

Warm Up



$$1) 20 - 32a + 40a^3$$

$$4(5 - 8a + 10a^3)$$

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

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

$$3) -42k + 36k^2 + 30k^3$$

$$4) 5x^2 - 45x + 70$$

$$5) 4n^2 + 21n - 18$$

$$6) 10n^2 - n - 24$$

$$7) 49x^4 - 4$$

$$8) x^2 + 100$$

1) GCF

2) Simple Trinomial $\rightarrow x^2 + 7x + 12$
 $(x+3)(x+4)$

3) Hard Trinomial $\rightarrow 2x^2 - 9x + 4$
 $2x^2 - 8x - 1x + 4$
 $2x(x-4) - 1(x-4)$
 $(x-4)(2x-1)$

4) Difference of Square $\rightarrow x^2 - 9$
subtract $(x-3)(x+3)$

5) Perfect Sq Trinomial $\rightarrow 16x^2 - 40x + 25$
 $(4x - 5)^2$

Prime Numbers

Prime Numbers

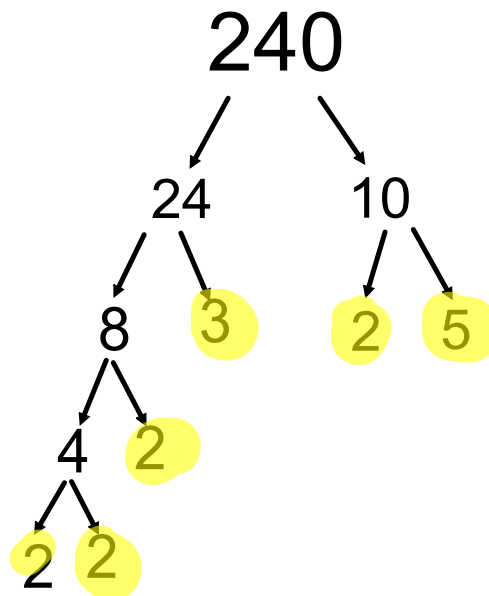
A Prime Number can be divided evenly **only** by 1 & itself.
And it must be a whole number greater than 1.

The first few prime numbers are 2, 3, 5, 7, 11, 13, 17 etc.....

Determining the Prime Factors of a Whole Number

Write the prime factorization of 240

Draw a Factor
Tree !!



The Prime Factorization of 240 is:

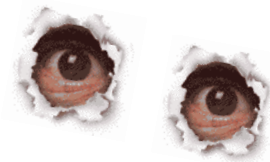
$$2 \times 2 \times 2 \times 3 \times 5 \times 2 \quad \text{or} \quad 2^4 \times 3 \times 5$$

The Prime Factors of 240 are:

2, 3, & 5



Warm Up



What is the greatest common factor of 144 and 216 ?

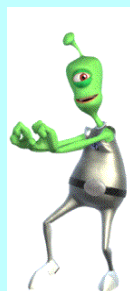
What is the least common multiple of 45 and 30 ?

Distributing Factor

3.7 Multiplying Polynomials

Expand & Simplify

Rainbow



$$4x(2x + 1) - 2x(3x - 3)$$
$$\begin{array}{r} 8x^2 + 4x \\ \hline \end{array} \quad \begin{array}{r} -6x^2 + 6x \\ \hline \end{array}$$
$$2x^2 + 10x$$

$$(x + 4)(x - 3)$$

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

$$x^2 + 1x - 12$$

Expand and collect like terms.

$$2x(5x+3) - 7x(6x-5)$$

$$10x^2 + 6x - 42x^2 + 35x$$

$$10x^2 - 42x^2 + 6x + 35x$$

$$-32x^2 + 41x$$

$$\overset{\text{top}}{(x + 4)} \overset{\text{side}}{(x - 3)}$$

	x	+4
x	x^2	+4x
-3	-3x	-12

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

$$x^2 + 1x - 12$$

5) $(10x^5 + 3)(-2x^2 - 11x + 2)$

	$-2x^2$	$-11x$	$+2$
$10x^5$	•	•	•
$+3$	•	•	•

Expand and simplify

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

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

$$(x+4)(x+4)$$
$$x^2 + 4x + 4x + 16$$
$$x^2 + 8x + 16$$

Expand and simplify

$$(x - 3)^2$$

Expand and simplify

$$(x - 3)(x - 1)(x - 5)$$

Not on tes

Factoring

There are 5 different kinds of Factoring:

- Greatest common factor (GCF)
- Simple Trinomials (Factor by Inspection)
- Hard Trinomials (Factor by Decomposition)
- Special Factors

- Difference of Squares

$$a^2 - b^2 \Rightarrow (a-b)(a+b)$$

- Perfect Square Trinomials

$$a^2 - 2ab + b^2 = (a-b)^2$$

$$a^2 + 2ab + b^2 \Rightarrow (a+b)^2$$

Simple Trinomials

- has three terms with the form...

