1-2 The Set of Real Numbers

Name _____ Date _____

Determine if the set of positive multiples of 5 is *closed* under subtraction.

$\{5, 10, 15, 20, 25, \ldots\}$ ◀— Identify the elements of the set.

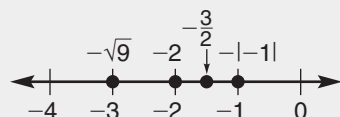$10 - 5 = 5$ ◀— Test a case. Subtract two elements of the set.

$5 - 10 = -5$ ◀— Test another case.

-5 is not an element of the set.
No, the set of positive multiples of 5 is *not* closed under subtraction.

Use a number line to order the numbers $-2, -\frac{3}{2}, -\sqrt{9}, -|-1|$ from least to greatest.

The farther to the right a number is on the number line, the greater it is.

Read the order from least to greatest: $-\sqrt{9}, -2, -\frac{3}{2}, -|-1|$

Give an example to illustrate the type of number described.

1. a real number that is irrational

5.010010001…

2. a whole number that is not a natural number

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3. a rational number with a terminating decimal

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4. a real number with a nonperfect square radicand

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**Determine if each set of numbers is *closed* under the indicated operation.
If it is *not closed*, give a counterexample.**

5. $\{0, 1, 2\}$; subtraction

not closed
$1 - 2 = -1$
-1 is not an element of the set.

6. $\{$Real Numbers$\}$; addition

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7. $\{10, 11, 12\}$; subtraction

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8. $\{0, 1, 2\}$; multiplication

9. $\{4, 6, 8\}$; multiplication

10. $\{$integers$\}$; division

11. $\{$odd integers$\}$; addition

12. $\{$natural numbers$\}$; addition

13. $\{$whole numbers$\}$; division

Find the value of each expression.

14. $-(-19.8)$

    <u>   **19.8**   </u>

15. $3.05 + (-3.05)$

16. $-|\sqrt{25}|$

17. $|-\sqrt{36}| - (-\sqrt{36})$

18. $-(-4.2) + |-7.5|$

19. $-|4\frac{1}{2} \cdot 2|$

20. $|\sqrt{25}| - |-\sqrt{25}|$
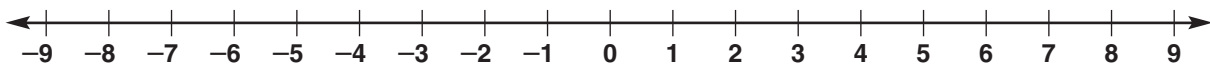
21. $|-6.2| - |-2.1|$

22. $|-2| - (-15)$

23. $|-\sqrt{64}| - (-\sqrt{81})$

24. $-(-12) - |-6|$

25. $|-1.2| - [-(-1)]$

Use the number line to compare and order each set of numbers from least to greatest.

26. $|7 + 2|, -6, -5.4, -0.8, \sqrt{25}, \frac{9}{2}$

    $|7 + 2| = 9, \sqrt{25} = 5, \frac{9}{2} = 4.5$

    <u>$-6, -5.4, -0.8, \frac{9}{2}, \sqrt{25}, |7 + 2|$</u>

27. $-\frac{7}{4}, -|3|, -1.9, -2, -\sqrt{16}, -1.\overline{4}$

28. $-\frac{6}{3}, -3.21, 5, -\sqrt{49}, -1.\overline{23}, |-2|$

29. $-\sqrt{1}, 0, -\frac{5}{4}, -1.5, -1.\overline{09}, -|4|$

30. $-\sqrt{36}, -6.9, -\frac{25}{4}, 8.\overline{3}, -|10 - 2|, 9$

31. $-\frac{19}{7}, -2.9, -4, -2.\overline{85}, -\sqrt{4}, -|5 - 2|$

Problem Solving

32. Three negative numbers are labeled a, b, and c. List the numbers from least to greatest if $|a| > |c|$ and $b > c$. Explain your reasoning.

33. The set of numbers $\{0, 1\}$ is closed for which operations: addition, subtraction, multiplication, division?

CRITICAL THINKING

34. A new operation is defined as $a \blacklozenge b = a + a - b$. Is the set of whole numbers closed under the operation $\blacklozenge$? If not, give a set that is closed under this operation.