U7 Day 4 Notes: Polynomial Addition and Subtraction Application

A-APR.1: I can add and subtract polynomials.

Mixed Practice!

1. $(-9x^2 - 8y) + (-2xy - 2y + x^2) + (x^2 + 4xy)$

$$-9x^2 - 6xy - 2y^2 - 8y$$

$$\boxed{-9x^2 - 2y^2 - 6xy - 8y}$$

2. $(4x^2 + 7xy) - (-6x^2 - 7xy - 4x) - (10x + 9x^2)$

$4x^2 + 7xy + 6x^2 + 7xy + 4x - 10x - 9x^2$

$$\boxed{1x^2 + 14xy - 6x}$$

3. The number of gallons of water in a leaking pool is determined by the rate that the water is filling, $8g^2 + 3g - 4$, and the rate the water *leaks* from the pool, $9g^2 - 2g - 5$, where **g** represents the number of gallons entering or leaving the pool per minute. Write an expression for the change in gallons per minute of the water in the pool.

* leaks = going down = subtraction

$(8g^2 + 3g - 4) - (9g^2 - 2g - 5)$

$8g^2 + 3g - 4 - 9g^2 + 2g + 5$

$$\boxed{-1g^2 + 5g + 1}$$

4. Jen a biologist is growing bacterial cultures at different temperatures as a part of her research. She has two different cultures growing. One, at 25° C, is given by the polynomial $t^2 + 4t + 4$, where t is minutes. The number of cells in the second culture, at 35° C, is modeled by the polynomial $t^2 + 4$. Find the polynomial representing how many more cells are in the 25°C culture for time t.

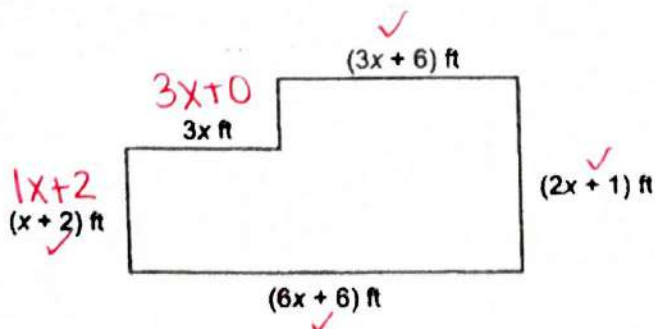how many more = difference = subtraction

$(t^2 + 4t + 4) - (t^2 + 4)$

$t^2 + 4t + 4 - t^2 - 4$

$$\boxed{4t}$$

Perimeter application.

5. The figure below shows the measurements of a neighborhood park. Find the perimeter of the shape.

$3x + 0$
$3x$ ft

$(3x + 6)$ ft

$1x + 2$
$(x + 2)$ ft

$(2x + 1)$ ft

$(6x + 6)$ ft

Add all of the <u>outsides</u>

* Line up variables & constants

$$\begin{array}{r} 3x + 6 \\ 2x + 1 \\ 6x + 6 \\ 1x + 2 \\ + \ 3x + 0 \\ \hline \end{array}$$

$$\boxed{15x + 15 \text{ feet}}$$

6. Little Mountain Elementary School has plans to double the area of their parking lot. The diagram below shows the shape of the new parking lot. Find the expression for the ==perimeter of the <u>entire</u> rectangular parking lot.==

(3x + 2) ft   4X+4

(x + 2) ft
(x + 2) ft

2X+3

(2x + 3) ft

(x + 1) ft

(4x + 4) ft   3X+2
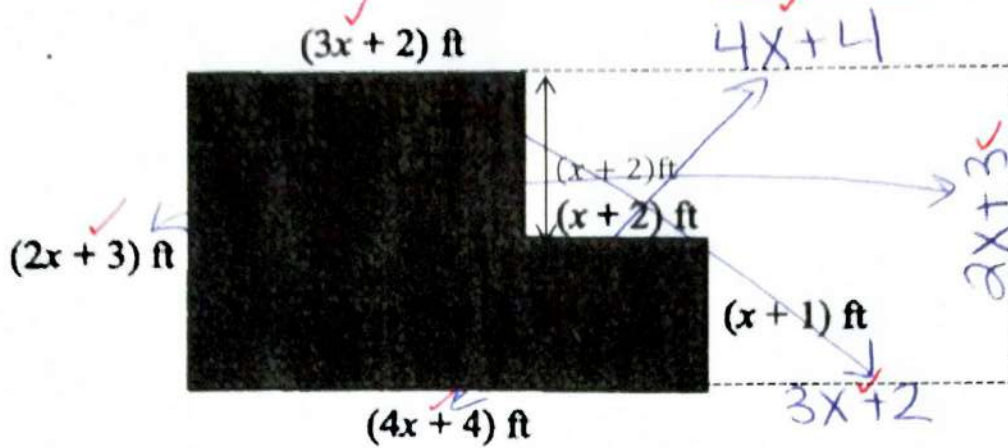
① figure out missing outsides