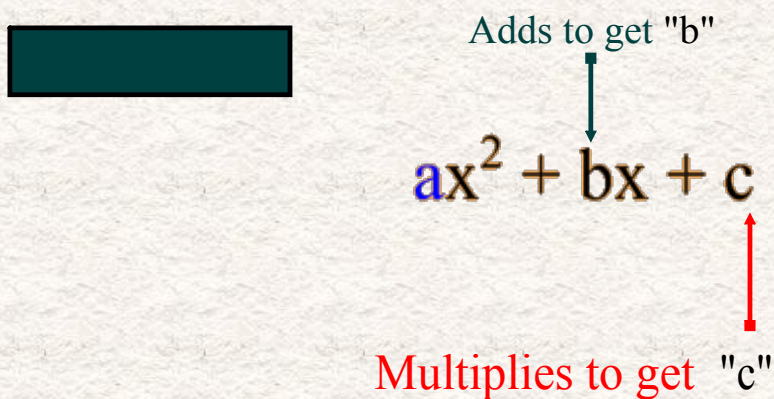
$$ax^2 + bx + c$$

- a simple trinomial has an "a" value of 1.
- we use a method of inspection to factor them.

CHECK IT OUT!!!

INSPECTION METHOD

- here's how it goes... "What two numbers?"



EXAMPLES...

SOLUTIONS

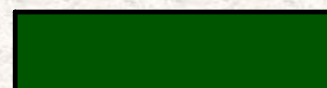
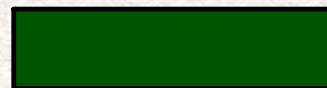
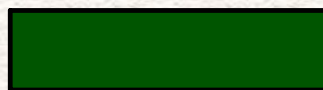
	<u>multiply</u>	<u>add</u>
1) $x^2 + 13x - 48$	-1, +48	
	-2, +24	
	-3, +16 ✓	
	-4, +12	
	-6, +8	

largest factor different signs

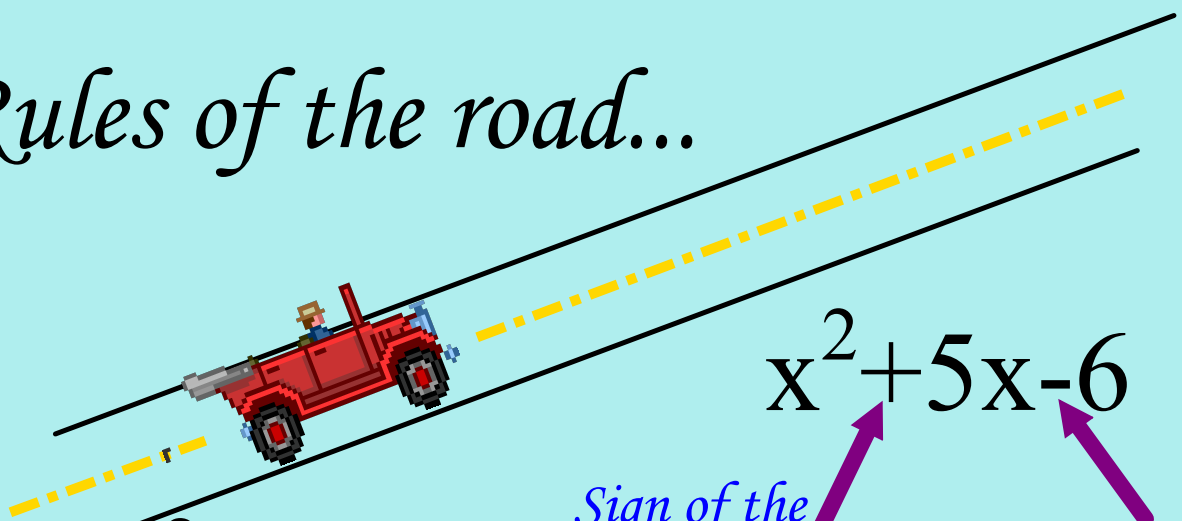
$(x-3)(x+16)$

2) $x^2 - 10x - 24$

3) $2x^2 - 20x + 42$



Rules of the road...



