

## Y-Intercepts

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Name: \_\_\_\_\_

Period:

Answer the following problems below.

- 1) A projectile is launched with an upward velocity of 50 ft/sec and it has an initial height of 35 feet.

a) Write a function that models its height using this format:  $h(t) = -16t^2 + v_0 t + h_0$ .

$$v_0 = 50 \text{ ft/sec}$$

$$h_0 = 35 \text{ ft} \quad \therefore h(t) = -16t^2 + 50t + 35$$

- b) Locate the y-intercept of this function and write it as an ordered pair.

$$\text{y-intercept} = 35 \quad \therefore (0, 35)$$

- 3) a) Locate the y-intercepts of these functions.

$$h_1(t) = -16t^2 + 90t + 40$$

$$h_2(t) = -16t^2 + 120t + 30$$

At  $t=0$ ,  $h_1(t) = 40$ .  $\therefore$  y-intercept is  $(0, 40)$

At  $t=0$ ,  $h_2(t) = 30$ .  $\therefore$  y-intercept is  $(0, 30)$

- b) Which function has the greater y-intercept?

Function  $h_1(t)$  has the greater y-intercept.

- 5) What is the y-intercept of the:

- a) exponential function?

$$-1$$

- b) linear function?

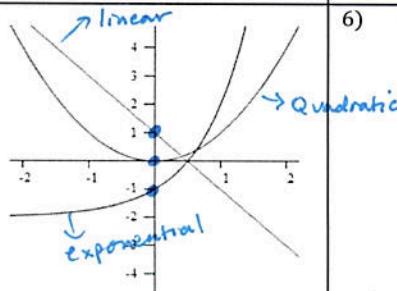
$$1$$

- c) quadratic function?

$$0$$

Which y-intercept is highest?

The y-intercept of the linear function is the highest.



- 7) Locate the y-intercepts of these functions using substitution [let  $x = 0$ ].

$$\text{a) } y = -4x^3 + 5x^2 + 17x + 6$$

$$y = -4(0)^3 + 5(0)^2 + 17(0) + 6 = 6 \quad \therefore \text{y-intercept is } 6.$$

$$\text{b) } y = -7|x| + 4$$

$$y = -7|0| + 4 = 4 \quad \therefore \text{y-intercept is } 4.$$

$$\text{c) } y = \frac{x-4}{x+5}$$

$$y = \frac{0-4}{0+5} = -\frac{4}{5} \quad \therefore \text{y-intercept is } -\frac{4}{5}.$$

2)

x	0	1	-1	2	-2	3
y	-3	-4	0	-3	5	0

- a) Determine the minimum y-value for this quadratic function.

The minimum y-value of -4 occurs at  $x=1$ .

- b) Locate the y-intercept of this quadratic function.

The y-intercept of -3 occurs at  $x=0$ .

$\therefore$  y-intercept as ordered pair is  $(0, -3)$ .

4)

- a) Determine the equation of the line that contains these points.

$$\text{Slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 2}{3 - 9} = \frac{-4}{-6} = \frac{2}{3}$$

$$y = mx + b \Rightarrow 2 = \frac{2}{3} \cdot 9 + b \Rightarrow 2 = 6 + b \Rightarrow -4 = b$$

- b) Locate the y-intercept of this linear function.

$\therefore$  Equation of line

$$y = \frac{2}{3}x - 4$$

x	y
9	2
3	-2
-3	-6
-9	-10

choose these two points  
 $(x_1, y_1)$   
 $(x_2, y_2)$

So the y-intercept of the linear function

$y = \frac{2}{3}x - 4$  is -4; as an ordered pair its  $(0, -4)$ .

- 6) Locate the y-intercepts of these functions using substitution [let  $x = 0$ ].

$$\text{a) } y = 6^x - 2$$

$$y = 6^0 - 2 = 1 - 2 = -1 \quad \therefore \text{y-intercept is } -1.$$

$$\text{b) } y = -3x + 4$$

$$y = -3(0) + 4 = 4 \quad \therefore \text{y-intercept is } 4.$$

$$\text{c) } y = 13x^2 + 1700x + 500$$

$$y = 13(0)^2 + 1700(0) + 500 = 500 \quad \therefore \text{y-intercept is } 500.$$

- 8) a) Write the equation of the line that has the below table of values.

x	-12	-2	0	4	8
y	9	4	?	1	-1

$x_1, y_1$   
 $(4, 1)$

$x_2, y_2$   
 $(8, -1)$

$$y = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 1}{8 - 4} = \frac{-2}{4} = -\frac{1}{2}$$

$$y = mx + b \Rightarrow 1 = -\frac{1}{2}(4) + b \Rightarrow 1 = -2 + b \Rightarrow 3 = b$$

- b) Locate the y-intercept of this linear function.  $\therefore y = -\frac{1}{2}x + 3$

So the y-intercept occurs when  $x=0$ .

$$\text{So } y = -\frac{1}{2}x + 3 = -\frac{1}{2}(0) + 3 = 3. \quad \therefore ? = 3$$

$\therefore$  The y-intercept is at 3.