

## Polynomials and Polynumerals

**Adding:**

1.  $23 + 345 = 368$

2.  $1253 + 386 = 1639$

3.  $1050203 + 7213 = 1057416$

4. How do you add multi-digit numbers? Explain the steps thoroughly.

Add digits with the same place value. If the sum is greater than 10, "carry the one" to the next place value.

5.  $(2x + 3) + (3x^2 + 4x + 5) = 3x^2 + 6x + 8$

6.  $(1x^3 + 2x^2 + 5x + 3) + (3x^2 + 8x + 6) = 1x^3 + 5x^2 + 13x + 9$

7.  $(x^6 + 5x^4 + 2x^2 + 3) + (7x^3 + 2x^2 + x + 3) = x^6 + 5x^4 + 7x^3 + 4x^2 + x + 6$

8. How do you add multi-term polynomials? Explain the steps thoroughly.

Add terms with the same power of  $x$ .

**Subtracting:**

9.  $754 - 23 = 731$

10.  $1234 - 111 = 1123$

11.  $(7x^2 + 5x + 4) - (2x + 3) = 7x^2 + 3x + 1$

12.  $(x^3 + 2x^2 + 3x + 4) - (x^2 + x + 1) = x^3 + x^2 + 2x + 1$

13. How are adding and subtracting similar? How are they different?

They are similar in that you combine like terms. For subtraction, you have to "distribute the negative" & subtract each term.

**Multiplying: Use an area model to help.**

14.  $(23)(35) =$

$30 + 5$	
20	100
+3	15

$= 805$

15.  $(1356)(11) =$

<del>10</del> 1	
1000	1000
300	300
50	50
6	6

$= 10000$   
 $+ 4000$   
 $+ 800$   
 $+ 6 = 14916$

16.  $(2x+3)(3x+5) =$

$3x+5$	
$2x$	$10x$
+3	15

$= 6x^2 + 19x + 15$

17.  $(x^3 + 3x^2 + 5x + 6)(x + 1) =$

$x^3 + 3x^2 + 5x + 6$			
x	$4x^3$	$3x^2$	$5x^2$
+	$6x$	$3x^2$	$5x$
+	$x^3$	$3x^2$	$5x$
+	$6$	$6$	$6$

$= x^4 + 4x^3 + 8x^2 + 11x + 6$

18. How do you multiply multi-digit numbers? How do you multiply multi-term polynomials?

Set up an area model and multiply length & width. Break down the number or polynomial

**Extra Practice:**

19.  $(6x^3 + 2x^2 - 3x + 5)(x^2 - 3x - 2) =$

*by its place value to combine like terms easier.*

$6x^3 + 2x^2 - 3x + 5$			
$x^2$	$6x^5$	$2x^4$	$-3x^3$
$-3x$	$-18x^4$	$-6x^3$	$9x^2$
$-2$	$-12x^3$	$-4x^2$	$6x - 10$

$= 6x^5 - 16x^4 - 21x^3 + 10x^2 - 9x - 10$

20.  $(x^4 + x^2 + 1)(x - 1) =$

$x^4 + x^2 + 1$		
x	$x^5$	$x^3$
-1	$-x^4$	$-x^2$

$= x^5 - x^4 + x^3 - x^2 + x - 1$

21.  $(x^4 + 2x^3 + 4x^2 + 8x + 16)(x - 2) =$

$x^4 + 2x^3 + 4x^2 + 8x + 16$				
x	$x^5$	$2x^4$	$4x^3$	$8x^2$
-2	$-2x^4$	$-4x^3$	$-8x^2$	$-16x$
			$-32$	

$= x^5 - 32$