

Solving Quadratics

Ex/ Solve.

a) $2x + 10 = 0$

$2x = -10$

$x = -5$

b) $3x + 5 = 0$

$3x = -5$

$x = -\frac{5}{3}$

c) $2(x-4) = 0$

$2x - 8 = 0$

$2x = 8$

$x = 4$

OR

$x - 4 = 0$

$x = 4$

The Variable

d) $(x+1)(x-3) = 0$

If one of the brackets equal zero, the whole expression will equal zero

$x+1=0$ and $x-3=0$

$x=-1$

$x=3$

- To solve a quadratic, the equation needs to be equal to zero. This allows us to identify the zeros, which are the solution(s). Solutions can also be called roots.

Zeros = Solutions

Ex/ Solve.

a) $2(x+4)(x-6) = 0$

$x = -4$ and $x = 6$
the zeros

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

$x = -5$

$2x - 3 = 0$

$2x = 3$

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

c) $x^2 + 8x + 12 = 0$ Factor first!

$(x+6)(x+2) = 0$

$x = -6, x = -2$

d) $4x^2 - 9 = 0$

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

$2x - 3 = 0$

$2x = 3$

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

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

e) $2x^2 = 18x - 40$

Needs to equal zero first

$2x^2 - 18x + 40 = 0$

$2(x^2 - 9x + 20) = 0$

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

$x = 4, x = 5$

f) $2x^2 - 11x = -12$

$2x^2 - 11x + 12 = 0$

$2x^2 - 8x - 3x + 12 = 0$

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

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

$x = 4$

$2x - 3 = 0$

$2x = 3$

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

Ex/ Is $x = 2$ a root of the equation $3x^2 - 2x - 8 = 0$?

* If its a root, the equation will equal zero when it is substituted in

$$3(2)^2 - 2(2) - 8 = 0$$

$$3(4) - 4 - 8 = 0$$

$$12 - 12 = 0$$

$0 = 0$ ✓ $\therefore 2$ is a root

Ex/ A rocket is launched upwards in a parabolic arc. The height of the rocket can be modeled by the equation $h = -10t^2 + 200t$. Where h is the height in metres, and t is the time elapsed in seconds.

- When does the rocket reach its maximum height?
- What is the maximum height of the rocket?
- How long is the rocket in the air for?
- When will the rocket reach a height of 640 m? How long is it above this height?

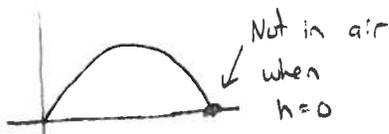
$$a) x = \frac{-200}{2(-10)} = 10$$

\therefore A max at 10 sec

$$b) h = -10(10)^2 + 200(10) = 1000 \text{ m}$$

\therefore A max of 1000 m

c)



$$0 = -10t^2 + 200t$$

$$0 = -10t(t - 20)$$

$t = 0$ start \swarrow $t = 20$ end

\therefore The rocket is in the air for 20 sec.

d) $h = 640$

$$640 = -10t^2 + 200t$$

$$0 = -10t^2 + 200t - 640$$

$$0 = -10(t^2 - 20t + 64)$$

$$0 = -10(t - 4)(t - 16)$$

$t = 4$ going up \downarrow $t = 16$ going down

\therefore The rocket first reaches 640 m after 4 sec. It is above this height for 12 sec

Homework: Pg. 320

#s: 3abc, 4ab, 5, 6(ACE), 14