Amusement Park Math

Grades 6-8

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Roller Coasters

Fury 325 at Carowinds

32 passengers

325 feet high

1.25 miles long

Duration 3.25 minutes

Top speed 95 mph

Height requirement 54 inches

Coaster Problems

You go to a height of 150 feet , pause, then plunge 128 feet, reaching a speed of 60 mph.

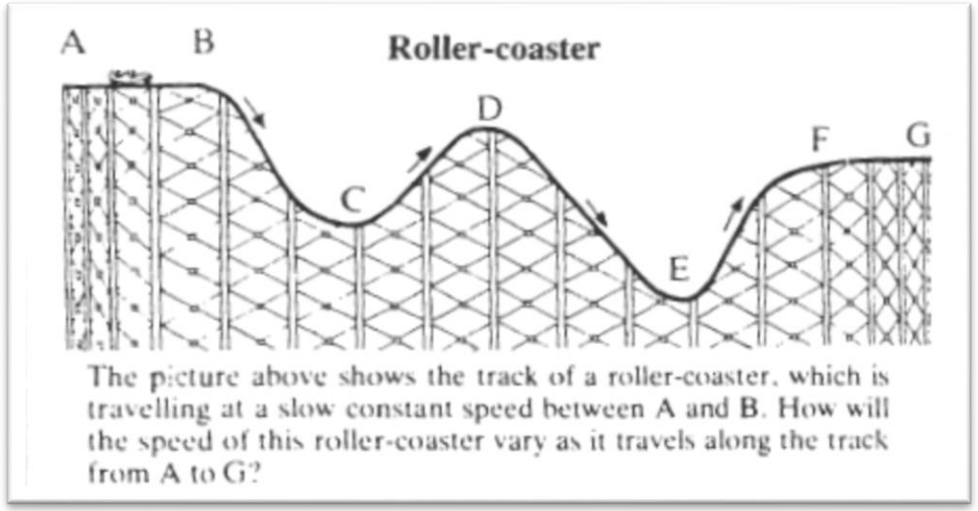
You spin through a 104-foot vertical loop, two 45-degree loops, a 60-foot loop underground, and a corkscrew.

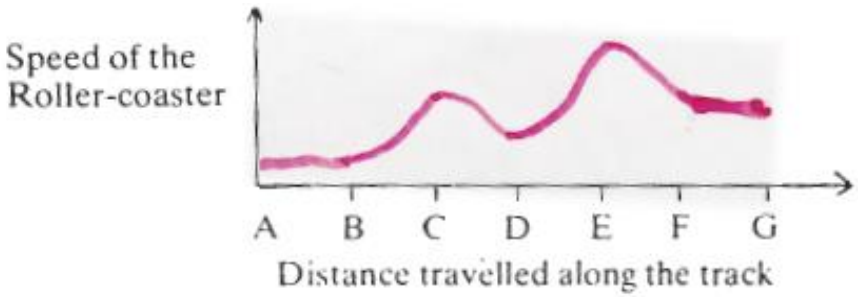
Use integers to describe your height during the ride.

Ride	Drop (ft)
Desperado	-225
DropZ	-137
Sforce	-205
Monster	-114
Mantis	-137

- Plot each drop on a number line.
- Estimate a point that represents the mean of these drops.

