

## IF.3 Operations with Polynomials

**Arrange a polynomial into so powers of x DESCENDING order.**

1.  $5x^5 + 7x^3 - 8 - 3x^8 + 10x$

$$-3x^8 + 5x^5 + 7x^3 + 10x - 8$$

2.  $3x^2y^4 - 6xy + 9x^3y + 5$

$$9x^3y + 3x^2y^4 - 6xy + 5$$

**Addition and Subtraction of Polynomials: Combine Like Terms between different polynomials using the correct operations to find the sum or difference listed below.**

3.  $(5 + 2x + 3x^2) + (7x^2 + 9 - 2x)$

$$\boxed{10x^2 + 14}$$
 (x term cancels out)

4.  $(4y^3 + 5y) + (3y^2 - 2y) - (7y^3 - 6y^2 + 8y)$

$$\begin{aligned} &4y^3 + 5y + 3y^2 - 2y - 7y^3 + 6y^2 - 8y \\ &\boxed{-3y^3 + 9y^2 - 5y} \end{aligned}$$

5.  $(7x^3 - 11x + 3x^2) + (2x^2 - 12 + x)$

$$\boxed{7x^3 + 5x^2 - 10x - 12}$$

6.  $(4y^3 - 6y + 8y^2) - (-3y^2 - 7 + 2y^3)$

$$\begin{aligned} &4y^3 - 6y + 8y^2 + 3y^2 + 7 - 2y^3 \\ &\boxed{2y^3 + 11y^2 - 6y + 7} \end{aligned}$$

7.  $(-3x^2 + 5xy - 2y^2) - (y^2 + 5xy - 9y)$

$$-3x^2 + 5xy - 2y^2 - y^2 - 5xy + 9y$$

$$\boxed{-3x^2 - 3y^2 + 9y}$$

8.  $(3r - 5s + 6t) - (5s - 2r) + (11t + 2r)$

$$3r - 5s + 6t - 5s + 2r + 11t + 2r$$

$$\boxed{7r - 10s + 17t}$$

**Multiplication with Polynomials: Simplify using the distributive property or BOX method.**

9.  $2d(d^5 - 7d^3 + 4)$

$$\boxed{2d^6 - 14d^4 + 8d}$$

10.  $(n + 4m)(2n - 3m)$

$$\begin{aligned} &2n^2 - 3nm + 8nm - 12m^2 \\ &\boxed{2n^2 + 5nm - 12m^2} \end{aligned}$$

11.  $(x + 4)(6x^2 + 2x - 8)$

$$6x^3 + 2x^2 - 8x + 24x^2 + 8x - 32$$

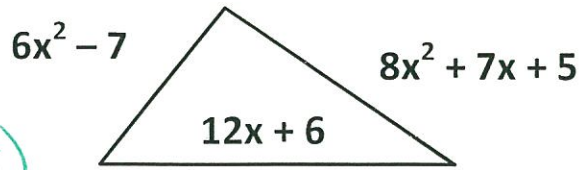
$$\boxed{6x^3 + 26x^2 - 32}$$

12.  $(3x^2 - 2x + 5)(7x - 8x^2 + 9)$

$$\begin{aligned} &21x^3 - 24x^4 + 27x^2 - 14x^2 + 16x^3 - 18x \\ &\quad + 35x - 4x^2 + 45 \end{aligned}$$

$$\text{CLT: } \boxed{-24x^4 + 37x^3 + 9x^2 + 17x + 45}$$

13. Find the perimeter of the triangle pictured.



$$(6x^2 - 7) + (12x + 6) + (8x^2 + 7x + 5)$$

$$14x^2 + 19x + 4$$

Factor each polynomial. Write the solution as a product of factors.

