Algebra Ch. 12 Factoring

12-1 Warm-Up

1. List all numbers that can be multiplied to equal 30. 1, 2, 3, 5, 6, 10, 15, 30

2. List all numbers that go into 45 and 27 1, 3, 9

3. Name 5 multiples of 6. Ex) 6, 12, 18, 24, 600

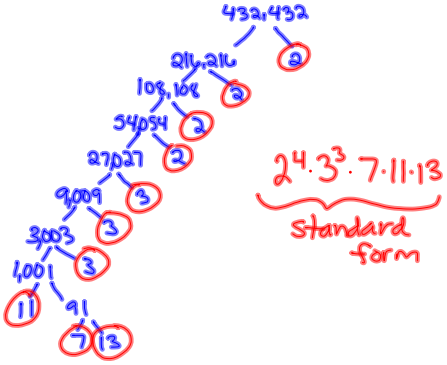
Algebra 12-1 Factoring Integers

Word	Definition	Example
Factors	# or variables that an expression is divisible by	Factors of 4x: 1, 2, 4 1x, 2x, 4x
Multiple	what you mult. by	40 is a multiple of 10, 4, 20, 2, 8, 5
Common Factor	a factor that 2 expressions have in common	33x 22x² common factor: 11x
Prime Numbers	a# that can only be ÷ by 1 & itself * whole #'s > 1	3, 5, 7, 11, 13, 17...
Composite Numbers	not prime	4, 6, 8... 15, 21
Prime Factorization	break down a# by factoring * must be prime	
Standard Form		$2 \cdot 2 \cdot 2 = 2^3$

Examples

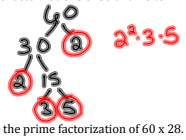
1. List prime numbers between 10 and 25. 11, 13, 17, 19, 23

2. Write the prime factorization of 432, 432 in standard form.



$2^4 \cdot 3^3 \cdot 7 \cdot 11 \cdot 13$ standard form

3. Use prime factorizations of 60 and 28 to...



$2^2 \cdot 3 \cdot 5$

$2^2 \cdot 7$

1. Write the prime factorization of 60 x 28.

$2^2 \cdot 3 \cdot 5 \cdot 2^2 \cdot 7$

$2^4 \cdot 3 \cdot 5 \cdot 7$

1. Write 28/60 in lowest terms.

$\frac{2^2 \cdot 7}{2^2 \cdot 3 \cdot 5}$

$\frac{7}{15}$

Assignment: 12-1 #'s 1-7, 10-13, 15-18, give examples for 18, 20

Algebra 12-2: Common Monomial Factoring

Warm-Up

Fill in the blank.

1. $15x^2 + 20 = \_5\_ (3x^2 + 4)$

2. $18x^2 + 12x = \_6x\_ (3x + 2)$

Algebra 12-2: Common Monomial Factoring

Word	Definition	Example
Greatest Common Factor GCF	the largest common factor	$24x^2$ $16x$ $8x$ = GCF
Prime Polynomials	polynomials that cannot be factored	$\frac{6x^2}{3x} + \frac{3x}{3x} =$ $3x(2x+1)$ prime polynomial

