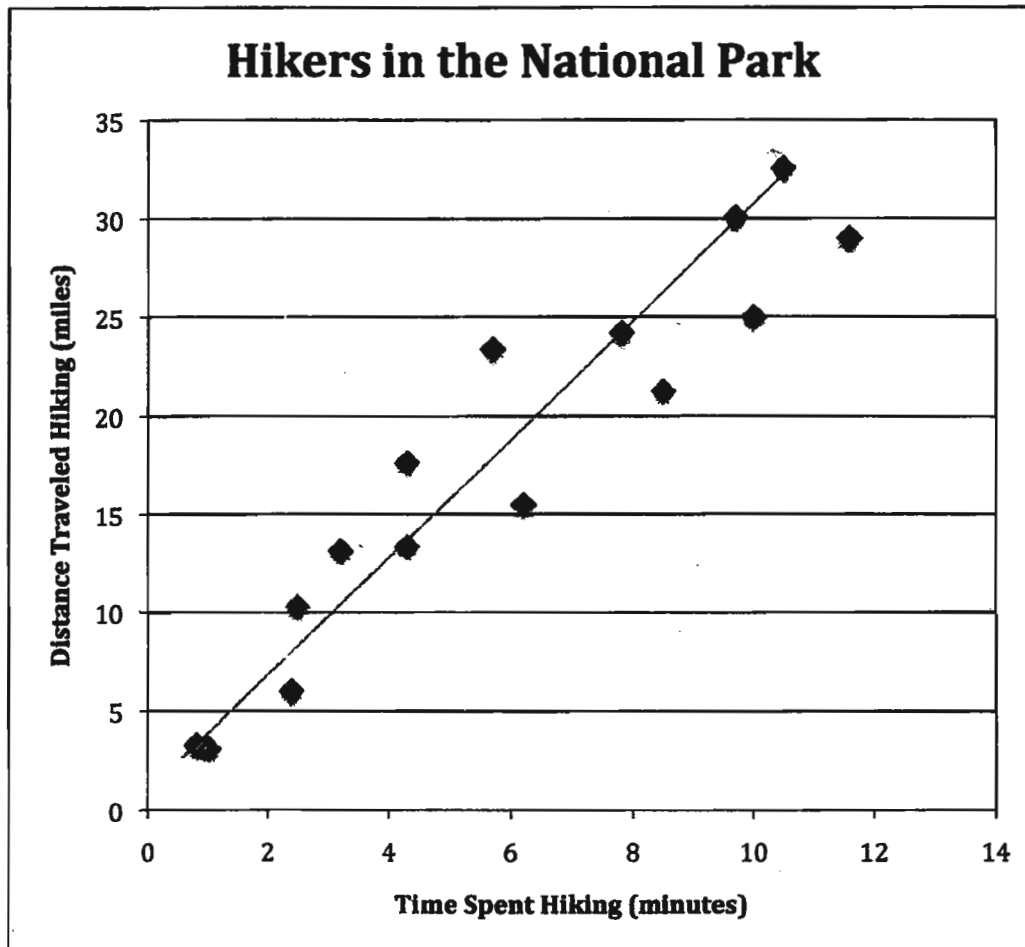


The follow scatter graph was created from a survey taken at a National Park.



1. Draw a line on the graph that best fits the data.
2. State whether the two variables have a positive correlation, have a negative correlation or have no correlation.

