Chapter 3 Review

- properties of quadratics
- Max/Mins
- Applications → finding zeros
- # of zeros
- Linear quadratic systems

Vertex $(-2, 3)$ ✓ $\Rightarrow (h, k)$

x-ints: $(-3, 0)$, $(-1, 0)$ ✓ ✓

y-int: $(0, -9)$

$y = a(x-h)^2 + k$

$-9 = a(0+2)^2 + 3$

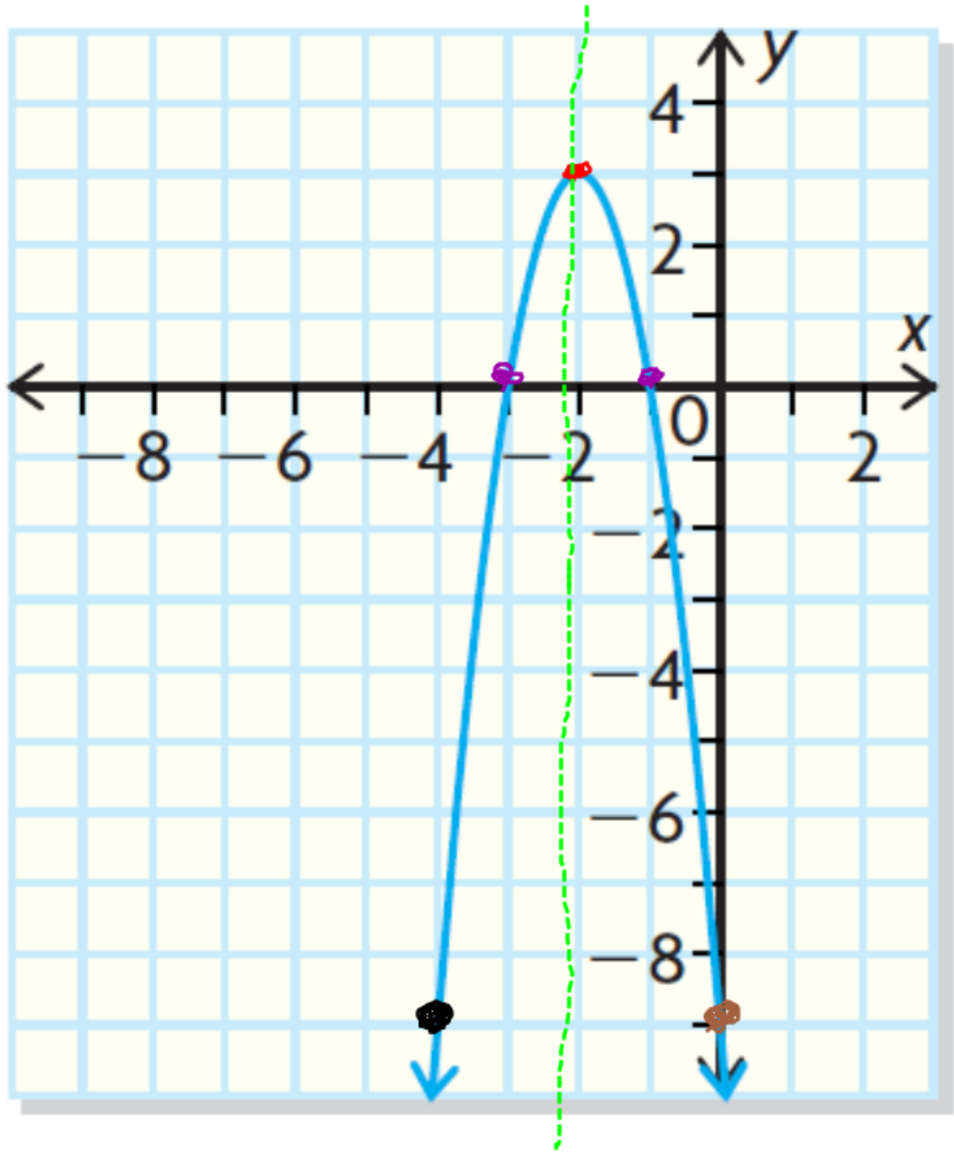
$-12 = a(4)$

$-3 = a$

$y = -3(x+2)^2 + 3$

$y = -3(x^2 + 4x + 4) + 3$

$y = -3x^2 - 12x - 9$



Max/Mins : Partial Factoring

$$f(x) = \underbrace{-4x^2}_{ax} + \underbrace{24x}_{ax} - 15$$

$$f(x) = \underbrace{-4x(x-6)}_{=0} - 15$$

$$h = \frac{0+6}{2} = 3$$

$$k = -4(3)^2 + 24(3) - 15$$

$$k = 21$$

$\therefore$ max of

$(3, 21)$

max value

The sum of the squares of two consecutive integers is 685. What could the integers be? List all possibilities.

