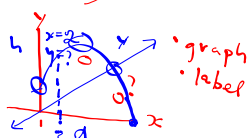


# Unit 3: Solving Word Problems

## Represented by a System of Equations

Translate sentences into points  $(x, y)$



Translate the question into a point on the graph  
 ? - x-rts • vertex  
 ? - y-int • POI

Find  $y = mx + b$

$$m = 3 \quad y = 3x + b$$

to find  $b$ , sub in temporarily a point  $(x, y)$

3, 35

$$35 = 3(3) + b$$

$$b = 35 - 9$$

$$b = 26$$

$$y = 3x + 26$$

To find POI, use

Comparison  
 Substitution  
 Elimination

$$y = 3x + 26$$

$$y = -2(x - 3.75)^2 + 38.125$$

$$3x + 26 = -2(x - 3.75)^2 + 38.125$$

$$3x + 26 = -2(x - 3.75)(x - 3.75) + 38.125$$

$$0 = -2(x^2 - 7.5x + 14.0625) + 38.125 - 3x - 26$$

$$0 = -2x^2 + 15x - 28.125 + 12.125 - 3x$$

$$0 = -2x^2 + 12x - 16 \rightarrow \text{use quad formula}$$

$$a = -2$$

$$b = 12$$

$$c = -16$$

$$\Delta = b^2 - 4ac$$

$$\Delta = 12^2 - 4(-2)(-16)$$

$$\Delta = 16$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

$$x = \frac{-12 \pm \sqrt{16}}{2(-2)} \text{ or } x = \frac{-12 \pm 4}{2(-2)}$$

$$x = 2$$

$$\text{or } x = 4$$

find  $y$

$$y = 3x + 26$$

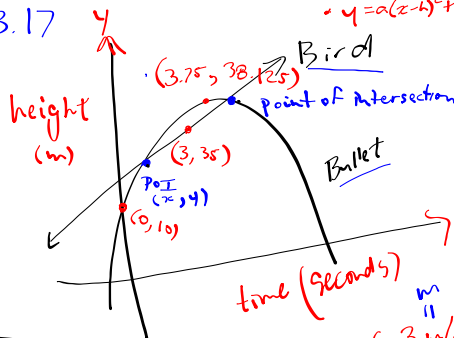
$$y = 3(2) + 26 \text{ or } y = 3(4) + 26$$

$$y = 32$$

$$y = 38$$

The bird either got hit at a height of 32 m after  $n$  secs

P 3.17



$$y = mx + b$$

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

bullet has a speed of 3 m/s

$$m = \frac{\text{rise}}{\text{run}} = \text{rate of change} = \frac{\Delta y}{\Delta x}$$

For the parabola, use either

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

if you have vertex  $(h, k)$   
 3.75, 38.125

or  $y = a(x-x_1)(x-x_2)$   
 if you have x-ints  $(x_1, 0)$   
 $(x_2, 0)$

$$y = a(x - 3.75)^2 + 38.125$$

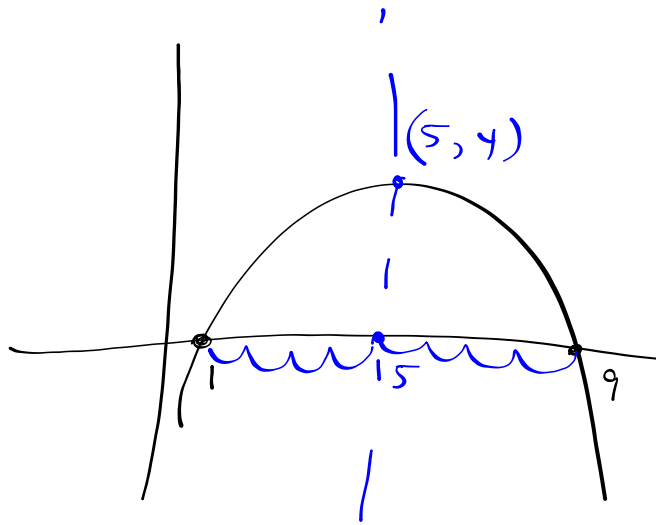
to find  $a$ , sub in  $(0, 10)$

$$10 = a(0 - 3.75)^2 + 38.125$$

$$(10 - 38.125) = \frac{a(-3.75)^2}{(3.75)^2}$$

$$a = -2$$

$$y = -2(x - 3.75)^2 + 38.125$$



A mermaid jumped out of the water 2 m away from a cliff and reentered the water 8 m away from said cliff. 3 m away from the cliff, she reached a height of 5 m. Ulysses is in a boat 3 m away from the cliff. He shoots a harpoon at the mermaid at a height of 1 m. The harpoon reaches a height of 2 m, 4 m away from the cliff.

- How high does the mermaid jump?
- How far from the cliff was she when the harpoon hit her?