More Coaster Problems



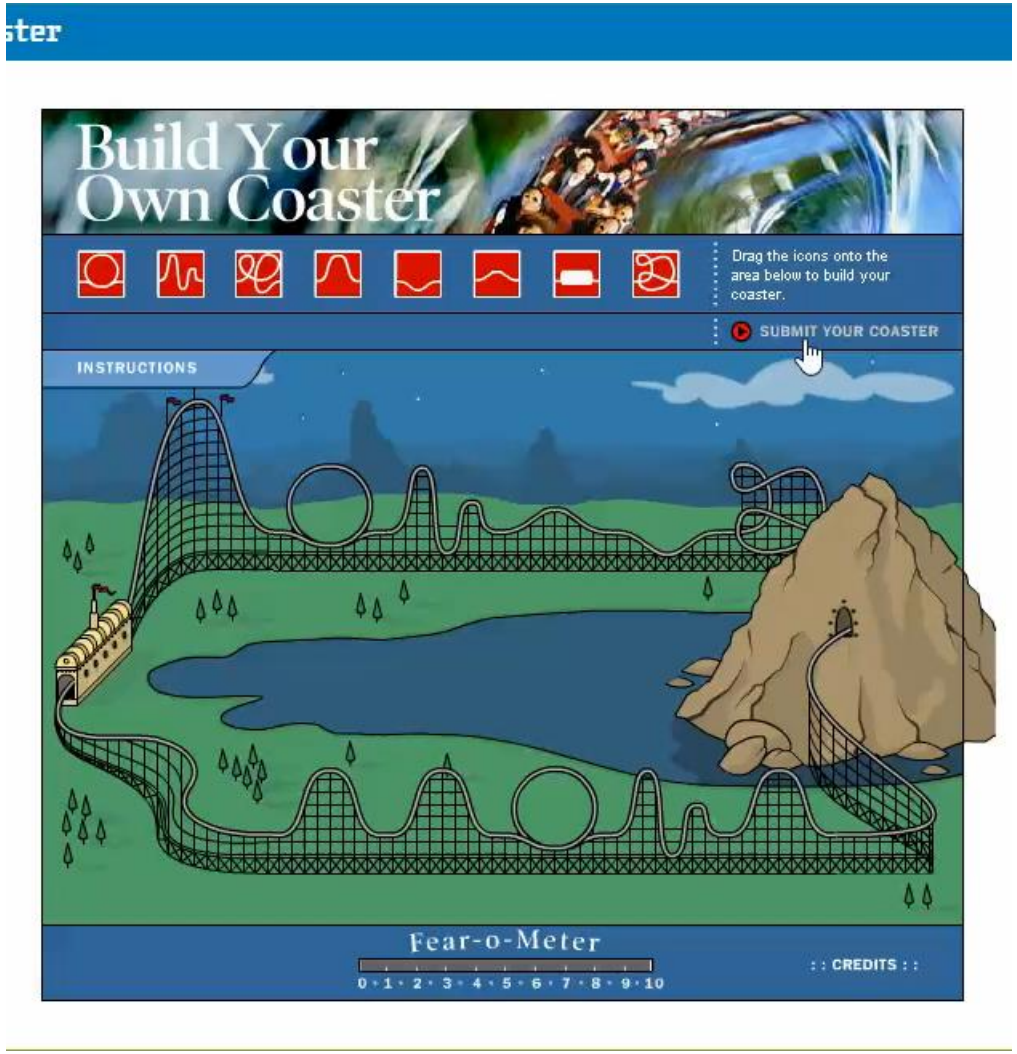


Use words and a graph.

Using just your graph:

- Where is the coaster going fast?
- Where is it going slowly?
- Faster at B or D? D or F? C or E?

Roller Coasters



Build Your Own Online

http://discoverykids.com/games/build-a-coaster/

http://www.learner.org/interactives/parkphysics/coaster/

Build Your Own Model

Knex

Lego

Pitsco …

At the Arcade

Ann, Beth, Carol, and Dave were playing Skeeball at the arcade. They agreed to pool their tickets and split them equally.

Ann has 17 single tickets and eight 25-point tickets.

Beth has 9 single tickets and seven 25-point tickets.

Carol has 11 single tickets and twelve 25-point tickets.

Dave has 3 single tickets and fifteen 25-point tickets.

How many tickets will each person get?

Carousel

A carousel has an inner and outer ring, each going in opposite directions.

A horse on the inner ring makes a complete circle in 40 seconds.

A horse on the outer ring makes a complete circle in 60 seconds.

How often do the horses meet?

Two Ring Carousel – At the Park

Count the number of horses in the inner ring and in the outer ring.

Measure the space between the horses in each ring.

Find out how long it takes for a horse in each ring to go around the circle.

Which horses look like they are moving faster? Why?

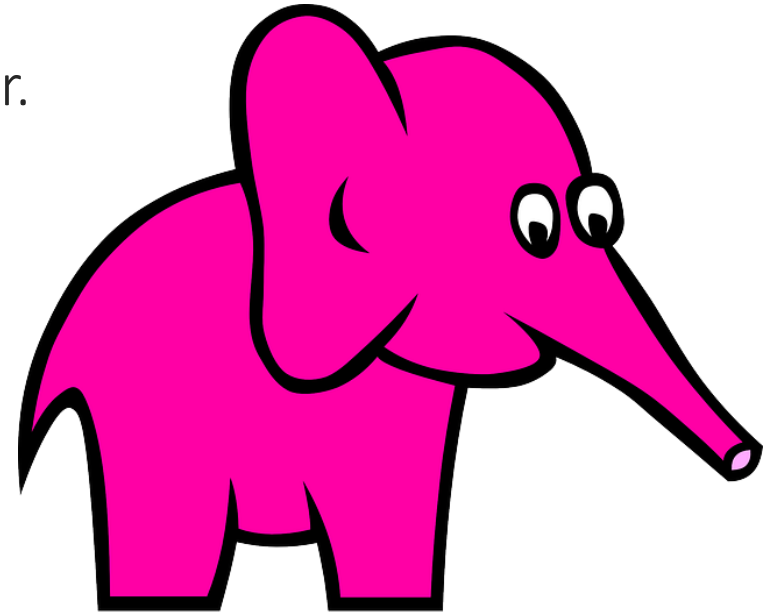
What's the Wait?

