HW #5 - Due Tuesday, 9/15:
5.1 #63-85 odd

HW #6 - Due Wednesday, 9/16:
5.2 #3-7odd, 15-25odd, 35-49odd

HW #7 - Due Tuesday, 9/22:
5.3 #25-29odd, 43-51odd, 61-67odd, 89-97odd, 109-117odd

HW #8 - Due Friday, 9/25?
5.4 #19-25 odd; 27-43 odd; 55-61 odd
5.5 #21-47 odd

HW #9 - Due Tuesday, 9/29?
5.6 #3-131 odd
5.7 #35-49 odd, 51-57 odd, 61-75odd

Test 3 - Tuesday, 9/29?

Ch 5 - Exponential Expressions & Polynomials
5.1 - Exponential Expressions
5.2 - Intro to Polynomials
5.3 - Multiplying Polynomials
5.4 - Dividing Polynomials
5.5 - Factoring
5.6 - Special Factoring
5.7 - Solving Equations by Factoring

42. $(x^3 + 2x + 5) \div (x - 2)$ $= x^2 + 2x + 6 + \frac{17}{x-2}$

$1x^3 + 0x^2 + 2x + 5$

2	1	0	2	5
	↓	2	4	12
	1	2	6	17

x^2 coeff. → 1; x-coeff. → 2; constant → 6; remainder → 17

48. $\frac{3 - 13x - 5x^2 + 9x^3 - 2x^4}{3 - x} = \frac{-2x^4 + 9x^3 - 5x^2 - 13x + 3}{3 - x}$

3	-2	9	-5	-13	3
		-6	9	12	-3
	-2	3	4	-1	0
	x^3	x^2	x	c	

$= -2x^3 + 3x^2 + 4x - 1 + \frac{0}{3-x}$

52. $\dfrac{x^4 - 3x^3 - 30}{x + 2}$ $= x^3 - 5x^2 + 10x - 20 + \dfrac{10}{x+2}$

$$\begin{array}{r|rrrrr} -2 & 1 & -3 & 0 & 0 & -30 \\ & & -2 & 10 & -20 & 40 \\ \hline & 1 & -5 & 10 & -20 & \boxed{10} \end{array}$$

Evaluate a Polynomial using Synthetic Division

Remainder Theorem: If the polynomial $P(x)$ is divided by $x - a$, the remainder is $P(a)$.

56. $Q(x) = 3x^2 - 5x - 1;\ Q(2)$

$$\begin{array}{r|rrr} 2 & 3 & -5 & -1 \\ & & 6 & 2 \\ \hline & 3 & 1 & \boxed{1} \end{array}$$

$Q(2) = 1$

$(2, 1)$ is a point on the graph of Q

60. $R(t) = 3t^3 + t^2 - 4t + 2;\ R(-3)$

$$\begin{array}{r|rrrr} -3 & 3 & 1 & -4 & 2 \\ & & -9 & 24 & -60 \\ \hline & 3 & -8 & 20 & \boxed{-58} \end{array}$$

$R(-3) = -58$

$(-3, -58)$ is a point on the graph of R

64. $Q(x) = x^4 - 2x^3 + 4x - 2;\ Q(-2)$

-2	1	-2	0	4	-2
		-2	8	-16	24
	1	-4	8	-12	22

$Q(-2) = 22$

68. $P(z) = 2z^4 + z^2 - 3;\ P(-4)$

-4	2	0	1	0	-3
		-8	32	-132	528
	2	-8	33	-132	525

$P(-4) = 525$

5.5 – factoring a polynomial

GCF - Greatest Common Factor

$ab + ac = a(b + c)$

prime factorization of 12

$12 = 1 \cdot 12 = 2 \cdot 6 = 3 \cdot 4 = 2 \cdot 2 \cdot 3 = 2^2 \cdot 3$

$x^3 = x^3 \cdot 1 = x^2 \cdot x = x \cdot x^2 = x \cdot x \cdot x$

$x^2y^3 = x^2y^3 \cdot 1 = x \cdot (xy^3) = (x^2y)y^2 = (x^2y^2)y$

$= x \cdot x \cdot y \cdot y \cdot y$

$12x^3y^4$ & $8x^2y^5$

$2\cdot 6$ $2\cdot 2\cdot 2$

$2\cdot 2\cdot 3$ $2\cdot 2\cdot 2$

GCF: $4x^2y^4$

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1. $15x^2yz^3$, $9x^3y^2z$, $75x^4y^2z^2$