Examples

1. Find the GCF among the following: $16a^5m$ $-12a^3m^3$ $4a^2m^5$

$4a^2m$

2. Factor.

$18y^3 - 6y^2 - 15y$ $\div 3y$ $\div 3y$ $\div 3y$

1. GCF
2. ÷

$= 3y(6y^2 - 2y - 5)$

3. Simplify

$$\frac{-10z^2 + 5z}{5z} = \frac{5z(-2z+1)}{5z} = -2z+1$$

Assignment: 12-2 #'s 1-6a, 8-18, 20-23 abc, 28

Algebra 12-3 Day 1: Factoring $x^2 + bx + c$

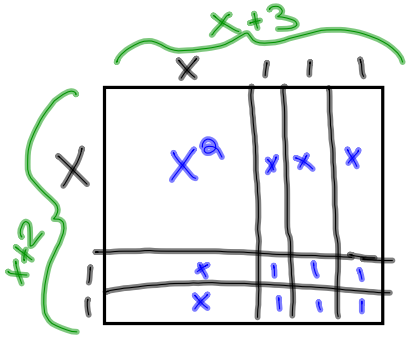
Warm-Up Brain Teasers

1. Find 2 numbers that multiply to equal 96 and add up to 28. 24, 4

2. Find 2 number2 that multiply to equal 90 and add up to -21. -15, -6

3. Find 2 numbers that multiply to equal -54 and add up to -3. -9, 6

Algebra 12-3 Factoring $x^2 + bx + c$



Write an equality (=) that represents the area (lw) of the tiles and the sum of the smaller tiles.

add ↓ mult. ↓

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

Hints...

- Take out the GCF first, if there is one. Example: $3x + 6x^2 = 3x(1 + 2x)$ ($\frac{3x}{3x}$ $\frac{3x}{3x}$)
- List the factors & sum. Ex: Multiply = 24

mult. = 6	sum
3, 2	5
1, 6	7

- Check by multiplying (FOIL / boxes) or graphing on a calculator.

Examples - Factor

1. $y^2 - 3y - 54$ $= (y+6)(y-9)$

add ↑ mult

-54

$1, 54$

$3, 18$

$6, -9$

$2, 27$

sum -3

2. $c^2 - 16 = c^2 + 0c - 16$

add ↑ mult.

4 & -4

mult $= -16$

add $= 0$

$(c+4)(c-4)$

check

	c	$+4$
c	c^2	$4c$
-4	$-4c$	-16

3. $3r^3 + 30r^2 + 75r$

$\frac{3r}{3r} \quad \frac{3r}{3r} \quad \frac{3r}{3r}$

add ↙ ↘ mult.

$3r(r^2 + 10r + 25)$

$3r(r+5)(r+5)$

$3r(r+5)^2$

Assignment: 12-3 #'s 2-20, 24

Algebra 12-3 Day 2: Factoring $x^2 + bx + c$

Warm-Up/Review

Factor.

1. $x^2 + 8x + 12$

add ↙ ↘ mult

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

2. $x^2 - 9x - 22$

add ↙ ↘ mult.

$(x+2)(x-11)$

3. $2x^2 - 32$

$2(x^2 - 16)$

$x^2 + 0x - 16$

add ↙ ↘ mult

4 & -4

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

4. $18a^4 + 6a^2 - 9a$

$3a(6a^3 + 2a - 3)$

5. Draw a rectangle that represents the polynomial $b^2 + 5b + 1$.

(Hint: find the length and width first by ~~factoring~~)

7 & 0

add ↙ ↘ mult.

	b	$+2$
b	b^2	$2b$
$+5$	$5b$	10

Assignment: 12-3 Wkst

12-4 Solving Some Quadratics by Factoring

Warm-Up

Factor.

1. $5x^3 - 20x^2 + 20x$

$5x(1x^2 - 4x + 4)$

$5x(x-2)(x-2)$

$5x(x-2)^2$

Algebra 12-4 Solving Some Quadratics by Factoring

Word	Definition	Example
Zero Product Property	0 times anything = 0	$x \cdot y = 0$ $x=0$ or $y=0$

How to Use the Zero Product Property to Solve Quadratics

1. Is the equation in standard form? $ax^2 + bx + c = 0$
2. Factor - 1. GCF 2. 2 #'s add mult. must = 0
3. Set each factor equal to 0 and solve.

Solve.

1. $r^2 - 11r - 12 = 0$

add, mult.

$(r+1)(r-12)=0$

$r+1=0 \quad r-12=0$

$r=-1 \quad r=12$

2. $10t^3 + 80t^2 - 200t = 0$

$10t \quad 10t \quad 10t$

$10t(t^2 + 8t - 20)=0$

add, mult.