The Dumbo ride seats 32 people at one time and lasts for 2 minutes 20 seconds.

It takes 4 minutes to unload and load the ride.

You are 50 feet back in the line with your little sister.

How long must you wait to ride?

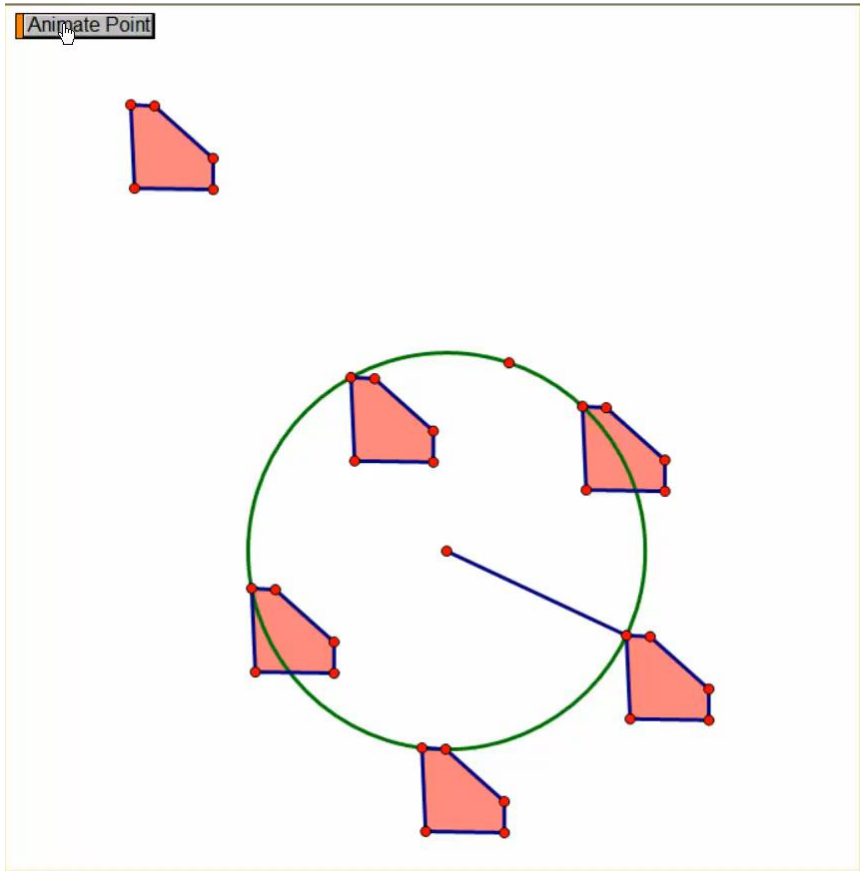


Ferris Wheel

Karen rode a ferris wheel that turned forward during the first half of the ride and then turned backward the second half. Her sister made a video and then they ran the video forward and backward.

Which way did the wheel move if the ride was going backward and the video was running backward?

Sketchpad



Chuck-a-Luck

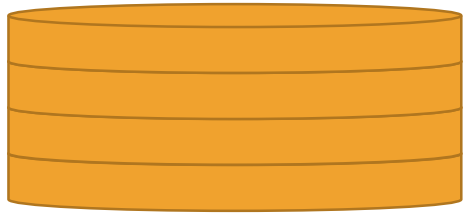
1. Pick a number from 1-6.
2. Roll three number cubes. You win one chip for each time your number appears.

How Fair Is It?

