APPLICATION

1.

VERBALLY

A 64 gallon tank of gas is losing 6 liters every 5 miles.

ALGEBRAICALLY

$m = \frac{\Delta y}{\Delta x} = \frac{(40)-(34)}{(20)-(25)} = \frac{6}{-5}$

$y - y_1 = m(x - x_1)$

$y - (40) = \frac{6}{-5}(x - (20))$

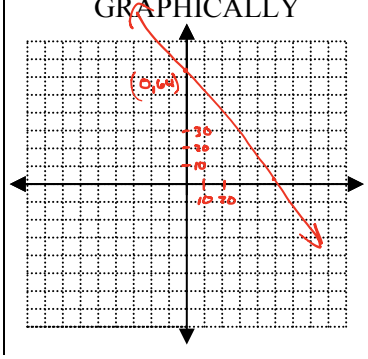
$y - 40 = \frac{6}{-5}x + 24$

$y = -\frac{6}{5}x + 64$

NUMERICALLY

Distance (miles)	Gas (liters)
20	40
25	34
30	28

GRAPHICALLY



2. If $g(x) = -x^2 + 3x + 1$ then find…

a. $g(-2) = -(-2)^2 + 3(-2) + 1$

$= -(4) - 6 + 1$

$= -4 - 5$

$g(-2) = -9$

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

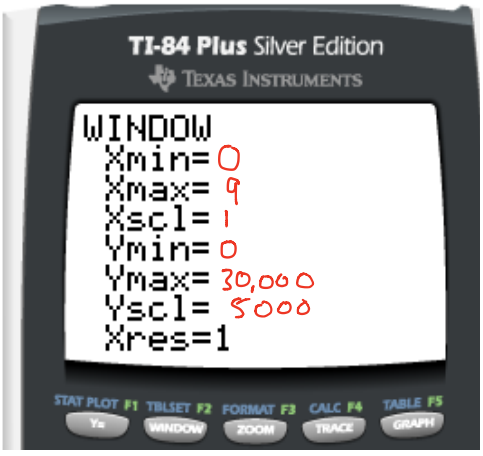
$= -(x^2 + 4x + 4) + 3x + 6 + 1$

$= -x^2 - 4x - 4 + 3x + 7$

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

3. From 1994 to 2003, the amount of athletic equipment E, in millions of dollars, sold domestically can be modeled by $E(t) = -10t^3 + 140t^2 - 20t + 18150$ where t is the number of years since 1994.

a. Graph with a friendly window. Record the window here →



b. What does $E(5)$ mean? Find it!

In 1999, how many dollars worth of equipment is sold?

$20,300 million

c. Approximate the maximum sales.

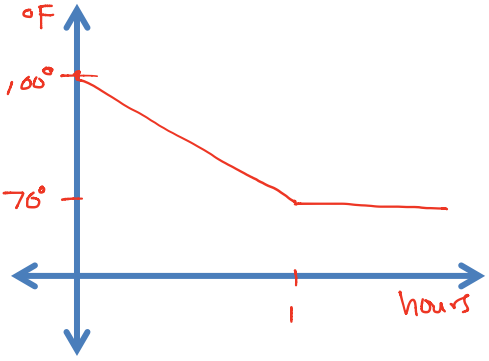
The maximum sales are about $22029.236 million or $22,029,236,000

d. What does the y-intercept mean?

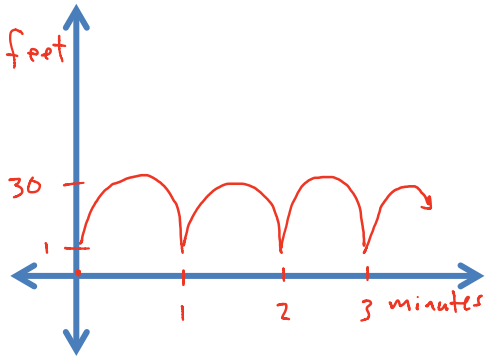
The amount of athletic equipment sold in millions of dollars in 1994.

