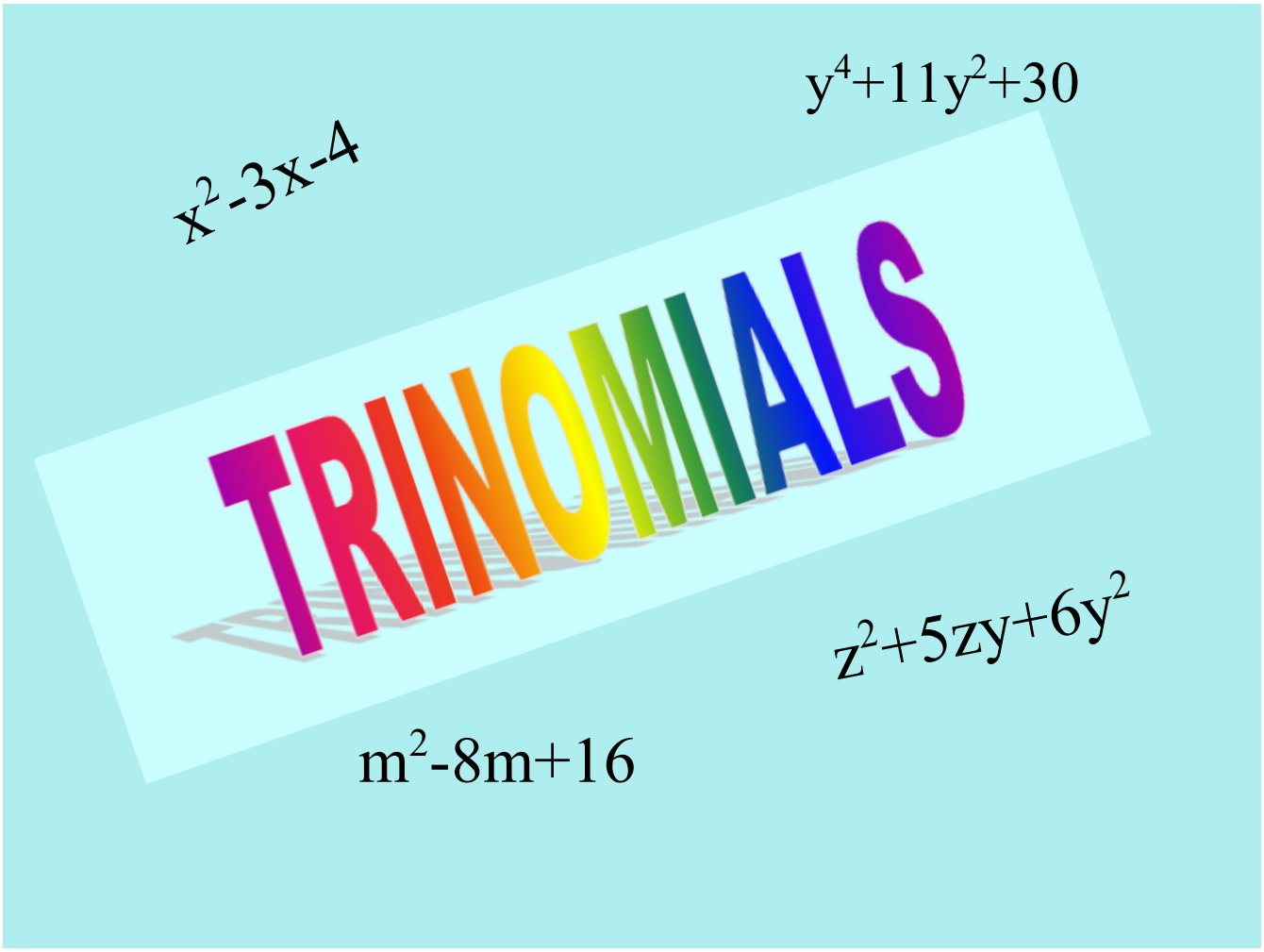
