Bellwork: Algebra 1

1. Write down your work for the week in your planner.
2. You will need a calculator and your Algebra Nation book
3. Take out your assignment from Friday if you did not finish it continue working on it after you answer the bellwork question.
4. Take out your homework from Thursday.
5. Answer the following question in the MONDAY section of your bellwork sheet.

The function that represents the amount of caffeine, in milligrams, remaining in a body after drinking the two Mountain Dew sodas is given by $f(t) = 110(0.8855)^t$ where t is time in hours. How much caffeine is left in a person's body 18 hours after drinking two Mountain Dew sodas?

$f(18) = 110(0.8855)^{18}$

$f(18) = 12.32 \text{ mg}$

1. Let $f(x) = 7x^2 - 5x + 3$ and $g(x) = 2x^2 + 4x - 6$.

   Part A: Find $\boldsymbol{f(x) + g(x)}$ $9x^2 - x - 3$

   Part B: Find $\boldsymbol{f(x) - g(x)}$ $5x^2 - 9x + 9$

   Part C: Find $\boldsymbol{g(x) - f(x)}$ $-5x^2 + 9x - 9$

2. The perimeter of a trapezoid is $\boldsymbol{39a - 7}$. Three sides have the following lengths: $\boldsymbol{9a}$, $\boldsymbol{5a + 1}$, and $\boldsymbol{17a - 6}$.

   What is the length of the fourth side?

   $8a - 2$

3. The polynomial, $5v^3 - 4v^2 + 10v - 1$ is subtracted from the polynomial, $7v^2 + 2v^3 - 7v$. The difference can be expressed as $av^3 + bv^2 + cv + d$. Rudy said that the value of a is 3. Is Rudy correct? Justify your answer.

   $-3v^3 + 11v^2 - 17v + 1$

   Rudy is incorrect because a = -3

4. Evaluate $g(p) \cdot h(p)$ by modeling or by using the distributive property.

$g(p) = (p - 2)$ and $h(p) = (p^3 + 4p^2 - 2)$

$p^4 + 2p^3 - 8p^2 - 2p + 4$

	p^3	$4p^2$	-2
p	p^4	$4p^3$	$-2p$
-2	$-2p^3$	$-8p^2$	4

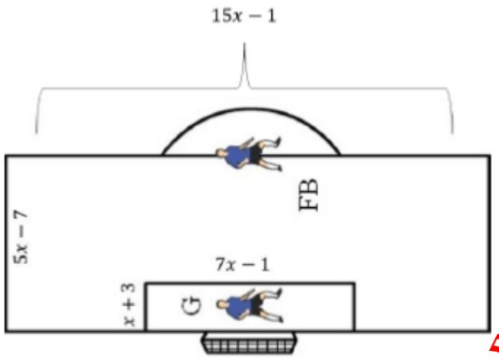
5. Evaluate $f(x) \cdot g(x)$ by modeling or by using the distributive property.

$f(x) = (-3x + 2)$ and $g(x) = (2x^2 - 5x - 1)$

$-6x^3 + 19x^2 - 7x - 2$

	$2x^2$	$-5x$	-1
$-3x$	$-6x^3$	$15x^2$	$3x$
2	$4x^2$	$-10x$	-2

6. The figure below shows the penalty box and the goal box of a soccer field. The penalty box is the larger rectangle.



	$15x$	-1
$5x$	$75x^2$	$-5x$
-7	$-105x$	7

Part A: Find the area of the penalty box.

$$75x^2 - 110x + 7$$

Part B: Find the area of the goal box.

	$7x$	-1
x	$7x^2$	$-x$
3	$21x$	-3

$$7x^2 + 20x - 3$$

Part C: Find the area of the penalty box not covered by the goal box. $68x^2 - 130x + 10$

When we add two integers, what type of number is the sum?

$-2 + -3 = -5$ integer

When we multiply two irrational numbers, what type of numbers could the resulting product be?

$\sqrt{2} \cdot \sqrt{6} = \sqrt{12}$ irrational

$\sqrt{5} \cdot \sqrt{5} = \sqrt{25} = 5$ rational

A set is closed for a specific operation if and only if the operation on two elements of the set ***always*** produces an element of the same set.

Are integers closed under addition? Justify your answer.

Yes! Because your result is an integer.

Are irrational numbers closed under multiplication? Justify your answer.

No! Because you can get a result of rational or irrational

Let's apply the closure property to polynomials.

Except negative exponents.

Are the following statements true or false? If false, give a counterexample.

Polynomials are closed under addition.

$2x^2 + 6x^2 = 8x^2$ Yes!

$\frac{x^2}{x^5} = x^{-3}$

Polynomials are closed under subtraction.

$2x^2 - 6x^2 = -4x^2$ Yes!

Polynomials are closed under multiplication.

$2x^2 \cdot 6x^2 = 12x^4$ Yes!

Let's Practice!

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

Set	+	−	×	÷
$\{0, 1, 2, 3, 4, \ldots\}$ whole	☑	☐	☑	
$\{\ldots, -4, -3, -2, -1\}$ Negative	☑	☐	☐	
$\{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$ Integers	☑	☑	☑	
{rational numbers}	☑	☑	☑	☑
{polynomials}	☑	☑	☑	

$-4(-2)8$

$-4+8=4$

BEAT THE TEST!

1. Choose from the following words and expressions to complete the statement below.

$2x^5 + (3y)^{-2} - 2$	$(5y)^2 + 4x + 3y^3$
$5y^{-1} + 7x^2 + 8y^2$	

integers	variables	whole numbers
coefficients	rational numbers	exponents

The product of $5x^4 - 3x^2 + 2$ and $(5y)^2 + 4x + 3y^3$ illustrates the closure property because the exponents of the product are whole numbers and the product is a polynomial.

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.

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

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

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.

   b. Write a cost function.

   c. Write a revenue function.

   d. Write a profit function.

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 $\$1500$.

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

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

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.
$g(b)$	
$g(f(a))$	