2-3 Rules for Addition

Objective: To add real numbers using rules for addition.

Vocabulary

Opposite signs A positive and a negative number are said to have opposite signs.

Rules for Addition	Examples
If two numbers have the *same sign*, add their absolute values and put their common sign before the result.	$2 + 5 = 7$ $-2 + (-5) = -7$
If two numbers have *opposite signs*, subtract the lesser absolute value from the greater and put the sign of the number having the greater absolute value before the result.	$6 + (-4) = 6 - 4 = 2$ $(-6) + 4 = -(6 - 4) = -2$
If two numbers are *opposites*, then their sum is zero.	$3 + (-3) = 0$

Example 1   Add $6 + (-8) + 13 + (-9)$.

Solution 1   Add the numbers in order from left to right.

$$6 + (-8) + 13 + (-9)$$
$$-2 \quad + 13 + (-9)$$
$$11 \quad\quad + (-9)$$
$$2$$

Solution 2   1. Add positive numbers.   2. Add negative numbers.   3. Add the results.

6	-8	19
$\underline{13}$	$\underline{-9}$	$\underline{-17}$
19	-17	2

Add.

| 1. | 6
 $\underline{2}$ | 2. | -4
 $\underline{-7}$ | 3. | -7
 $\underline{6}$ | 4. | -3
 $\underline{8}$ | 5. | 23
 $\underline{64}$ | 6. | -56
 $\underline{31}$ |

| 7. | -37
 $\underline{-56}$ | 8. | -35
 $\underline{120}$ | 9. | 126
 -35
 -37
 $\underline{-17}$ | 10. | -145
 309
 -47
 $\underline{-82}$ | 11. | 136
 -58
 -47
 $\underline{-23}$ | 12. | -162
 323
 -47
 $\underline{-82}$ |

Add.

13. $(-8 + 5) + 2$

14. $(-12 + 15) + 6$

15. $(-4 + 8) + (-3)$

16. $(-2 + 6) + (-4)$

17. $-5 + (-3) + 5$

18. $-4 + (-14) + 4$

2–3 Rules for Addition (continued)

Add.

19. $16 + 5 + (-8)$

20. $-6 + (-24) + 6$

21. $(-3 + 3) + 7 + (-11)$

22. $(-3 + 3) + 17 + (-7)$

23. $-2 + (-4) + (-8)$

24. $-7 + (-5) + (-6)$

25. $-3 + (-9) + 7 + (-5)$

26. $-15 + 10 + (-3) + (-2)$

Example 2   Simplify $3 + (-5) + (-x) + 7$.

Solution $3 + (-5) + (-x) + 7 = -x + \underbrace{3 + 7} + (-5)$ Regroup the terms.

$= -x + \underbrace{10 \quad + (-5)}$ Simplify.

$= -x + \qquad 5$

Simplify.

27. $-2 + x + (-6) + 3$

28. $3 + (-8) + (-y) + (-11)$

29. $-5 + 2a + 3 + (-3)$

30. $-5 + 2a + 8 + 7$

31. $17 + 8b + (-15) + (-10)$

32. $-[6 + (-1)] + (-c) + 2$

33. $-(-7) + 3y + (-6) + 4$

34. $3x + [7 + (-2) + (-3)]$

Example 3   Evaluate $x + y + (-2)$ if $x = -2$, and $y = 5$.

Solution $x + y + (-2) = \underbrace{(-2) + 5} + (-2)$ Substitute -2 for x and 5 for y.

$= \underbrace{3 \quad + (-2)}$ Add from left to right.

$= \qquad 1$ Simplify.

Evaluate each expression if $x = -2$, $y = 5$, and $z = -3$.

35. $y + z + (-2)$

36. $-18 + x + y$

37. $-11 + (-x) + (-y)$

38. $-z + (-7) + y$

39. $1 + (-y) + x$

40. $-x + (-y) + (-15)$

Mixed Review Exercises

Simplify.

1. $3 + 8 \div 2$

2. $7 \cdot 5 \cdot 3 \cdot 2$

3. $(9 - 6 \div 3) \cdot 2$

4. $|-9| - 7$

5. $|-1.6| + 1.6$

6. $|-11| - |-5|$

7. $\dfrac{9 \cdot 6 + 9 \cdot 4}{6 + 3}$

8. $3\frac{1}{5} + 7\frac{1}{2} + 8\frac{4}{5}$

9. $2.7 + 1.0 + 3.3$

10. $[12 + (-2)] + 5$

11. $(-7 + 2) + (-3)$

12. $-2 + (-8) + 7 + (-1)$