$$x^2 - 5x + 6$$

*Sign of the
biggest number.*

*Signs are
the same.*

$$x^2 + 5x - 6$$

*Sign of the
biggest number.*

*Signs are
different.*

$$x^2 + 5x - 6$$

Hard Trinomials

- has three terms with the form...

$$ax^2 + bx + c$$

- a hard trinomial has an "a" value **not equal to 1**.
- we use a method of decomposition to factor them.

DECOMPOSITION METHOD

- here's how it goes... "What two numbers?"

Adds to get "b"

$$ax^2 + bx + c$$

Multiplies to get "a" times "c"

- once you find the two numbers, use them to break the **MIDDLE TERM** into two pieces (decomposition).
- then, factor by grouping.

Factor Completely!

$$\begin{array}{r|l} x & + \\ \hline +6 & +5 \\ +1 & \\ \hline 2 & 3 \end{array}$$

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

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

I think I need
to use decomposition!



Difference of Squares

- two terms that are perfect squares.
- must be a difference
- factor like this...

$$a^2 - b^2 = (a + b)(a - b)$$

EXAMPLES...

1) $4x^2 - 49 = (2x + 7)(2x - 7)$ 2) $16x^2 - 9y^2 = (4x - 3y)(4x + 3y)$

3) $81z^4 - 625$

4) $49w^2 - 4s^2$

Perfect Square Trinomials

- three terms: the first and last are perfect squares.
- factors like this...

$$a^2 + 2ab + b^2 = (a + b)^2$$


OR

$$a^2 - 2ab + b^2 = (a - b)^2$$

- recognize them and you save yourself the decomposition steps!!!

EXAMPLES...


1) $25x^2 - 10x + 1$



$(5x - 1)^2$

A handwritten arrow points from the top of the blue box down to the $5x$ term in the factored expression.

2) $9x^2 + 24x + 16$



$(3x + 4)^2$

Hand in For Marks

1) $20 - 32a + 40a^3$

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

3) $-42k + 36k^2 + 30k^3$

4) $5x^2 - 45x + 70$

5) $4n^2 + 21n - 18$

6) $10n^2 - n - 24$

Math 10

Name _____

Factoring: Difference of Squares and Perfect Squares

Date _____

Factor each completely.

