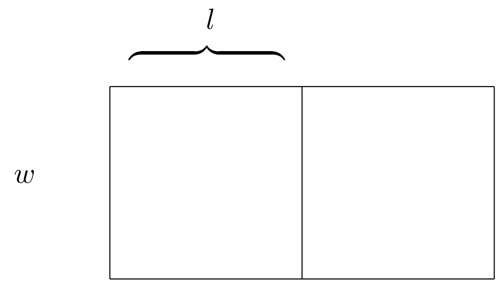
Worksheet Key # 2

Don't forget to use your neighbors and play around with the ideas presented here.

1. Everyone knows the formula $Area = width \times length$ for a rectangular field. The formula gets more complicated if you want to construct two corrals of equal size as in the figure below.



Come up with an equation that represents the *Area* of the two corrals. Enter it into the **Numeric Solver** in your calculator and answer the following questions.

Find the *Area* if:

$w = 15$ $l = 27$ $\boxed{\boldsymbol{A = 810}}$

$w = 55$ $l = 220$ $\boxed{\boldsymbol{A = 24,200}}$

$w = 55$	$l = 550$	$\boxed{\boldsymbol{A = 60,500}}$
$w = 200$	$l = 75$	$\boxed{\boldsymbol{A = 30,000}}$
$w = -8$	$l = 103$	$\boxed{\boldsymbol{A = -1648}}$

Find the *width* if:

$l = 100$	$A = 6785$	$\boxed{\boldsymbol{w = 33.925}}$
$l = 525$	$A = 185,000$	$\boxed{\boldsymbol{w = 176.19}}$
$l = 430$	$A = 260,580$	$\boxed{\boldsymbol{w = 303}}$
$l = 600$	$A = 878,400$	$\boxed{\boldsymbol{w = 732}}$

Find the *length* if:

$w = 25$	$A = 6,250$	$\boxed{\boldsymbol{l = 125}}$
$w = 73.5$	$A = 12,300$	$\boxed{\boldsymbol{l = 83.67}}$
$w = 79$	$A = 22,752$	$\boxed{\boldsymbol{l = 144}}$
$w = \frac{1}{100}$	$A = 3$	$\boxed{\boldsymbol{l = 150}}$

Find the equation for the *Perimeter* of our two corrals and enter it into the **Numeric Solver**. Answer the following questions.

Find the *Perimeter* if:

$w = 25$	$l = 36$	$\boxed{\boldsymbol{P = 219}}$

$w = 120$	$l = 180$	$\boxed{\boldsymbol{P = 1080}}$
$w = 43.789$	$l = 59.231$	$\boxed{\boldsymbol{P = 368.291}}$

Find *length* if:

$w = 75$	$P = 550$	$\boxed{\boldsymbol{l = 81.25}}$
$w = 23$	$P = 293$	$\boxed{\boldsymbol{l = 56}}$
$w = 100$	$P = 726$	$\boxed{\boldsymbol{l = 106.5}}$
$w = 2,250$	$P = 1,000$	$\boxed{\boldsymbol{l = -1437.5}}$

Find the *width* if:

$l = 32.3$	$P = 185.3$	$\boxed{\boldsymbol{w = 18.7}}$
$l = 37$	$P = 160$	$\boxed{\boldsymbol{w = 4}}$
$l = 200$	$P = 1367$	$\boxed{\boldsymbol{w = 189}}$
$l = 8$	$P = .01$	$\boxed{\boldsymbol{w = -10.663}}$

2. Let's investigate an equation that can have more than one solution. Enter:

$$a * x\hat{}2 + b * x + c \;=\; 0$$

into your **Numeric Solver**.

Give the variables the following values,

$a = -1 \quad , \quad b = 2.5 \quad , \quad c = 21 \ .$

The remaining unknown **x** has two possible solutions. One near -5 and one near 5. Find them.

Answer: $x = 6$ and $x = -3.5$

Give the variables the values $a = -.1$, $b = .5$, $c = 5$, and find the two solutions.

Answer: $x = 10$ and $x = -5$

Given $a = \frac{1}{6}$, $b = 3\frac{1}{3}$, $c = 5\frac{1}{3}$. Both the solutions for **x** are negative. Find them.

Answer: $x = -1.7538$ and $x = -18.246$

Given $a = .25$, $b = -7$, $c = 49$. There is only one solution for **x**. Find it.

Answer: $x = 14.000$

Suppose we want $x = 2$ to be a solutions of the equation. Let $b = 6$ and $c = -3$. What does the **Numeric Solver** get for a?

Answer: $a = -2.25$

3. Let us use the **Numeric Solver** for economics, enter the following cost function.

$$\text{cost} = \text{fixed} + a * q\hat{\ }3 + b * q^2 + c * q$$

Give the variables the following values,

fixed = 2000

$a = .0033$

$b = -1.5$

$c = 225$

To find the cost producing a quantity of 150 units make $q = 150$. Find the cost.

Answer: $cost = 13,137.5$

Find the cost for q =50, 100, and 200.

Answer: $cost_1 = 9912.5$ $cost_2 = 12800$ $cost_3 = 13400$

Find what quantity keeps cost at $12000.

Answer: $q = 78.195$

Change our variables to $a = .5$, $b = -2$, $c = 100$.
What happens to cost?

Answer: $cost = 236,653.40$

Done in LaTeX.