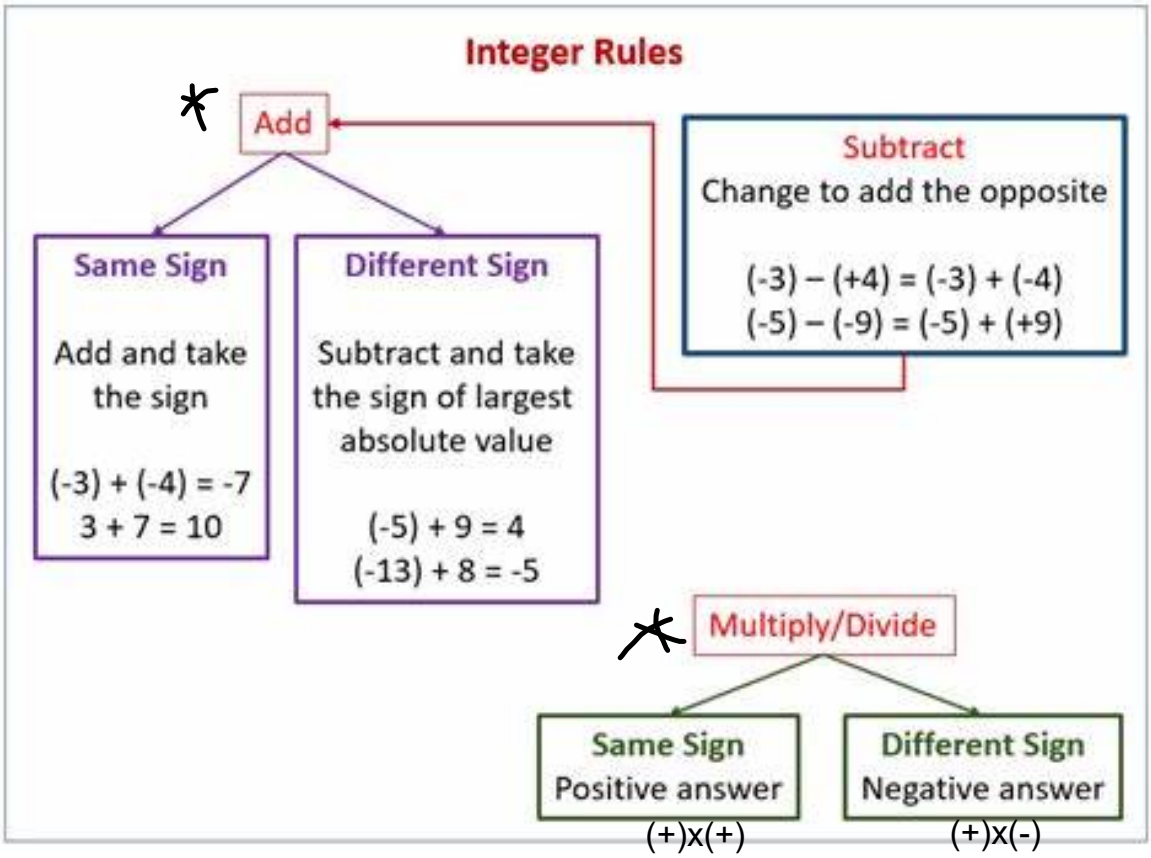