1) $n^2 - 9$

2) $25a^2 - 9$

3) $k^2 - 4$

4) $16x^2 - 9$

5) $x^2 - 25$

6) $25x^2 - 16y^2$

7) $u^2 - 16v^2$

8) $u^2 - 9v^2$

9) $4x^2 - y^2$

10) $a^2 - 25b^2$

11) $9m^2 + 12m + 4$

12) $16r^2 + 8r + 1$

13) $25x^2 - 20x + 4$

14) $16n^2 + 40n + 25$

15) $9b^2 - 24b + 16$

16) $16m^2 - 24mn + 9n^2$

17) $9x^2 - 6xy + y^2$

18) $25x^2 + 10xy + y^2$

19) $x^2 - 8xy + 16y^2$

20) $9x^2 + 24xy + 16y^2$

Review Questions

$$1. \quad 9x^2 - y^2 \quad (3x - y)(3x + y)$$

$$2. \quad 2x^2 - x - 15 \quad (x - 3)(2x + 5)$$

$2x^2 - 6x + 5x - 15$
 $2x(x - 3) + 5(x - 3)$

$$3. \quad 3a^2b^2 + 27a^4b^7 - 12a^6b^5$$

$3a^2b^2(1 + 9a^2b^5 - 4a^4b^3)$

$$4. \quad 3x^2 - 27x + 42$$

$$5. \quad 24x^4 + 10x^2 + 4$$

$$6. \quad (x + 1)^2 - (x + 5)^2$$

x	+
-30	-1
11, 30	
12, -15	
13, -10	
15, -6	

Tricky

1. $9x^2 - y^2$





3. $3a^2b^2 + 27a^4b^7 - 12a^6b^5$



