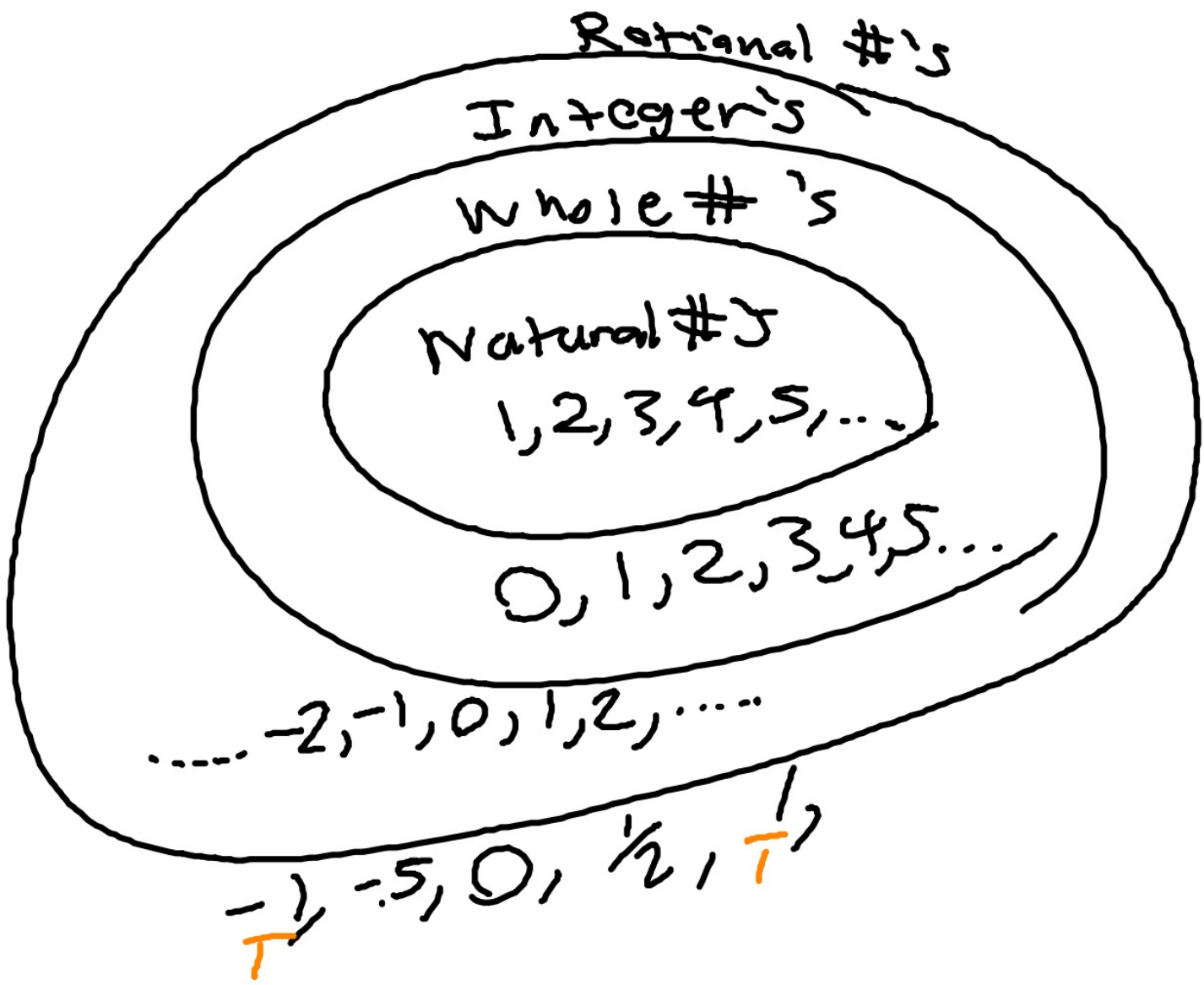
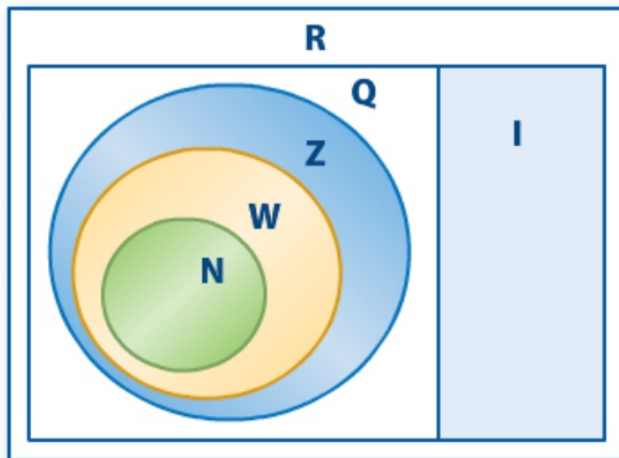