## Unit 4: Operation on Functions

+ , - , × , ~~÷~~

$$f(x) = 2x + 3$$

$$y = 2x + 3$$

find  $f(2) = 2(2) + 3$

find the value  
of  $y$  when  
 $x = 2$

$$f(2) = 7$$
$$(2, 7)$$

find yint

$$f(0) = 2(0) + 3$$

$$f(0) = 3$$

$(0, 3)$

## Adding Functions w/lets f+g

ex  $f(x) = x + 2$   
 $g(x) = x^2 - 2x + 1$

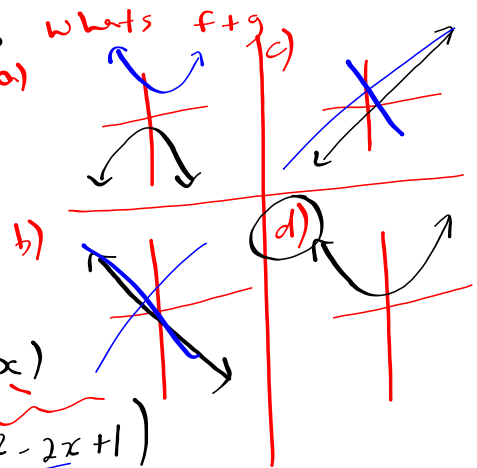
find  $(f + g)(x) = f(x) + g(x)$

$$(f+g)(x) = (\underline{x+2}) + (\underline{x^2-2x+1})$$

$$(f+g)(x) = x^2 - x + 3$$

find  $(f+g)(0) = 0^2 - 0 + 3$

$$(f+g)(0) = 3$$



$$\begin{aligned} f(x) &= x + 2 \\ f(0) &= 2 \\ g(x) &= x^2 - 2x + 1 \\ g(0) &= 1 \end{aligned}$$

$$\begin{aligned} (f+g)(x) &= f(x) + g(x) \\ (f+g)(0) &= f(0) + g(0) \\ f+g(0) &= (0 + 2) + (0^2 - 2(0) + 1) \\ f+g(0) &= 2 + 1 \\ f+g(0) &= 3 \end{aligned}$$

## Subtracting Functions

$$f(x) = x + 2$$

$$g(x) = x^2 - 2x + 1$$

$$\begin{aligned} \text{Note: } (f - g)(x) &= f(x) - g(x) \\ &= (x + 2) - (x^2 - 2x + 1) \\ &= \underline{x} + \underline{2} - x^2 + \underline{2x} - \underline{1} \end{aligned}$$

$$(f - g)(x) = -x^2 + 3x + 1$$

$$\text{find } (f - g)(0) = 1$$

$$f(x) = x + 2$$

$$g(x) = x^2 - 2x + 1$$

find  $(g-f)(0)$

find  $(g-f)(-1)$

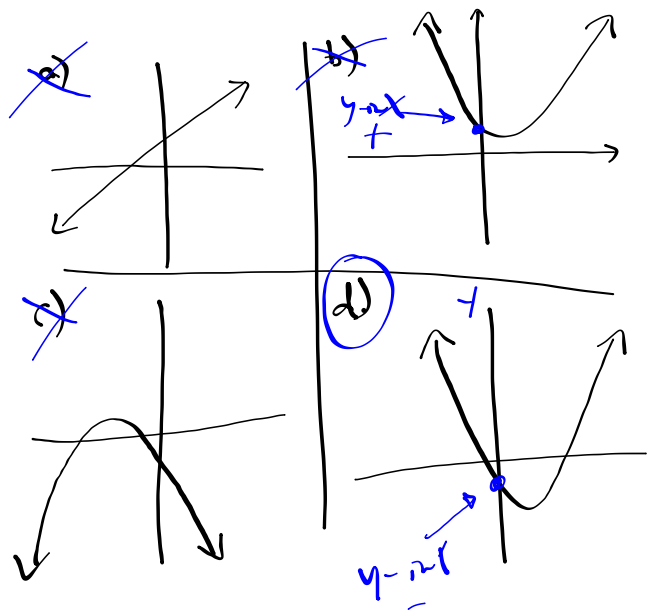
$$g-f(x) = g(x) - f(x)$$

$$= x^2 - 2x + 1 - (x + 2)$$

$$g-f(x) = x^2 - 3x - 1$$

- > quad
- > facing up
- > y-int negative

Which best represents  $g-f$



If  $f(x) = 3$       Multiplying Functions  
 $g(x) = x^2 + 1$

$$\begin{aligned} f \cdot g(x) &= f(x) \cdot g(x) \\ &= (3) \cdot (x^2 + 1) \end{aligned}$$

$$f \cdot g(x) = 3x^2 + 3$$

$$\therefore f \cdot g(0) = 3$$



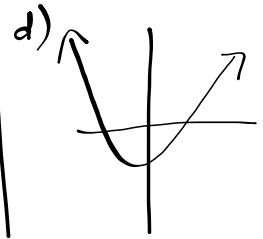
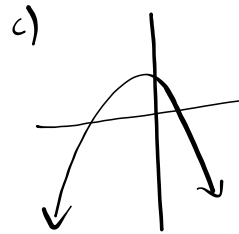
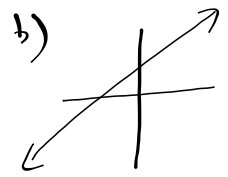
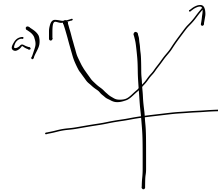
If

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

$$g(x) = 2x - 3$$

find  $g \circ f(-1)$

What best represent  $g \circ f$



find

$$f \cdot g(0) =$$

$$= f(0) \cdot g(0)$$

$$= 3 \cdot 1$$

$$= 3$$

$x$	$f(x)$	$g(x)$	$f(x) \cdot g(x)$
2	3	5	15
1	3	2	6
0	3	1	3
-1	3	2	6
-2	3	5	15