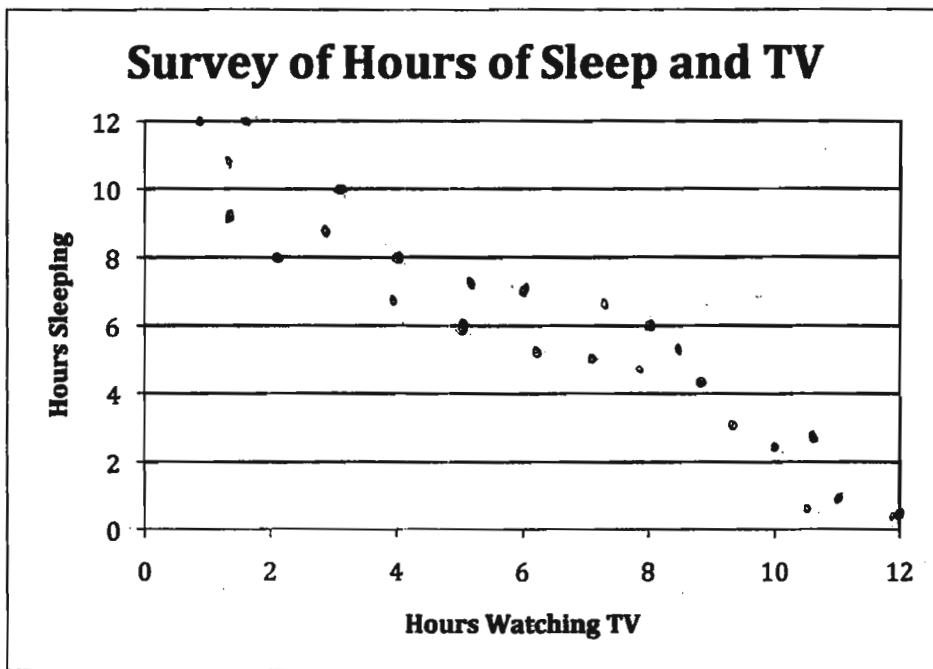
Positive correlation

Explain your reasoning.

As you spend more time hiking your distance goes up.

A survey of your classmates was taken in math class. Two questions were asked. "How many hours did you sleep last night?" and "How many hours of TV did you watch last night?"

3. Draw a scatter graph of the answers you think your classmates would say. Each point represents a student in your class. There are 25 students in class.



Explain how the variables correlate and the reason for drawing the graph in the manner you did.

As you watch more tv, the hours of sleep go down

4. If a set of data has no correlation, what would the graph look like? Explain why.

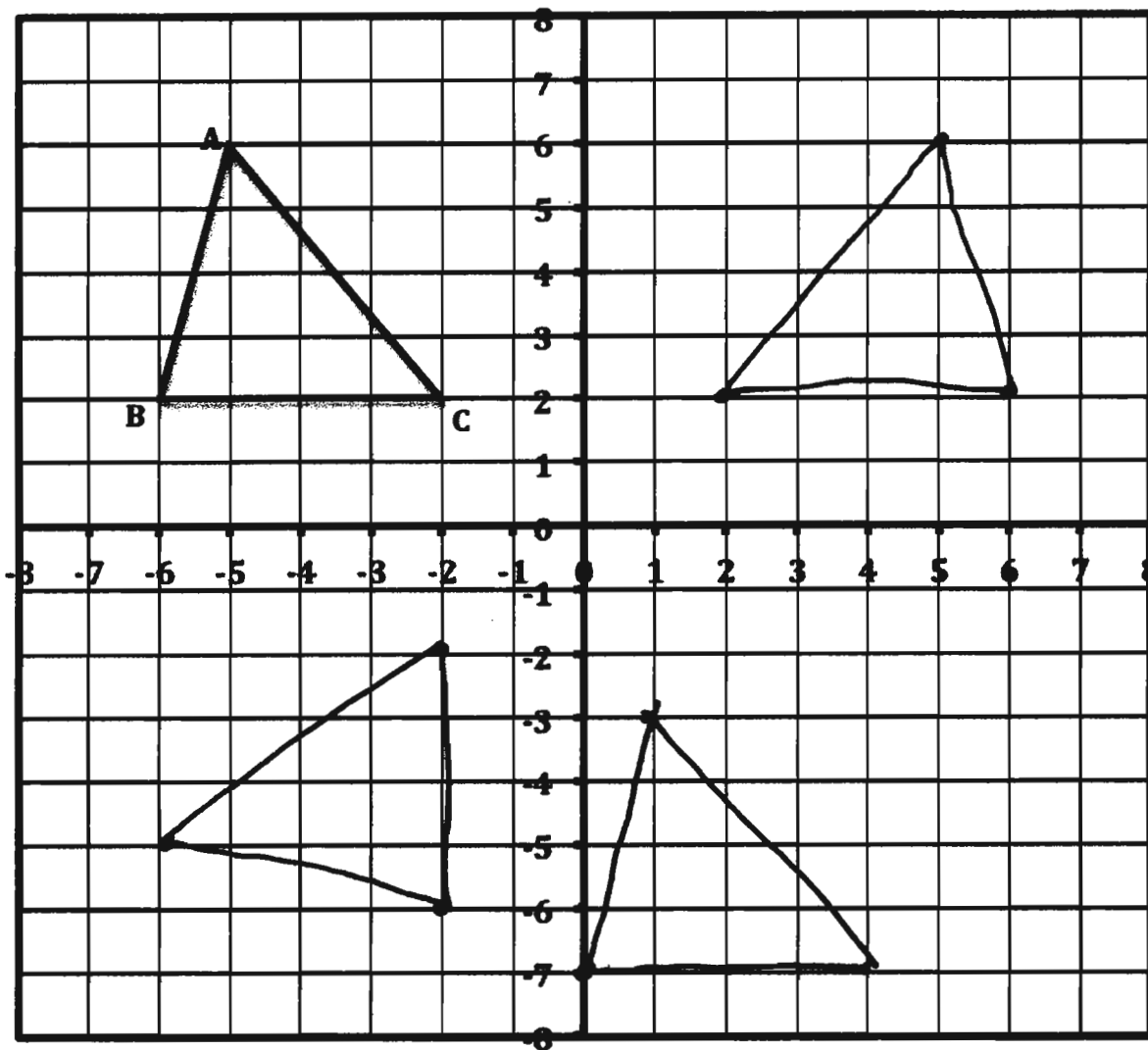
The dots would be everywhere.

