

$$x^2 - 3x - 4$$

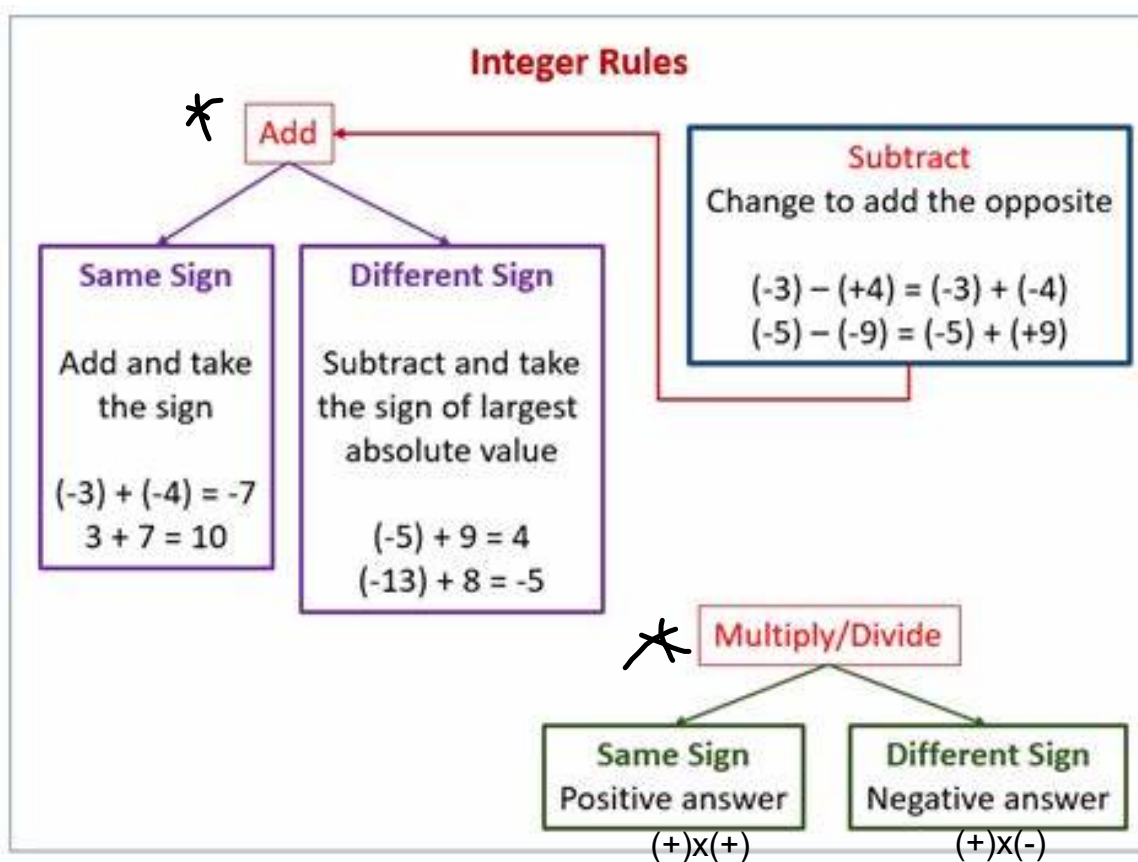
$$y^4 + 11y^2 + 30$$

# TRINOMIALS

$$z^2 + 5zy + 6y^2$$

$$m^2 - 8m + 16$$

Before we start review integer rules



Going to use the addition rule and multiplication rule

# Simple Trinomials

- has three terms with the form...

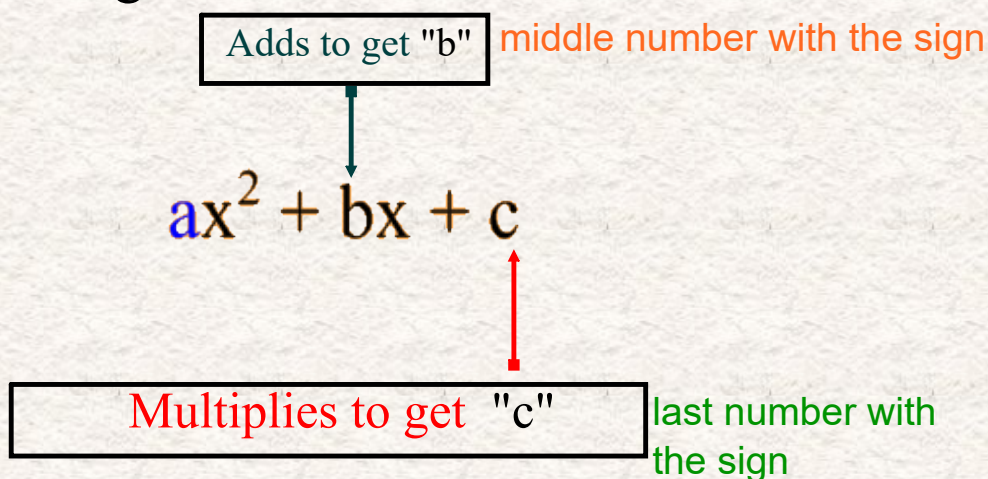
$$ax^2 + bx + c$$

- 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...