x, $x+1$

$\rightarrow x^2 + (x+1)^2 = 685$

$x^2 + x^2 + 2x + 1 = 685$

$\frac{2x^2 + 2x - 684 = 0}{2}$

$x^2 + x - 342 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-1 \pm \sqrt{1^2 - 4(1)(-342)}}{2}$

$x = \frac{-1 \pm \sqrt{1369}}{2}$

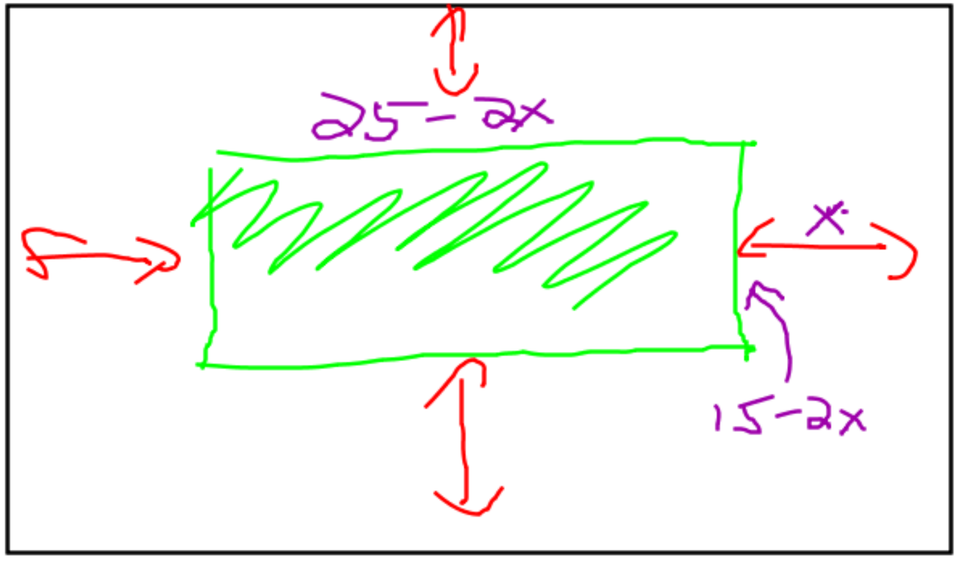
$x = \frac{-1 \pm 37}{2}$

$x = \frac{36}{2} = 18$

$x = \frac{-38}{2} = -19$

Jackie mows a strip of uniform width around her 25 m by 15 m rectangular lawn and leaves a patch of lawn that is 60% of the original area. What is the width of the strip?

25



15

$(25-2x)(15-2x) = .6(25)(15)$

225

$P(x) = -2x^2 + 6.4x - 5.12$

$a \quad b \quad c$

$b^2 - 4ac = (6.4)^2 - 4(-2)(-5.12)$

$= 40.96 - 40.96$

$= 0$

∴ there is one zero

∴ only one way to make a profit

$f(x) = kx^2 - 4x + k$ have ~~no~~ zeros? 1 zero

$b^2 - 4ac = 0$

$(-4)^2 - 4k^2 = 0$

$16 - 4k^2 = 0$

$16 = 4k^2$

$4 = k^2$

$\pm\sqrt{4} = k$

$\pm 2 = k$

$f(x) = -4x^2 - 2x + 3, g(x) = 5x + 4$

$-4x^2 - 2x + 3 = 5x + 4$

$-4x^2 - 7x - 1 = 0$

$4x^2 + 7x + 1 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-7 \pm \sqrt{7^2 - 4(4)(1)}}{2(4)}$$

$$x = \frac{-7 \pm 5.74}{8}$$

$f(x) = g(x)$

$x = -0.1575 \approx -0.16$

$x = -1.5925 \approx -1.6$

$g(-0.16) = 5(-0.16) + 4$

$= 3.2$

$g(-1.6) = 5(-1.6) + 4$

$= -4$

PoI's are $(-0.16, 3.2)$ and $(-1.6, -4)$