They would be in random places.

M.C. Escher

T1

M. C. Escher, was a Dutch graphic artist. He is known for his often mathematically inspired tessellation drawings. M. C. Escher started his drawings using transformations. There are three basic transformations; reflections, translations and rotation. On the grid below is $\triangle ABC$.



1. Draw an image of $\triangle ABC$ reflected across the y-axis on the coordinate grid above.
2. What are the coordinates of the vertices of the new reflected image?

(2, 2) (6, 2) (5, 6)

3. Draw an image of the original $\triangle ABC$ rotated counter-clockwise about the origin on the same coordinate grid.

4. What are the coordinates of the vertices of the new reflected image?

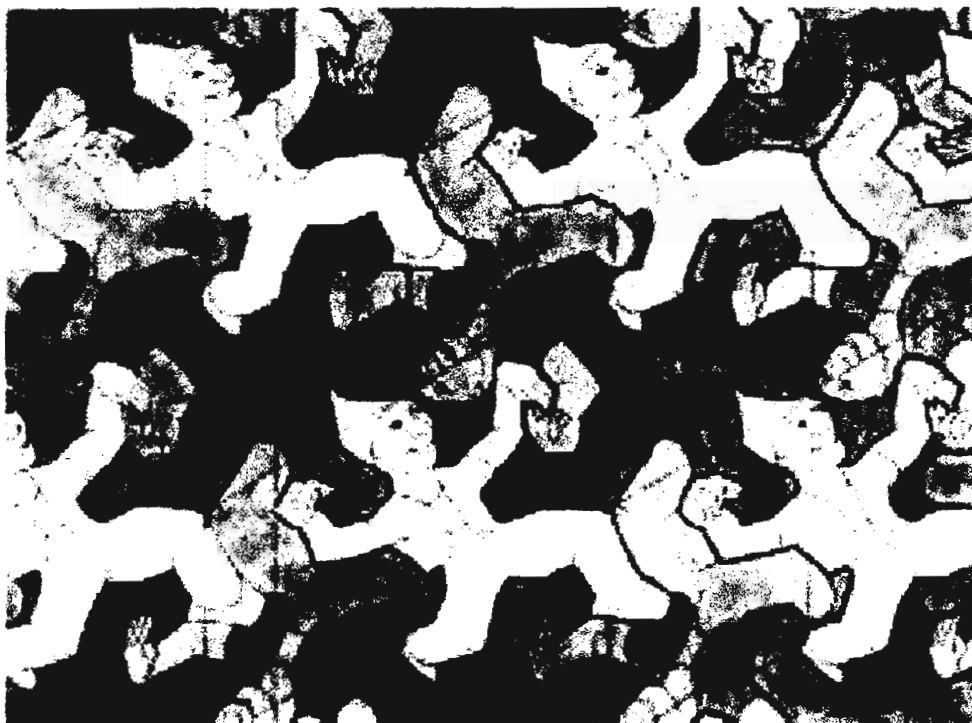
$(-2, 2) (-2, -6) (-6, -5)$

5. Draw an image of the original $\triangle ABC$ translated $(6, -9)$ on the same coordinate grid.

What are the coordinates of the new translated image?