S



KeyConcept Real Numbers (R)



Letter	Set	Examples
Q	rationals	$0.125, -\frac{7}{8}, \frac{2}{3} = 0.66\dots$
I	irrationals	$\pi = 3.14159\dots$ $\sqrt{3} = 1.73205\dots$
Z	integers	$-5, 17, -23, 8$
W	wholes	$2, 96, 0, \sqrt{36}$
N	naturals	$3, 17, 6, 86$

Example 1 Classify Numbers

Name the sets of numbers to which each number belongs.

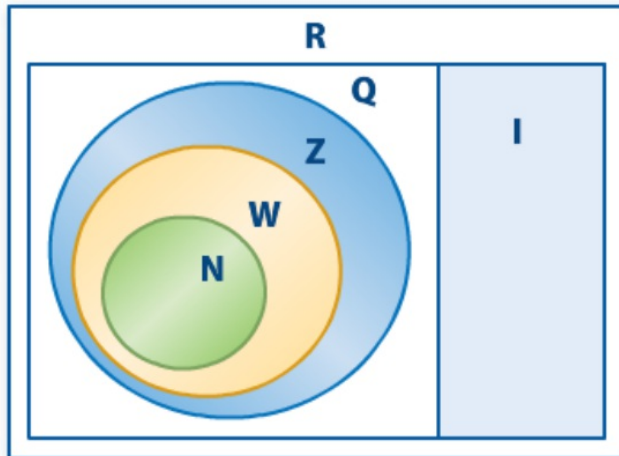
- a. -23 integers (Z), rationals (Q), reals (R)
- b. $\sqrt{50}$ irrationals (I), reals (R)
- c. $-\frac{4}{9}$ rationals (Q), reals (R)

-185
1

Guided Practice

- 1A. -185 **Z, Q, R**
- 1B. $-\sqrt{49}$ **Z, Q, R**
- 1C. $\sqrt{95}$ **I, R**
- 1D. $-\frac{7}{8}$ **Q, R**

KeyConcept Real Numbers (R)



Letter	Set	Examples
Q	rationals	$0.125, -\frac{7}{8}, \frac{2}{3} = 0.66\dots$
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Example 1 Name the sets of numbers to which each number belongs.

1. 62 **N, W, Z, Q, R** 2. $\frac{5}{4}$ **Q, R** 3. $\sqrt{11}$ **I, R** 4. -12 **Z, Q, R**

T



Property	Addition	Multiplication
Commutative	$a + b = b + a$	$a \cdot b = b \cdot a$
Associative	$(a + b) + c = a + (b + c)$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Identity	$a + 0 = a = 0 + a$	$a \cdot 1 = a = 1 \cdot a$
Inverse	$a + (-a) = 0 = (-a) + a$	$a \cdot \frac{1}{a} = 1 = \frac{1}{a} \cdot a, a \neq 0$
Closure	$a + b$ is a real number.	$a \cdot b$ is a real number.
Distributive	$a(b + c) = ab + ac$ and $(b + c)a = ba + ca$	

Example 2 Name Properties of Real Numbers

Name the property illustrated by $5 \cdot (4 \cdot 13) = (5 \cdot 4) \cdot 13$.

