

Lesson 1 Algebraic Expressions

To evaluate an algebraic expression you replace each variable with its numerical value, then use the order of operations to simplify.

Example 1

Evaluate $6x - 7$ if $x = 8$.

$$\begin{aligned} 6x - 7 &= 6(8) - 7 \\ &= 48 - 7 \\ &= 41 \end{aligned}$$

Replace x with 8.
Use the order of operations.
Subtract 7 from 48.

Example 2

Evaluate $5m - 3n$ if $m = 6$ and $n = 5$.

$$\begin{aligned} 5m - 3n &= 5(6) - 3(5) \\ &= 30 - 15 \\ &= 15 \end{aligned}$$

Replace m with 6 and n with 5.
Use the order of operations.
Subtract 15 from 30.

Example 3

Evaluate $\frac{ab}{3}$ if $a = 7$ and $b = 6$.

$$\begin{aligned} \frac{ab}{3} &= \frac{(7)(6)}{3} \\ &= \frac{42}{3} \\ &= 14 \end{aligned}$$

Replace a with 7 and b with 6.
The fraction bar is like a grouping symbol.
Divide.

6c means 6 times c
~~6c = 67~~

ac means the number "a" times the number "c"
a = 4
c = 7

1. $3ac$

$$\begin{aligned} &3 \times 4 \times 7 \\ &\quad \checkmark \\ &12 \times 7 \\ &\quad \checkmark \\ &84 \end{aligned}$$

2. $5b^3$
 $b = 2$

$$\begin{aligned} &5 \cdot 2 \cdot 2 \cdot 2 \\ &\quad \checkmark \quad \checkmark \\ &10 \quad 4 \\ &\quad \checkmark \\ &40 \end{aligned}$$

Example 4

Evaluate $x^3 + 4$ if $x = 3$.

$$\begin{aligned} x^3 + 4 &= 3^3 + 4 \\ &= 27 + 4 \\ &= 31 \end{aligned}$$

Replace x with 3.
Use the order of operations.
Add 27 and 4.

Exercises

Evaluate each expression if $a = 4$, $b = 2$, and $c = 7$.

1. $3ac$

$$\begin{aligned} &3(4)(7) \\ &84 \end{aligned}$$

2. $5b^3 \rightarrow 5(2)^3$

$$\begin{aligned} &5 \cdot 2 \cdot 2 \cdot 2 \\ &40 \end{aligned}$$

3. abc

$$\begin{aligned} &4 \cdot 2 \cdot 7 \\ &8 \cdot 7 = 56 \end{aligned}$$

4. $5 + 6c$

$$\begin{aligned} &5 + 6 \cdot 7 \\ &5 + 42 = 47 \end{aligned}$$

5. $\frac{ab}{8} = \frac{4 \cdot 2}{8}$

$$\frac{8}{8} = 1$$

6. $2a - 3b$

$$\begin{aligned} &2 \cdot 4 - 3 \cdot 2 \\ &8 - 6 = 2 \end{aligned}$$

7. $\frac{b^4}{4} = \frac{(2)^4}{4} = \frac{2 \cdot 2 \cdot 2 \cdot 2}{4}$

$$\frac{16}{4} = 4$$

8. $c - a$

$$7 - 4 = 3$$

9. $20 - bc$

$$\begin{aligned} &20 - 2 \cdot 7 \\ &20 - 14 = 6 \end{aligned}$$

10. $2bc$

$$\begin{aligned} &2 \cdot 2 \cdot 7 \\ &4 \cdot 7 = 28 \end{aligned}$$

11. $ac - 3b$

$$\begin{aligned} &4 \cdot 7 - 3 \cdot 2 \\ &28 - 6 = 22 \end{aligned}$$

12. $6a^2$

$$\begin{aligned} &6 \cdot (4)^2 \\ &6 \cdot 4 \cdot 4 \\ &24 \cdot 4 = 96 \end{aligned}$$

Lesson 1 Skills Practice *Algebraic Expressions*

Evaluate each expression if $w = 2$, $x = 3$, $y = 5$, and $z = 6$.

1. $2w$

2. $y + 5$

3. $9 - z$

4. $x + w$

5. $3 + 4z$

6. $6y - 5$

7. y^2

8. $y - x$

9. $\frac{z}{2}$

Evaluate each expression if $m = 3$, $n = 7$, and $p = 9$.

10. $m + n$

11. $12 - 3m$

12. $5p$

13. $3.3p$

14. $3.3p + 2$

15. $2p + 3.3$

16. $20 + 2n$

17. $20 - 2n$

18. $\frac{n}{7}$

19. n^2

20. $6m^2$

21. $\frac{p^2}{3}$

22. $1.1 + n$

23. $p - 8.1$

24. $3.6m$

28. $\frac{m^2}{p}$

29. $\frac{2.5m + 2.5}{5}$

30. $\frac{(n + 2)^2}{3}$