Example: Provide a study of the following function.

$$f(x)=\frac{2}{5}(x+6)^2+3$$

Dom: $\mathbb{R}$

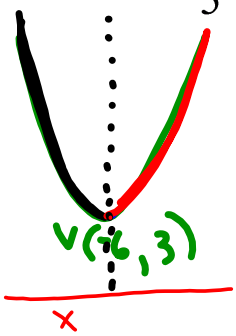
Ran: $[3,+\infty[$

Max: None

Min: 3

Positive: $\mathbb{R}$

Negative: never



Increasing: $]-\infty,-6]$

Decreasing: $[-6,+\infty[$

y-intercept: $x=0$ 17.4

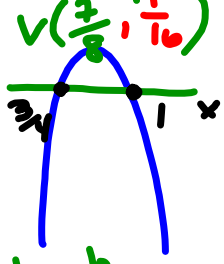
Zero(s): None

Axis of Symmetry: $x=-6$

$0=\frac{2}{5}(x+6)^2+3$

$x=h\pm\sqrt{-\frac{k}{a}}=-6\pm\sqrt{\frac{-3}{0.4}}$ None

Provide a study of the function $f(x) = -4x^2 + 7x - 3$ (a = −4, b = 7, c = −3)



Dom: $\mathbb{R}$

Ran: $]-\infty, 1/16]$

Max: $1/16$

Min: None

Positive: $[3/4, 1]$

Negative: $]-\infty, 3/4] \cup [1, +\infty[$

$h = \frac{-b}{2a} = \frac{-7}{-8}$

$k = \frac{4ac - b^2}{4a}$

$k = \frac{4(-4)(-3) - 7^2}{4(-4)} = \frac{-1}{-16}$

Increasing: $]-\infty, 7/8]$

Decreasing: $[7/8, +\infty[$

y-intercept: -3

Zero(s): $\{3/4, 1\}$

Axis of Symmetry: $x = 7/8$

$0 = -4x^2 + 7x - 3$

$0 = -4x^2 + 4x + 3x - 3$

$0 = -4x(x-1) + 3(x-1)$

$0 = (x-1)(-4x+3)$

$x - 1 = 0$ or $-4x + 3 = 0$

$-4x = -3$

$x = \frac{3}{4}$

mx: 12

m+n: 7

4, 3

The rule of correspondence $h(t) = -8t^2 + 32t + 1$ describes the relation between the height, $h(t)$ in metres, of a baseball and the time, t in seconds, elapsed since it was hit.

Ans: 4.03 s

a) How long does the ball stay in the air? **Find zeros.**

$h(t) = \overset{a}{-8}t^2 + \overset{b}{32}t + \overset{c}{1}$

$0 = -8t^2 + 32t + 1$

$t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$t = \dfrac{-32 \pm \sqrt{1024 - 4(-8)(1)}}{2(-8)}$

$= \dfrac{-32 \pm \sqrt{1056}}{-16}$

$= \dfrac{-32 \pm 32.50}{-16}$

mxn: -8 1, 2, 4, 8

mtn: 32

$\frac{0.50}{-16} = -0.\ldots$ rejected

$\frac{-64.5}{-16} = 4.03$

b) How many seconds after being hit does the ball reach a height of $31m$?

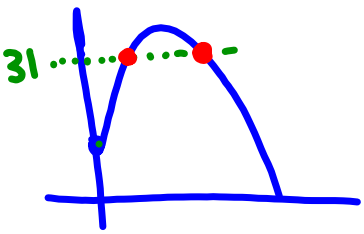
$h(t) = -8t^2 + 32t + 1$

$31 = -8t^2 + 32t + 1$

$-31 \quad -31$

$0 = -8t^2 + 32t - 30$

$0 = -4t^2 + 16t - 15$



$m \times n = 60$, $m + n = 16$ → $10, 6$

$0 = -4t^2 + 10t + 6t - 15$

$0 = -2t(2t-5) + 3(2t-5)$

$0 = (2t-5)(-2t+3)$

$2t - 5 = 0$

$2t = 5$

$t = 2.5\,s$

$-2t + 3 = 0$

$-2t = -3$

$t = 1.5\,s$

c) Is it possible for the ball to reach a height of $35m$?

$$h(t) = -8t^2 + 32t + 1$$

$35 = -8t^2 + 32t + 1$

$0 = -8t^2 + 32t - 34$

$0 = -4t^2 + 16t - 17$

$t = \dfrac{-16 \pm \sqrt{256 - 4(-4)(-17)}}{-8}$

$t = \dfrac{-16 \pm \sqrt{-16}}{-8}$

No

max = 33m

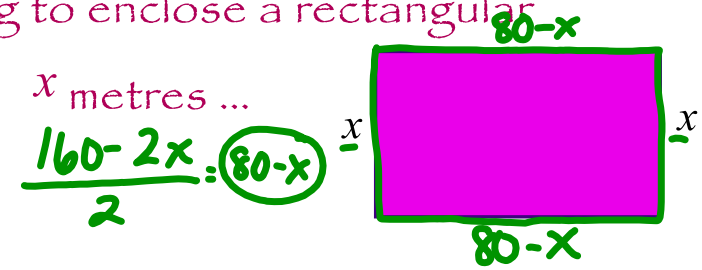
$k = \dfrac{4ac - b^2}{4a}$

$= \dfrac{4(-8)(1) - (32)^2}{-32}$

$= \dfrac{-1056}{-32} = 33$

Jerome has $160m$ of fencing to enclose a rectangular space. If two sides measure x metres ...

$P = 160$



$\frac{160-2x}{2} = 80-x$

a) What is the maximum area of the space?

$A = (80-x)x$

$A = 80x - x^2$

$A = -x^2 + 80x + 0$

$V(h,k)$

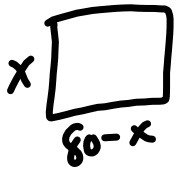
$k = \frac{-b^2}{4a}$

$= -\frac{b^2}{4a}$

$= \frac{-6400}{-4}$

$1600m^2$

b) What are the dimensions of the rectangle?



$h = \frac{-b}{2a} = \frac{-80}{-2} = 40$