Find the x-ints

$$y = 2x^2 - 12x + 9$$

sub $y = 0$

$$0 = 2x^2 - 12x + 9$$

-9 -9

isolating is impossible here w 'bx' term?

solve for x

$$0 = 2x^2 - 12x$$

Unit 5 · Solving 2nd degree equations by factoring (aka Finding the x-ints by factoring)

solve for x

Find the x-ints of $y = x^2 - 4x - 5$

Step (1)
Sub. $y = 0$ into equation

$0 = x^2 - 4x - 5$

Step (2): FACTOR

$0 = x^2 + x - 5x - 5$

$0 = x(x+1) - 5(x+1)$

$0 = (x+1)(x-5)$

Step (3): Put each bracket to zero and make 2 individual cases

$0 = 0$ or $0 = 0$

Step (4): Solve for x by isolating by performing opposite operations

$x + 1 = 0$ (−1 −1)

$x = -1$ or $x - 5 = 0$ (+5 +5)

$x = 5$

x-ints $(-1, 0)$ $(5, 0)$

1×-5

-5

$1 \quad -5$

$-1 \quad 5$

Find the x-ints of the equation

$y = mx + b$

$y = 2x + 3$

$y = x^2 - 7x + 10$

$0 = x^2 - 7x + 10$

$0 = (x - 2)(x - 5)$

$0 \quad\quad 0$

$x - 2 = 0$ or $x - 5 = 0$

$+2 \quad +2 \quad\quad +5 \quad +5$

$x = 2$ or $x = 5$

10

2 5

-2 -5

Check:

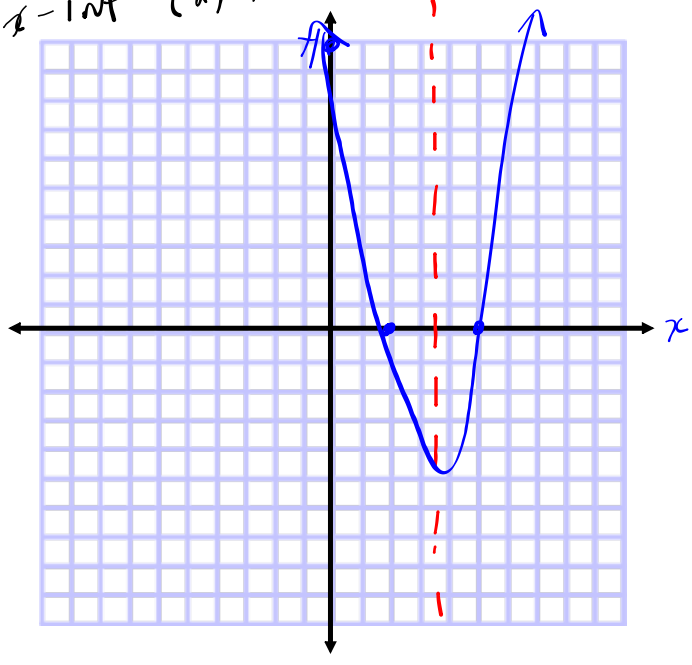
$0 = 2^2 - 7(2) + 10$

$0 = 4 - 14 + 10$

$0 = -10 + 10$

$0 = 0$ True

x-int (2, 0) (5, 0)



Solve the following equation → find the x-ints

Note: In unit 5, y has already been put to zero.

