

Check for Understanding

- Concept Check**
1. **Explain** why writing a conditional statement in if-then form is helpful.
 2. **OPEN ENDED** Write an example of a conditional statement.
 3. **Compare and contrast** the inverse and contrapositive of a conditional.

Guided Practice Identify the hypothesis and conclusion of each statement.

4. If it rains on Monday, then I will stay home.
5. If $x - 3 = 7$, then $x = 10$.
6. If a polygon has six sides, then it is a hexagon.

Write each statement in if-then form.

7. A 32-ounce pitcher holds a quart of liquid.
8. The sum of the measures of supplementary angles is 180.
9. An angle formed by perpendicular lines is a right angle.

Determine the truth value of the following statement for each set of conditions.

If you drive faster than 65 miles per hour on the interstate, then you will receive a speeding ticket.

10. You drive 70 miles per hour, and you receive a speeding ticket.
11. You drive 62 miles per hour, and you do not receive a speeding ticket.
12. You drive 68 miles per hour, and you do not receive a speeding ticket.

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

Determine whether each related conditional is *true* or *false*. If a statement is false, find a counterexample.

13. If plants have water, then they will grow.
14. Flying in an airplane is safer than riding in a car.

- Application**
15. **FORESTRY** In different regions of the country, different variations of trees dominate the landscape. In Colorado, aspen trees cover high areas of the mountains. In Florida, cypress trees rise from swamps. In Vermont, maple trees are prevalent. Write these conditionals in if-then form.

Practice and Apply

Homework Help

For Exercises	See Examples
16–21	1
22–27	2
28–39	3
40–45	4

Extra Practice
See page 756.

Identify the hypothesis and conclusion of each statement.

16. If $2x + 6 = 10$, then $x = 2$.
17. If you are a teenager, then you are at least 13 years old.
18. If you have a driver's license, then you are at least 16 years old.
19. If three points lie on a line, then they are collinear.
20. "If a man hasn't discovered something that he will die for, he isn't fit to live."
(Martin Luther King, Jr., 1963)
21. If the measure of an angle is between 0 and 90, then the angle is acute.

Write each statement in if-then form.

22. Get a free visit with a one-year fitness plan.
23. Math teachers love to solve problems.
24. "I think, therefore I am." (Descartes)
25. Adjacent angles have a common side.
26. Vertical angles are congruent.
27. Equiangular triangles are equilateral.

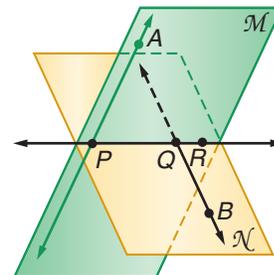
Determine the truth value of the following statement for each set of conditions.

If you are over 18 years old, then you vote in all elections.

28. You are 19 years old and you vote.
29. You are 16 years old and you vote.
30. You are 21 years old and do not vote.
31. You are 17 years old and do not vote.
32. Your sister is 21 years old and votes.
33. Your dad is 45 years old and does not vote.

In the figure, P , Q , and R are collinear, P and A lie in plane \mathcal{M} , and Q and B lie in plane \mathcal{N} . Determine the truth value of each statement.

34. P , Q , and R lie in plane \mathcal{M} .
35. \overline{QB} lies in plane \mathcal{N} .
36. Q lies in plane \mathcal{M} .
37. P , Q , A , and B are coplanar.
38. \overline{AP} contains Q .
39. Planes \mathcal{M} and \mathcal{N} intersect at \overline{RQ} .



Write the converse, inverse, and contrapositive of each conditional statement. Determine whether each related conditional is *true* or *false*. If a statement is false, find a counterexample.

40. If you live in Dallas, then you live in Texas.
41. If you exercise regularly, then you are in good shape.
42. The sum of two complementary angles is 90.
43. All rectangles are quadrilaterals.
44. All right angles measure 90.
45. Acute angles have measures less than 90.

SEASONS For Exercises 46 and 47, use the following information.

