Lesson 8: Adding and Subtracting Polynomials

Classwork

Exercise 1

* 1. How many quarters, nickels, and pennies are needed so the value of the coins are $\$1.13$?

 b. Find each sum or difference by combining the parts that are alike.

* 1. $417+231$ = \_\_\_\_\_ hundreds + \_\_\_\_\_ tens + \_\_\_\_\_ ones + \_\_\_\_\_ hundreds + \_\_\_\_\_ tens + \_\_\_\_\_ ones

 = \_\_\_\_\_ hundreds + \_\_\_\_\_ tens + \_\_\_\_\_ ones.

b. $ 8,943 = \\_\\_\\_\\_\\_\\_\\_ ×1000 +\\_\\_\\_\\_\\_\\_\\_×100 + \\_\\_\\_\\_\\_\\_\\_×10 + \\_\\_\\_\\_\\_\\_\\_×1$

$$1,553 = \\_\\_\\_\\_\\_\\_\\_ ×1000 +\\_\\_\\_\\_\\_\\_\\_×100 + \\_\\_\\_\\_\\_\\_\\_×10 + \\_\\_\\_×1$$

Exercise 2

Now let’s be as general as possible by not identifying which base we are in. Just call the base x.

Consider the expression: $1×x^{3}+ 2×x^{2} + 7×x + 3×1$, or equivalently: $x^{3}+2x^{2}+7x+3$.

* 1. What is the value of this expression if $x = 10$?
	2. What is the value of this expression if $x = 20$

**Polynomials**

**Adding and Subtracting**

|  |  |  |
| --- | --- | --- |
| **Monomial** | **Binomial** | **Trinomial** |
| 3y22abc2-914m | 4x – 72x + 9y3x2 – 11xy2 + 3x | a + 2b + 4cx2 + 8x + 9x2 + 2xy + y23a – 7b2 – 4c |

A **monomial** is a term that represents just a number, just a variable or a product of numbers and variables.

A **polynomial** is a monomial or a sum or difference of monomials.

A **binomial** is the sum or difference of two monomials.

A **trinomial** is the sum or difference of three monomials.

The **degree** of a polynomial is the degree of the monomial term with the highest degree.

To find the sum of polynomials add the like terms.

1. (9x2 – 7x + 5) + (-3x2 + 8x – 8) 2. (3a2 + 3ab – b2) + (4ab + 6b2) 3. (7x2 + 7x + 8) + (2x2 – 4x + 3)

|  |  |
| --- | --- |
| Polynomial | Additive Inverse |
| 4x – 7 |  |
| 3x2 + 11xy – y |  |
| -2x + 9y – 2z |  |
| 2x2 – 4x + 3 |  |

To subtract you add the opposite.

1. (9x2 – 7x + 5) – (-3x2 + 8x – 8) 2. (3a2 + 3ab – b2) – (4ab + 6b2) 3. (7x2 + 7x + 8) – (2x2 – 4x + 3)



**Remember: To add or subtract polynomial**

* Group like terms
* To subtract find the additive inverse and then add.

Exercise 3

a. $\left(4x^{2}+x+7\right)+(2x^{2}+3x+1)$

b. 2 $\left(3x^{3}-x^{2}+8\right)-(x^{3}+5x^{2}+4x-7)$

* 1. $\left(3x^{3}+8x\right)-2\left(x^{3}+12\right)+x^{3}$
	2. $\left(5-t-t^{2}\right)+(9t+t^{2})$

* 1. $\left(3p+1\right)+6\left(p-8\right)-(p+2)$

Problem Set

1. What is the value of $22x+3$ when $x=5$? How much money is $22$ nickels and $3$ pennies?

2. What number is represented by $4x^{2}+17x+2$ if $x=10$?

3. What number is represented by $4x^{2} + 17x + 2$ if$ x=-2 $ or if$ x=\frac{2}{3} $?

4. Celina says that each of the following expressions is actually a binomial in disguise:

* + 1. $5abc-2a^{2}+6abc$

* + 1. $5x^{3}∙2x^{2}-10x^{4}+3x^{5}+3x∙\left(-2\right)x^{4}$
		2. $\left(t+2\right)^{2}-4t$

* + 1. $5\left(a-1\right)-10(a-1)+100(a-1)$
		2. $\left(2πr-πr^{2}\right)r-(2πr-πr^{2})∙2r$

For example, she sees that the expression in (i) is algebraically equivalent to $11abc-2a^{2}$, which is indeed a binomial. (She is happy to write this as $11abc+\left(-2\right)a^{2}$, if you prefer.)

Is she right about the remaining four expressions? ***Simplify the remaining ones to find out.***

5. Find each sum or difference by combining the parts that are alike. Put final answer next to the given expression.

$a. \left(2p+4\right)+5\left(p-1\right)-(p+7)$ b. $\left(7x^{4}+9x\right)-2(x^{4}+13)$

$c. \left(6-t-t^{4}\right)+(9t+t^{4})$ d. $\left(5-t^{2}\right)+6\left(t^{2}-8\right)-(t^{2}+12)$

$e. \left(8x^{3}+5x\right)-3(x^{3}+2)$ f. $\left(12x+1\right)+2\left(x-4\right)-(x-15)$

$g. \left(13x^{2}+5x\right)-2(x^{2}+1)$ h. $\left(9-t-t^{2}\right)-\frac{3}{2}\left(8t+2t^{2}\right)$

$i. \left(4m+6\right)-12\left(m-3\right)+\left(m+2\right)$ j. $\left(15x^{4}+10x\right)-12(x^{4}+4x)$