The Math Dawg

Factoring Quadratic Functions_The Basics

FORM:

$f(x) = x^2 - bx + c$

Sum/Difference/Product of 2 Integers

THE FIRST KEY TO SUCCESS IN FACTORING SIMPLE QUADRATIC FUNCTIONS IS BEING ABLE TO QUICKLY IDENTIFY THE SUM/PRODUCT OF 2 NUMBERS

EXAMPLES

1. FIND 2 NUMBERS THAT MULTIPLY TO -32 AND ADD UP TO -4.

2. FIND 2 NUMBERS THAT MULTIPLY TO 30 AND UP TO -11.

Sum/Difference/Product of 2 Integers

MORE EXAMPLES

3. FIND 2 NUMBERS THAT MULTIPLY TO -18 AND ADD UP TO 3

4. FIND 2 NUMBERS THAT MULTIPLY TO -56 AND UP TO -1

5. FIND 2 NUMBERS THAT MULTIPLY TO 100 AND ADD UP TO -20

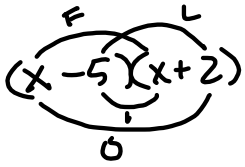
FOIL

A METHOD OF QUICKLY MULTIPLYING 2 BINOMIALS

F → FIRST
O → OUTSIDE
I → INSIDE
L → LAST

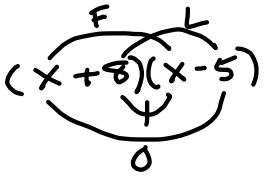
4 MULTIPLICATIONS TO PERFORM

EXAMPLE:



F O I L
$x \cdot x + 2 \cdot x - 5x - 5 \cdot 2$
$= x^2 + 2x - 5x - 10$
$= x^2 - 3x - 10$

EXAMPLE:



F O I L
$x \cdot x - 5x + 8x - 5$
$= x^2 - 5x + 8x - 5$
$= x^2 + 3x - 10$

MORE EXAMPLES

FOIL

MULTIPLY THE EXPRESSIONS BELOW USING FOIL

#1. $(x-11)(x+2) =$

#2 $(x-6)(x-9) =$

#3 $(2x-3)(4x+7) =$

EXAMPLE:

Factor Quadratics with a Leading Coefficient of 1

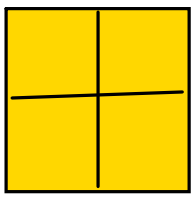
FACTOR $x^2+12x+35$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO 35
- ADD UP TO 12

$x^2 + 12x + 35$

$=(x \quad)(x \quad)$

CHECK: "THE BOX"



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EXAMPLE:

Factor Quadratics with a Leading Coefficient of 1

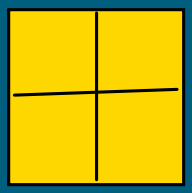
FACTOR $x^2 - 3x - 18$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO -18
- ADD UP TO -3

$x^2 - 3x - 18$

$= (x \quad)(x \quad)$

CHECK: "THE BOX"



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EXAMPLE:

Factor Quadratics with a Leading Coefficient of 1

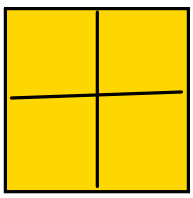
FACTOR $x^2 + 4x - 21$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO -21
- ADD UP TO 4

$x^2 + 4x - 21$

$= (x \quad)(x \quad)$

CHECK: "THE BOX"



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EXAMPLE:

Factor Quadratics with a Leading Coefficient of 1

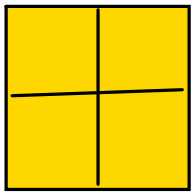
FACTOR $x^2 - 9x + 20$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO 20
- ADD UP TO -9

$x^2 - 9x + 20$

$= (x \quad)(x \quad)$

CHECK: "THE BOX"



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EXAMPLE

Factor Quadratics with a Leading Coefficient of 1

FACTOR $x^2 - 14x + 49$

SPECIAL CASE

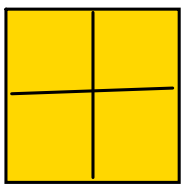
$x^2 - 2bx + b^2 = (x-b)^2$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO 49
- ADD UP TO -14

$x^2 - 14x + 49$

$= (x \quad)(x \quad) = (\quad)^2$

CHECK: "THE BOX"



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SHORTCUT CHECK

$(\quad)^2$

EXAMPLE

Factor Quadratics with a Leading Coefficient of 1

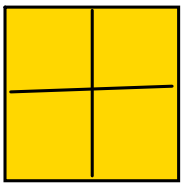
FACTOR $x^2+22x+121$

SPECIAL CASE
$x^2+2bx+b^2$
$=(x+b)^2$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO 121
- ADD UP TO 22

$x^2+22x+121$
$=(x\ \ )(x\ \ )$ $=(\ -\ )^2$

CHECK: "THE BOX"



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SHORTCUT CHECK
$(\ \ )^2$

EXAMPLE

Factor Quadratics with a Leading Coefficient of 1

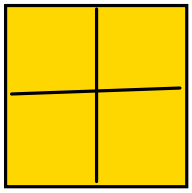
FACTOR x^2-81

SPECIAL CASE
x^2-c^2
$=(x+c)(x-c)$

LOOKING FOR 2 NUMBERS THAT
- MULTIPLY TO -81
- ADD UP TO 0

x^2-81
$=(x\ \ )(x\ \ )$

CHECK: "THE BOX"



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Have you noticed?

$x^2 + \square\, x + \square = (x + \square)(x + \square)$

MUST BE 2 "+"s

EXAMPLE:

$x^2 + 13x + 42 = (x+7)(x+6)$

+ +

+ + OR

$(x+6)(x+7)$

Have you noticed?

$x^2 + \square\, x - \square = (x + \square)(x - \square)$

OR

$= (x - \square)(x + \square)$

EXAMPLE:

$x^2 + x - 110 = (x+11)(x-10)$

OR

$(x-10)(x+11)$

Have you noticed?

$x^2 - \square\, x - \square = (x + \;)(x - \;)$ or $= (x - \;)(x + \;)$

EXAMPLE:

$x^2 - 5x - 50 = (x + 5)(x - 10)$ or $(x - 10)(x + 5)$

Have you noticed?

$x^2 - \square\, x + \square = (x - \;)(x - \;)$

EXAMPLE:

$x^2 - 16x + 48 = (x - 12)(x - 4)$ or $(x - 4)(x - 12)$