$10t(t-2)(t+10)=0$

$10t=0 \quad t-2=0 \quad t+10=0$

$t=0 \quad t=2 \quad t=-10$

Assignment: 12-4 #'s 3-9, 14-22, 26-28

20

1	20
-2	10
4	5

12-1 to 12-4 Quiz Review

1. a. Factor $t^2 + 9t + 14$

$(t+7)(t+2)$

b. Solve $t^2 + 9t + 14 = 0$.

$t+7=0 \quad t+2=0$

$-7 \quad -7 \quad -2 \quad -2$

$t=-7 \quad t=-2$

2. Find the GCF of $25x^4y + 15x^2y + 50xy$.

$5xy$

3. Use the diagram to factor $x^2 + 10x + 21$

x+7

	x	1	1	1	1	1	1	1
x								
1								
1								
1								

x+3

L·W

$(x+7)(x+3)$

Algebra 12-5 Factoring $ax^2 + bx + c$

Warm-Up

Solve by factoring.

1. $x^2 + 10x - 24 = 0$

$(x-2)(x+12)=0$

$x=2 \therefore x=-12$

2. $t^2 + 9t + 18 = 0$

$(t+3)(t+6)=0$

$t=-3 \quad t=-6$

Algebra 12-5 Factoring $ax^2 + bx + c$

Factor $2x^2 + 5x + 3$.

mult.

x^2+5x+6

undo

$(x+\frac{2}{2})(x+\frac{3}{2})$

$(x+1)(2x+3)$

1. Multiply "a value and c value"
2. Factor.
3. Divide by the number you multiplied by in step 1.
4. Reduce/Simplify.
5. Place numbers in the denominator in front of the variable.
6. Check by boxes or foil.

	x	$+1$
$2x$	$2x^2$	$2x$
$+3$	$3x$	3

$2x^2+5x+3$

Examples

1. $2n^2 - 3n - 20$

$n^2-3n-40$

$(n-\frac{8}{2})(n+\frac{5}{2})$ undo

$(n-4)(2n+5)$

2. $6y^2 - 29y - 5 = 0$

$y^2-29y-30=0$ undo

$(y-\frac{30}{6})(y+\frac{1}{6})=0$

$(y-5)(6y+1)=0$

$y-5=0$ or $6y+1=0$

$y=5$ or $6y=-1$

$y=-\frac{1}{6}$

Assignment: 12-5 #'s 1 a-d, 2-8, 12-16, 20, 22

Algebra 12-7 Rational & Irrational Numbers

Warm-Up

1. Give an example of 3 fractions that are repeating decimals when written in decimal form.

$\frac{1}{6}$, $\frac{1}{3}$, $\frac{2}{3}$

2. Give an example of a number that is not a whole number, integer, fraction, and does not repeat.

π

Algebra 12-7 Rational & Irrational Numbers

Word	Definition	Example
Rational Number	can be written as a simple fraction or repeating decimal	5 $-\frac{1}{3}$ $1.\overline{4683}$ $\sqrt{4}=2$
Irrational Number	- not rational - not repeating many radicals (not all)	π $\sqrt{3}$

Example

Write $9.\overline{45}$ as a simple fraction.

$n=2$ 10^n or 10^2

$x = 9.\overline{45}$ ($\times 100$)

$100x = 945.\overline{45}$

$1x = 9.\overline{45}$ (NEW − original)

$99x = 936$

$\frac{99x}{99} = \frac{936}{99}$

$x = \frac{936}{99} \div 9 \div 9 = \frac{104}{11}$

$x = \frac{104}{11}$

1. mult. both sides by 10^n.
   n = number of digits repeated
2. Subtract: New - original
3. Solve equation
4. Reduce.
5. check answer by dividing.

Assignment: 12-7 #'s 1-5, 8, 10-13, 15-22