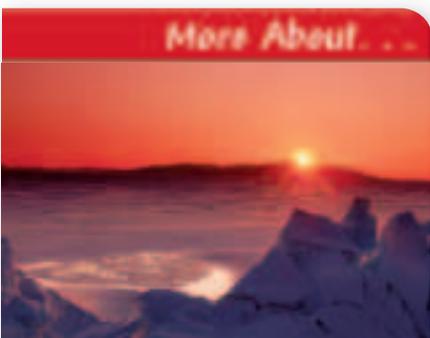
Due to the movement of Earth around the sun, summer days in Alaska have more hours of daylight than darkness, and winter days have more hours of darkness than daylight.

46. Write two true conditional statements in if-then form for summer days and winter days in Alaska.
47. Write the converse of the two true conditional statements. State whether each is *true* or *false*. If a statement is false, find a counterexample.
48. **CRITICAL THINKING** Write a false conditional statement. Is it possible to insert the word *not* into your conditional to make it true? If so, write the true conditional.
49. **WRITING IN MATH** Answer the question that was posed at the beginning of the lesson.

How are conditional statements used in advertisements?

Include the following in your answer:

- an example of a conditional statement in if-then form, and
- an example of a conditional statement that is not in if-then form.



Seasons

At the poles, sunlight may shine continuously for six months during spring and summer, but never rises more than 23.5° above the horizon. During the other six months of the year, the poles are in darkness.

Source: U.S. Geological Survey



50. Which statement has the same truth value as the following statement?
If Ava and Willow are classmates, then they go to the same school.
- (A) If Ava and Willow go to the same school, then they are classmates.
(B) If Ava and Willow are not classmates, then they do not go to the same school.
(C) If Ava and Willow do not go to the same school, then they are not classmates.
(D) If Ava and Willow go to the same school, then they are not classmates.
51. **ALGEBRA** In a history class with 32 students, the ratio of girls to boys is 5 to 3. How many more girls are there than boys?
- (A) 2 (B) 8 (C) 12 (D) 20

Maintain Your Skills

Mixed Review Use the following statements to write a compound statement for each conjunction and disjunction. Then find its truth value. (Lesson 2-2)

p : George Washington was the first president of the United States.

q : A hexagon has five sides.

r : $60 \times 3 = 18$

52. $p \wedge q$ 53. $q \vee r$ 54. $p \vee q$
55. $\sim q \vee r$ 56. $p \wedge \sim q$ 57. $\sim p \wedge \sim r$

Make a conjecture based on the given information. Draw a figure to illustrate your conjecture. (Lesson 2-1)

58. $ABCD$ is a rectangle. 59. In $\triangle FGH$, $m\angle F = 45$, $m\angle G = 67$, $m\angle H = 68$.
60. $J(-3, 2)$, $K(1, 8)$, $L(5, 2)$ 61. In $\triangle PQR$, $m\angle PQR = 90$

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

62. $C(-2, -1)$, $D(0, 3)$ 63. $J(-3, 5)$, $K(1, 0)$
64. $P(-3, -1)$, $Q(2, -3)$ 65. $R(1, -7)$, $S(-4, 3)$

Getting Ready for the Next Lesson

PREREQUISITE SKILL Identify the operation used to change Equation (1) to Equation (2). (To review solving equations, see pages 737 and 738.)

66. (1) $3x + 4 = 5x - 8$ 67. (1) $\frac{1}{2}(a - 5) = 12$ 68. (1) $8p = 24$
(2) $3x = 5x - 12$ (2) $\frac{1}{a} - 5 = 24$ (2) $p = 3$

Practice Quiz 1

Lessons 2-1 through 2-3

Determine whether each conjecture is *true* or *false*. Give a counterexample for any false conjecture. (Lesson 2-1)

1. **Given:** $WX = XY$ 2. **Given:** $\angle 1$ and $\angle 2$ are complementary.
Conjecture: W , X , and Y are collinear. $\angle 2$ and $\angle 3$ are complementary.
Conjecture: $m\angle 1 = m\angle 3$

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

3. $\sim p \wedge q$ 4. $p \vee (q \wedge r)$
5. Write the converse, inverse, and contrapositive of the following conditional statement. Determine whether each related conditional is *true* or *false*. If a statement is false, find a counterexample. (Lesson 2-3)
If two angles are adjacent, then the angles have a common vertex.