1)  $x^2 + 13x - 48$

larger factor needs to be +  
 signs are different

multiply	add
-48	+13
-1 x +48	
-2 x +24	
<b>-3 x +16</b>	
-4 x +12	
-6 x +8	

### SOLUTIONS

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

Rules of the road...



*Sign of the  
biggest number.*

↓

$$ax^2 + bx + c$$

Helpful hints

#1

*Sign of the  
biggest number.*

↓

$$ax^2 - bx + c$$

Using rules of addition of integers

If the **middle number is positive** then  
MEANS the larger factor is positive

If the **middle number is negative** then  
MEANS the larger factor is negative

Rules of the road...

second sign



*Signs are  
the same.*

$$ax^2 + bx + c$$

Helpful hints

#2

*Signs are  
different.*

$$ax^2 + bx - c$$

Using rules of multiplication of integers

If the **LAST number is positive** then  
MEANS that **both factors have the  
same signs** (Either both + or Both -)

Middle term will help determine

If the **LAST number is negative** then  
MEANS that **factors have opposite  
signs** (one + other -)

Middle term will help determine

# Work

$$1. \quad x^2 + 1x - 6$$

sign on largest  $\downarrow$  Find two numbers  
that

multiply to get last

to give -6.

$$\begin{array}{l} -1 \times 6 \\ -2 \times 3 \end{array}$$

add:

(Middle)

to give +1

$$(x - 2)(x + 3)$$



$$x^2 + 4x - 21$$

↑ var  
↓ diff

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

mult	add
-21	+4
-1 x 21	
<b>-3 x 7</b>	



Another Example

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

*Handwritten red annotations: "diff" with an arrow pointing to the constant term -24, and "10" with an arrow pointing to the coefficient -10.*

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

mult	add
-24	-10
<del>1</del> x-24	
✓ <del>2</del> x-12	
+3 x-8	
+4 x-6	



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

Sign of the  
biggest number.

Signs are  
different.

$$(x+6) (x-1)$$

mult	add
-6	+5
-1 x 6 ✓	
-2 x 3	

So must be

only pair  
that works

$$-2 \quad +3$$

$(x-1) (x+6)$  are your factors

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

*same*

$$(x-2)(x-8)$$

mu \ +	add
+16	-10
-1x-16	
-2x8 ✓	
-4x4	

Always check if a GCF can be factored out

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

$$2 (x^2 - 10x + 21)$$

mult		add
<hr/>		
+21		-10
-1 x 21		
<u>-3 x -7</u>		

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



Look for

- 1) Is there a GCF?
- 2) Is it a simple trinomial?

## When working with Factoring trinomials

-Always check for GCF first

Look for

1) Is there a GCF?

2) Is it a simple trinomial?

$$n^3 - 4n^2 - 21n$$

$$n(n^2 - 4n - 21)$$

$$n(n+3)(n-7)$$

mult +	}	add
-21	}	-4
+1x21	}	
+3x-7	}	

$$3r^3 + 24r^2 + 45r$$

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

Look for

- 1) Is there a GCF?
- 2) Is it a simple trinomial?

Factor Each of the following:  
(Try some on your own )

1. $x^2 - 14x + 45$	2. $x^2 + 17x + 60$
3. $x^2 - 18x + 80$	4. $x^2 - 10x + 16$
5. $x^2 - 6x + 9$	6. $x^2 - 7x + 6$
7. $x^2 + 20x + 99$	8. $x^2 + 3x - 18$
9. $x^2 - 3x - 88$	10. $x^2 - 16x + 48$
11. $x^2 + 11x + 30$	12. $x^2 - 14x + 33$
13. $x^2 + x - 30$	14. $x^2 - 3x - 70$
15. $x^2 + 8x - 9$	16. $x^2 - 16x + 55$
17. $x^2 + 6x - 72$	18. $x^2 + 5x - 50$
19. $x^2 + 10x + 24$	20. $x^2 + 6x - 16$

Page 166

Questions: 10ab, 11ab. 13a, 15ab, 19ab 21ce,



## Solutions

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10★**a)**  $(w + 3)(w + 2) = w^2 + 5w + 6$