$(0, -7) (4, -7) (1, -3)$

6. This is an M.C. Escher drawing.



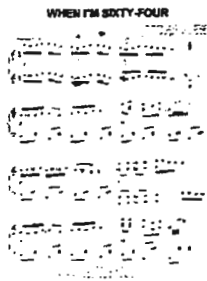
What transformation is used to create the drawing?

rotation

Explain how you know.

They turn around a point





When I'm 64



T1

Pop said, "I have three grand children on my knee: Vera, Chuck and Dave."

Chuck is three years younger than Dave.

1. Write an expression to represent Chuck's age if Dave's age is x years old.

$$C = x - 3$$

Vera is half as old as Chuck.

2. Write an expression in terms of x that represents her age.

$$\frac{1}{2}C = V$$

$$\frac{1}{2}(x - 3) = V$$

Vera's age plus Chuck's age is Dave's age.

3. How old are they?

$$\frac{1}{2}(x - 3) + x - 3 = x$$

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

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

$$\frac{1}{2}x = \frac{9}{2}$$

$$x = 9$$

Show how you figured it out.

Vera's age 3

Chuck's age 6

Dave's age 9

Pop said, "In three years, the sum of the two oldest grand children will be a third of my age then."

4. "How old will they be when I am 64?"

~~13~~

Vera's age 7

Chuck's age 10

Dave's age 13

Show how you figured it out.

