

Write the polynomial in standard form. Identify the degree and leading coefficient of the polynomial. Then classify the polynomial by the number of terms.

1. $3x + 5x^2 - 7x + 5$
 Standard Form: $5x^2 - 4x + 5$
 Degree: 2
 Leading Coefficient: 5
 Classify: trinomial

2. $-5b^3$
 Standard Form: $-5b^3$
 Degree: 3
 Leading Coefficient: -5
 Classify: monomial

3. $20z^4 - z^7 + \frac{2}{3}z$
 Standard Form: $-z^7 + 20z^4 + \frac{2}{3}z$
 Degree: 7
 Leading Coefficient: -1
 Classify: trinomial

4. $-\frac{3}{7}a^2 + \frac{4}{5}a^5$
 Standard Form: $\frac{4}{5}a^5 - \frac{3}{7}a^2$
 Degree: 5
 Leading Coefficient: $\frac{4}{5}$
 Classify: binomial

Directions: Find the sum or difference. Show your work!

5. $-5(4b^3 - 5b) \mp (3b^4 \mp b^3)$
 $-5(4b^3) + (-5)(-5b) - 3b^4 + b^3$
 $-20b^3 + 25b - 3b^4 + b^3$
 $-3b^4 - 19b^3 + 25b$

6. $(-3x + 4x^2) + (-12x^3 + 7x)$
 $-12x^3 + 4x^2 + 4x$

7. $(2 - 3x) + (14x - 7x^2 - 5)$
 $-7x^2 + 14x - 5$
 $-3x + 2$
 $+$
 $-7x^2 + 11x - 3$

8. $(5 - 6y - 4y^2) - (-2y^2 + 5y + 12y^3)$
 $5 - 6y - 4y^2 + 2y^2 - 5y - 12y^3$
 $-4y^2 - 6y + 5$
 $+ -12y^3 + 2y^2 - 5y$
 $-12y^3 - 2y^2 - 11y + 5$

Directions: Find the product. Show your work!

9. $(5 - a)(a^2 - 3a - 10)$

	a^2	$-3a$	-10
$-a$	$-a^3$	$3a^2$	$+10a$
$+5$	$5a^2$	$-15a$	-50

$$-a^3 + 8a^2 - 5a - 50$$

10. $(1 - 5c)(2c + 6)$

	$2c$	$+6$
$-5c$	$-10c^2$	$-30c$
$+1$	$2c$	$+6$

$$-10c^2 - 28c + 6$$

11. $2x(3x + 1)(x^2 + 4x)$

	x^2	$+4x$
$3x$	$3x^3$	$12x^2$
$+1$	x^2	$4x$

$$2x(3x^3 + 13x^2 + 4x)$$

$$6x^4 + 26x^3 + 8x^2$$

12. $5(p - 3)^2$ $5(p - 3)(p - 3)$

$$5(p^2 - 6p + 9)$$

$$5p^2 - 30p + 45$$

13. A rectangular picture is 6 centimeters longer than it is wide. A frame 1 centimeter wide is placed around the picture.

a. Write a polynomial that represents the perimeter of the frame.

$$2(x + 6 + 2) + 2(x + 2)$$

$$2(x + 8) + 2(x + 2)$$

$$2x + 16 + 2x + 4$$

$$4x + 20$$

b. Write a polynomial that represents the area of the frame.

$$(x + 8)(x + 2)$$

$$x^2 + 8x + 2x + 16$$

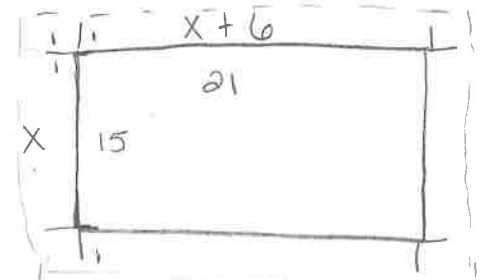
$$x^2 + 10x + 16$$

c. Find the perimeter of the frame if the picture is 15 centimeters wide?

$$15 + 2 + 2 + 15 + 2$$

$$17 + 23$$

$$1p = 40$$



Directions: Factor the polynomial completely. Show your work!

