10 Solve by Graphing

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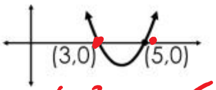
FOM 11 Ch 7 Day 10 Solving Quadratic Equations by Graphing (7.3)

A quadratic FUNCTION is of the form $y = ax^2 + bx + c$. To solve a quadratic function, means to find the *x-intercepts* of its *graph*.	A quadratic EQUATION is of the form $ax^2 + bx + c = 0$. To solve a quadratic equation means to find the *zeros* or the *roots* of the *function*.

GRAPHS have **X-INTERCEPTS**

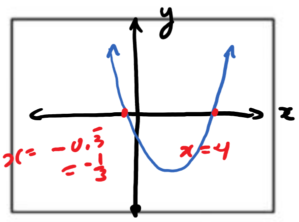


$x=3$ $x=5$

x-intercepts
zeroes
roots
ALL REFER to the SOLUTION of the quadratic equation!!

Functions have **ZEROS**
f(x)=(x-3)(x-5)
x=3,x=5 at y=0

Example 1: Solve $3x^2 - 11x - 4 = 0$ using graphing. (ie. Find the roots.)



① In desmos, type $3x^2 - 11x - 4$

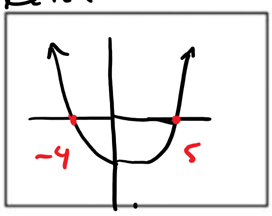
② Find x-intercepts
These are your answers! (Solution).

$\boxed{x = -\frac{1}{3},\ x = 4}$

(3) Check by plugging in to equation:
$x=4$: $3(4)^2 - 11(4) - 4 = 0$
$3(16) - 44 - 4 = 0$
$48 - 44 - 4 = 0$
$0 = 0$ ✓
Also $x = -\frac{1}{3}$ ....

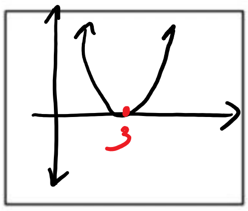
Example 2: Find the zeroes for $y = x^2 - x - 20$.

sketch



$x = -4$
$x = 5$

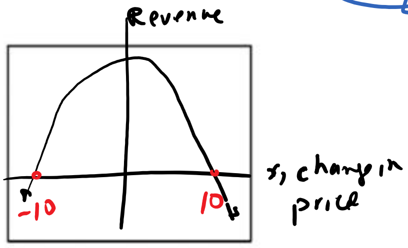
Example 3: What are the roots for $x^2 - 6x + 9 = 0$?



$x = 3$

Example 4: The manager at Suzie's Fashion Store has determined that the function $R(x) = 600 - 6x^2$ models the expected weekly revenue, R, in dollars, from sweatshirts as the price changes, where x is the change in price, in dollars. What price increase or decrease will result in no revenue?

$R(x) = 0$

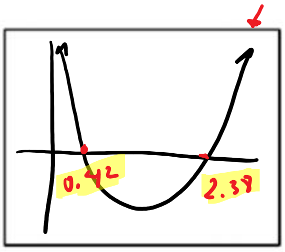


A price increase of \$10 (i.e., $x = 10$) or a price decrease of \$10 (i.e., $x = -10$) will result in no revenue.

Example 5: Solve $3x^2 - 6x + 5 = 2x(4 - x)$ by graphing.

Method 1: Want 1 side $= 0$

$$3x^2 - 6x + 5 = 8x - 2x^2$$
$$+2x^2 - 8x \qquad -8x + 2x^2$$
$$\underbrace{5x^2 - 14x + 5}_{\text{desmos}} = 0$$



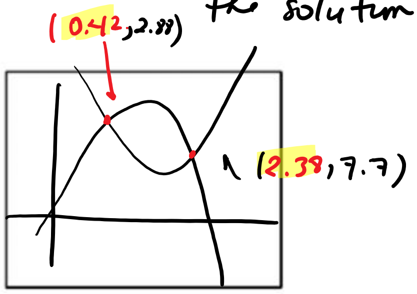
$x = 0.42$

$x = 2.38$

Method 2: · Graph LHS, $3x^2 - 6x + 5$

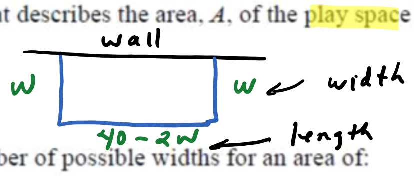
· Graph RHS, $8x - 2x^2$

· the x-coordinates of where they intersect are the solution!



Example 6: Lamont runs a boarding kennel for dogs. He wants to construct a rectangular play space for the dogs, using 40 m of fencing and an existing wall as one side of the play space.

a. Write a function that describes the area, A, of the play space in terms of any width, w.



b. Determine the number of possible widths for an area of:

Area

i. 250 m^2

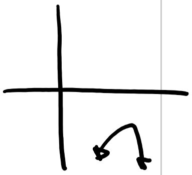
ii. 200 m^2

iii. 150 m^2

Solve for w for each area:

$A = l \times w$
$= (40-2w)w$
$= 40w - 2w^2$

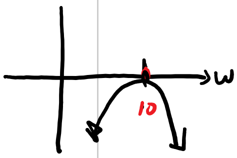
a) $A = 250$ so $250 = 40w - 2w^2$ Rewrite so 1 side = 0!!
$-250 \qquad -250$
$0 = -2w^2 + 40w - 250$
↳ graph with desmos but use x!



No solution!
(no x-intercept!)

Means impossible to get a 250 m² play area with 40 m fencing!

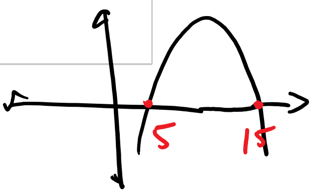
b) $A = 200 \Rightarrow 0 = -2w^2 + 40w - 200$



$w = 10$ A width of 10 m + length of $40 - 2w = 40 - 2(10) = 20$ m will give an area of 200 m²

Assignment: Sec 7.3, p. 379, use *desmos* to solve: #5abc, 6abc, 7, 11, opt: 12.

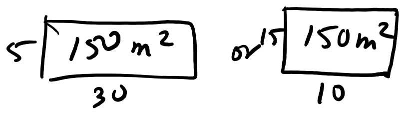
c) $A = 150 \quad 0 = -2w^2 + 40w - 150$



$\boxed{w = 5}$ OR $\boxed{w = 15}$

$l = 40 - 2(w)$
$= 40 - 2(5)$
$= 30$ m

$l = 40 - 2(15)$
$= 40 - 30$
$= 10$ m



the end!