4. Sketch a graph for each the verbal situation given below. Make sure to label the axis of your graph!

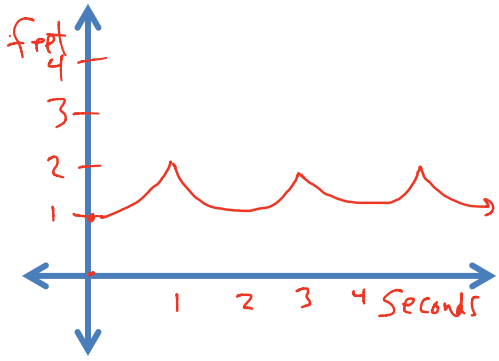
a. You get a large cup of coffee from McDonalds. Graph the temperature of the coffee in the cup vs. time.



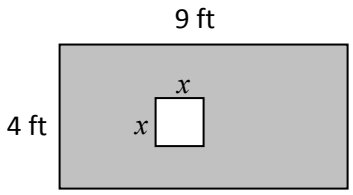
b. While at a county fair, you go on a Ferris wheel ride. Graph your height above ground vs. time.



c. Your three-year old cousin asks you to push him on a swing at the park. Graph his height vs. time.



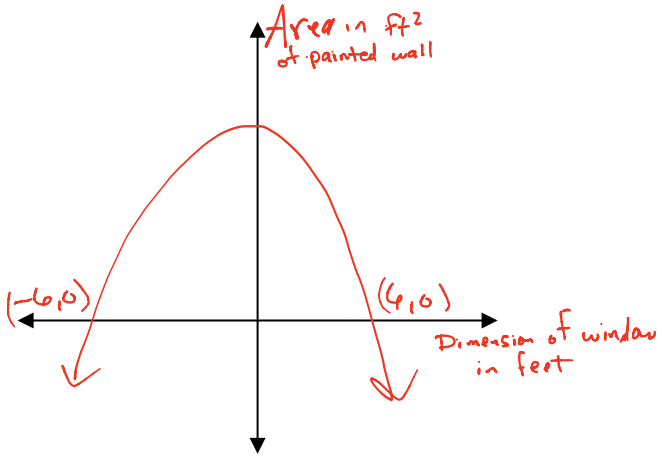
Bob the builder wants to paint a wall (shaded region below). Unfortunately, he does not know how big his square window is going to be. Help a builder out.



5. Explain why the function $A(x) = 36 - x^2$ represents the shaded area in the figure above.

The area of the paint wall is l·w, or 9(4) = 36ft.
Then if you subtract the area of the window, x·x = x^2, you'll find area of shaded = $A_{\square} - A_{\square} = 36 - x^2$

6. Draw a rough sketch of the graph.



7. What does the x-axis represent?

Dimension of window in ft

8. What does the y-axis represent?

Area of painted wall in ft²

9. If the square has sides of 3 ft, what is the area of the shaded region?

$A(3) = 36 - (3)^2$
$= 36 - 9$
$A(3) = 27\ ft^2$

10. If the area of the shaded region is 10, what are the lengths of the sides of the square?

$10 = 36 - x^2$
$-26 = -x^2$
$26 = x^2$
$\pm\sqrt{26} = x$ → $x \approx 5.099$ ft

11. What are the x-intercepts?

$0 = 36 - x^2$
$x^2 = 36$
$x = \pm 6$

12. What do the x-intercepts represent in this problem?

The dimensions of the square that would give painted area of zero.

13. Are the x-intercepts possible solutions for this problem? Why/Why not?

The x-int of -6 makes no real length of the window would be -6 feet.

The x-int of 6 means no real length of the window would be bigger the wall height.

14. Fill in the table. Describe what happens to $A(x)$ as x becomes infinitely small. →

As x gets smaller, the painted area gets closer and closer to 36ft²

x	$A(x)$
2	32
1	35
0.5	35.75
0.25	35.9375
0.1	35.9999