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Practice

Form G

Biconditionals and Definitions

Each conditional statement below is true. Write its converse. If the converse is also true, combine the statements as a biconditional.

1. If a number is divisible by 2, then the number is even.
Converse: If a number is even, then the number is divisible by 2; Biconditional: A number is divisible by 2 if and only if it is even.
2. If two angles have the same measure, then the angles are congruent.
Converse: If two angles are congruent, then the two angles have the same measure; Biconditional: Two angles have the same measure if and only if they are congruent.
3. If $x > 5$, then $|x| > 5$.
Converse: If $|x| > 5$, then $x > 5$.
4. If a closed figure is a pentagon, then it has exactly five sides.
Converse: If a closed figure has exactly five sides, then it is a pentagon; Biconditional: A closed figure is a pentagon if and only if it has exactly five sides.
5. If two numbers are both even, then the sum of the two numbers is even.
Converse: If the sum of two numbers is even, then the numbers are both even.

Write the two statements that form each biconditional.

6. Two lines are perpendicular if and only if they intersect to form four right angles.
If two lines are perpendicular, then they intersect to form four right angles. If two lines intersect to form four right angles, then the two lines are perpendicular.
7. A whole number is divisible by 3 if and only if the sum of the digits of the whole number is divisible by 3.
If a whole number is divisible by 3, then the sum of the digits of the whole number is divisible by 3. If the sum of the digits of a whole number is divisible by 3, then the whole number is divisible by 3.
8. A whole number is an odd number if and only if it is not divisible by 2.
If a whole number is an odd number, then it is not divisible by 2. If a whole number is not divisible by 2, then it is an odd number.
9. A person lives in Alaska if and only if the person lives in the northernmost state in the United States.
If a person lives in Alaska, then the person lives in the northernmost state in the United States. If a person lives in the northernmost state in the United States, then the person lives in Alaska.

2-3

Practice (continued)

Form G

Biconditionals and Definitions

Test each statement below to see if it is reversible. If so, write it as a true biconditional. If not, write *not reversible*.

10. If a quadrilateral is a square, then the quadrilateral has four congruent angles.
not reversible
11. An isosceles triangle is a triangle with two congruent angles.
Reversible; a triangle has two congruent angles if and only if it is isosceles.
12. A circle is a figure with no sides.
not reversible
13. If a quadrilateral is a trapezoid, it has exactly two sides that are parallel.
Reversible; a quadrilateral is a trapezoid if and only if it has exactly two sides that are parallel.
14. A person who lives in Miami is a person who lives in Florida.
not reversible

Is each statement below a good definition? If not, explain.

15. Two rays intersect if and only if they lie in the same plane.
No; the rays could be parallel.
16. A redwood tree is an evergreen tree that grows very tall.
No; the statement is not reversible. There are many evergreen trees that grow very tall that are not redwoods.
17. A rectangle is a quadrilateral with four congruent angles.
yes
18. A hexagon is a polygon with exactly six sides.
yes

Write each statement as a biconditional.

19. A square is a rectangle with four congruent sides.
A figure is a square if and only if it is a rectangle with four congruent sides.
20. An equilateral triangle is a triangle with three congruent angles.
A figure is an equilateral triangle if and only if it is a triangle with three congruent angles.
21. A factor of a whole number is a whole number that divides evenly into the given number.
A whole number is a factor of a given number if and only if the first whole number divides evenly into the given number.
22. **Open-Ended** Write a definition of your choice. Then write the definition as a biconditional.
Answers may vary. Sample: A chair is a piece of furniture that is designed for one person to sit on. Biconditional: A piece of furniture is a chair if and only if it is designed for one person to sit on.