★**b)**  $(x + 5)(x + 2) = x^2 + 7x + 10$

**c)**  $(y + 10)(y + 2) = y^2 + 12y + 20$

11★**a)**  $(x + 4)(x + 6)$

**b)**  $(m + 2)(m + 8)$

★**c)**  $(p + 1)(p + 12)$

**d)**  $(s + 2)(s + 10)$

★**e)**  $(n + 1)(n + 11)$

**f)**  $(h + 2)(h + 6)$

★**g)**  $(q + 1)(q + 6)$

**h)**  $(b + 2)(b + 9)$



## Solutions

13. **a)**  $r^2 - 9r - 52$

**b)**  $s^2 - 20s + 75$

14. **a)**  $(b - 1)(b + 20)$

**b)**  $(t - 3)(t + 18)$

**c)**  $(x - 2)(x + 14)$

**d)**  $(n + 3)(n - 8)$

**e)**  $(a + 4)(a - 5)$

**f)**  $(y + 6)(y - 8)$

**g)**  $(m - 5)(m - 10)$

**h)**  $(a - 6)(a - 6)$

15. **a)**  $(1 + k)(12 + k)$

**b)**  $(2 + g)(-8 + g)$

**c)**  $(5 + y)(12 + y)$

**d)**  $(9 + z)(8 - z)$

16. **a)** **i)**  $x^2 + 3x + 2$ ; 132

**ii)**  $x^2 + 4x + 3$ ; 143

**b)** The coefficients of the terms of the polynomial are the digits in the product of integers.

17. **a)**  $(m + 5)(m - 12)$

**b)**  $(w - 5)(w - 9)$

**c)**  $(b - 3)(b + 12)$

18. **a)** **i)**  $t^2 + 11t + 28$

**ii)**  $t^2 - 11t + 28$

**iii)**  $t^2 + 3t - 28$

**iv)**  $t^2 - 3t - 28$

**b)** **i)** Because the constant terms in the binomials have the same sign**ii)** Because the constant terms in the binomials have opposite signs**iii)** Add the constant terms in the binomials

19. **a)**  $\pm 7, \pm 11$ ; 4 integers

**b)**  $0, \pm 8$ ; 3 integers

**c)**  $\pm 6, \pm 9$ ; 4 integers

**d)**  $\pm 1, \pm 4, \pm 11$ ; 6 integers

**e)**  $\pm 9, \pm 11, \pm 19$ ; 6 integers

**f)**  $0, \pm 6, \pm 15$ ; 5 integers

## Solutions

20. Infinitely many integers are possible. For example:

- a) 0, -2, -6, -12, -20, -30, ...
- b) 0, -2, -6, -12, -20, -30, ...
- c) 1, 0, -3, -8, -15, -24, -35, ...
- d) 1, 0, -3, -8, -15, -24, -35, ...
- e) 2, 0, -4, -10, -18, -28, -40, ...
- f) 2, 0, -4, -10, -18, -28, -40, ...

21. a)  $4(y - 7)(y + 2)$                       b)  $-3(m + 2)(m + 4)$

c)  $4(x - 3)(x + 4)$                       d)  $10(x + 2)(x + 6)$

e)  $-5(n - 1)(n - 7)$                       f)  $7(c - 2)(c - 3)$

23. a) i)  $(h + 2)(h - 12)$                       ii)  $(h - 2)(h + 12)$

iii)  $(h - 4)(h - 6)$                       iv)  $(h + 4)(h + 6)$

b) The first 6 are:

$$h^2 \pm 13h \pm 30, h^2 \pm 15h \pm 54, h^2 \pm 17h \pm 60,$$

$$h^2 \pm 25h \pm 84, h^2 \pm 20h \pm 96, h^2 \pm 26h \pm 120$$

Solutions

Factor Each of the following:  
(Finished For homework)

1. $x^2 - 14x + 45$	$(x-9)(x-5)$	2. $x^2 + 17x + 60$	$(x+5)(x+12)$
3. $x^2 - 18x + 80$	$(x-8)(x-10)$	4. $x^2 - 10x + 16$	$(x-8)(x-2)$
5. $x^2 - 6x + 9$	$(x-3)(x-3)$	6. $x^2 - 7x + 6$	$(x-6)(x-1)$
7. $x^2 + 20x + 99$	$(x+11)(x+9)$	8. $x^2 + 3x - 18$	$(x-3)(x+6)$
9. $x^2 - 3x - 88$	$(x+8)(x-11)$	10. $x^2 - 16x + 48$	$(x-12)(x-4)$
11. $x^2 + 11x + 30$	$(x+6)(x+5)$	12. $x^2 - 14x + 33$	$(x-11)(x-3)$
13. $x^2 + x - 30$	$(x+6)(x-5)$	14. $x^2 - 3x - 70$	$(x-10)(x+7)$
15. $x^2 + 8x - 9$	$(x+9)(x-1)$	16. $x^2 - 16x + 55$	$(x-5)(x-11)$
17. $x^2 + 6x - 72$	$(x-6)(x+12)$	18. $x^2 + 5x - 50$	$(x+10)(x-5)$
19. $x^2 + 10x + 24$	$(x+6)(x+4)$	20. $x^2 + 6x - 16$	$(x+8)(x-2)$