

GUIDED PRACTICE

Vocabulary Check ✓

1. If the statements $p \rightarrow q$ and $q \rightarrow r$ are true, then the statement $p \rightarrow r$ is true by the Law of ____? _____. If the statement $p \rightarrow q$ is true and p is true, then q is true by the Law of ____? ____.

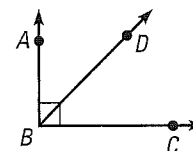
Concept Check ✓

2. State whether the following argument uses inductive or deductive reasoning: "If it is Friday, then Kendra's family has pizza for dinner. Today is Friday, therefore, Kendra's family will have pizza for dinner."

Skill Check ✓

3. Given the notation for a conditional statement is $p \rightarrow q$, what statement is represented by $q \rightarrow p$?
4. A conditional statement is defined in symbolic notation as $p \rightarrow q$. Use symbolic notation to write the inverse of $p \rightarrow q$.
5. Write the contrapositive of the following statement: "If you don't enjoy scary movies, then you wouldn't have liked this one."

6. If a ray bisects a right angle, then the congruent angles formed are complementary. In the diagram, $\angle ABC$ is a right angle. Are $\angle ABD$ and $\angle CBD$ complementary? Explain your reasoning.



7. If $f \rightarrow g$ and $g \rightarrow h$ are true statements, and f is true, does it follow that h is true? Explain.

PRACTICE AND APPLICATIONS

STUDENT HELP

Extra Practice

to help you master skills is on p. 805.

WRITING STATEMENTS Using p and q below, write the symbolic statement in words.

p : Points X , Y , and Z are collinear.

q : Points X , Y , and Z lie on the same line.

8. $q \rightarrow p$ 9. $\sim q$ 10. $\sim p$
 11. $\sim p \rightarrow \sim q$ 12. $p \leftrightarrow q$ 13. $\sim q \rightarrow \sim p$

WRITING INVERSE AND CONTRAPOSITIVE Given that the statement is of the form $p \rightarrow q$, write p and q . Then write the inverse and the contrapositive of $p \rightarrow q$ both symbolically and in words.

14. If Jed gets a C on the exam, then he will get an A for the quarter.
 15. If Alberto finds a summer job, then he will buy a car.
 16. If the fuse has blown, then the light will not go on.
 17. If the car is running, then the key is in the ignition.
 18. If you dial 911, then there is an emergency.
 19. If Gina walks to the store, then she will buy a newspaper.
 20. If it is not raining, then Petra will ride her bike to school.

STUDENT HELP

HOMEWORK HELP

Example 1: Exs. 8–13

Example 2: Exs. 14–20

Example 3: Exs. 21, 22

Example 4: Exs. 23–25

Example 5: Exs. 30–48

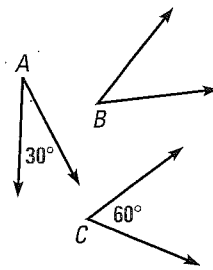
Example 6: Exs. 30–48

LOGICAL REASONING Decide whether *inductive* or *deductive* reasoning is used to reach the conclusion. Explain your reasoning.

21. For the past three Wednesdays the cafeteria has served macaroni and cheese for lunch. Dana concludes that the cafeteria will serve macaroni and cheese for lunch this Wednesday.
22. If you live in Nevada and are between the ages of 16 and 18, then you must take driver's education to get your license. Marcus lives in Nevada, is 16 years old, and has his driver's license. Therefore, Marcus took driver's education.

USING THE LAW OF DETACHMENT State whether the argument is valid. Explain your reasoning.

23. If the sum of the measures of two angles is 90° , then the two angles are complementary. Because $m\angle A + m\angle C = 90^\circ$, $\angle A$ and $\angle C$ are complementary.



24. If two adjacent angles form a right angle, then the two angles are complementary. Because $\angle A$ and $\angle C$ are complementary, $\angle A$ and $\angle C$ are adjacent.
25. If $\angle A$ and $\angle C$ are acute angles, then any angle whose measure is between the measures of $\angle A$ and $\angle C$ is also acute. In the diagram above it is shown that $m\angle A \leq m\angle B \leq m\angle C$, so $\angle B$ must be acute.

USING ALGEBRA State whether any conclusions can be made using the true statement, given that $x = 3$.