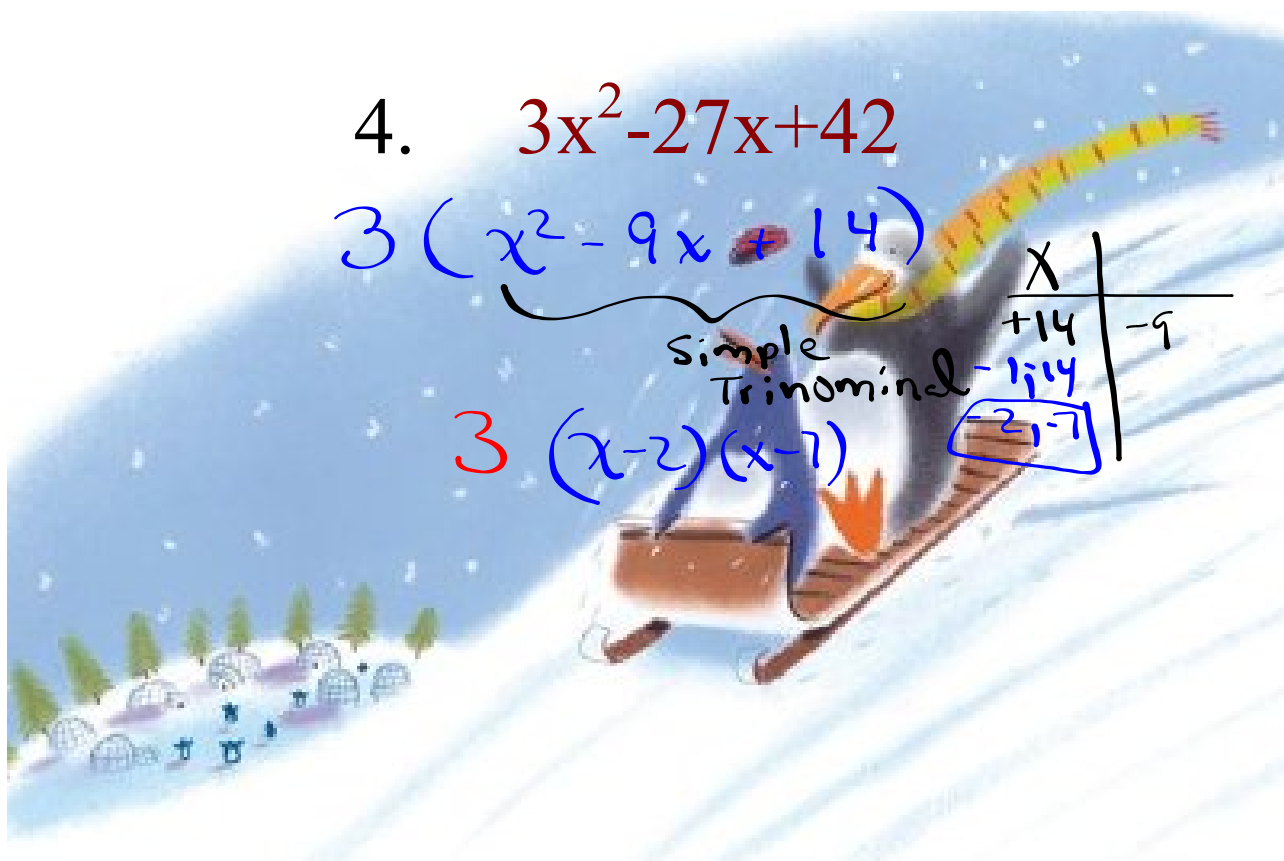
$$4. \quad 3x^2 - 27x + 42$$

$$3(x^2 - 9x + 14)$$

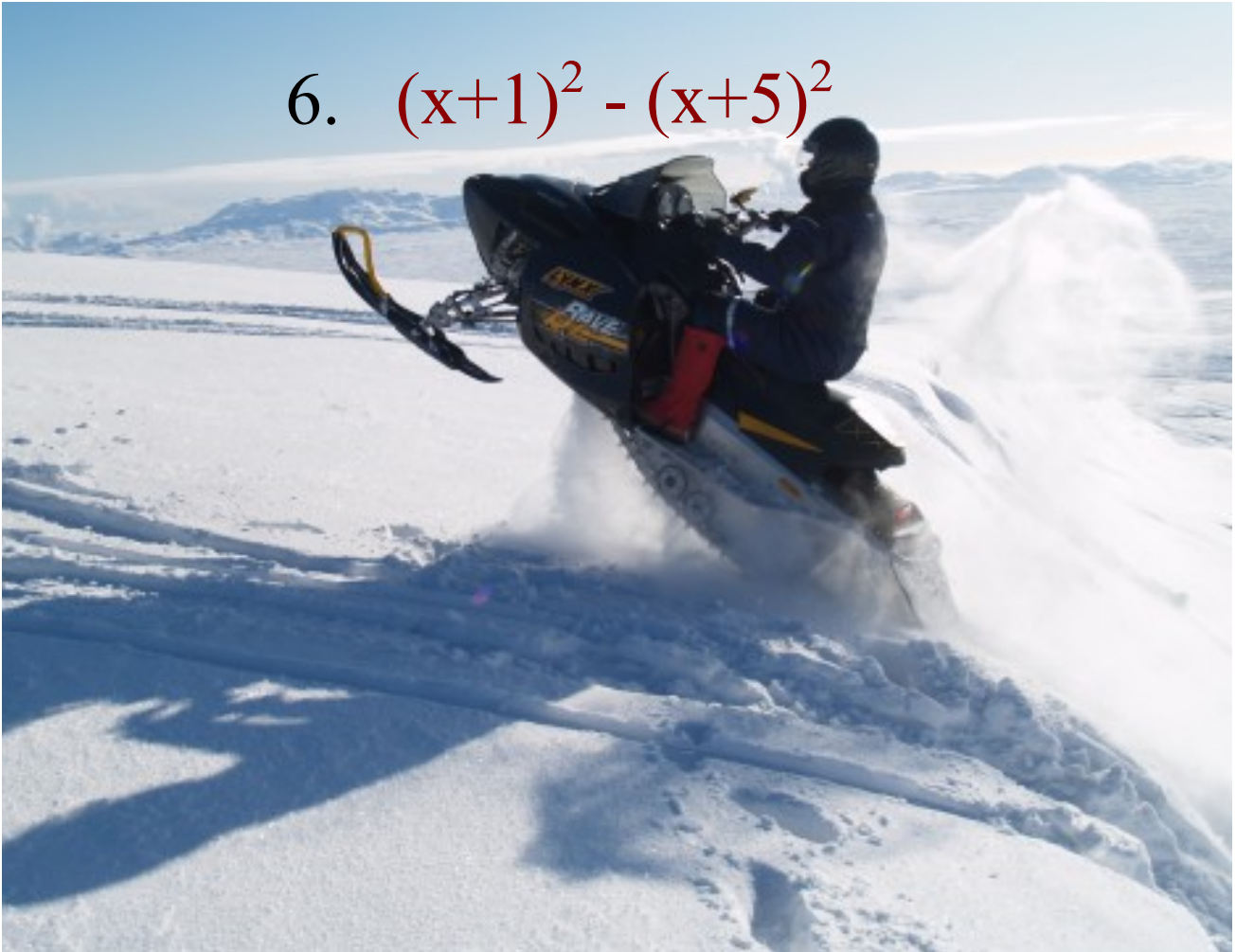
Simple
Trinomial

$$3(x-2)(x-7)$$

X	
+14	-9
-14	
<u>-2</u>	<u>-7</u>



6. $(x+1)^2 - (x+5)^2$



$$7. (x-2)^2 - 9(x+1)^2$$



Factoring Review

Math 10B

Factor each completely :

1) $6b^2a^2 - 24b^2$

2) $3x^2 + x - 10$

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

4) $m^2 - 10m - 11$

5) $25x^2 - 30x + 9$

6) $2n^2 - 9n + 9$

7) $15x^2 - 12y^2$

8) $2a^2 - 7a^2 - 20a + 70$

9) $4x^2 + 10xy + 625y^2$

10) $36n^2 - 32$

11) $a^2 - 9a - 36$

12) $6v^3 - 48v - 2v^2 + 16$

13) $-56x^3 + 80$

14) $9m^4 + 30m^2n^2 + 25n^4$

15) $5v^2 - 26v - 63$

16) $64x^2 - 36y^2$

17) $2x^2 - 2x - 40$

18) $4x^2 - 25$

19) $3x^2 - 17xy + 10y^2$

20) $40x^3 - 5x^2 - 32x + 4$

21) $25r^2 - 49$

22) $p^2 - 5p - 84$