② Add all outsides

$$
\begin{array}{r}
3x + 2 \\
4x + 4 \\
2x + 3 \\
3x + 2 \\
4x + 4 \\
+\ \ 2x + 3 \\
\hline
18X + 18 \text{ feet}
\end{array}
$$

7. The local zoo has plans to double the home of the giraffes. The need to find the perimeter to know how much fencing will be needed. Find the expression for the ==perimeter of the rectangle.==

lx+l
(x + 1) ft   6X+4

5X+3

(5x + 3) ft

(6x + 4) ft

X+l
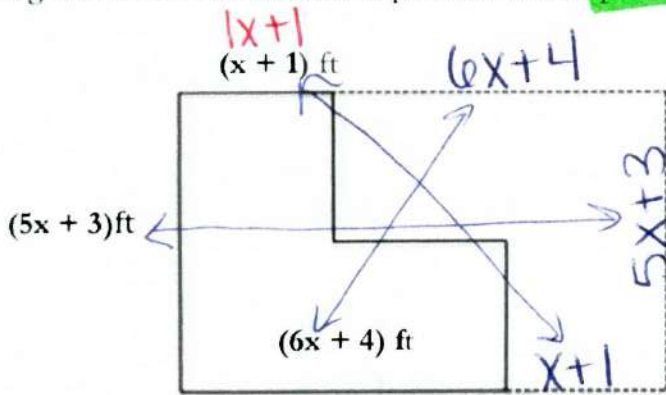
① figure out missing sides
② Add all outsides

$$
\begin{array}{r}
1x + 1 \\
6x + 4 \\
5x + 3 \\
1x + 1 \\
6x + 4 \\
+\ \ 5x + 3 \\
\hline
24X + 16 \text{ feet}
\end{array}
$$

8. Find the ==perimeter== of the given triangle.

2x + 4 in

−3x + 12
[12 − 3x] in

7x + 0
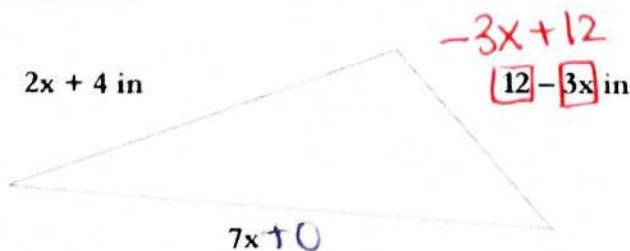
$$
\begin{array}{r}
2x + 4 \\
-3x + 12 \\
+\ \ 7x + 0 \\
\hline
6X + 16 \text{ inches}
\end{array}
$$

Finding Profit

$$(\text{Revenue}) - (\text{Cost}) = \text{Profit}$$

Revenue – Cost = Profit

always put polynomials in ( ) & distribute the negative!

Find the profit using the given revenue and costs polynomials.

9. Revenue: $12x - 0.0003x^2$

   Cost: $340 + 7x$

   R　　　　C
   $(12x - .0003x^2) - (340 + 7x)$

   $12x - .0003x^2 - 340 - 7x$

   $\boxed{-.0003x^2 + 5x - 340}$

10. Cost: $y^2 + 15y + 75,000$

    Revenue: $4y^2 + 45 + 100,000$

    R
    $(4y^2 + 45 + 100000) - (y^2 + 15y + 7500)$

    $4y^2 + 45 + 100,000 - y^2 - 15y - 75,000$

    $\boxed{3y^2 - 15y + 25,045}$

Subtracting to Find Profit Word Problems

12. The cost in dollars of producing x toothbrushes is given by the polynomial $400,000 + 3x$ and the revenue generated from sales is given by the polynomial $20x - 0.00004x^2$. Write a polynomial expression for the profit from making and selling x toothbrushes.

R – C
$(20x - .00004x^2) - (400,000 + 3x)$

$20x - .00004x^2 - 400,000 - 3x$

$\boxed{-.00004x^2 + 17x - 400,000}$

13. The total revenue of a CD company is modeled by the expression $0.74x^2 + 2.35x + 9$ where x is the number of CD's produced per week. The total cost of producing x CD's is modeled by the expression $0.02x^2 + 1.25x - 12$, what is the total profit earned by the CD Company?

R – C
$(.74x^2 + 2.35x + 9) - (.02x^2 + 1.25x - 12)$

$.74x^2 + 2.35x + 9 - .02x^2 - 1.25x + 12$

$\boxed{.72x^2 + 1.1x + 21}$

14. The total revenue the app Snapchat makes is modeled by the expression $24x^3 + 42x + 4$ where x is the number of dollars they make in millions. The total cost of maintenance for the app is modeled by the expression $4x^3 + 12x + 2$ what is the total profit earned by the owners of Snapchat?

R – C
$(24x^3 + 42x + 4) - (4x^3 + 12x + 2)$

$24x^3 + 42x + 4 - 4x^3 - 12x - 2$

$\boxed{20x^3 + 30x + 2}$