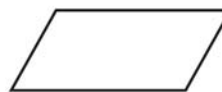


A **counterexample** is an example that shows that a statement is false.

EXAMPLE

Tell whether the statement is *true* or *false*. If false, give a counterexample.

- a. If a polygon has four sides and opposite sides are parallel, then it is a rectangle.
 - ▶ False. A counterexample is the parallelogram shown.
- b. If $x^2 = 49$, then $x = 7$.
 - ▶ False. A counterexample is $x = -7$, because $(-7)^2 = 49$.

**PRACTICE**

Rewrite the conditional statement in if-then form. Then write its converse and tell whether the converse is *true* or *false*.

1. The graph of the equation $y = mx + b$ is a line.
2. You will earn \$35 for working 5 hours.
3. Abby can go swimming if she finishes her homework.
4. In a right triangle, the sum of the squares of the lengths of the legs equals the square of the length of the hypotenuse.
5. $x = 5$ when $4x + 8 = 28$.
6. The sum of two even numbers is an even number.

Tell whether the biconditional statement is *true* or *false*. *Explain*.

7. Two lines are perpendicular if and only if they intersect to form a right angle.
8. $x^3 = 27$ if and only if $x = 3$.
9. A vegetable is a carrot if and only if it is orange.
10. A rhombus is a square if and only if it has four right angles.
11. The graph of a function is a parabola if and only if the function is $y = x^2$.
12. An integer is odd if and only if it is not even.

Tell whether the statement is *true* or *false*. If false, give a counterexample.

13. If an integer is not negative, then it is positive.
14. If you were born in the summer, then you were born in July.
15. If a polygon has exactly 5 congruent sides, then the polygon is a pentagon.
16. If $x = -6$, then $x^2 = 36$.
17. If B is 6 inches from A and 8 inches from C , then A is 14 inches from C .
18. If a triangle is isosceles, then it is obtuse.
19. If Charlie has \$1.00 in coins, then he has four quarters.
20. If you are in Montana, then you are in the United States.