6 x 6 x 6 = 216 equally likely rolls

5 x 5 x 5 = 125 ways the house wins

216 – 125 = 91 ways you win



Ways of winning

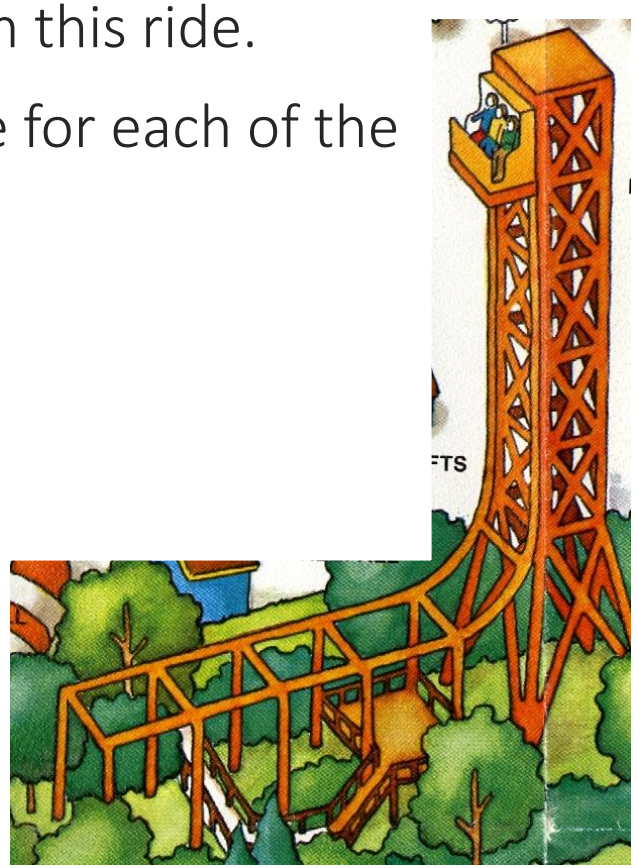
All three dice show winning number	1
Two dice show winning number	3 x (1 * 1 * 5) = 15
One die shows winning number	3 x (1 * 5 * 5) = 75

Freefall at the Park

Make a graph that shows how speed will change over time on this ride.

Check the accuracy of your graph by finding the average time for each of the following stages:

1. The elevator ride to the top
2. The free fall section
3. The curved section
4. The stopping track



Flying Wave

Technical Information	
Manufacturer:	**Zierer, Germany**
Model:	**Wave Swinger 48**
Total Height:	**40 feet**
Lift Height:	**15 feet**
Ground Dimension:	**65 feet diameter**
Aerial Dimension:	**69 feet diameter**
Number of Seats:	**48**
Ride Cycle Time:	**3 Minutes 30 Seconds**
Hourly Capacity:	**816 guests**

What's the Problem?

Chip Toss

In this game, a player tosses a chip onto a game board that looks like checkerboard. If the coin touches a line on the game board, the player loses. If not, the player wins! Players get three throws for a dollar!

You have been asked to design a similar game for a fund-raising carnival. For prizes, a local store will sell up to 100 DVDs for $5 each. You can choose any DVD priced under $20.

To make the game more fun, you have decided to let players throw old scratched DVDs rather than chips. You have 12 mm and 8mm DVDs, so the cost of three throws can depend on which size a player chooses to throw.

All plans must be approved by the carnival committee. You want to make as large a profit as possible, but if too few people win, no one will want to play the game. Write a plan to submit to the carnival planning committee that includes details about the size of the game board, the cost of throws, the chances of winning, and an estimate of expected profits.