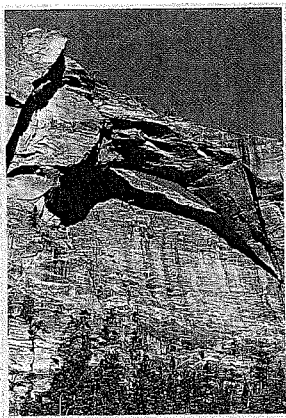
26. If $x > 2x - 10$, then $x = y$.
27. If $2x + 3 < 4x < 5x$, then $y \leq x$.
28. If $4x \geq 12$, then $y = 6x$.
29. If $x + 3 = 10$, then $y = x$.

MAKING CONCLUSIONS Use the Law of Syllogism to write the statement that follows from the pair of true statements.

30. If the sun is shining, then it is a beautiful day.
If it is a beautiful day, then we will have a picnic.
31. If the stereo is on, then the volume is loud.
If the volume is loud, then the neighbors will complain.
32. If Ginger goes to the movies, then Marta will go to the movies.
If Yumi goes to the movies, then Ginger will go to the movies.

USING DEDUCTIVE REASONING Select the word that makes the concluding statement true.

33. The Oak Terrace apartment building does not allow dogs. Serena lives at Oak Terrace. So, Serena (must, may, may not) keep a dog.
34. The Kolob Arch is the world's widest natural arch. The world's widest arch is in Zion National Park. So, the Kolob Arch (is, may be, is not) in Zion.
35. Zion National Park is in Utah. Jeremy spent a week in Utah. So, Jeremy (must have, may have, never) visited Zion National Park.



The Kolob Arch mentioned in Ex. 34, spans 310 feet.

USING THE LAWS OF LOGIC In Exercises 36–42, use the diagram to give a reason for each true statement. In the diagram, $m\angle 2 = 115^\circ$, $\angle 1 \cong \angle 4$, $\angle 3 \cong \angle 5$.

36. $p_1: m\angle 2 = 115^\circ$

37. $p_1 \rightarrow p_2$: If $m\angle 2 = 115^\circ$, then $m\angle 1 = 65^\circ$.

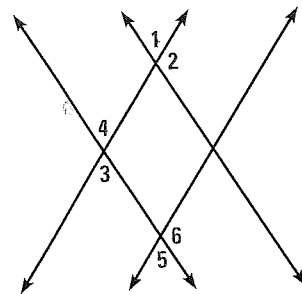
38. $p_2 \rightarrow p_3$: If $m\angle 1 = 65^\circ$, then $m\angle 4 = 65^\circ$.

39. $p_3 \rightarrow p_4$: If $m\angle 4 = 65^\circ$, then $m\angle 3 = 65^\circ$.

40. $p_4 \rightarrow p_5$: If $m\angle 3 = 65^\circ$, then $m\angle 5 = 65^\circ$.

41. $p_5 \rightarrow p_6$: If $m\angle 5 = 65^\circ$, then $m\angle 6 = 115^\circ$.

42. $p_1 \rightarrow p_6$: If $m\angle 2 = 115^\circ$, then $m\angle 6 = 115^\circ$.



43. **Writing** Describe a time in your life when you use deductive reasoning.

44. **CRITICAL THINKING** Describe an instance where inductive reasoning can lead to an incorrect conclusion.

LOGICAL REASONING In Exercises 45–48, use the true statements to determine whether the conclusion is *true* or *false*. Explain your reasoning.

- If Diego goes shopping, then he will buy a pretzel.
- If the mall is open, then Angela and Diego will go shopping.
- If Angela goes shopping, then she will buy a pizza.
- The mall is open.

45. Diego bought a pretzel.

46. Angela and Diego went shopping.

47. Angela bought a pretzel.

48. Diego had some of Angela's pizza.

49. **ROBOTICS** Because robots can withstand higher temperatures than humans, a fire-fighting robot is under development. Write the following statements about the robot in order. Then use the Law of Syllogism to complete the statement, "If there is a fire, then ?."

- A. If the robot sets off a fire alarm, then it concludes there is a fire.
- B. If the robot senses high levels of smoke and heat, then it sets off a fire alarm.
- C. If the robot locates the fire, then the robot extinguishes the fire.
- D. If there is a fire, then the robot senses high levels of smoke and heat.
- E. If the robot concludes there is a fire, then it locates the fire.

50. **DOGS** Use the true statements to form other conditional statements.

- A. If a dog is a gazehound, then it hunts by sight.
- B. If a hound bays (makes long barks while hunting), then it is a scent hound.
- C. If a dog is a foxhound, then it does not hunt primarily by sight.
- D. If a dog is a coonhound, then it bays when it hunts.
- E. If a dog is a greyhound, then it is a gazehound.

STUDENT HELP

INTERNET **HOMEWORK HELP**
Visit our Web site
www.mcdougallittell.com
for help with problem
solving in Exs. 45–48.