

Lesson 3.1

Algebraic Expressions

Essential Question

How can you simplify an algebraic expression?

Write the phrase as an expression.

1. 7 increased by a number x

$$+ \quad 7+x$$

2. negative 14 minus y

$$- \quad -14-y$$

3. negative 19 increased by n

$$- \quad + \quad -19+n$$

4. the product of 14 and y

$$\boxed{\cdot} \quad 14 \cdot y$$

5. 10 divided by the sum of a number n and 6

$$\div \quad + \quad \boxed{() \quad 10 \div (n+6) \text{ or } \frac{10}{n+6}$$

6. 6 times the quotient of a number x and 3

$$\cdot \quad \div \quad \boxed{() \quad 6 \cdot (x \div 3) \text{ or } 6 \cdot \frac{x}{3}$$

We will be using "x" as a variable, so use "." or "*" for Multiplication

Identify the terms and like terms in each expression.

a. $9x - 2 + 7 - x$

Terms: $9x$, -2 , 7 , $-x$

* Use the sign immediately before

Like terms: $9x$; $-x$
 -2 ; 7

b. $z^2 + 5z - 3z^2 + z$

Terms: z^2 , $5z$, $-3z^2$, z

Like terms: z^2 ; $-3z^2$
 $5z$; z

* Variables match

Simplify $\frac{3}{4}y + 12 - \frac{1}{2}y - 6$

- 1) ID like terms
- 2) Combine like terms

$$\frac{3}{4}y - \frac{1}{2}y \rightarrow \frac{3}{4}y - \frac{2}{4}y = \frac{1}{4}y$$

$$12 - 6 \rightarrow 6$$
- 3) Put back together

$\frac{1}{4}y + 6$

* Mean the same thing, just simpler

Identify the terms and like terms in the expression.

| | | |
|---|---|---|
| <p>1. $y + 10 - \frac{3}{2}y$</p> <p>T: <u>y</u>, <u>10</u>, <u>$-\frac{3}{2}y$</u></p> <p>LT: <u>y</u>, <u>$-\frac{3}{2}y$</u></p> <p><u>10</u></p> | <p>2. $2r^2 + 7r - r^2 - 9$</p> <p>T: <u>$2r^2$</u>, <u>$7r$</u>, <u>$-r^2$</u>, <u>-9</u></p> <p>LT: <u>$2r^2$</u>, <u>$-r^2$</u></p> <p><u>$7r$</u></p> <p><u>-9</u></p> | <p>3. $7 + 4p - 5 + p + 2q$</p> <p>T: <u>7</u>, <u>$4p$</u>, <u>-5</u>, <u>p</u>, <u>$2q$</u></p> <p>LT: <u>7</u>, <u>-5</u></p> <p><u>$4p$</u>, <u>p</u></p> <p><u>$2q$</u></p> |
|---|---|---|

Simplify the expression.

| | | |
|--|--|---|
| <p>4. $14 - 3z + 8 + z$</p> <p>$14 + 8 = 22$</p> <p>$-3z + z = -2z$</p> <div style="border: 2px solid red; padding: 5px; display: inline-block;"> $22 - 2z$ </div> | <p>5. $2.5x + 4.3x - 5$</p> <p>$2.5x + 4.3x = 6.8x$</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $6.8x - 5$ </div> | <p>6. $\frac{3}{8}b - \frac{3}{4}b$</p> <p>$\frac{3}{8}b - \frac{6}{8}b$</p> <div style="border: 1px solid purple; padding: 5px; display: inline-block;"> $-\frac{3}{8}b$ </div> |
|--|--|---|

Simplify $-\frac{1}{2}(6n + 4) + 2n$.

$$-\frac{1}{2}(6n) - \frac{1}{2}(4) + 2n$$

Distributive Property

$$-3n - 2 + 2n$$

ID like terms

$$-3n + 2n = -n$$

Combine like terms

$$\boxed{-n - 2}$$

Final answer

Simplify the expression.

7. $3(q + 1) - 4$

$$3q + 3 - 4$$

$$3 - 4 = -1$$

$$3q - 1$$

8. $-2(g + 4) + 7g$

$$-2g - 8 + 7g$$

$$-2g + 7g = 5g$$

$$5g - 8$$

9. $7 - 4\left(\frac{3}{4}x - \frac{1}{4}\right)$

$$7 - 3x + 1$$

$$7 + 1 = 8$$

$$8 - 3x$$

Each person in a group buys a ticket, a medium drink, and a large popcorn. Write an expression in simplest form that represents the amount of money the group spends at the movies. Interpret the expression.

| ROYAL CINEMAS | |
|----------------|--------|
| Evening Ticket | \$7.50 |
| REFRESHMENTS | |
| Drinks | |
| Small | \$1.75 |
| Medium | \$2.75 |
| Large | \$3.50 |
| Popcorn | |
| Small | \$3.00 |
| Large | \$4.00 |

$x = \#$ of people in the group

$$x(7.50 + 2.75 + 4.00)$$

$$7.5x + 2.75x + 4x$$

$$\begin{array}{r} 7.50 \\ 2.75 \\ + 4.00 \\ \hline 14.25 \end{array}$$

$$14.25x$$

Expression

Each person spends \$14.25.

Interpret

- Simplify the following algebraic expressions.

a. $5x - 8 + 2x^2 + 7x$

$$5x + 7x = 12x$$

$$12x - 8 + 2x^2$$

b. $4n + 6(n - 4)$

$$4n + 6n - 24$$

$$4n + 6n = 10n$$

$$10n - 24$$