$$3((d+3) + (e+3)) = p$$

$$3((7+3) + (6+3)) = p$$

$$3(12 + 9) = p$$

$$3(21) = p$$

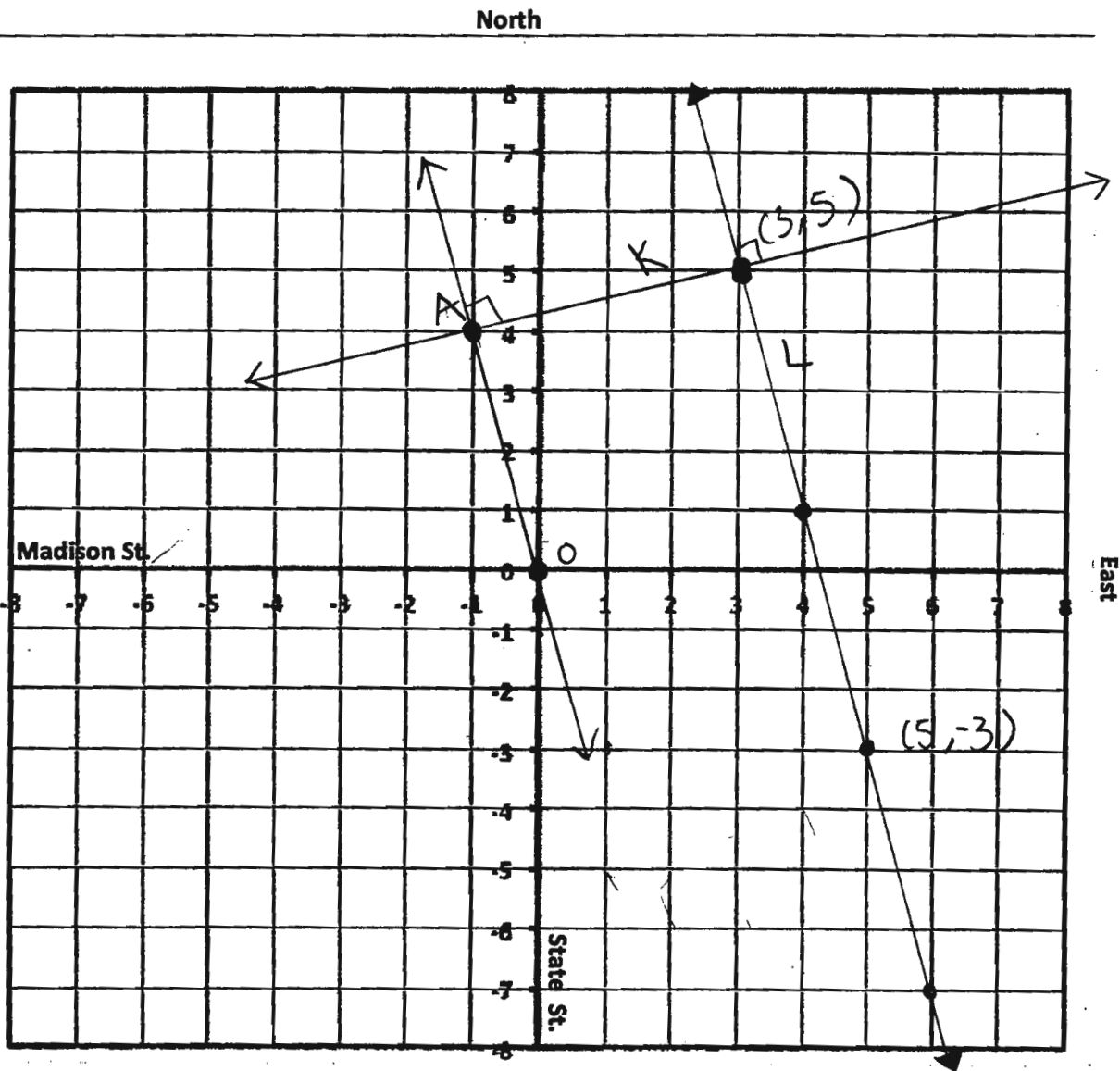
$$63 = p$$

when $p = 63$, $c = 9$, $d = 12$, so when $p = 64$, $d = 13$, $c = 10$

Chicago Treasure

TI

A very generous entrepreneur, Gudelia, has hidden a treasure in downtown Chicago. Gudelia has provided a list of clues to find the treasure. Mary Jo and Sendhil are looking for the treasure. Mary Jo said, "Chicago's streets are laid out on a grid." Sendhil replied, "Yes, the origin is the intersection of Madison and State streets, and that is point O." Below is a grid of the blocks in downtown Chicago.



Gudelia's first clue is to start at the origin and go north 4 blocks and then west 1 block. Call that point A.

1. What is the coordinate pair of point A? $(-1, 4)$
2. Draw a line from the point O to point A as the crow flies.

3. Write the equation of the line through point O and point A.

$y = -4x + 0 \rightarrow y = -4x$

Show how you figure it out.

equation of the line \rightarrow slope $\rightarrow \frac{y_1 - y_2}{x_1 - x_2}$

$\frac{4-0}{-1-0} = -4 \rightarrow \text{slope} = -4$

Gudelia's second clue reads: There is a line that I will call L. It is parallel to the line that contains points O and A. That line goes through point (5, -3).

4. Find the equation of the line L.

$y = -4x$

Show how you figured it out.

- ① 2 lines are parallel
- ② slope of 2 lines must be equal

points taken: $(3,5) \& (4,1)$

$\rightarrow \frac{5-1}{3-4} \rightarrow \frac{4}{-1} \rightarrow -4$

Gudelia's final clue states: There is a line I will call K. Line K is perpendicular to the line that contains points O and A at point A. My treasure is at the intersection of lines L and K.

5.. What are the coordinates of the treasure? $(3,5)$

Show how you figured it out.

① A line that is perpendicular to line \overleftrightarrow{OA} is also perpendicular to line L.

② I drew a line that crossed point A $(-1,4)$, and it had a slope of $\frac{1}{4}$.

③ The line \overleftrightarrow{K} intersected line L at point $(3,5)$. That point is the answer

I figured that the perpendicular line of any line is basically the slope of the original line flipped. If the original slope was positive, then the new flipped slope is negative. If it was negative, then the new flipped slope is positive.

Babysitting Blocks

T1

Maia is babysitting her niece and nephew. The kids are playing with blocks. They built the following sets of blocks. Maia recognizes that the kids have created an interesting pattern.

