Example 1 Use the vertical format to find the sum.

(handwritten top right) pg. 819

(A) $5x^2 + 2x - 1$ and $4x^2 - x + 2$

$(5x^2 + 2x - 1) + (4x^2 - x + 2)$

Rewrite the problem, vertically aligning the terms.

$$5x^2 + 2x - 1$$
$$+4x^2 - 1x + 2$$
$$\overline{9x^2 + 1x + 1}$$

Simplify.

$9x^2 + x + 1$

(handwritten right side)
Vertical
  43
$+ 37$

43 + 37 = ____
Horizontal

(B) $3y^3 + 2y + 1$ and $y^2 - 1$

$(3y^3 + 2y + 1) + (y^2 - 1)$

Rewrite the problem, vertically aligning the terms.

$$3y^3 + \boxed{}y^2 + 2y + \boxed{}$$
$$+0y^3 + 1y^2 + y + \boxed{}$$
$$\overline{3y^3 + \boxed{} + 2y + \boxed{}}$$

Simplify.

_____

Reflect

2. Is the sum of two polynomials always another polynomial? Explain.

_____

_____

_____

Your Turn *(handwritten)* pg 819

Add the given polynomials using the vertical format.

3. $-x^2 - 1$ and $4x^2 - x$

(handwritten) $3x^2 - x - 1$

4. *(handwritten above)* $-1 + 2$
   $-z^3 - 2z \;\text{—}\; 1$ and $2z^3 - z^2 + 2z$

(handwritten) $1z^3 - z^2 - 1$

5. $x - 1$ and $4x - 6$

(handwritten) $5x - 7$

(handwritten right) trinomial
degree of 3
LC : 1

Module 17

Lesson 2

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Adding Polynomials Using a Horizontal Format

To add polynomials horizontally, combine like terms. Use the Associative and Commutative Properties to regroup. Place all like terms within the same parentheses. Combine like terms by adding their coefficients, simplifying if necessary.

Example 2 Add the polynomials using the horizontal format.

(A) $5x^2 + 2x + 1$ and $-4x^2 - x - 2$

$$\left(5x^2 + 2x + 1\right) + \left(-4x^2 - x - 2\right)$$ Add.

$$= \left(5x^2 - 4x^2\right) + \left(2x - x\right) + \left(1 - 2\right)$$ Group like terms by using the Commutative and Associative Properties.

$$= x^2 + x - 1$$ Combine like terms.

(B) $-ab + b$ and $ab - a$

$$\left(-ab + b\right) + \left(ab - a\right)$$ Add.
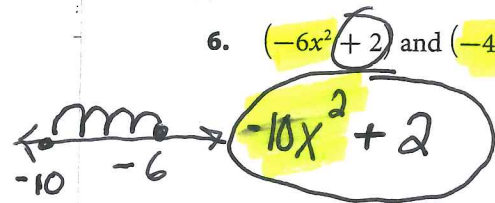
$$= \left(-ab + \boxed{}\right) + b + \left(\boxed{}\right)$$ Group like terms together.

$$= \boxed{}$$ Combine like terms.

Your Turn
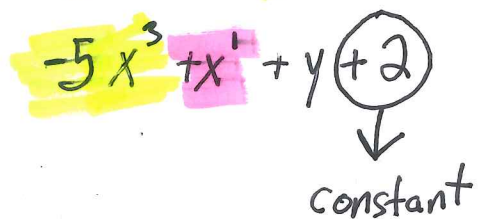
Use the horizontal format to find the sum.

6. $\left(-6x^2 + 2\right)$ and $\left(-4x^2\right)$

$\overleftarrow{}\overset{mm}{} \rightarrow$ $\boxed{-10x^2 + 2}$

$-10 \quad -6$

7. $\left(-x^3 + 2\right)$ and $\left(-4x^3 + y' + x'\right)$

$-5x^3 + x' + y \boxed{+ 2}$

$\downarrow$

constant

8. $\left(y - 7\right)$ and $\left(3y + 18\right)$

Equations

🔧 Explain 3 Modeling with Polynomials

You can model many situations using polynomials. Sometimes you can model a new situation by adding two or more polynomials.

For example, a company offers two services. The number of people using each service at a given time can be modeled by polynomials that use the same variable. The total number of people using both services can be modeled by adding the two polynomials.

Example 3 **A box company owns two factories in different parts of the country. The profit for each factory is modeled by a polynomial with x representing the number of boxes each produces. Solve by adding the polynomials. The models needed in each situation are provided.**
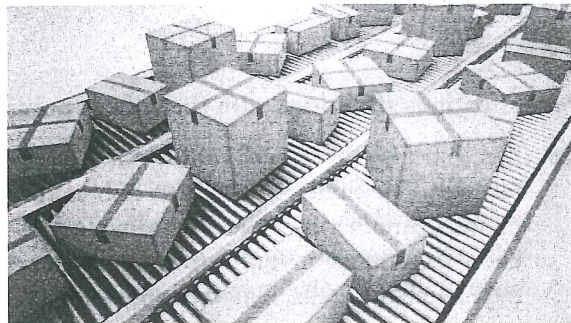
Ⓐ The first factory makes a profit of $-0.03x^2 + 20x - 500$, and the second makes $-0.04x^2 + 25x - 1000$. What is the polynomial modeling the box company's total profit if both factories make the same number of boxes?

$$\left(-0.03x^2 + 20x - 500\right) + \left(-0.04x^2 + 25x - 1000\right)$$ Add.

$$= \left(-0.03x^2 - 0.04x^2\right) + \left(20x + 25x\right) + \left(-500 - 1000\right)$$ Group like terms together.

$$= -0.07x^2 + 45x - 1,500$$ Simplify.

The factories make a total profit of $-0.07x^2 + 45x - 1500.$

Ⓑ The company plans to open a third factory with a projected profit of $-0.03x^2 + 50x - 100$. What will be the total profit of the box company, written as a polynomial, if the projected profit is correct?

The total profit from the first two factories mentioned is $-0.07x^2 + 45x - 1500$. The projected profit from the new factory is $-0.03x^2 + 50x - 100$. Add to solve.

$$(-0.07x^2 + 45x - 1500) + (-0.03x^2 + 50x - 100)$$ Add.

$$= -0.10x^2 + 95x^1 - 1600$$ Group like terms together.

$$= \rule{8cm}{0.4pt}$$ Simplify.

The total projected profit is $-0.10x^2 + 95x - 1600$