

Translating Word Problems into Algebraic Expressions

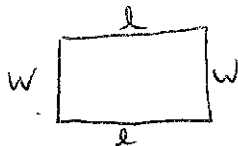
- 1) Two integers have a sum of 24. If the first integer is called m , create an expression for the second integer in terms of m .

$$m + x = 24$$

$$x = 24 - m$$

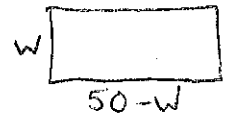
$$\begin{aligned} 1st &= m \\ 2nd &= 24 - m \end{aligned}$$

- 2) The perimeter of a rectangle is 100. If the width is called w , create an expression for the length in terms of w .

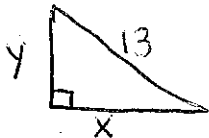


$$\begin{aligned} 2l + 2w &= 100 \\ \frac{2l}{2} &= \frac{100 - 2w}{2} \end{aligned}$$

$$\begin{aligned} \text{width} &= w \\ \text{length} &= 50 - w \end{aligned}$$

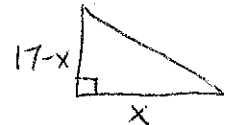


- 3) The perimeter of a right triangle is 30. The hypotenuse is 13. Assuming the triangle is not isosceles and one leg is called x , create an expression for the other leg.

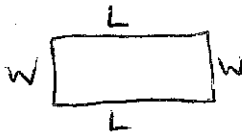


$$\begin{aligned} x + y + 13 &= 30 \\ y &= 30 - 13 - x \\ &= 17 - x \end{aligned}$$

$$\begin{aligned} x &= \text{one leg} \\ 17 - x &= \text{other leg} \end{aligned}$$

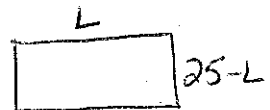


- 4) A rectangle has a perimeter of 50. If the length is called L , create an expression for the width in terms of L .



$$\begin{aligned} 2L + 2W &= 50 \\ \frac{2W}{2} &= \frac{50 - 2L}{2} \end{aligned}$$

$$\begin{aligned} \text{Length} &= L \\ \text{Width} &= 25 - L \end{aligned}$$

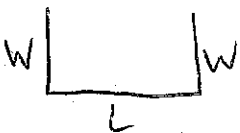


- 5) Two integers have a sum of 40. The first integer is called x , create an expression for the second integer in terms of x .

$$x + y = 40 \quad y = 40 - x$$

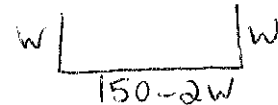
$$\begin{aligned} 1st &= x \\ 2nd &= 40 - x \end{aligned}$$

- 6) A 3-sided rectangular fence is constructed against the side of a building. If one side of the fence is called w , create an expression for the length of the fence in terms of w . (Using 150 ft of fencing)



$$\begin{aligned} 2w + L &= 150 \\ L &= 150 - 2w \end{aligned}$$

$$\begin{aligned} \text{width} &= w \\ \text{length} &= 150 - 2w \end{aligned}$$



- 7) I am thinking of three consecutive integers. If the first integer is called y , create an expression for the other two integers.

$$y, y + 1, y + 2$$

- 8) Two integers are called x and y . Create an expression that represents their product.

$$\text{PRODUCT} = x \cdot y$$

- 9) Two integers are called x and y . Create an expression that represents the sum of their squares.

$$\text{SUM OF SQUARES} = x^2 + y^2$$

Creating Polynomials from Word Problems

Use the previous exercises #1-7, to complete the following problems:

- 1) Two integers have a sum of 24. If the first integer is called m , create a polynomial that represents their product.

$$\text{Product} = m(24-m) = \boxed{24m - m^2}$$

- 2) The perimeter of a rectangle is 100. If the width is called w , create an expression that represents the area of the rectangle.

$$\text{Area} = w(50-w) = \boxed{50w - w^2}$$

- 3) The perimeter of a right triangle is 30. The hypotenuse is 13. Assuming the triangle is not isosceles and one leg is called x ,

a) Create an algebraic expression using Pythagorean Theorem.