14.  $x^2 - 1$

$$(x+1)(x-1)$$

Difference of Squares

15.  $64x^2 - 9$

$$(8x-3)(8x+3)$$

Difference of Squares

16.  $144x^2 - 169$

$$(12x-13)(12x+13)$$

Difference of Squares

17.  $8x^2 - 12$

GCF: 4

$$4(2x^2 - 3)$$

18.  $18x^2 - 8$

GCF:  $2(9x^2 - 4)$  diff of squares

$$2(3x-2)(3x+2)$$

19.  $50x^2 + 8$

GCF:  $2(25x^2 + 4)$

↑  
Can't factor because  
No "Sum of Squares"

20.  $x^3 - 1$

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

↑ ↑  
SOAP  
because Sum of Cubes

21.  $1000 + 27a^3$

$$(10+3a)(100-30a+9a^2)$$

↑ ↑  
SOAP  
Sum of Cubes

23.  $(2x+3)^3 - y^3$

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

Diff. of Cubes

24.  ~~$81x^3 + 64y^3$~~

25.  $x^4 + 15x^2 + 50$

$$(x^2+10)(x^2+5)$$

↑ ↑  
Quartics  
(Just like Short  
abc but  
with  $x^2$ )

26.  $f^4 - 11f^2 - 26$

$$(f^2-13)(f^2+2)$$

Name: \_\_\_\_\_

From weekend

Unit 1 IF.3 and IF.4 Review (Extra Practice!)

IF.3 Operations on Polynomial Expressions

Directions: Simplify the following polynomials.

1.  $(-5k^4 + 3k^2) - (-3k^4 - 14k^2 + 9k^5 - 68)$

$-5k^4 + 3k^2 + 3k^4 + 14k^2 - 9k^5 + 68$   
 $-9k^5 - 2k^4 + 17k^2 + 68$

3.  $(17x^2 + 3x - 9) + (3x^2 - 4x - 11)$

$20x^2 - x - 20$

5.  $5(-2x^4 + 2y - 6m)$

$-10x^4 + 10y - 30m$

7.  $(x^4 - 2x^3 + 1)(x^2 + 5x - 8)$

$x^6 + 5x^5 - 8x^4 - 2x^3 - 10x^4 + 10x^3 + x^2 + 5x - 8$   
 $x^6 + 5x^5 - 18x^4 + 10x^3 + x^2 + 5x - 8$

2.  $(4x^6 + 37x^4) + (x^6 - 5x^3)$

$5x^6 + 37x^4 - 5x^3$

4.  $(5x^3 - 6x^2 + 8x - 10) - (-8x^4 + 35x^3 + 4x^2)$

$5x^3 - 6x^2 + 8x - 10 + 8x^4 - 35x^3 - 4x^2$   
 $8x^4 - 30x^3 - 10x^2 + 8x - 10$

6.  $-3x^3(3x - 7)(2x - 1)$

$(-9x^4 + 21x^3)(2x - 1)$   
 $-18x^5 + 9x^4 + 42x^4 - 21x^3$   
 $-18x^5 + 51x^4 - 21x^3$

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

$x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3$   
 $x^3 - y^3$

IF.4 Factor Polynomial Expressions. Factor each polynomial completely. Write your answer as a product of its factors.

12.  $15x^2 + 20x^4 + 35x$

$5x(3x + 4x^2 + 7)$   
 $5x(4x^2 + 3x + 7)$

13.  $8x^3 - 125y^3$

$(2x - 5y)(4x^2 + 10xy + 25y^2)$

14.  $x^4 - 18x^2 + 32$

$(x^2 - 16)(x^2 - 2)$   
 $(x - 4)(x + 4)(x^2 - 2)$

15.  $3x^2 - 7x - 6$

$3x^2 - 9x + 2x - 6$   
 $3x(x - 3) + 2(x - 3)$   
 $(3x + 2)(x - 3)$

$\begin{array}{r|l} -18 & -7 \\ \hline & -9 \end{array}$

16.  $36x^2 - 121m^2$

$(6x - 11m)(6x + 11m)$

17.  $3x^4 + 9x^3 - 30x^2$

~~$3x^2(4x^2 + 3x - 10)$~~   
 $3x^2(x^2 + 3x - 10)$