x^2-3x-4
y^4+11y^2+30
TRINOMIALS
$z^2+5zy+6y^2$
$m^2-8m+16$

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?"

Adds to get "b" — middle number with the sign

$$ax^2 + bx + c$$

Multiplies to get "c" — last number with the sign

EXAMPLES...

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

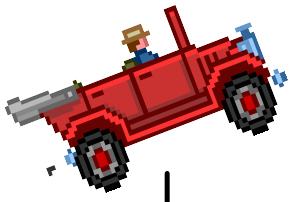
larger factor — signs are different — needs to be +

multiply	add
-48	+13
$-1 \times +48$	
$-2 \times +24$	
$-3 \times +16$ ✓	
$-4 \times +12$	
$-6 \times +8$	

SOLUTIONS

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

Rules of the road...



Helpful hints

#1

Sign of the biggest number.

$ax^2 + bx + c$

Sign of the biggest number.

$ax^2 - bx + c$

Using rules of addition of integers

If the middle number is positive then

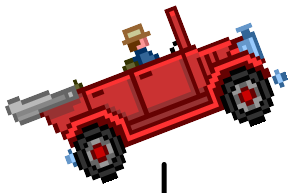
MEANS the larger factor is positive

If the middle number is negative then

MEANS the larger factor is negative

Rules of the road...

second sign



Helpful hints

#2

Signs are the same.

$ax^2 + bx + c$

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. x^2+1x-6 (diff)

sign on largest

Find two numbers that

multiply to get last to give -6.

-1×6

-2×3

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	
-3 x 7	

Another Example

$x^2 - 10x - 24$

diff

mult	add
-24	-10
1 x -24	
✓ -12 x 12	
-3 x 8	
-4 x 6	

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

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

Sign of the biggest number.

Signs are different.

mult	add
-6	+5
-1 x 6 ✓	
-2 x 3	

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

So must be

only pair that works

-2 +3

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

$x^2 - 10x + 16$ (same)

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

mult	add
+16	−10

-1×-16

-2×-8 ✓

-4×-4

Always check if a GCF can be factored out

$2x^2 - 20x + 42$

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

mult	add
+21	-10
-1 x -21	
-3 x -7	

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

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
+1 x -21	
+3 x -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. $x^2 + 6x - 16$

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

10. Copy and complete.

a) $(w + 3)(w + 2) = w^2 + \square w + 6$

b) $(x + 5)(x + \square) = x^2 + \bigcirc x + 10$

c) $(y + \bigcirc)(y + \square) = y^2 + 12y + 20$

These questions are good ones to try

11. Factor. Check by expanding.

a) $x^2 + 10x + 24$ b) $m^2 + 10m + 16$

c) $p^2 + 13p + 12$ d) $s^2 + 12s + 20$

e) $n^2 + 12n + 11$ f) $h^2 + 8h + 12$

g) $q^2 + 7q + 6$ h) $b^2 + 11b + 18$

13. Find and correct the errors in each expansion.

a) $(r - 13)(r + 4) = r(r + 4) - 13(r + 4)$
$= r^2 + 4r - 13r + 52$
$= r^2 + 9r + 52$

b) $(s - 15)(s - 5) = s(s - 15) + 15(s + 5)$
$= s^2 - 15s + 15s + 75$
$= s^2 + 75$

14. Factor. Check by expanding.

a) $b^2 + 19b - 20$ b) $t^2 + 15t - 54$

c) $x^2 + 12x - 28$ d) $n^2 - 5n - 24$

e) $a^2 - a - 20$ f) $y^2 - 2y - 48$

g) $m^2 - 15m + 50$ h) $a^2 - 12a + 36$

15. Factor. Check by expanding. just written backwards

a) $12 + 13k + k^2$ b) $-16 - 6g + g^2$

c) $60 + 17y + y^2$ d) $72 - z - z^2$

19. Find an integer to replace $\square$ so that each trinomial can be factored.
How many integers can you find each time?

a) $x^2 + \square x + 10$

b) $a^2 + \square a - 9$

c) $t^2 + \square t + 8$

d) $y^2 + \square y - 12$

e) $h^2 + \square h + 18$

f) $p^2 + \square p - 16$

20. Find an integer to replace $\square$ so that each trinomial can be factored.
How many integers can you find each time?

a) $r^2 + r + \square$ b) $h^2 - h + \square$

c) $b^2 + 2b + \square$ d) $z^2 - 2z + \square$

e) $q^2 + 3q + \square$ f) $g^2 - 3g + \square$

21. Factor.

a) $4y^2 - 20y - 56$ b) $-3m^2 - 18m - 24$

c) $4x^2 + 4x - 48$ d) $10x^2 + 80x + 120$

e) $-5n^2 + 40n - 35$ f) $7c^2 - 35c + 42$

Solutions

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)