

**PART A: QUICKIES: Circle the right answer.**

- Which term is **UNLIKE** the other terms?  
 A)  $-2x^3y$  B)  $2yx^3$  **C)  $3y^3x$**  D)  $\frac{2}{3}(x^3y)$  E)  $-3yx^3$
- Which polynomial is of the **fourth degree**?  
 A)  $-2x^4y$  B)  $4yx^3 + 2x^2y^3$  C)  $-4y^4x^4$  **D)  $11x^3y + 2xy + 8$**  E)  $-3yx^3$
- Which polynomial is a **binomial**?  
 A)  $-2x^4y$  **B)  $4yx^3 + 2x^2y^3$**  C)  $-4y^4x^4$  D)  $11x^3y + 2xy + 8$  E)  $-3yx^3$
- Which polynomial is a **trinomial**?  
 A)  $-2x^4y$  B)  $4yx^3 + 2x^2y^3$  C)  $-4y^4x^4$  **D)  $11x^3y + 2xy + 8$**  E)  $-3yx^3$

**PART B: MULTIPLE CHOICE: Circle the right answer.**

- Multiply:  $(2x + 3)(3x^2 + 2x - 5)$   
 A)  $6x^3 - 19x - 15$   
 B)  $6x^3 + 4x^2 - 15$   
 C)  $6x^3 + 5x^2 - 4x - 15$   
**D)  $6x^3 + 13x^2 - 4x - 15$**   
 E)  $6x^3 + 13x^2 - 16x - 15$
- Factor Completely:  $2x^2 - 3x - 2$  (Box)  
**A)  $(x - 2)(2x + 1)$**   
 B)  $x(2x^2 - 3) - 2$   
 C)  $(2x - 1)(x + 2)$   
 D)  $(x - 1)(2x - 2)$   
 E)  $2(x^2 - \frac{3}{2}x - 1)$
- One factor of the expression  $6x^2 + 11x - 10$  is (Box)  
**A)  $3x - 2$**  B)  $3x - 5$  C)  $2x - 5$  D)  $3x + 2$  E)  $3x + 5$ 

$$\begin{array}{r} (3x - 2) \quad -4x \\ \hline (2x + 5) \quad 15x \end{array}$$
- Which polynomial has the **highest degree**?  
 A)  $\frac{-2x^6y^4}{2}$  B)  $4yx^3 + 2x^2y^3$  C)  $\frac{-4y^4x^2}{5}$  **D)  $\frac{11x^2y^9 + 2xy + 8}{7}$**  E)  $\frac{-3y^9x^3}{6}$
- Factor completely:  $3x^3 - 12x$  (GCF/Dofs)  
 A)  $2x(3x^2 - 2) - 5x^2$  B)  $x^2(3x - 4)$  C)  $3x(x^2 - 4)$  **D)  $3x(x + 2)(x - 2)$**  E)  $x(3x^2 - 12)$

**PART C: SIMPLIFY COMPLETELY: (i.e., no brackets)**

1.	$5x^2 - 3x + 1 - 7x^2 + 2x + 11 = -2x^2 - x + 12$
2.	$\frac{14ab}{7b} + 7a = 2a + 7a = 9a$

3	$(x^2 + 17x - 11) - (4x^2 + 2x - 2) = -3x^2 + 15x - 9$
4	$4(3x - 2) - 2(x + 2) = 12x - 8 - 2x - 4 = 10x - 12$
5	$(-2y^4)^3(-3y^3)^2 = (-8y^{12})(9y^6) = -72y^{18}$
6	$\frac{54x^3y^2z^3}{9x^2yz^3} = 6xyz^2$
7	$\frac{3m^4n^3}{-21mn} \left( \frac{3m^6n^4}{7m^2n^2} \right) = \frac{3m^{10}n^7}{-49m^3n^2} = -\frac{3m^7n^5}{49}$
8	$\frac{18a^3b^4}{-6a^3b} \left( \frac{7ab^5}{3b^2} \right) = \frac{-7a^6b^9}{a^3b^3} = -7a^3b^6$
9	$(y - 7)^2 = y^2 - 14y + 49$
10	$(3a + 5b)(2a - b) = 6a^2 - 3ab + 10ab - 5b^2 = 6a^2 + 7ab - 5b^2$
11	$(5 - y)(5 + y) = 25 - y^2$
12	$(5x - 1)(5x + 1)(x + 2) = (25x^2 - 1)(x + 2) = 25x^3 + 50x^2 - x - 2$
13	$(x - 4)(3x^2 - 2x + 6) = 3x^3 - 2x^2 + 6x - 12x^2 + 8x - 24 = 3x^3 - 14x^2 + 14x - 24$

