

Name: _____

Date: _____

Order of Operations and Evaluating Algebraic Expressions Algebra 1

Exercise #1:

- (a) Evaluate $3 + 4 \times 5$ by: adding first: _____ multiplying first: _____
- (b) Are both answers above correct? _____
- (c) Which answer is correct? _____ Why?

As *Exercise #1* above illustrates, the order in which we perform operations on numbers matters. In middle school, you learned the order to follow when evaluating numerical expressions. The order is summarized below:

- 1st - Perform operations within parentheses.
- 2nd - Evaluate expressions that contain exponents.
- 3rd - Multiply and divide in the order that they appear from left to right.
- 4th - Add and subtract in the order that they appear from left to right.

We **must** follow this order; otherwise, we couldn't possibly communicate mathematically. When we all look at a numerical expression, we all **must** interpret it the same way.

Exercise #2: Evaluate each of the following numerical expressions **without** the use of a calculator.

(a) $(-3)(-5) + 2$

(d) $6 \bullet 5 + 6 \div (-2)$

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

(b) $2(3)^2$

(e) $(-1)(-3)^2 + 9$

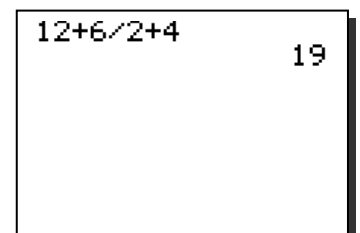
(h) $5(\sqrt{100} - \sqrt{64})$

(c) $4 - 6 \bullet 2$

(f) $\frac{18 - 3 \bullet 4}{5 - 2}$

(i) $6 - 2^2 \bullet 4 + 2\sqrt{25}$

Exercise #3: Fiona evaluated the expression $\frac{12+6}{2+4}$ as follows using her graphing calculator. The display is shown at the right. Explain why Fiona obtained an incorrect answer.



Exercise #4: Evaluate each of the following numerical expressions using your calculator. Round all answers to the *nearest hundredth*, where appropriate.

(a) $\pi(4.2)^2 + 2\pi(4.2)(3.1)$

(c) $12(2.5) + 16(2.5)^2$

(b) $2\pi\sqrt{12/9.81}$

(d) $\frac{4(1-2.14^3)}{1-2.14}$

Oftentimes we are asked to evaluate formulas or algebraic expressions for given replacements of their variables.

Exercise #5: If $V = \pi r^2 h$, then find the value of V if $r = 2$ and $h = 8$. Round your answer to the *nearest hundredth*.

Exercise #6: If $V = \frac{4}{3}\pi r^3$, then find the value of V if $r = 12$. Round your answer to the *nearest hundredth*.

Exercise #7: If $c = \sqrt{a^2 + b^2}$, then find the value of c , to the *nearest tenth*, if $a = 45$ and $b = 17$.

Exercise #8: If $x = -3$, then find the value of each of the following algebraic expressions.

(a) $2x + 1$

(c) $-4x - 2$

(e) $-x^2 + 4$

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

(d) $-3x^2 + 6x$

(f) $\frac{2 + \sqrt{x + 19}}{6 - 2x}$

Name: _____

Date: _____

Order of Operations and Evaluating Algebraic Expressions Algebra 1 Homework

Skills

1. Compute each of the following without using a calculator.

(a) $-3(\sqrt{16}-\sqrt{9})$

(d) $5 \bullet 7 + 8 \div 2$

(g) $\frac{4+\sqrt{36}}{2(-1)}$

(b) $10 - 2 \times 3$

(e) $-2(-6)^2$

(h) $(15 - 2 \bullet 6)^3$

(c) $\sqrt{13^2 - 12^2}$

(f) $(-4)(-10) - 5$

(i) $\frac{4+\sqrt{64}}{4-\sqrt{64}}$

2. If $x = 5$, then find the value of each of the following algebraic expressions.

(a) $6x + 2$

(b) $x^2 + 4x$

(c) $-2x^2 - x + 6$

3. If $x = -2$, then find the value of each of the following algebraic expressions.

(a) $4 - 3x$

(b) $2x - x^2$

(c) $3x^2 - 5x + 1$

4. If $s = -16t^2$, then find the value of s if $t = 4$.

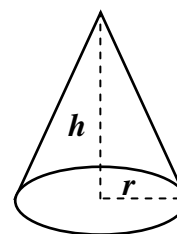
5. If $P = 2l + 2w$, then find the value of P if $l = 16$ and $w = 35$.

6. If $S = 2(\pi r^2 + \pi rh)$, then determine the value of S , to the *nearest tenth*, if $r = 4$ and $h = 5$.

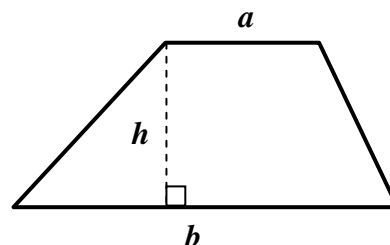
Applications

7. A concession stand operator is going to purchase x cases of soda for \$5.99 each and y bags of chips for \$0.69 each. If C represents the total cost, in *dollars*, for the operator to purchase x cases of soda and y bags of chips, then $C = 5.99x + 0.69y$. Find the total cost if the operator purchases 11 cases of soda and 125 bags of chips.

8. In order to calculate the base radius of a right circular cone, the formula $r = \sqrt{\frac{3V}{\pi h}}$ can be used, where V represents the volume of the cone and h represents the height of the cone. Find the value of r if $V = 75$ and $h = 4$. Give your answer to the *nearest hundredth*.



9. The area of a trapezoid is given by the formula $A = \frac{1}{2}h(a + b)$, where a and b represent the lengths of the parallel bases and h represents the height. Determine the area of a trapezoid whose height is 4.2 meters and whose bases have lengths 12.6 meters and 9.3 meters, respectively. Give your answer to the *nearest tenth* of a square meter.



Reasoning

10. Use the numbers 3, 4, 5, and 6 (each exactly once) together with the operations $+$, \cdot , and \div to create a numerical expression whose value is 22.
11. If $x = 12$, then which expression is larger? $2x^2 - 18x$ or $5x + 14$
- By how much?