

Check for Understanding

- Concept Check**
- OPEN ENDED** Write an example to illustrate the correct use of the Law of Detachment.
 - Explain** how the Transitive Property of Equality is similar to the Law of Syllogism.
 - FIND THE ERROR** An article in a magazine states that if you get seasick, then you will get dizzy. It also says that if you get seasick, you will get an upset stomach. Suzanne says that this means that if you get dizzy, then you will get an upset stomach. Lakeisha says that she is wrong. Who is correct? Explain.

Guided Practice Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

If two angles are vertical angles, then they are congruent.

- Given:** $\angle A$ and $\angle B$ are vertical angles.
Conclusion: $\angle A \cong \angle B$
- Given:** $\angle C \cong \angle D$
Conclusion: $\angle C$ and $\angle D$ are vertical angles.

Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements. If a valid conclusion is possible, write it. If not, write *no conclusion*.

- If you are 18 years old, you are in college.
You are in college.
- The midpoint divides a segment into two congruent segments.
If two segments are congruent, then their measures are equal.

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*.

- (1) If Molly arrives at school at 7:30 A.M., she will get help in math.
(2) If Molly gets help in math, then she will pass her math test.
(3) If Molly arrives at school at 7:30 A.M., then she will pass her math test.
- (1) Right angles are congruent.
(2) $\angle X \cong \angle Y$
(3) $\angle X$ and $\angle Y$ are right angles.

Application **INSURANCE** For Exercises 10 and 11, use the following information. An insurance company advertised the following monthly rates for life insurance.

If you are a:	Premium for \$30,000 Coverage	Premium for \$50,000 Coverage
Female, age 35.....	\$14.35.....	\$19.00
Male, age 35.....	\$16.50.....	\$21.63
Female, age 45.....	\$21.63.....	\$25.85
Male, age 45.....	\$23.75.....	\$28.90

- If Ann is 35 years old and she wants to purchase \$30,000 of insurance from this company, then what is her premium?
- If Terry paid \$21.63 for life insurance, can you conclude that Terry is 35? Explain.

Practice and Apply

Homework Help

For Exercises	See Examples
12–19	1
20–23	2
24–29	3

Extra Practice
See page 757.

For Exercises 12–19, determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.

If two numbers are odd, then their sum is even.

12. **Given:** The sum of two numbers is 22.
Conclusion: The two numbers are odd.
13. **Given:** The numbers are 5 and 7.
Conclusion: The sum is even.
14. **Given:** 11 and 23 are added together.
Conclusion: The sum of 11 and 23 is even.
15. **Given:** The numbers are 2 and 6.
Conclusion: The sum is odd.

If three points are noncollinear, then they determine a plane.

16. **Given:** A , B , and C are noncollinear.
Conclusion: A , B , and C determine a plane.
17. **Given:** E , F , and G lie in plane M .
Conclusion: E , F , and G are noncollinear.
18. **Given:** P and Q lie on a line.
Conclusion: P and Q determine a plane.
19. **Given:** $\triangle XYZ$
Conclusion: X , Y , and Z determine a plane.

Use the Law of Syllogism to determine whether a valid conclusion can be reached from each set of statements. If a valid conclusion is possible, write it. If not, write *no conclusion*.

20. If you spend money on it, then it is a business.
If you spend money on it, then it is fun.
21. If the measure of an angle is less than 90 , then it is acute.
If an angle is acute, then it is not obtuse.
22. If X is the midpoint of segment YZ , then $YX = XZ$.
If the measures of two segments are equal, then they are congruent.
23. If two lines intersect to form a right angle, then they are perpendicular.
Lines ℓ and m are perpendicular.

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*.

24. (1) In-line skaters live dangerously.
(2) If you live dangerously, then you like to dance.
(3) If you are an in-line skater, then you like to dance.
25. (1) If the measure of an angle is greater than 90 , then it is obtuse.
(2) $m\angle ABC > 90$
(3) $\angle ABC$ is obtuse.
26. (1) Vertical angles are congruent.
(2) $\angle 3 \cong \angle 4$
(3) $\angle 3$ and $\angle 4$ are vertical angles.
27. (1) If an angle is obtuse, then it cannot be acute.
(2) $\angle A$ is obtuse.
(3) $\angle A$ cannot be acute.



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*.

28. (1) If you drive safely, then you can avoid accidents.
(2) Tika drives safely.
(3) Tika can avoid accidents.

29. (1) If you are a customer, then you are always right.
(2) If you are a teenager, then you are always right.
(3) If you are a teenager, then you are a customer.