Associative Property of Multiplication

The Associative Property of Multiplication states that the way in which you group factors does not affect the product.

Guided Practice

2. Name the property illustrated by $2(x + 3) = 2x + 6$. **Distributive Property**

Property	Addition	Multiplication
Commutative	$a + b = b + a$	$a \cdot b = b \cdot a$
Associative	$(a + b) + c = a + (b + c)$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Identity	$a + 0 = a = 0 + a$	$a \cdot 1 = a = 1 \cdot a$
Inverse	$a + (-a) = 0 = (-a) + a$	$a \cdot \frac{1}{a} = 1 = \frac{1}{a} \cdot a, a \neq 0$
Closure	$a + b$ is a real number.	$a \cdot b$ is a real number.
Distributive	$a(b + c) = ab + ac$ and $(b + c)a = ba + ca$	

Example 2

Name the property illustrated by each equation.

5. $(6 \cdot 8) \cdot 5 = 6 \cdot (8 \cdot 5)$ **Assoc. (\times)**

7. $84 + 16 = 16 + 84$ **Comm. (+)**

6. $7(9 - 5) = 7 \cdot 9 - 7 \cdot 5$ **Dist.**

8. $(12 + 5)6 = 12 \cdot 6 + 5 \cdot 6$ **Dist.**



Example 3 Additive and Multiplicative Inverses

Find the additive inverse and multiplicative inverse for $-\frac{5}{8}$.

Since $-\frac{5}{8} + \frac{5}{8} = 0$, the additive inverse of $-\frac{5}{8}$ is $\frac{5}{8}$.

Since $\left(-\frac{5}{8}\right)\left(-\frac{8}{5}\right) = 1$, the multiplicative inverse of $-\frac{5}{8}$ is $-\frac{8}{5}$.

Guided Practice

Find the additive and multiplicative inverse for each number.

3A. 1.25 **-1.25** ; **0.8**

3B. $2\frac{1}{2}$ **$-2\frac{1}{2}$** ; **$\frac{2}{5}$**

Example 3 Find the additive inverse and multiplicative inverse for each number.

9. -7 **7**; **$-\frac{1}{7}$**

10. $\frac{4}{9}$ **$-\frac{4}{9}$** ; **$\frac{9}{4}$**

11. 3.8 **-3.8** ; **$\frac{1}{3.8}$**

12. $\sqrt{5}$ **$-\sqrt{5}$** ; **$\frac{1}{\sqrt{5}}$**

MONEY The prices of the components of a computer package offered by Computer Depot are shown in the table. If a 6% sales tax is added to the purchase price, how much sales tax is charged for this computer package?

Component	Price (\$)
Computer	359.95
Monitor	219.99
Printer	79.00
Digital Camera	149.50
Software Bundle	99.00

There are two ways to determine the total sales tax.

Method 1 Multiply, then add.

Multiply each dollar amount by 6% or 0.06 and then add.

$$\begin{aligned}
 T &= 0.06(359.95) + 0.06(219.99) + 0.06(79.00) + 0.06(149.50) + 0.06(99.00) \\
 &= 21.60 + 13.20 + 4.74 + 8.97 + 5.94 \\
 &= 54.45
 \end{aligned}$$

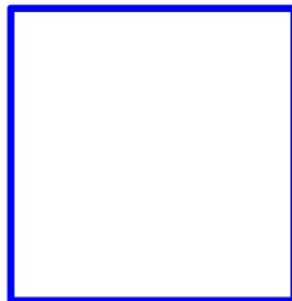
Method 2 Add, then multiply.

Find the total cost of the computer package, and then multiply the total by 0.06.

$$\begin{aligned}
 T &= 0.06(359.95 + 219.99 + 79.00 + 149.50 + 99.00) \\
 &= 0.06(907.44) \\
 &= 54.45
 \end{aligned}$$



Example 4 13. **CCSS REASONING** Melba is mowing lawns for \$22 each to earn money for a video game console that costs \$550.