b) Create an algebraic expression representing the area of the triangle

$$\text{Area} = \frac{1}{2} b h$$

$$\text{b) Area} = \frac{1}{2}(x)(17-x)$$

$$\text{a) } x^2 + (17-x)^2 = 13^2$$

$$x^2 + 289 - 34x + x^2 = 169$$

$$\boxed{2x^2 - 34x = -130}$$

or

$$\boxed{2x^2 - 34x + 130 = 0}$$

$$\boxed{\text{Area} = \frac{17x - x^2}{2}}$$

- 4) A rectangle has a perimeter of 50. If the length is called L , create an expression for the area of the rectangle in terms of L .

$$\text{Area} = L(25-L) = \boxed{25L - L^2}$$

- 5) Two integers have a sum of 40. The first integer is called x , create an expression for the sum of their squares.

$$\text{Sum of Squares} = x^2 + (40-x)^2$$

$$= x^2 + 1600 - 80x + x^2$$

$$\boxed{\text{Sum of Squares} = 2x^2 - 80x + 1600}$$

- 6) A 3-sided rectangular fence is constructed against the side of a building. If one side of the fence is called w , create an expression for the area of the fence in terms of w . (using 150 ft of fencing)

$$\text{Area} = w(150 - 2w) = \boxed{150w - 2w^2}$$

- 7) I am thinking of three consecutive integers. If the first integer is called y , create an expression that represents the product of the 2nd and 3rd integers. If the product is 306

$$y, y+1, y+2$$

$$(y+1)(y+2) = 306$$

$$y^2 + 3y + 2 = 306$$

$$y^2 + 3y - 304 = 0$$

Creating Polynomials from Word Problems

A high diver jumps off a 10-meter springboard. For h in meters and t in seconds after the diver leaves the board, her height above the water is given by:

$$h(t) = -4.9t^2 + 8t + 10$$

(Calc Active)

- a) Find the x intercepts. Interpret the values in the context of this problem.

$x = -.829$ (no meaning) $x = 2.46$ seconds until the diver hits the water

- b) Find the y intercept and interpret its value in the context of this problem.

(plug in 0 for x) $y = 10$ feet, the initial height of the diver on the spring board

- c) Identify concavity Concave Down

- d) Find the diver's maximum height 13.26 meters

(Calc Active)

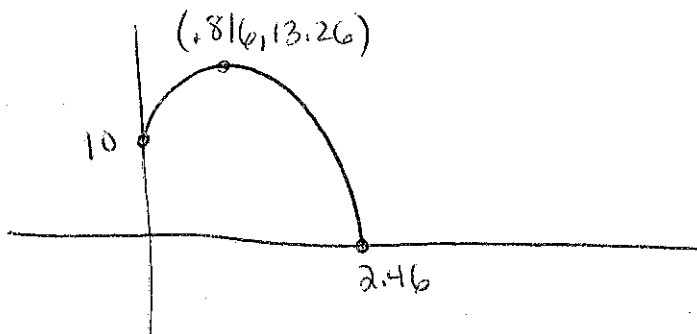
- e) How long does it take the diver to reach max height?

$x = .816$ seconds to reach the max height

- f) What domain and range would we use for this model?

$D: [0, 2.46]$

- g) Sketch the graph: $R: [0, 13.26]$



Creating Polynomials from Word Problems

A baseball is popped up by a batter. The height of the ball above the ground after t seconds is given by the function

$$f(t) = -16t^2 + 64t + 3$$

- a) Find the x intercepts. Interpret the values in the context of this problem.

Calc Active
 $x = -.046$

(no meaning)

$x = 4.04$ seconds for the ball to hit the ground

- b) Find the y intercept and interpret its value in the context of this problem.

plug in 0 for x

$y = 3$ feet is the initial height when the ball is hit

- c) Identify concavity *Concave Down*

- d) Find the maximum height of the baseball. 67 feet

- e) How long does it take the baseball to reach max height? *It takes 2 seconds to reach max height*

- f) What domain and range would we use for this model?

$D: [0, 4.04]$

- g) Sketch the graph:

$R: [0, 67]$