x	4
1	4
2	9
3	16
4	25
5	36



SET 1

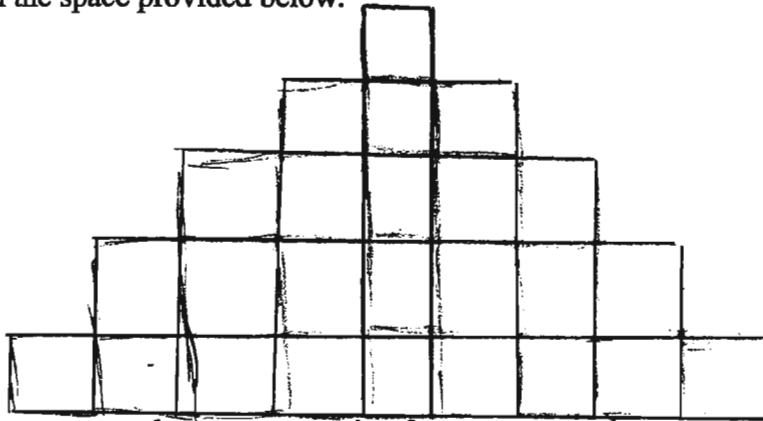


SET 2



SET 3

1. Maia builds the next set of blocks, SET 4, following the pattern she saw. Draw the fourth sets of blocks in the space provided below.



2. Describe how you see the pattern growing from one set to the next set.

I found the pattern to be each row is ascending in odd #s. In set 1, it is 1 then 3. In #2 it is 1, 3, 5. In 3 it is 1, 3, 5, 7. In the 4th one it is 1, 3, 5, 7, 9.

3. How many blocks would be in SET 8? 81 blocks

Explain how you know.

As shown in the addition equation $1+3+5+7+9+11+13+15+17$, in each new set the next odd number up is added. $1+3 =$ set 1, $1+3+5 =$ set 2, $1+3+5+7 =$ set 3, and so on.

$$\begin{array}{r} 1 \\ 3 \\ 5 \\ 7 \\ 9 \\ 11 \\ 13 \\ 15 \\ 17 \\ \hline 81 \end{array}$$

4. Determine a function to find the number of blocks in any set. Use x for the set number and $f(x)$ for the number of blocks.

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

Explain how the function represents the geometric pattern of the blocks.

This represents the pattern because in set 1, $x = 1$, so $(1+1)^2 = 4$. 4 is the number of squares total. In set 2, $(2+1)^2 = 9$, and the pattern continues.

5. Maia wants to create the pattern with 196 blocks. How many blocks will be on the bottom row of the geometric pattern?

27 blocks

Show how you figured it out.

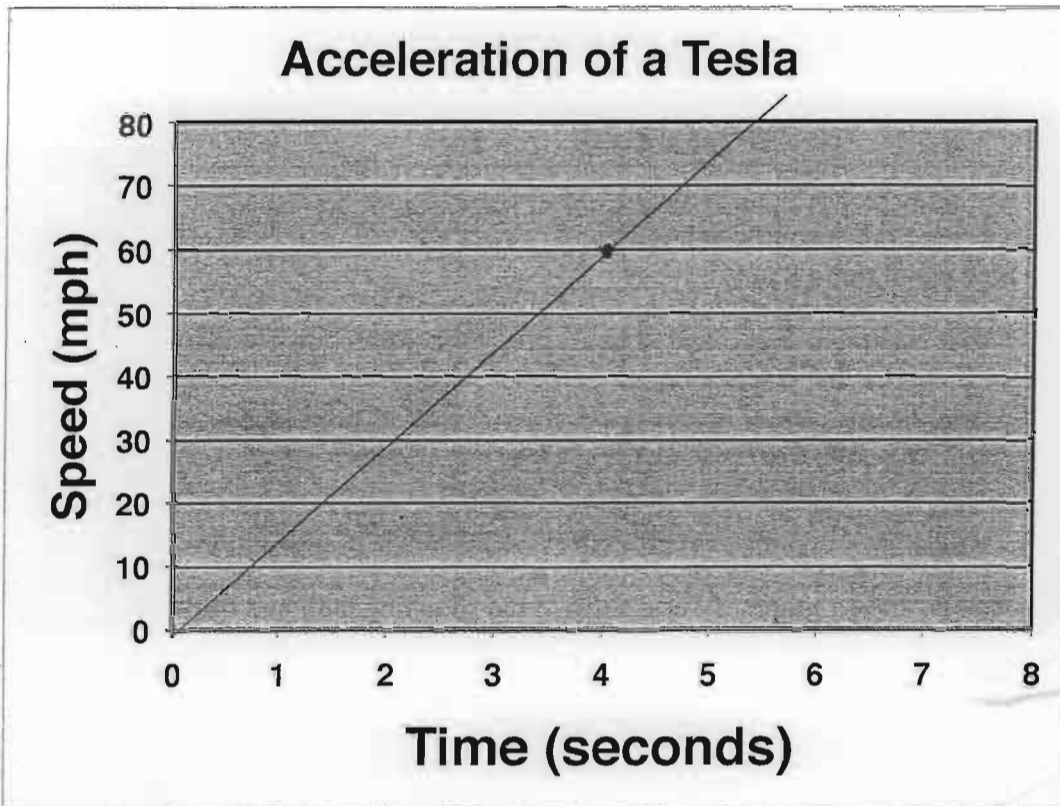
x	y			$2(\sqrt{196} - 1) + 1$
3	4	1	3	$2(14 - 1) + 1$
5	9	4	5	$2(13) + 1$
7	16	9	7	$26 + 1$
9	25	16	9	27
11	36			

