

Key

EVALUATING EXPRESSIONS

Substitution Property:

If $a = b$, then a may be replaced for b in any expression.

Example:

Evaluate $ab^2 + c$

when $a = 2$, $b = 4$, and $c = 7$

$$\begin{aligned} & 2(4)^2 + 7 \\ & 2(16) + 7 \\ & 32 + 7 = \boxed{39} \end{aligned}$$

THE MOST IMPORTANT RULE IN ALGEBRA:

Put parentheses around negative numbers when substituting them into an expression!

Example:

Evaluate $3x^2 - 4x$ when $x = -2$

$$\begin{aligned} & 3(-2)^2 - 4(-2) \\ & 3(4) - (-8) \\ & 12 + 8 = \boxed{20} \end{aligned}$$

More Examples:

1 $a^2b - b^2$ when $a = 3$ and $b = -4$

$$\begin{aligned} & 3^2(-4) - (-4)^2 \\ & 9(-4) - 16 \\ & -36 - 16 \\ & \boxed{-52} \end{aligned}$$

2 $a^2b - b^2$ when $a = 4$ and $b = -7$

$$\begin{aligned} & 4^2(-7) - (-7)^2 \\ & 16(-7) - 49 \\ & -112 - 49 \\ & \boxed{-161} \end{aligned}$$

3 $-y^2 - 3xy$ when $x = -4$ and $y = 2$

$$\begin{aligned} & -(2)^2 - 3(-4)(2) \\ & -4 - (-24) \\ & -4 + 24 \\ & \boxed{20} \end{aligned}$$

4 $-y^2 - 3xy$ when $x = -5$ and $y = -3$

$$\begin{aligned} & -(-3)^2 - 3(-5)(-3) \\ & -9 - 45 \\ & \boxed{-54} \end{aligned}$$

5 $\frac{a^2 + b^2}{a - b}$ when $a = 3$ and $b = 4$

$$\frac{3^2 + 4^2}{3 - 4} = \frac{9 + 16}{-1} = \frac{25}{-1}$$

$$\textcircled{-25}$$

6 $\frac{a^2 + b^2}{a - b}$ when $a = -3$ and $b = -5$

$$\frac{(-3)^2 + (-5)^2}{-3 - (-5)} = \frac{9 + 25}{-3 + 5}$$

$$\frac{34}{2} = \textcircled{17}$$

7 $x^2 - 2(x + y) - z^3$

a. when $x = 2$, $y = -2$, and $z = -3$

$$2^2 - 2(2 + (-2)) - (-3)^3$$

$$4 - 2(4) - (-27)$$

$$4 - 8 + 27$$

$$-4 + 27 = \textcircled{23}$$

b. when $x = -3$, $y = 4$ and $z = -1$

$$(-3)^2 - 2(-3 + 4) - (-1)^3$$

$$9 - 2(-1) - (-1)$$

$$9 - (-2) + 1$$

$$9 + 2 + 1 = \textcircled{12}$$

8 $-a^2 - 2bc - c^2$

a. when $a = -2$, $b = 3$, and $c = -3$

$$-(-2)^2 - 2(3)(-3) - (-3)^2$$

$$-4 - (-18) - 9$$

$$-4 + 18 - 9$$

$$14 - 9 = \textcircled{5}$$

b. when $a = -3$, $b = -5$, and $c = 2$

$$-(-3)^2 - 2(-5)(2) - (2)^2$$

$$-9 - (-20) - 4$$

$$-9 + 20 - 4$$

$$11 - 4$$

$$\textcircled{7}$$