Creating Polynomials from Word Problems

Word Problem Extra Practice:

1) The sum of two numbers is 18.
   a. Create a polynomial to represent all possible products

1st integer = x
2nd integer = 18 − x

$x + y = 18$

$y = 18 - x$

Product = $x(18 - x)$

Product = $18x - x^2$

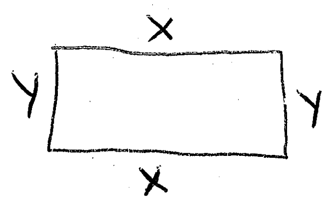
   b. What is the maximum possible value of their product? 81

1st integer $(9, 81)$ Product

   c. What two numbers would be used to yield the max product?

9 and 9

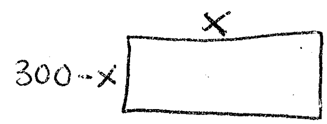
2) Suppose that the perimeter of a rectangle is 600 ft.



$2y + 2x = 600$

$\frac{2y}{2} = \frac{600 - 2x}{2}$

$y = 300 - x$



   a. If *x* represents the width of the rectangle (in feet), then express the length of the rectangle in terms of x as well.

   b. Create a polynomial that represents all possible areas of the rectangle.

Area = $x(300 - x)$

Area = $300x - x^2$

Max (75, 5625)

width Area

   c. Find the maximum area of the rectangle.

5625 ft^2

   d. Give the dimensions that yield the maximum area.

75 × 75 ft

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3) The sum of two numbers is 22.

a. If the first integer is called x, define the second integer in terms of x.

$X + y = 22$ $\quad\quad$ 1st $= X$

$y = 22 - x$ $\quad\quad$ 2nd $= 22 - x$

b. Create a polynomial that represents the sum of their squares $X^2 + y^2$

Sum of Squares $= (x)^2 + (22-x)^2$

$= x^2 + 484 - 44x + x^2$

Sum of Squares $= 2x^2 - 44x + 484$

Minimum

$(11, 242)$

$\uparrow \quad \uparrow$

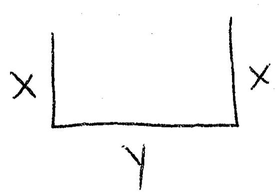
1st integer $\quad$ Sum of Squares

c. Find the **smallest** possible sum of their squares. 242

d. What are the two integers that yield this minimum value?

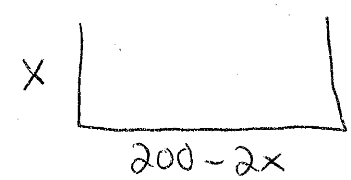
11 and 11

4) A farmer has 200 feet of fencing with which to build a rectangular fence that will have a river as its fourth side. If *x* represents the width of the rectangle (in feet), then express the length of the rectangle in terms of x as well.



$2x + y = 200$

$y = 200 - 2x$



a. Create a polynomial that represents all possible areas of the rectangle.

Area $= x(200 - 2x)$

Area $= 200x - 2x^2$

Maximum $(50, 5000)$

$\uparrow \quad \uparrow$

width $\quad$ Area

b. Find the maximum area of the rectangle.

5000 ft^2

c. Give the dimensions that yield the maximum area.

50, width $\quad\quad$ 50 x 100 feet

100, length