

Bellwork: Algebra 1

1. Write down your homework for the night in your planner.
2. Make sure you have a calculator and Algebra Nation book.
3. Take out your homework from last night AND from Thursday so I can check both.
4. Answer the following on your TUESDAY bellwork sheet:

Is the set of whole numbers closed under subtraction?
JUSTIFY YOUR ANSWER!

$$\{0, 1, 2, 3, \dots\}$$

NO! $1 - 7 = -6$

1. Check the boxes for the following sets that are closed under the given operations.

Set	+	-	x	÷
Integers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Rational Numbers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Whole Numbers	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

2. Consider the following polynomials.

$$ab^2 + 3ab + 8a^2$$

$$-5ab^2$$

Use the two polynomials to illustrate the following:

a. Polynomials are closed under addition.

$$(ab^2 + 3ab + 8a^2) + (-5ab^2) = -4ab^2 + 3ab + 8a^2 \quad \text{yes}$$

b. Polynomials are closed under subtraction

$$(ab^2 + 3ab + 8a^2) - (-5ab^2) = 6ab^2 + 3ab + 8a^2 \quad \text{yes}$$

c. Polynomials are closed under multiplication.

$$-5a^2b^4 - 15a^2b^3 - 40a^3b^2$$

$$\text{yes} \quad -5ab^2 \begin{array}{|c|c|c|} \hline ab^2 & 3ab & 8a^2 \\ \hline -5a^2b^4 & -15a^2b^3 & -40a^3b^2 \\ \hline \end{array}$$

There are many times in real world situations when we must combine functions. Profit and revenue functions are a great example of this.

Let's Practice!

1. At the fall festival, the senior class sponsors hayrides to raise money for the senior trip. The ticket price is \$5.00 and each hayride carries an average of 15 people. They consider raising the ticket price in order to earn more money. For each \$0.50 increase in price, an average of 2 fewer seats will be sold. Let x represent the number of \$0.50 increases.
 - a. Write a function, $T(x)$, to represent the cost of one ticket based on the number of increases.

$$T(x) = 5 + 0.5x$$

- b. Write a function, $R(x)$, to represent the number of riders based on the number of increases.

$$R(x) = 15 - 2x$$

- c. Write a revenue function for the hayride that could be used to maximize revenue.

$$A(x) = T(x) \cdot R(x)$$
$$(5 + 0.5x)(15 - 2x)$$

$$A(x) = -x^2 - 2.5x + 75$$

$$A(1) = -1(1)^2 - 2.5(1) + 75$$

	5	.5x
15	75	7.5x
-2x	-10x	-1x ²

Try It!

2. The freshman class is selling t-shirts to raise money for a field trip. The cost of each custom designed t-shirt is \$8. There is a \$45 fee to create the design. The class plans to sell the shirts for \$12.

- a. Define the variable.

$$x = \# \text{ of shirts}$$

- b. Write a cost function.

$$C(x) = 8x + 45$$

- c. Write a revenue function.

$$R(x) = 12x$$

- d. Write a profit function.

$$P(x) = R(x) - C(x)$$

$$P(x) = 12x - (8x + 45)$$

$$P(x) = 12x - 8x - 45$$

$$P(x) = 4x - 45$$

Let's Practice!

3. Priscilla works at a cosmetics store. She receives a weekly salary of \$350 and is paid a 3% commission on weekly sales over \$1500.

- a. Let x represent Priscilla's weekly sales. Write a function, $f(x)$, to represent Priscilla's weekly sales over \$1500.

$$f(x) = x - 1500$$

- b. Let x represent the weekly sales on which Priscilla earns commission. Write a function, $g(x)$, to represent Priscilla's commission.

$$g(x) = 0.03x$$

- c. Write a composite function, $(g \circ f)(x)$ to represent the amount of money Priscilla earns on commission.

$$g(f(x)) = 0.03(x - 1500)$$
$$g(f(x)) = 0.03x - 45$$

Handwritten note: $g(x) \cdot f(x)$ with an arrow pointing to the composite function.

BEAT THE TEST!

1. A furniture store charges 6.5% sales tax on the cost of the furniture and a \$20 delivery fee. (The delivery fee is not subject to sales tax.)

The following functions represent the situation:

$$f(a) = 1.065a$$

$$g(b) = b + 20$$

Part A: Write the function $g(f(a))$.

Part B: Match each of the following to what they represent. Some letters will be used twice.

a

A. The cost of the furniture, sales tax, and delivery fee.

b

B. The cost of the furniture and sales tax.

$f(a)$

C. The cost of the furniture.

$g(b)$

$g(f(a))$