$ax^2 + bx + c$ Lp

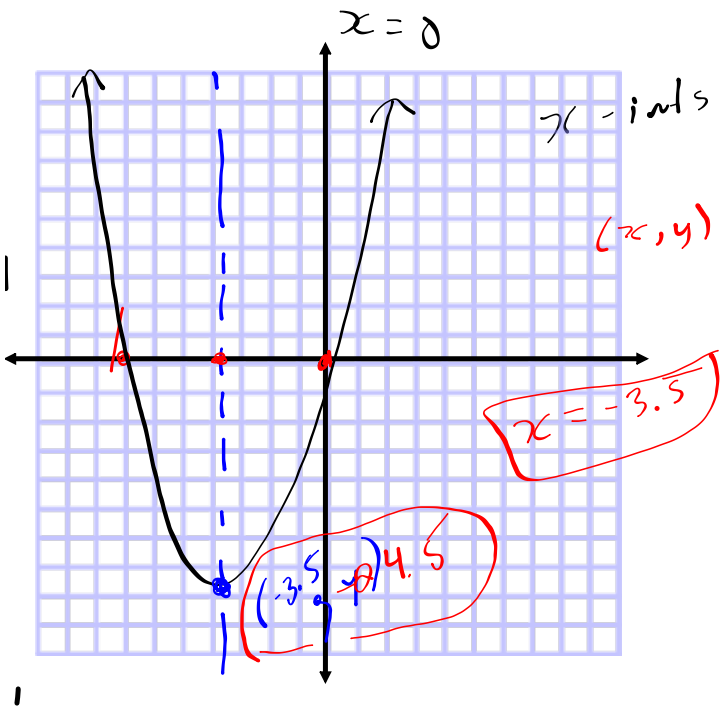
$0 = 2x^2 + 14x + 0$

$0 = 2x(x+7)$

find the value of x that makes a true statement

$2x = 0$ or $x + 7 = 0$

$x = 0$ $\quad x = -7$



$(0,0)$ $(-7,0)$
x_1 x_2

axis of sym $= \frac{x_1 + x_2}{2}$

$y = 2x^2 + 14x$

sub $x = -3.5$ in

$y = 2(-3.5)^2 + 14(-3.5)$

$y = -24.5$

Solve the following equation

$-6x - x^2 = 5$ -5 -5

Nota Bene:
You must bring everything to one side before solving by factoring

$ax^2 + bx + 5$

$y - x^2$

$2x + y$

$-x^2 - 6x - 5 = 0$

$\frac{-1(x^2 + 6x + 5) = 0}{-1}$ -1

$x^2 + 6x + 5 = 0$

$(x + 5)(x + 1) = 0$

0 0

$x + 5 = 0$ or $x + 1 = 0$

$x = -5$ or $x = -1$

$(-5, 0)$

$(-1, 0)$

Solve

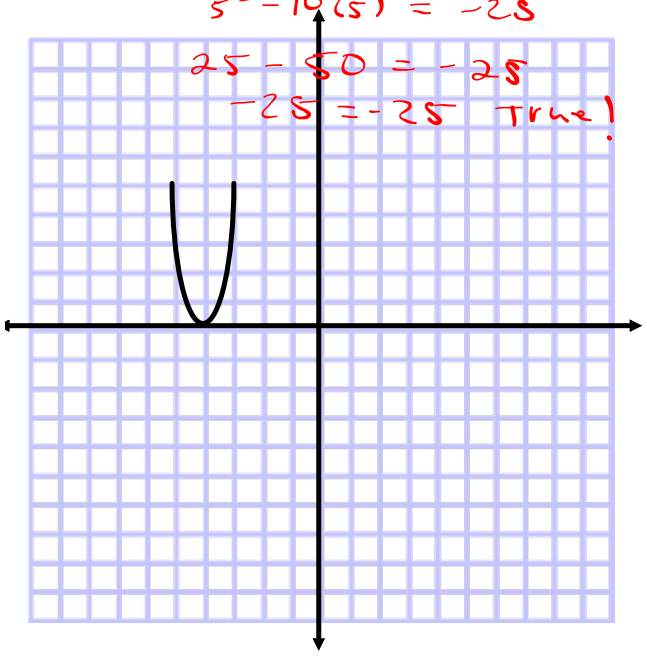
$x = 5$
$x = 5$ } $x = 5$

$x^2 - 10x = -25$

$5^2 - 10(5) = -25$

$25 - 50 = -25$

$-25 = -25$ True!



Solve x represents what?

$2x^2 - x - 4 = -x + x^2$

$2x^2 - x^2 - x + x - 4 = 0$

$x^2 - 4 = 0$

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

$x+2 = 0$ $\quad x-2 = 0$

$x = -2$ or $x = 2$

find x-ints

$y = 2x^2 - 12x + 9$

$0 = 2x^2 - 12x + 9$

not factorable!
∴ use quad formula

1	18
2	9
3	6
-1	-18
-2	-9
-3	-6

Unit 6 : Solving a 2nd degree equation by using the quad formula

→ mainly for finding the x-ints ($y=0$)

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

where $\Delta = b^2 - 4ac$

* the value of the delta will tell you how many x-ints there are!

Find the x-int

$y = 2x^2 - 12x + 9$

$0 = 2x^2 - 12x + 9$

$y = ax^2 + bx + c$

Step ②: correctly identify a / b / c

$a = 2$

$b = -12$

$c = 9$

Step ③: sub in carefully

$\Delta = b^2 - 4ac$

$\Delta = (-12)^2 - 4(2)(9)$

$\Delta = 72$ — 2 ints permission to proceed

Step ①: verify the value of delta

- if $\Delta < 0$, (negative #) then there's no x-int
- if $\Delta = 0$, then there's one x-int
- if $\Delta > 0$, (positive #) then there's two x-ints

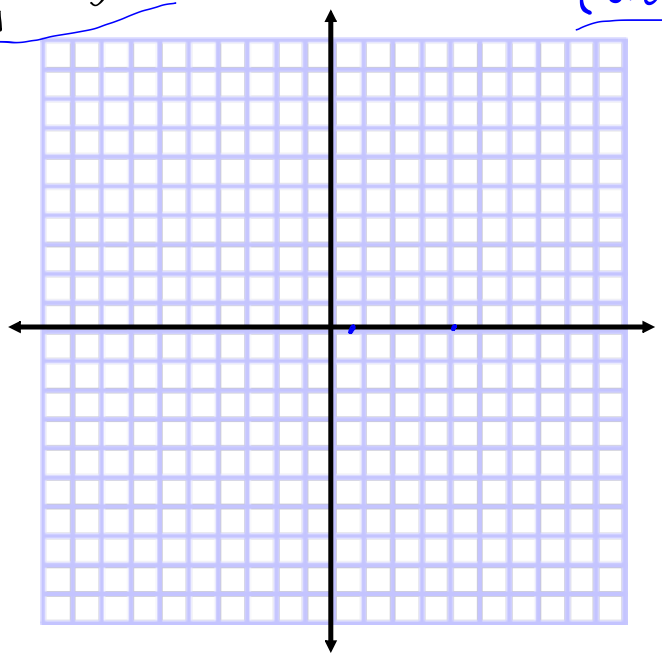
$$x_1 = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{(-(-12) + \sqrt{72})}{(2(2))} \quad \text{or} \quad x_2 = \frac{(12 - \sqrt{72})}{4}$$

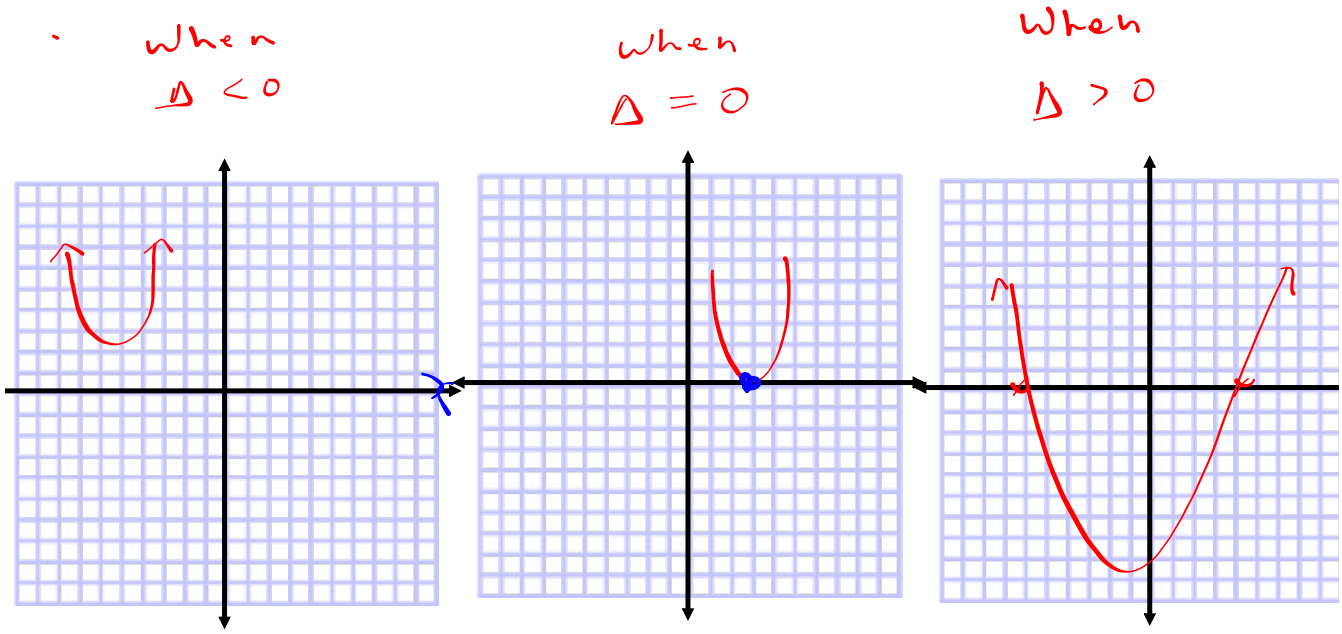
$x_1 = 5.12$

$x_2 = 0.879$

$(0.879, 0)$

$(5.12, 0)$




When
$\Delta < 0$
when
$\Delta = 0$
When
$\Delta > 0$

Find the x-ints

$y = -x^2 - 3$

$y = ax^2 + bx + c$

$a = -1$

$b = 0$

$c = -3$

$\Delta = b^2 - 4ac$

$\Delta = -12$

LOSTOP

no - x-ints

$x = \left(\frac{-0 + \sqrt{-12}}{2(-1)}\right)$ Error no-x-ints

Find the x-ints

$y = -x^2 + 6x + 4$

$0 = ax^2 + bx + c$

$a = -1$

$b = 6$

$c = 4$

$\Delta = b^2 - 4ac$

$\Delta = 52 \rightarrow 2$ x-ints proceed

$x = \frac{-b \pm \sqrt{\Delta}}{2a}$

$x_1 = \left(\frac{-6 + \sqrt{52}}{2(-1)}\right)$ and $x_2 = \frac{-6 - \sqrt{52}}{-2}$

$x_1 = -0.605$ $x_2 = 6.606$

Solve

$x^2 = 4x$

$4^2 = 4(4)$

$16 = 16$

$(-4)^2 = 4(-4)$

$16 = -16$

FALSE

$0^2 = 4(0)$

$0 = 0$

$x^2 - 4x = 0$

$x(x-4) = 0$

$x = 0$ or $x - 4 = 0$

$x = 4$

Before using quad formula, everything must be put to one side!

$y = ax^2 + bx + c$

$x^2 = 4x$

$-4x \quad -4x$

$x^2 - 4x = 0$

$a = 1$

$b = -4$

$c = 0$

True and False Question: Attenzione: if a statement is partially true then it's false.

T / F

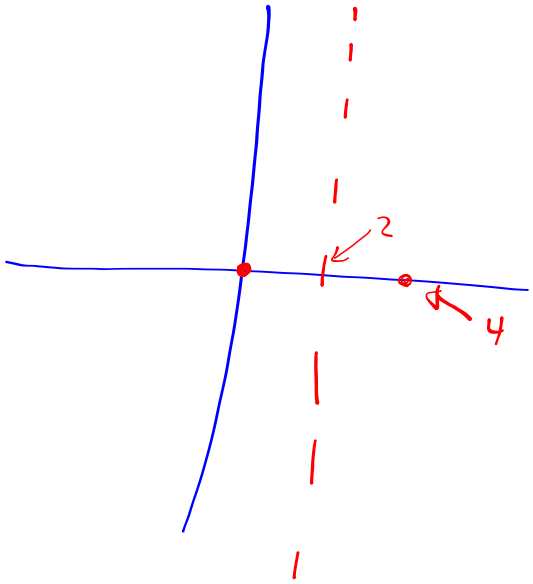
1) A parabola has x-ints (1,0) (3,0). Therefore the delta is negative.

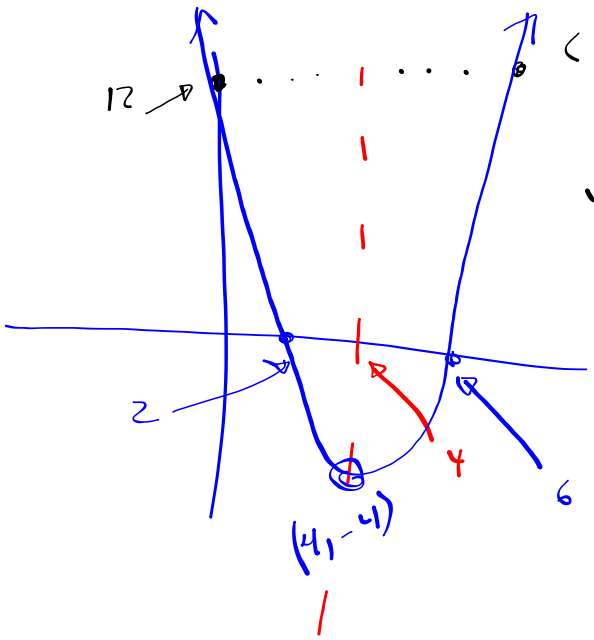
2) The delta is positive. Therefore the x-ints must be (2,0) (6,0)

3) The delta is equal to one. Therefore there's one x-int.

4) The x-int is (2,0).

Therefore, Δ is equal to zero.


2
4



(8, 12)

$(x-2)(x-6)$

$y = x^2 - 8x + 12$

Completing the square

$y = 4^2 - 8(4) + 12$

$y = -4$

graph $y = 2x^2 - 3x$

and

list

- vertex
- y-int
- x-int
- axis of sym
- image point of y-int.

$0 = 2x^2 - 3x$

$0 = x(2x - 3)$

$x = 0$ or $2x - 3 = 0$

$+3 \quad +3$

$\frac{2x}{2} = \frac{3}{2}$

$x = 1.5$