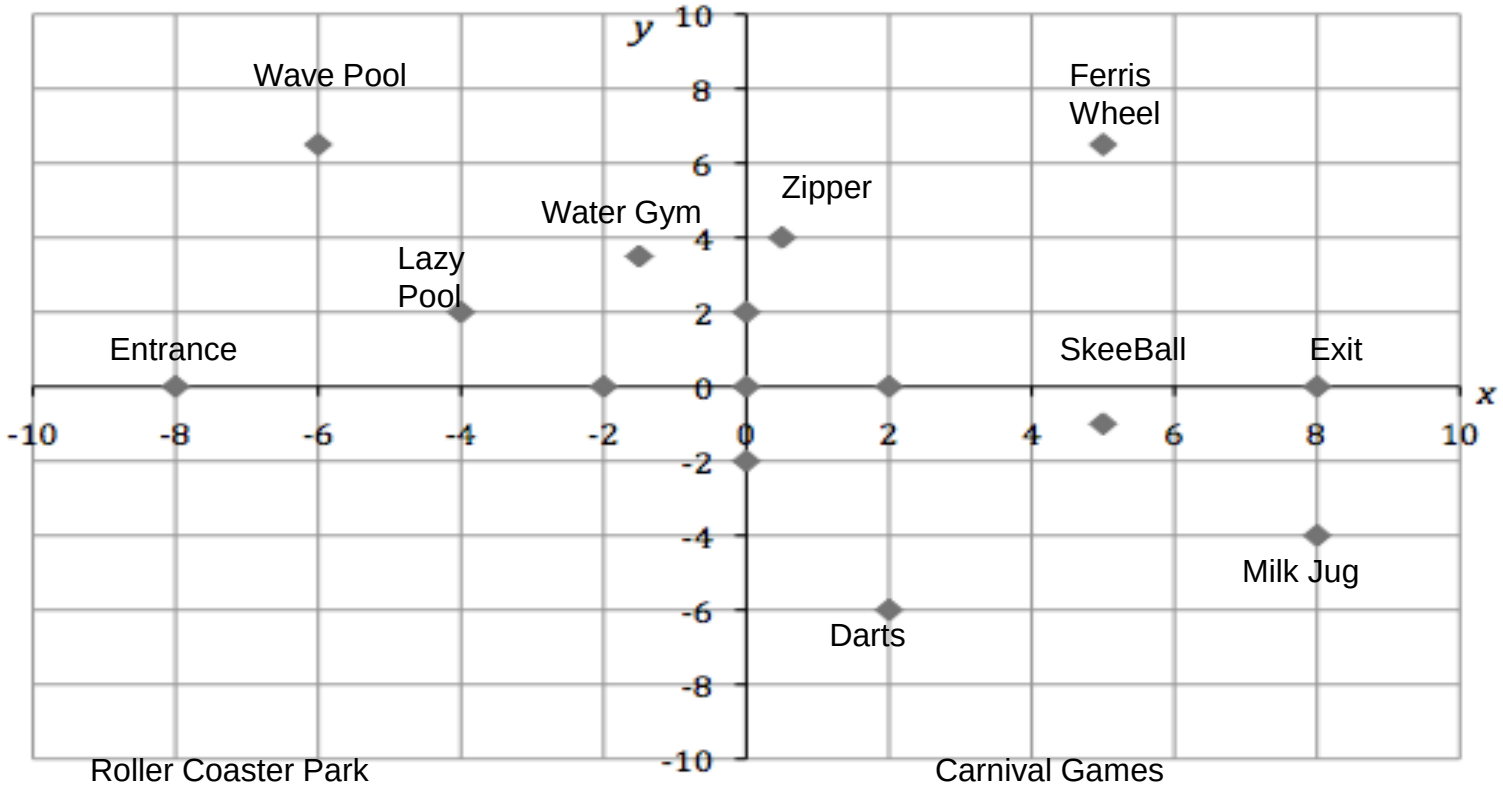
Map of Mathtastic Amusement Park – Howard County MD

On the map, all food is located at (0, 0), and the bathrooms for the park are located at (-2, 0), (2, 0), (0, -2) and (0, 2).

- How do the positions of the bathrooms relate to each other?
- What about the entrance and exit?
- Describe the relationship between the wave pool and the Ferris wheel?
- Dr. Algebra was looking for the "Milk Jug" game on the map. Where would you direct him to look?

