

Word Problems cont'

Recall from yesterday:

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

Use to find
eqn parabola
when you know
vertex + one point.

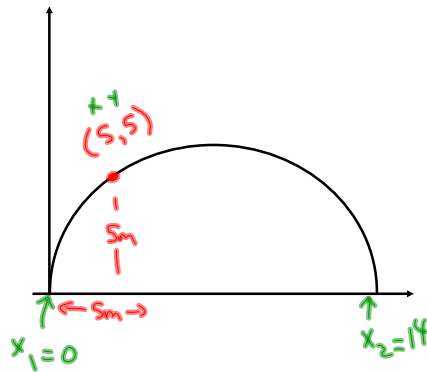
Today : (p.s)

$$y = a(x-x_1)(x-x_2)$$

(x_1, y) : Known point

x_1 + x_2 : zeros

Use to find
eqn parabola
when you know
both zeros +
one point



$$y = a(x - x_1)(x - x_2)$$

$$5 = a(5 - 0)(5 - 14)$$

$$5 = a(5)(-9)$$

$$\frac{5}{-45} = \frac{-45a}{-45}$$

$$-\frac{1}{9} = a$$

Now: Plug in a , x_1 & x_2 , leave "generic" x & y

$$y = a(x - x_1)(x - x_2)$$

$$y = -\frac{1}{9}(x - 0)(x - 14)$$

$$y = -\frac{1}{9}x(x - 14)$$

Looking for y value of vertex
 → Could find $-\frac{\Delta}{4a}$

OR, since x value of vertex = 7,
 Plug $x = 7$ into eqn to find y !

$$y = -\frac{1}{9}x(x - 14)$$

$$y = -\frac{1}{9}x^2 + \frac{14}{9}x$$

$$y = -\frac{1}{9}(7)^2 + \frac{14}{9}(7)$$

$$y = 5\frac{4}{9} \text{ or } \underline{5.44\text{m}}$$

The maximum height is 5.44m.

$$y = f(x)$$

$$y = \text{function of } x$$

$$B^{-2} \quad (x, y) = (4, 4)$$

$$x_1 = 0 \quad x_2 = 10$$

$$y = a(x - x_1)(x - x_2)$$

$$4 = a(4 - 0)(4 - 10)$$

$$4 = a(4)(-6)$$

$$4 = \frac{-24a}{-24} \quad a = \frac{-1}{6} \text{ or } -0.17$$

$$y = a(x - x_1)(x - x_2)$$

$$y = -\frac{1}{6}(x - 0)(x - 10)$$

$$y = -\frac{1}{6}x(x - 10)$$

$$\text{Let } x = 5$$

$$y = -\frac{1}{6}(5)(5 - 10)$$

$$y = -\frac{1}{6}(5)(-5)$$

$$y = \left(-\frac{1}{6}\right)(-25)$$

$$y = \frac{25}{6} = 4\frac{1}{6} = 4.17m$$

Function's Problem Type B

"Function" : is represented by a set of (x,y) points that work for some mathematical equation.

e.g. A function could be a straight line

$y = 3x - 2$
 "Linear function" The function would be all of the (x,y) points that "work" for this eqn

e.g. A function could be a parabola

$y = 3x^2 - 2x + 6$
 "Quadratic function" The function would be all of the (x,y) points that "work" for this eqn.

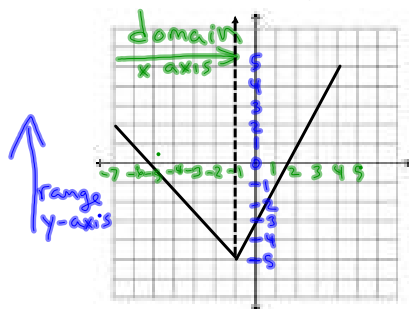
→ A function doesn't have to be a parabola or line.

See graph on 1st page...

"Minimum" → lowest y value

"Maximum" → highest y value

"domain" : all of the values for x that are in this function.



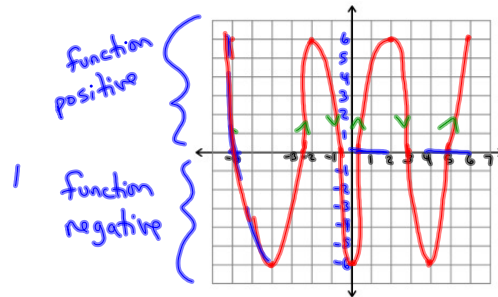
domain :
 $[-7, 4]$

* Use interval notation for domain & range

range : all of the y 's that are on the function
 $[-5, 5]$



axis of symmetry: a vertical line that divides the function into perfect mirror images of each other.



Determine the intervals [Always understood to mean intervals of "x"]

over which the function is increasing

$[-4, -2]$ $[0, 2]$ $[4, 6]$ [The function is increasing when "y" is increasing]

Over what intervals ^(of x) is the function ^(y decreasing) decreasing?

$[-6, -4]$ $[-2, 0]$ $[2, 4]$

Over what intervals is the function positive? (y is positive)

$[-2.5, -0.5]$ $[5, 6]$
 $[0.5, 3]$

Over what intervals is the function negative?

$[-6, -2.5]$ $[-0.5, 0.5]$
 $[3, 5]$

One interval over which the function is:

a) Positive + increasing $[-2.5, -2]$

b) Negative + increasing $[0, 0.5]$

c) Positive + decreasing $[-2, -0.5]$

d) Negative + decreasing $[3, 4]$

The letters $f, g, h, i, j, k \dots$

tend to be used to represent a function. Most common: f

e.g. $f(x) = 3x - 1$

OR $g(x) = 4x + 2$

For $f(x) = 3x - 1$

$f(0)$ = means "what is y when $x = 0$ "

$$f(0) = -1$$

$$f(2) = 5$$

$$f(1) = 2$$

$$f(3) = 8$$

For $g(x) = x + 2$

What is

$$g(0) = 2$$

$$g(2) = 4$$

$$g(1) = 3$$

$$g(3) = 5$$

$$g(0) = g(2) = g(4)$$

~~~~~

-6

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6

-6

p. 7

a) T

$$b) \quad \begin{array}{ccc} g(0) & = & g(3) \\ 4 & & -4 \end{array} \quad \Leftarrow$$

To Do :

- ① Finish Worksheet : Functions Prob Type B
- ② → Quiz on this
- ③ Functions Word Problems Type A Worksheet
→ Finish pp 1-8
- ④ Quiz on word problems
(Just do 1st 2 questions!)