

Bell Work

4/20/2015

Simplify the following

The image shows a handwritten solution for simplifying the expression  $\left(\frac{2x^3}{x}\right)^5$ . The original expression is written in black ink in the center. Two green arrows point from it to two different handwritten solutions in blue and green ink.

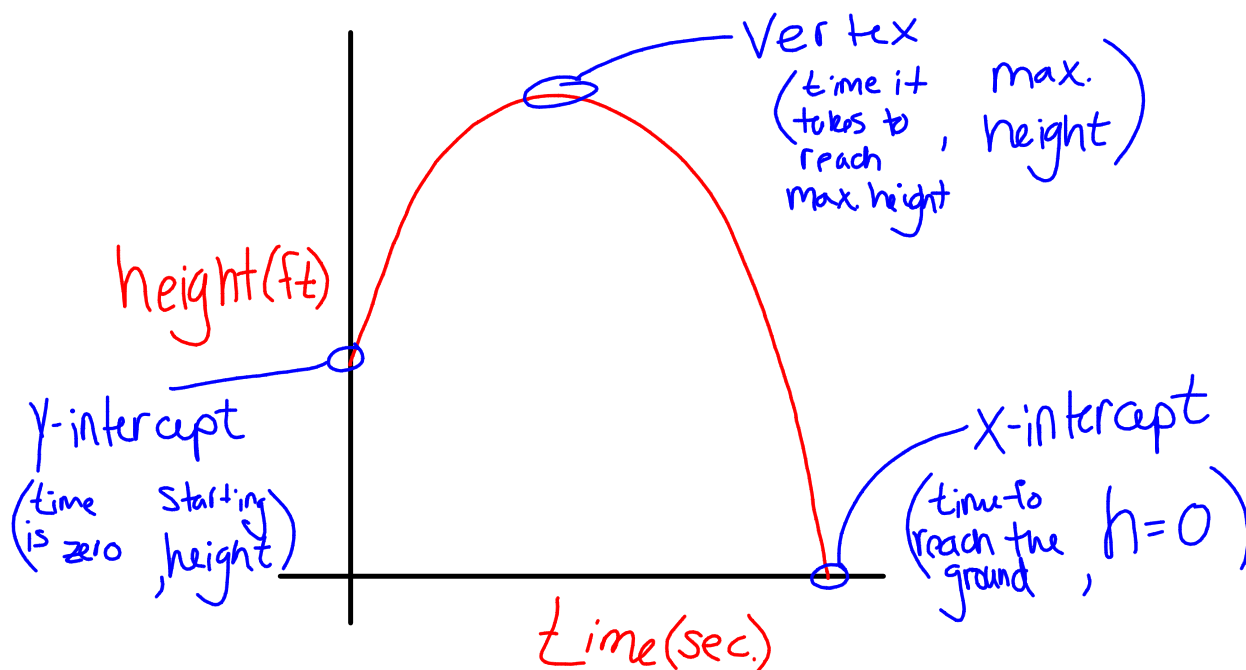
**Left Solution (Blue Ink):**

$$\left(\frac{2x^3}{x}\right)^5$$
$$\frac{2^5 x^{15}}{x^5}$$
$$2^5 x^{15-5} = 32x^{10}$$

**Right Solution (Green Ink):**

$$\left(\frac{2x^3}{x}\right)^5$$
$$(2x^2)^5$$
$$2^5 x^{10}$$
$$32x^{10}$$

1. A model rocket is launched from the roof of a building. Its flight path is modeled by  $h = -5t^2 + 30t + 10$  where  $h$  is the height of the rocket above the ground in meters and  $t$  is the time after the launch in seconds.
- a. Draw a general graph that illustrates the height of the rocket over time.