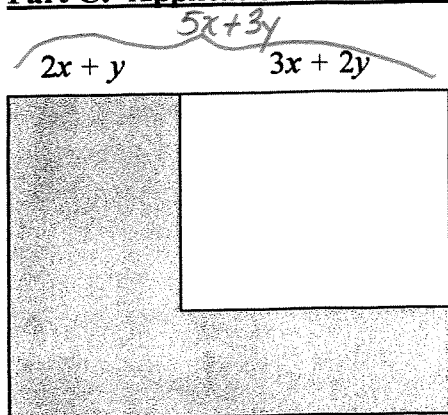
**PART D: FACTOR COMPLETELY:**

1.	$15y^4z^3 - 5zy^3 + 10y^2z^2 = 5y^2z(3y^2z^2 - y + 2z)$ GCF
2.	$3b(m - 2n) - 2c(m - 2n) = (m - 2n)(3b - 2c)$ GCF
3.	$16a^2 - 121 = (4a + 11)(4a - 11)$ DOS
4.	$9x^4 - 100y^4 = (3x^2 - 10y^2)(3x^2 + 10y^2)$ DOS ↳ also a DOS but not necessary to factor... this year!

$$7) (x^2 + 3x - 5)(2x^2 + x + 3) = \begin{array}{r} 2x^4 + x^3 + 3x^2 \\ + 6x^3 + 3x^2 + 9x \\ - 10x^2 - 5x - 15 \\ \hline 2x^4 + 7x^3 - 4x^2 + 4x - 15 \end{array}$$

$$8) 5x(3x - 7) - (2x + 1)(4x - 9) = 15x^2 - 35x - [8x^2 - 18x + 4x - 9] \\ = 7x^2 - 21x + 9$$

**Part C: Applications of Polynomials.** Calculate the area of the shaded region.



$$\text{Area (shaded)} = A(\text{large}) - A(\text{small})$$

$$A(s) = (5x + 3y)(4x + 3y) - (3x + 2y)(3x + y)$$

$$A(s) = 20x^2 + 27xy + 9y^2 - [9x^2 + 9xy + 2y^2]$$

$$A(s) = \underline{11x^2 + 18xy + 7y^2}$$

**Part D: State the degree for the following polynomials.**

1)  $-2x^3y^4 - 4yx^2 = 3^{\text{rd}}$

2)  $4yx^4 + 2x^3y^3 = 6^{\text{th}}$

3)  $4y^4xz^4 = 9^{\text{th}}$

**Part E: Factor completely: (Remember your rules!)**

1)  $20y^3z^2 - 16zy^4 + 24y^2z^2 - 48z^3y^5 = 4y^2z(5yz - 4y^2 + 6z - 12y^3z^2)$

GCF.

2)  $16a^2 - 169 = (4a - 13)(4a + 13)$

D.O.S.

3)  $8rs^5 - 98r^5s = 2rs(4s^4 - 49r^4) = 2rs(2s^2 - 7r^2)(2s^2 + 7r^2)$

GCF.

D.O.S.

4)  $a^4 - 81 = (a^2 + 9)(a^2 - 9) = (a^2 + 9)(a + 3)(a - 3)$

D.O.S.

D.O.S.



$$11) a^2 + ab - 30b^2 = (a+6b)(a-5b)$$

Tri

$$12) c^3 + 3c^2 - 18c = c(c^2 + 3c - 18) = c(c+3)(c-6)$$

GCF Tri

$$13) 5n^2 + 13n - 6 = (5n-2)(n+3)$$

Box

5n + 2	-2n
n + 3	15n

$$14) 10x^2 - 23xy - 21y^2 = (10x+7y)(x-3y)$$

Box

10x + 7y	7xy
x - 3y	-30xy

$$15) (x-4)^2 - (x+7)^2 = A^2 - B^2 = (2x+3)(-11)$$

D.O.S. = (A+B)(A-B) = (x-4+x+7)(x-4-[x+7]) = -11(2x+3) - Best

$$16) (a-7)^2 - 4a^2 = A^2 - 4a^2 = (-a-7)(3a-7)$$

D.O.S. = (A-2a)(A+2a) = -(a+7)(3a-7)

$$= (a-7-2a)(a-7+2a)$$

$$17) 4x - 12x^2 - 16x^3 = 4x(1-3x-4x^2) = 4x(1+x)(1-4x)$$

GCF Box = -4x(x+1)(4x-1)