- 30. **LITERATURE** John Steinbeck, a Pulitzer Prize winning author, lived in Monterey, California, for part of his life. In 1945, he published the book, *Cannery Row*, about many of his local working-class heroes from Monterey. If you visited Cannery Row in Monterey during the 1940s, then you could hear the grating noise of the fish canneries. Write a valid conclusion to the following hypothesis. *If John Steinbeck lived in Monterey in 1941, . . .*

31. **SPORTS** In the 2002 Winter Olympics, Canadian speed skater Catriona Le May Doan won her second Olympic title in 500-meter speed skating. Ms. Doan was in the last heat for the second round of that race. Use the two true conditional statements to reach a valid conclusion about Ms. Doan's 2002 competition.

- (1) If Catriona Le May Doan skated her second 500 meters in 37.45 seconds, then she would beat the time of Germany's Monique Garbrecht-Enfeldt.
(2) If Ms. Doan beat the time of Monique Garbrecht-Enfeldt, then she would win the race.

-  **Online Research Data Update** Use the Internet or another resource to find the winning times for other Olympic events. Write statements using these times that can lead to a valid conclusion. Visit www.geometryonline.com/data_update to learn more.

32. **CRITICAL THINKING** An advertisement states that "If you like to ski, then you'll love Snow Mountain Resort." Stacey likes to ski, but when she went to Snow Mountain Resort, she did not like it very much. If you know that Stacey saw the ad, explain how her reasoning was flawed.

33. **WRITING IN MATH** Answer the question that was posed at the beginning of the lesson.

How does deductive reasoning apply to health?

Include the following in your answer:

- an explanation of how doctors may use deductive reasoning to prescribe medicine, and
- an example of a doctor's uses of deductive reasoning to diagnose an illness, such as strep throat or chickenpox.

EOC Practice

Standardized Test Practice

A B C D

34. Based on the following statements, which statement must be true?
I If Yasahiro is an athlete and he gets paid, then he is a professional athlete.
II Yasahiro is not a professional athlete.
III Yasahiro is an athlete.
(A) Yasahiro is an athlete and he gets paid.
(B) Yasahiro is a professional athlete or he gets paid.
(C) Yasahiro does not get paid.
(D) Yasahiro is not an athlete.

More About . . .



Literature

The Pulitzer Prize is awarded annually for outstanding contributions in the fields of journalism, literature, drama, and music.

Source: www.pulitzer.org

35. **ALGEBRA** At a restaurant, a diner uses a coupon for 15% off the cost of one meal. If the diner orders a meal regularly priced at \$16 and leaves a tip of 20% of the discounted meal, how much does she pay in total?
 (A) \$15.64 (B) \$16.32 (C) \$16.80 (D) \$18.72

Maintain Your Skills

Mixed Review **ADVERTISING** For Exercises 36–38, use the following information. (Lesson 2-3)

Advertising writers frequently use if-then statements to relay a message and promote their product. An ad for a type of Mexican food reads, *If you're looking for a fast, easy way to add some fun to your family's menu, try Casa Fiesta.*

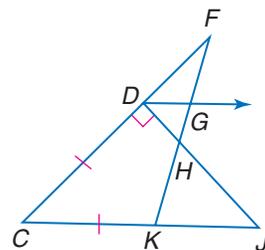
36. Write the converse of the conditional.
 37. What do you think the advertiser wants people to conclude about Casa Fiesta products?
 38. Does the advertisement say that Casa Fiesta adds fun to your family's menu?

Construct a truth table for each compound statement. (Lesson 2-2)

39. $q \wedge r$ 40. $\sim p \vee r$ 41. $p \wedge (q \vee r)$ 42. $p \vee (\sim q \wedge r)$

For Exercises 43–47, refer to the figure at the right. (Lesson 1-5)

43. Which angle is complementary to $\angle FDG$?
 44. Name a pair of vertical angles.
 45. Name a pair of angles that are noncongruent and supplementary.
 46. Identify $\angle FDH$ and $\angle CDH$ as *congruent*, *adjacent*, *vertical*, *complementary*, *supplementary*, and/or a *linear pair*.
 47. Can you assume that $\overline{DC} \cong \overline{CK}$? Explain.



Use the Pythagorean Theorem to find the distance between each pair of points. (Lesson 1-3)

48. $A(1, 5), B(-2, 9)$ 49. $C(-4, -2), D(2, 6)$
 50. $F(7, 4), G(1, 0)$ 51. $M(-5, 0), N(4, 7)$

For Exercises 52–55, draw and label a figure for each relationship. (Lesson 1-1)

52. \overline{FG} lies in plane \mathcal{M} and contains point H .
 53. Lines r and s intersect at point W .
 54. Line ℓ contains P and Q , but does not contain R .
 55. Planes \mathcal{A} and \mathcal{B} intersect in line n .

**Getting Ready for
the Next Lesson**

PREREQUISITE SKILL Write what you can assume about the segments or angles listed for each figure. (To review information from figures, see Lesson 1-5.)

56. $\overline{AM}, \overline{CM}, \overline{CN}, \overline{BN}$ 57. $\angle 1, \angle 2$ 58. $\angle 4, \angle 5, \angle 6$