2. A water balloon is catapulted into the air so that its height  $h$ , in meters, after  $t$  seconds is  $h = -4.9t^2 + 27t + 2.4$ .
- a. How high is the balloon after 1 second?

$$t = 1$$

$$h = -4.9(1)^2 + 27(1) + 2.4$$

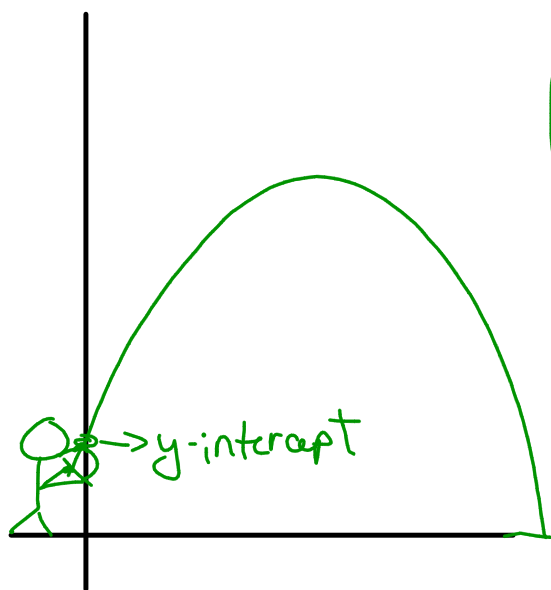
$$-4.9 + 27 + 2.4$$

$$-4.9 + 29.4$$

$$h = 25.4 \text{ meters}$$

3. A model for the height of an arrow shot into the air is  $h(t) = -16t^2 + 72t + 5$  where  $t$  is time in seconds and  $h$  is height in feet.

a. What is the height the arrow is shot from?

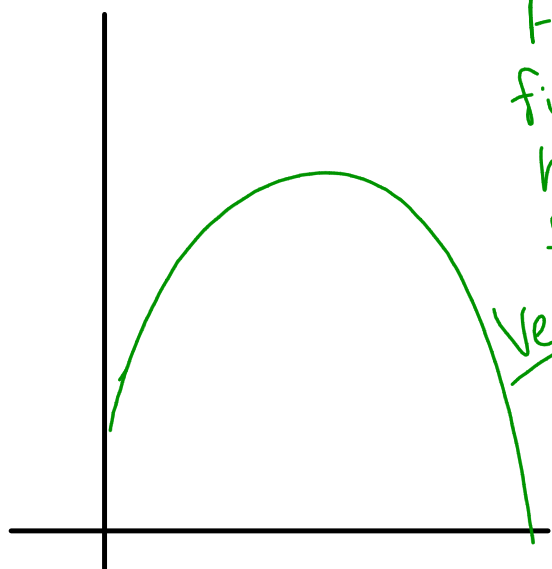


y-intercept, starting height  
 $t=0$

$$h(0) = -16(0)^2 + 72(0) + 5$$

$$h(0) = 5 \text{ feet}$$

4. Kali, a physics student, determined that the function  $h(t) = -2(t + 1)(t - 3)$  models the height,  $h(t)$  in feet, of a water balloon shot from her water balloon water launcher;  $t$  is the time in seconds. Her neighbor is accusing Kali of using the water balloon to knock the TV satellite dish off of her roof, 12 feet off the ground. Sketch the graph of  $h(t)$ , to determine Kali's guilt or innocence. What evidence in your graph supports your conclusion?



Find her max. height by finding the vertex. If her max. height is less than 12 feet she is innocent.

$$\text{Vertex } X = \frac{x\text{-int} + x\text{-int}}{2}$$

$$X = \frac{-1 + 3}{2} = \frac{2}{2} = 1$$

$X = 1$   
or  $t = 1$

$$h = -2(1+1)(1-3)$$

$$h = -2(2)(-2)$$

$$h = 8 \text{ feet}$$

Under 12 feet, therefore innocent

X-intercept; let  $y = 0$

$$0 = -2(t+1)(t-3)$$

$$t+1=0$$

$$t = -1$$

$$t-3=0$$

$$t = 3$$

5. The height of a diver,  $h(t)$  in meters, is modeled by  $h(t) = -(t + 3)(t - 5)$ , where  $t$  is number of seconds since he began the dive. Graph and label the quadratic function to help you answer the questions below.

**h** a) At what height did the diver begin his dive?

**o**

**m**

**e** b) How many seconds did it take to reach the water?

**w**

**o**

**r** c) What was the maximum height of the diver?

**k**

d) How many seconds did it take to reach the maximum height?