1	x	x
1	-4x	-4x

**Um, Nasty Beasty, Ring a Ding Dong Dandies...**

$$1) (a+b)^2 - 9(a+b) + 20 = x^2 - 9x + 20 = (a+b-4)(a+b-5)$$

$$= (x-4)(x-5)$$

$$2) (5x)^2 - 3(5x) + 2 = A^2 - 3A + 2 = (5x-2)(5x-1)$$

$$= (A-2)(A-1)$$

$$3) 2(A+B)^2 - (A+B) - 1 = 2x^2 - x - 1 = (2x+1)(x-1)$$

$$= (2[A+B]+1)(A+B-1)$$

$$= (2A+2B+1)(A+B-1)$$

2x + 1
x + 1

5.	$18rs^3 - 50r^3s = 2rs(9s^2 - 25r^2) = 2rs(3s - 5r)(3s + 5r)$ GCF D.O.S.
6.	$(x-1)^2 - (2x-3)^2 = (x-1+2x-3)(x-1-(2x-3)) = (3x-4)(-x+2)$ D.O.S. $= -(3x-4)(x-2)$
7.	$x^2 + 7x + 6 = (x+6)(x+1)$
8.	$b^2 - 10b + 21 = (b-7)(b-3)$
9.	$p^2 + 2p - 24 = (p+6)(p-4)$
10.	$x^2 - 3x - 10 = (x-5)(x+2)$
11.	$a^2 + 2ab - 24b^2 = (a+6b)(a-4b)$
12.	$2c^2 - 4c - 70 = (2c+10)(c-7)$ $\begin{array}{r} 2c+10 \\ c-7 \end{array}$
13.	$5(n-3)^2 - 23(n-3) - 10 = 5x^2 - 23x - 10 = (5[n-3]+2)(n-3-5)$ $\begin{array}{r} 5x+2 \\ x+5 \end{array} \quad \begin{array}{r} 2x \\ -25x \end{array} = (5x+2)(x-5) = (5n-13)(n-8)$
14.	$3x^2 + 5xy - 12y^2 = (3x-4y)(x+3y)$ $\begin{array}{r} 3x-4 \\ x+3 \end{array} \quad \begin{array}{r} -4x \\ 9x \end{array}$
15.	$12w^2 - 40w - 4 = 4(3w^2 - 10w - 1)$ GCF But cannot be factored... this year!
16.	$4x^3 - 25x = x(4x^2 - 25) = x(2x+5)(2x-5)$
17.	$4a^2 + 2ab - 30b^2 = 2(2a^2 + ab - 15b^2) = (2a-5b)(a+3b)$ $\begin{array}{r} 2a+5b \\ a+3b \end{array}$
18.	$2x - 6x^2 - 8x^3 = -2x(-1+3x+4x^2) = -2x(4x^2+3x-1)$ $= -2x(4x-1)(x+1)$
19.	$(a-b)^2 - 6(a-b) + 16 = x^2 - 6x + 16 = (x-8)(x+2)$ $= (a-b-8)(a-b+2)$
20.	$(4x-3y)^2 - y^2 = A^2 - y^2 = (A+y)(A-y)$ $= (4x-3y+y)(4x-3y-y)$ $= (4x-2y)(4x-4y)$ $= 2(2x-y)(4)(x-y) = 8(2x-y)(x-y)$

## Area & Volume:

- a) Calculate the surface area and volume of a sphere that has a radius of 3.5 cm. (SA =  $4\pi r^2$ )
- b) Calculate the diameter of a sphere that has a volume of 231.4 cm<sup>3</sup>. ( $V = \frac{4}{3}\pi r^3$ )

$$\begin{aligned} \text{a) } S.A. &= 4\pi(3.5)^2 \\ S.A. &= 153.9 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Vol} &= \frac{4\pi r^3}{3} \\ V &= \frac{4\pi(3.5)^3}{3} \\ V &= 179.6 \text{ cm}^3 \end{aligned}$$

$$\text{b) } 231.4 = \frac{4\pi r^3}{3}$$

$$\sqrt[3]{\frac{3(231.4)}{4\pi}} = \sqrt[3]{r^3}$$

$$3.8 = r$$

$$\therefore d = 7.6 \text{ cm}$$

## Long Division of Polynomials:

1) Divide:  $(3x^2 + 2x - 4)$  by  $(x - 1)$

$$\begin{array}{r} 3x+5 \text{ r } 1 \\ x-1 \overline{) 3x^2+2x-4} \\ \underline{-(3x^2-3x)} \phantom{-4} \\ 5x-4 \\ \underline{-(5x-5)} \\ 1 \end{array}$$

$$\begin{aligned} \therefore (x-1)(3x+5)+1 &= \\ 3x^2+2x-4 & \end{aligned}$$

$$\begin{array}{r} 3m^3-m^2-m+2 \\ 3m+1 \overline{) 9m^4+0m^3-4m^2+5m+2} \\ \underline{-(9m^4+3m^3)} \phantom{+2} \\ -3m^3-4m^2 \phantom{+5m+2} \\ \underline{-(-3m^3-m^2)} \phantom{+5m+2} \\ -3m^2+5m \phantom{+2} \\ \underline{-(-3m^2-m)} \phantom{+2} \\ 6m+2 \\ \underline{-(6m+2)} \\ 0 \end{array}$$

$$\begin{aligned} \therefore (3m+1)(3m^3-m^2-m+2) &= \\ = 9m^4-4m^2+5m+2 & \end{aligned}$$