6. Write a function to map the total number of blocks in a set, y , to the number of blocks in the bottom row of a set $r(y)$.

$$r(y) = 2(\sqrt{y} - 1) + 1$$

Tesla is the most advanced all-electric car. It is also the fastest of any street legal car made. It can go from 0 mph to 60 mph in 4 seconds.

- On the axes below graph the acceleration of the Tesla as it accelerates from 0 mph to 60 mph.



- If a car travels at an average speed of 60 mph over 4 seconds how far has the car traveled? Write your answer in miles.

0.06 miles

Show how you figured it out.

3600 seconds in an hour,

60 miles per 3600 seconds

$$\frac{60}{3600} = \frac{900}{900} = \frac{0.0666}{4}$$

The Tesla left from home traveling at an average speed of 35 mph for 7 miles. Then the Tesla entered the freeway where it average 72 mph for 20 minutes. At that point, the Tesla arrived at a shopping mall. The owner shopped at the mall for 40 minutes. The Tesla was driven home at an average speed of 62 mph.

3. How far away is the shopping mall from home? 31 miles
Show how you figured it out.

$$\frac{72 \times 20}{60} = 24$$

$$7 + 24 = 31$$

4. How long was the Tesla away from home? 1.7 hours
Show how you figured it out.

$$\frac{102}{60} = 1.7$$

$$\frac{31}{62} = 0.5$$

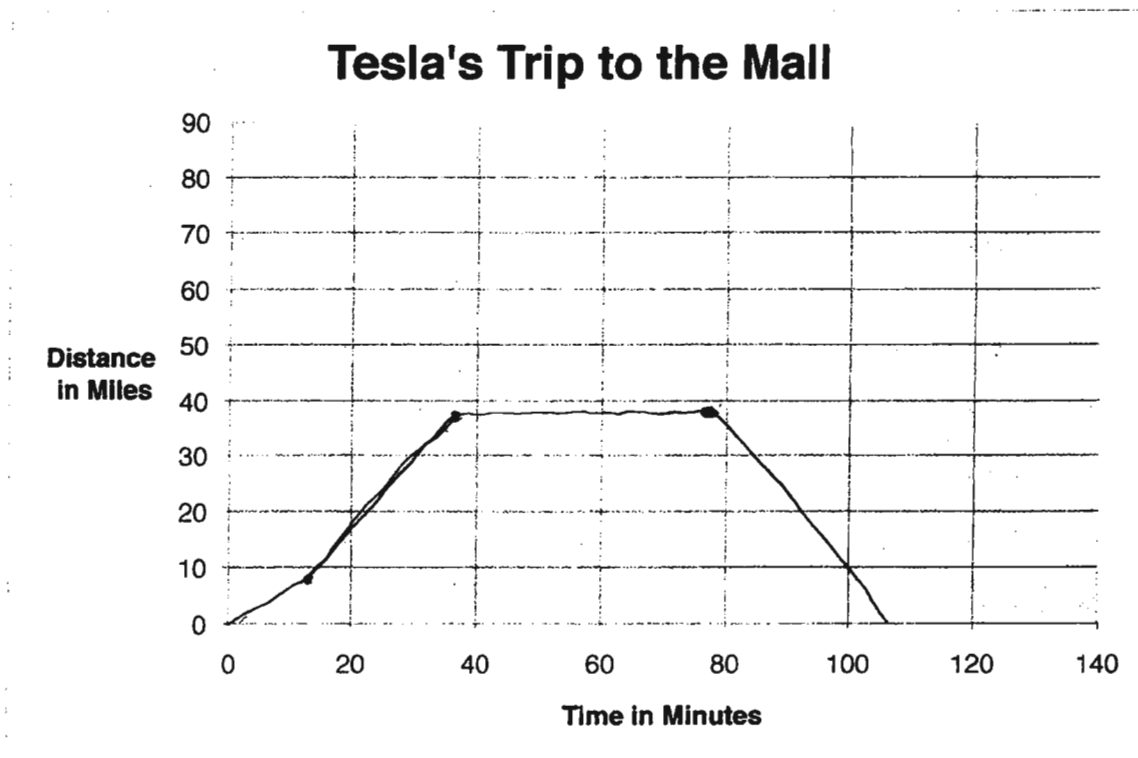
$$\times 60 = 30$$

$$20 + 40 = 60$$

$$\frac{7}{35} = 0.2 \times 60 = 12 \text{ minutes}$$

$$\begin{array}{r} 60 \\ + 12 \\ + 30 \\ \hline 102 \text{ minutes} \end{array}$$