$3\cdot 5$ $3\cdot 3$ $3\cdot 25 = 3\cdot 5\cdot 5$

GCF: $3x^2yz$

2. $-16x^3y^5z^6$, $24x^4y^{10}z^3$, $40x^2y^2z^9$

$2\cdot 8$ $3\cdot 8$ $5\cdot 8$

GCF: $8x^2y^2z^3$

5.5

$a^m a^n = a^{m+n}$

14. $x^2y^4 - x^2y - 4x^2$

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

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20. $b^{n+5} - b^5$

$b^5(b^n - 1)$

22. $14a^4b^4 - 42a^3b^3 + 28a^3b^2$

$14a^3b^2(ab^2 - 3b + 2)$

24. $10x^2y + 20x^2y^2 + 30x^2y^3$

$10x^2y(1 + 2y + 3y^2)$

Factor trinomials of the form

$x^2 + bx + c = (x + d)(x + e)$

$x^2 + 5x + 6 = (x + 2)(x + 3)$

factors of 6 (constant term) that sum to give you 5 (x-coeff.)

$x^2 - 7x + 6$

$= (x-6)(x-1)$

54. $a^2 + a - 72$

$= (a-8)(a+9)$

$= (a+9)(a-8)$

64. $b^2 - 6b - 16$

$= (b-8)(b+2)$

72. $y^2 - 13y + 12$

$= (y-12)(y-1)$

74. $x^2 + 7x - 18$

$= (x+9)(x-2)$

Factoring by Grouping

28. $3(x+y)+a(x+y)$

$(x+y)(3+a)$

$7-a=-1(a-7)$

30. $3(a-7)-b(7-a)$

$=3(a-7)+b(a-7)$

$=(a-7)(3+b)$

32. $x^2-5x+4x-20$

$x(x-5)+4(x-5)$

$(x-5)(x+4)$

34. $ab+7b-3a-21$

$b(a+7)-3(a+7)$

$(a+7)(b-3)$

38. a^2b+3a^2+2b+6

$a^2(b+3)+2(b+3)$

$(b+3)(a^2+2)$

Factor trinomials of the form ax^2+bx+c

When a=1, we look for factors of c that sum to b.

When a is any constant other than 1, we will
- look for factors of c*a that sum to b,
- rewrite bx as a sum of two terms whose coefficients are those factors,
- factor by grouping.

80. $6y^2+5y-6$

multiply constant term by leading coefficient

$6(-6) = -36$

What factors of this number sum to the x-coeff?

$(9)+(-4)=5$

$6y^2+9y-4y-6$

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

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

88. $4a^2-a-5$

$4(-5) = -20$

$4a^2+4a-5a-5$

$4a(a+1)-5(a+1)$

$(a+1)(4a-5)$

$4a^2-5a+4a-5$

$a(4a-5)+1(4a-5)$

$(4a-5)(a+1)$

24 & 52

$6 \cdot 4$ $2 \cdot 26$

$3 \cdot 2 \cdot 2 \cdot 2$ $2 \cdot 2 \cdot 13$

$3 \cdot 2^3$ $2^2 \cdot 13$

$2^2 \cdot 2^1$

GCF of 24 & 52: $2^2 = \boxed{4}$

$x^3y^2z^5$ & $x^7y^3z^1$

$a^m a^n = a^{m+n}$

$x^3 x^4$

$a(b+c) = ab + ac$

GCF $= \boxed{x^3y^2z}$

$x^3(x^4) = x^7$

$x^3y^2z^5 + x^7y^3z^1 = \boxed{x^3y^2z\left(z^4 + x^4y^1\right)}$

$(x^3y^2z)(z^4) = x^3y^2z^5$

$12x^3y^6z^2 - 20x^5y^2z^7$

$3 \cdot 4 \cdot x \cdot x \cdot x \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y \cdot z \cdot z - 5 \cdot 4 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot y \cdot y \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z \cdot z$

GCF: $4x^3y^2z^2$

$4x^3y^2z^2(3y^4 - 5x^2z^5)$

$54x^3y^9z^4 + 24x^6y^4z$

54 1
9 6
3 3 2 2

24 1
8 3
4 2 2 2

$4 + 0 = 4$

$6x^3y^4z(9y^5z^3 + 4x^3)$: