4.2 Solving Equations by Factoring

* Sometimes, quadratic equations can be factored . Once factored, we can determine the roots of the equation (or the zeroes of the related quadratic function) very easily. To do so, we must understand the zero product rule .

ex. think of two numbers that have a product = 0

What do you notice? ⇒ one of the numbers **must** = 0

ex. $0 = x^2 - 6x + 5$

$-1 \cdot -5 = 5$

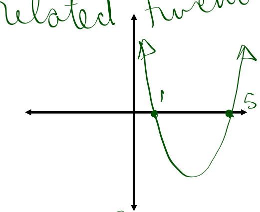
$-1 + -5 = -6$

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

either $x - 1 = 0$ or $x - 5 = 0$

$\boxed{x = 1}$ $\boxed{x = 5}$

related function



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

ex. Find the zeroes for the function $f(x) = 8x^2 + 4x - 60$

to get the zeroes set $f(x) = 0$, factor and solve

$0 = 8x^2 + 4x - 60$

$0 = 4(\underbrace{2x^2 + x - 15}_{-30})$

$-5 \cdot 6 = -30$

$-5 + 6 = 1$

$0 = 4[(2x^2 - 5x) + (6x - 15)]$

$0 = 4[x(2x-5) + 3(2x-5)]$

$0 = 4(2x-5)(x+3)$

$4 \neq 0$

$x + 3 = 0$

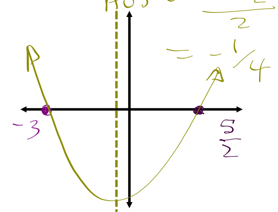
$\boxed{x = -3}$

$2x - 5 = 0$

$\frac{2x}{2} = \frac{5}{2} \Rightarrow \boxed{x = \frac{5}{2}}$

$AOS = \frac{-3 + \frac{5}{2}}{2}$

$= -\frac{1}{4}$



ex. The product of two consecutive even integers is 16 more than 8 times the smaller integer. Determine the integers.

let $x = 1^{st}$ #

$x + 2 = 2^{nd}$ #

$x(x+2) = 8x + 16$

$x^2 + 2x = 8x + 16$

$x^2 - 6x - 16 = 0$

$-8 \cdot 2 = -16$

$-8 + 2 = -6$

$(x-8)(x+2) = 0$

$x - 8 = 0$ $x + 2 = 0$

$\boxed{x = 8}$ $\boxed{x = -2}$

Homefun: Pg. 229 #(1, 3-5, 7-9)ace, 11, 12, 18-20, 23, 26, 28

2 possible sol'ns : if 1^{st} # = 8 then 2^{nd} # = 10 $\boxed{\text{or}}$ if 1^{st} # = −2 2^{nd} # = 0

either the numbers are $\boxed{8 \text{ \& } 10}$

or $\boxed{-2 \text{ \& } 0}$

✓ test

$LS = x(x+2)$ $RS = 8x + 16$

$= -2(0)$ $= 8(-2) + 16$

$= 0$ $= 0$

$LS = RS$