- Write an expression to represent the total amount of money Melba earned during this week.
- Evaluate the expression from part a by using the Distributive Property.
- When do you think Melba will earn enough for the video game console? Is this reasonable? Explain. **See margin.**

Lawns Mowed in One Week

Day	Lawns Mowed
Monday	2
Tuesday	4
Wednesday	3
Thursday	1
Friday	5
Saturday	6
Sunday	7



Example 5 Simplify an Expression

Simplify $3(2q + r) + 5(4q - 7r)$.

$$3(2q + r) + 5(4q - 7r)$$

$$= 3(2q) + 3(r) + 5(4q) - 5(7r) \quad \text{Distributive Property}$$

$$= 6q + 3r + 20q - 35r \quad \text{Multiply.}$$

$$= 6q + 20q + 3r - 35r \quad \text{Commutative Property (+)}$$

$$= (6 + 20)q + (3 - 35)r \quad \text{Distributive Property}$$

$$= 26q - 32r \quad \text{Simplify.}$$

Example 5 Simplify each expression.

14. $5(3x + 6y) + 4(2x - 9y)$ $23x - 6y$

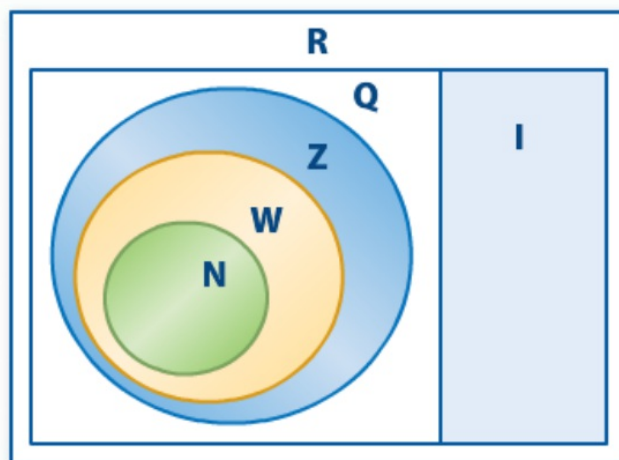
15. $6(6a + 5b) - 3(4a + 7b)$ $24a + 9b$

16. $-4(6c - 3d) - 5(-2c - 4d)$ $-14c + 32d$ 17. $-5(8x - 2y) - 4(-6x - 3y)$ $-16x + 22y$

14

$$\begin{array}{r} 5(3x + 6y) + 4(2x - 9y) \\ \hline 15x + 30y + 8x - 36y \\ \hline 23x - 6y \end{array}$$

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Practice and Problem Solving

Extra Practice is on page R1.

Example 1 Name the sets of numbers to which each number belongs.

18. $-\frac{4}{3}$ **Q, R** 19. -8.13 **Q, R** 20. $\sqrt{25}$ **N, W, Z, Q, R** 21. $0.\overline{61}$ **Q, R**
 22. $\frac{9}{3}$ **N, W, Z, Q, R** 23. $-\sqrt{144}$ **Z, Q, R** 24. $\frac{21}{7}$ **N, W, Z, Q, R** 25. $\sqrt{17}$ **I, R**

Example 2 Name the property illustrated by each equation.

26. $-7y + 7y = 0$ **Inverse (+)** 27. $8\sqrt{11} + 5\sqrt{11} = (8 + 5)\sqrt{11}$ **Dist.**
 28. $(16 + 7) + 23 = 16 + (7 + 23)$ **Assoc. (+)** 29. $\left(\frac{22}{7}\right)\left(\frac{7}{22}\right) = 1$ **Inverse (\times)**

Example 3 Find the additive inverse and multiplicative inverse for each number.

30. -8 **8; $-\frac{1}{8}$** 31. 12.1 **-12.1 ; $\frac{1}{12.1}$** 32. -0.25 **0.25 ; -4**
 33. $\frac{6}{13}$ **$-\frac{6}{13}$; $\frac{13}{6}$** 34. $-\frac{3}{8}$ **$\frac{3}{8}$; $-\frac{8}{3}$** 35. $\sqrt{15}$ **$-\sqrt{15}$; $\frac{1}{\sqrt{15}}$**

