot 11$.
9. 35 words per minute
10. 12
11. Hypothesis: Two lines intersect at right angles.
Conclusion: The two lines are perpendicular.
12. If a figure is a triangle, then it has three sides.
- 13.



14. If the coordinates of a point are positive, then the point is in the first quadrant.
15. If $x^2 = 9$, then $x = 3$. False
16. Both statements are true. An angle is a right angle if (and only if) its measure is 90.
17. $m\angle P = m\angle Q$
18. If two lines intersect and form right angles, then they intersect and form 90° angles.
19. Josef is wearing his school colors.
20. Angle Addition Postulate; Subtraction Property of Equality
21. 175
22. $\overline{CD} \cong \overline{GH}$
23. $6x = 320$
24. $8x + 3 = 12$
25. Symmetric Property

26. Transitive Property
27. a. Given
b. Subtraction Property of Equality
c. Multiplication Property of Equality
28. 19
29. 53
30. $x = 15, y = 17$
31. If an angle has a measure of 90, then it is a right angle.
True
32. If a figure is a square, then it is a quadrilateral.
33. If $x^2 = 16$, then $x = 4$. False; if $x^2 = 16$, then x can be equal to -4 .
34. a. Angle Addition Postulate
b. Substitution Property
c. Distributive Property
d. Simplify
e. Addition Property of Equality
f. Division Property of Equality
35. a. Segment Addition Postulate
b. Substitution
c. Simplify
d. Subtraction Property of Equality
e. Division Property of Equality

ESSAY

36. Converse:
If a figure is a parallelogram, then it is a rectangle.
The converse is false. A parallelogram that does not have four 90° angles is not a rectangle.
- Inverse:
If a figure is not a rectangle, then it is not a parallelogram.
The inverse is false. A parallelogram with angles that are not all 90° angles is not a rectangle, but it is a parallelogram.
- Contrapositive:
If a figure is not a parallelogram, then it is not a rectangle.
The contrapositive is true.
37. [4] a. Given
b. Substitution Property
c. Vertical Angles Theorem
d. Substitution Property
- [3] three parts correct
- [2] two parts correct
- [1] one part correct