

1.2 ALGEBRAIC EXPRESSIONS & MODELS

$$2^3 = 2 \cdot 2 \cdot 2$$

Exponential
Form

Words

Meaning

4^2

four to the second
power or four
squared

$4 \cdot 4$

8^3

eight to the third
power or eight cubed

$8 \cdot 8 \cdot 8$

x^5

x to the fifth power

$x \cdot x \cdot x \cdot x \cdot x$

EXAMPLE 1: Evaluate the following.

a) $(-3)^4$

b) -3^4

c) 4^4

d) -2^5

e) 5^3

f) $(-2)^6$

g) -2^6

ORDER OF OPERATIONS

1. Do operations that occur within grouping symbols.

 Parenthesis () and brackets []

2. Evaluate powers.

3. Do multiplication and division from left to right.

4. Do addition and subtraction from left to right.

EXAMPLES: Use the order of operations.

2. $15 + 6 \cdot 2$

3. $2 \cdot 3^2 + 5$

4. $2^4 - 5 \cdot 3$

5. $16 \div 4 \cdot 2 + 5^2$

Variable - a letter used to represent a number

Algebraic expression - consists of variables, numbers, operations, and/or grouping symbols

Evaluate means to replace the variables with numbers and simplify.

Evaluate the variable expression when $m = 3$.

6. $m^2 - 2 \cdot 3$

7. $\frac{15}{m} + 2^3 - 10$

8. $m + 3m^4$

9. $\frac{24}{m} \cdot 5$

10. Evaluate $-4x^2 + 6x - 5$ when $x = -3$.

11. Evaluate $2x^3 + 3x^2 + 27$ when $x = -4$.

The fraction bar is another grouping symbol. It indicates that the numerator and denominator should each be treated as a single value.

$$\frac{16 + 8}{8 - 2} \longrightarrow (16 + 8) \div (8 - 2)$$

Try $\frac{9 \cdot 4 + 2 \cdot 6}{5^2 - 1}$

12. Evaluate the variable expression when $x = 4$.

$$\frac{x - 2}{x^2 - 2 \cdot 5}$$

$$13. \quad \frac{13 - 4}{18 - 4^2 + 1} = \frac{9}{18 - 16 + 1} = \frac{9}{2 + 1} = \frac{9}{3} = 3$$

14. Evaluate $\frac{x^2}{2y+1}$ when $x = -3$ and $y = 2$.

$$\frac{(-3)^2}{2(2)+1} = \frac{9}{4+1} = \boxed{\frac{9}{5}}$$

15. Evaluate $\frac{4(x-2y)}{x+y}$ when $x = 4$ and $y = -2$.

$$[4(4 - 2(-2))] \div (4 + -2)$$

$$[4(4 + 4)]$$

$$[4(8)]$$

32

÷

2

=

16

Terms - the parts that are being added or subtracted

Coefficient - the number in front of the variable

Like terms - MUST have the same variable(s) and exponent(s)

Constant terms - numbers without variables

Example 16: Simplify by combining like terms.

a) $7x + 4x = 11x$

b) $3n^2 + n - n^2$ $2n^2 + n$

c) $7(x^2 - 3) - 3(x + 4)$ $7x^2 - 21 - 3x - 12 = 7x^2 - 3x - 33$

d) $2(x + 1) - 1(x + 4)$

$2x + 2 - x - 4 = x - 2$

e) $7x^2 + 12x - x^2 - 40x$

$6x^2 - 28x$