Water Park

Carnival Park



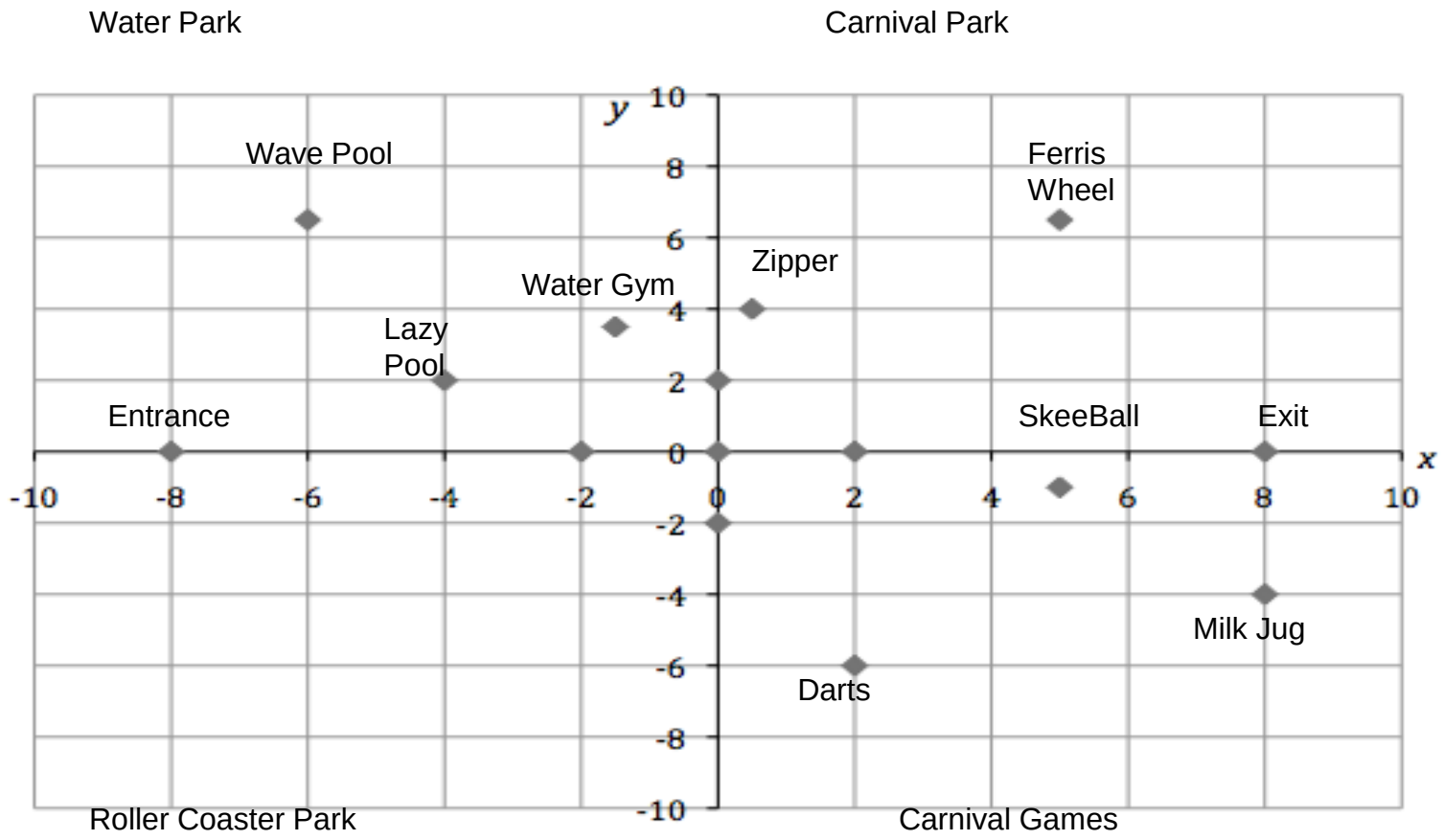
Roller Coaster Park

Carnival Games

Map of Mathtastic Amusement Park – Howard County MD

The Mathtastic team needs help finishing the map for guests to use in the park.
The team has five roller coasters that need to be placed on the map:

Intimidator (-3, -1)
Big Bear (-7, -5)
Comet (-2, -4)
Wild Mouse (-1, -6)
Skyrush (-5, -2)



Illustrative Mathematics – Grade 7

Malia is at an amusement park. She bought 14 tickets, and each ride requires 2 tickets.

1. Write an expression that gives the number of tickets Malia has left in terms of x, the number of rides she has already gone on. Find at least one other expression that is equivalent to it.

2. $14-2x$ represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides?

14 $-2x$

3. $2(7-x)$ also represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides?

7 $(7-x)$ 2

Design Your Own Park

Space Needed:

- Cotton Candy Stand – 14 squares
- Haunted House – 21 squares
- Roller Coaster – 24 squares
- Ticket Booth – 9 squares

Draw each area as a rectangle on a grid. Find its perimeter and area.

Try changing the shape of the roller coaster area.

- Does changing the shape affect the area?
- Does changing the shape affect the perimeter?

Criteria:

Include at least 1 of each of the following:

- Ticket booth
- Food booth
- Game booth
- Thrill ride

Your park is 16 squares x 20 squares.

Draw layout of your park, give each attraction a name, and find the area and perimeter of each attraction.

Web Resources

Amusement Park Physics – Annenberg

SIAM

Batman the Ride

Cedar Point Middle School Math & Physics Workbook

Dorney Park Workbooks

Six Flags Workbooks

Algebra Task

Roller Coaster Database