5. On the axes below, draw a graph of Tesla's trip to the shopping mall and back.



Launching Water Balloons

TI

Curly, Moe and Larry enjoy launching water balloons using a slingshot.



nigvise

The flight path of the water balloon is the shape of a parabola. There are three equations for the path of the water balloon, where x and y are measured in meters:

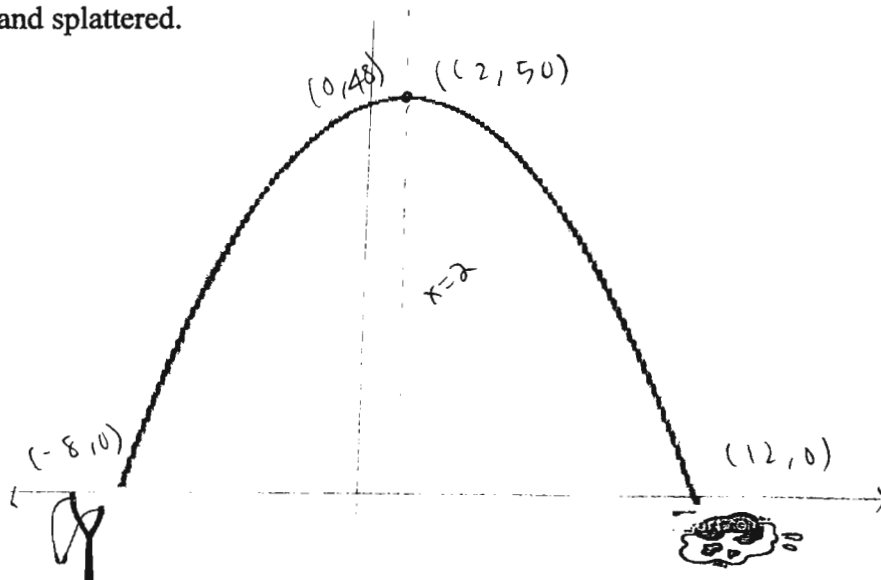
$$y = -\frac{1}{2}x^2 + 2x + 48$$

$$y = -\frac{1}{2}(x - 2)^2 + 50$$

$$y = -\frac{1}{2}(x + 8)(x - 12)$$

$$y_{int} = (0, 48)$$

The level ground is the x -axis where the water balloon was launched and where the water balloon landed and splattered.



1. Locate the vertex point on the parabola and label its coordinates.

2. Draw a dotted line to indicate the axis of symmetry of the parabola and explain the relationships between where the water balloon was launched, where the water balloon landed, and the axis of symmetry.

The axis of symmetry is $x=2$. The balloon's flight path reached its highest point where it crossed the axis, and the launching/landing points are equidistant to this axis.

3. Draw the x-axis and the y-axis on the parabola.

At what point does the parabola intersect the y-axis?

(0, 48)

4. What are the zeros of the parabola? -8, 12

Explain how you know.

$x + 8 = 0 \rightarrow x = -8$ / $x - 12 = 0 \rightarrow x = 12$

5. What is the horizontal distance between where the water balloon was launched and where the water balloon hit and splattered?

20 meters

Explain how you know.

$12 - (-8) = 12 + 8 = 20$