14. $10nm^3 - 15n^2m$

$5nm(2m^2 - 3n)$

16. $3p^3 + 9p^2 - 210p$

$3p(p^2 + 3p - 70)$
 $3p[(p^2 - 7p + 10p - 70)]$
 $3p[p(p-7) + 10(p-7)]$
 $3p(p-7)(p+10)$

<u>-70</u>	<u>Sum 9</u>
-1 70	69
-2 35	33
-5 14	9
-7 10	3

18. $5x^3 - 125x$

$5x(x^2 - 25)$
 $5x(x-5)(x+5)$

15. $4x^2 + 2xy - 2y^2$

$2(2x^2 + xy - y^2)$
 $2[(2x^2 - 1xy) + (xy - y^2)]$
 $2[x(2x-y) + y(2x-y)]$
 $2(2x-y)(x+y)$

<u>-2</u>	<u>Sum: 1</u>
-1 2	1
1 -2	-1

17. $-5x^2 + 15x + 140$

$-5(x^2 - 3x - 28)$
 $-5[(x^2 + 4x) - (7x + 28)]$
 $-5[x(x+4) - 7(x+4)]$
 $-5(x+4)(x-7)$

<u>28</u>
-1 -28
-2 -14
4 -7

19. $(6ab + 12a^2) - 7xb - 14xa$

$6a(b+2a) - 7x(b+2a)$
 $(b+2a)(6a-7)$

Directions: Solve the equation. Show your work!

22. $2p^2 + 24 = -16p$

$2p^2 + 16p + 24 = 0$
 $2(p^2 + 8p + 12) = 0$
 $2(p+6)(p+2) = 0$
 $p+6=0$ $p+2=0$
 $p=-6$ $p=-2$

23. $9m^2 - 1 = 0$

$(3m-1)(3m+1) = 0$
 $3m-1=0$ $3m+1=0$
 $3m=1$ $3m=-1$
 $m = \frac{1}{3}$ $m = -\frac{1}{3}$

24. $-3x^2 + x^3 = 4x$

$x^3 - 3x^2 - 4x = 0$
 $x(x^2 - 3x - 4) = 0$
 $x(x-4)(x+1) = 0$
 $x=0$ $x-4=0$ $x+1=0$
 $x=4$ $x=-1$

25. $x^4 - 5x^2 + 4 = 0$

$(x^2 - 4)(x^2 - 1) = 0$
 $(x+2)(x-2)(x+1)(x-1) = 0$
 $x+2=0$ $x-2=0$ $x+1=0$ $x-1=0$
 $x=-2$ $x=2$ $x=-1$ $x=1$

26. An object is launched at 9.8 meters per second from a 73.5-meter tall platform. The object's height s (in meters) after t seconds is given by the equation $s(t) = -4.9t^2 - 9.8t + 73.5$. When does the object strike the ground?

$$0 = -4.9(t^2 + 2t - 15)$$

$$0 = -4.9(t + 5)(t - 3)$$

$$t + 5 = 0 \\ t = -5$$

$$t - 3 = 0 \\ t = 3$$

$$t = 3 \text{ seconds}$$

27. You are designing an aquarium for your new office. The dimensions of the aquarium are restricted as shown in the diagram below.

- a. Write a polynomial expression that represents the volume of the aquarium according to the specified dimensions.

$$V = L \times w \times h$$

$$V = (49 - w)(w)(w + 9)$$

$$V = (-w + 49)(w + 9)(w)$$

$$V = (-w^2 - 9w + 44w + 441)w$$

$$V = -w^3 + 40w^2 + 441w$$

$$V = -w^3 + 40w^2 + 441w$$

- b. You need the aquarium to hold 17,640 cubic inches of water. Find the possible dimensions of the aquarium.



$$(49 - w) \text{ in.} \\ 9$$

$$w \text{ in.} \\ 40$$

$$49 \\ (w + 9) \text{ in.}$$

$$L = 9 \text{ in.}, w = 40, h = 49 \\ \text{or} \\ L = 28 \text{ in.}, w = 21, h = 30$$

$$(-w^3 + 40w^2 + 441w) \text{ in}^3$$

18081

3 6027

7 2583

9 2009

21 861

$$w - 40 = 0$$

$$w = 40$$

$$w - 21 = 0$$

$$w = 21$$

$$w + 21 = 0$$

$$w \neq -21$$

$$-w^3 + 40w^2 + 441w = 17,640$$

$$0 = (w^3 - 40w^2) - 441w + 17,640$$

$$= w^2(w - 40) - 441(w - 40)$$

$$= (w^2 - 441)(w - 40)$$

$$(w + 21)(w - 21)(w - 40)$$

28. Write a polynomial that has two positive roots and one negative root.

$$x = 3$$

$$x = 2$$

$$x = -1$$

$$(x - 3) = 0$$

$$(x - 2) = 0$$

$$(x + 1) = 0$$

$$x^3 - 5x^2 + 6x + x^2 - 5x + 6 = 0$$

$$x^3 - 4x^2 + x + 6 = 0$$

$$(x - 3)(x - 2)(x + 1) = 0$$

$$(x^2 - 2x - 3x + 6)(x + 1) = 0$$

$$(x^2 - 5x + 6)(x + 1) = 0$$

$$x(x^2 - 5x + 6) + (1)(x^2 - 5x + 6) = 0$$