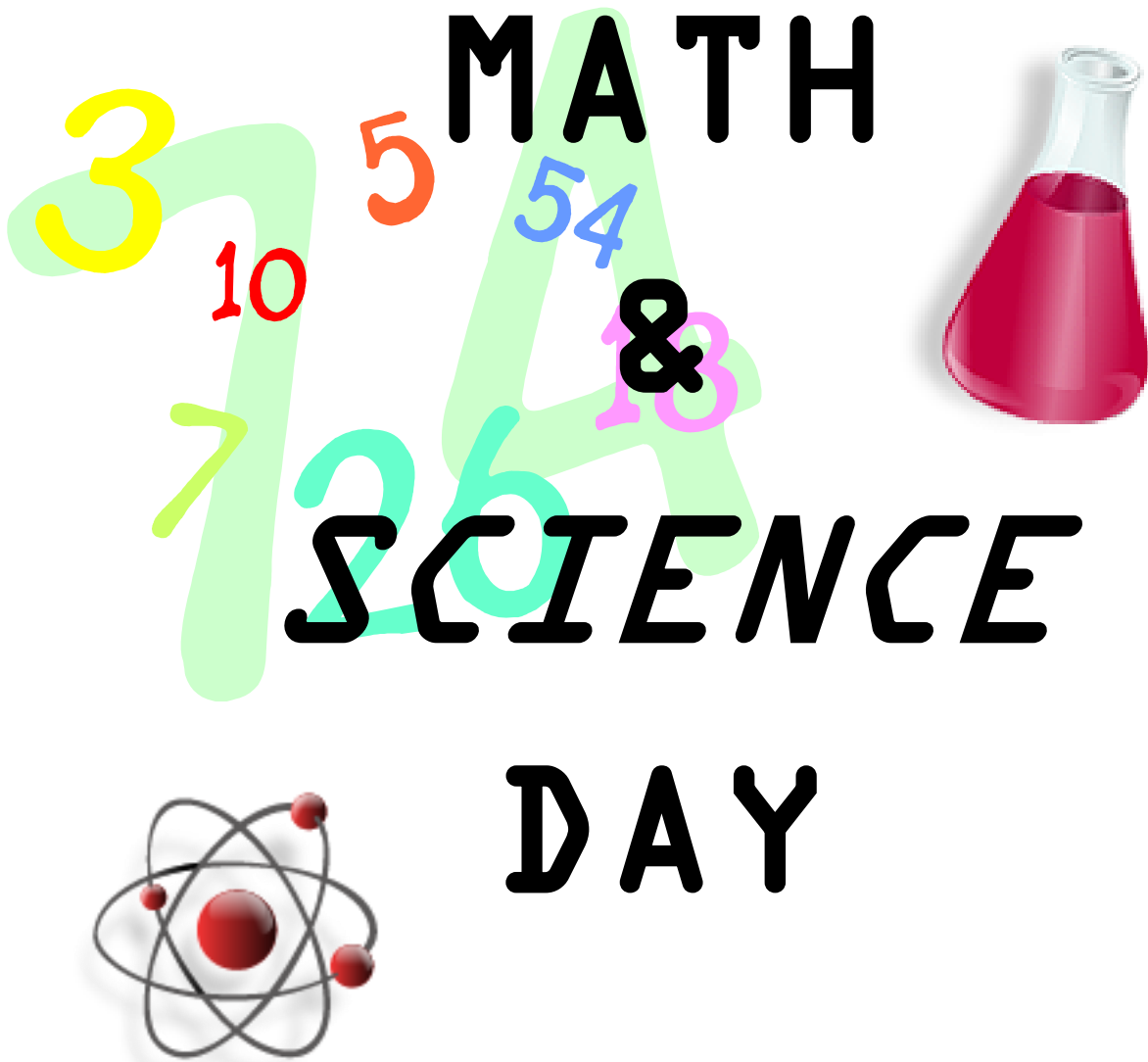


LAKE GEORGE • NEW YORK
THE GREAT ESCAPE[®]
& SPLASHWATER KINGDOM
A Six Flags[®] Theme Park

MATH & **SCIENCE**
DAY



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WHAT YOU NEED TO BRING:

Pencil
Stopwatch
Calculator

MAKING MEASUREMENTS

TIME

If you must figure an amount of time in order to work a problem, use a stopwatch, a digital watch with a stopwatch mode, or a watch with a second hand. When measuring the period of a ride that involves circular motion, measure the time for several repetitions of the motion, then divide by the number of repetitions. This will give a better estimate of the period of motion than just measuring one repetition. It is best to measure two or three times and then take an average.

DISTANCE

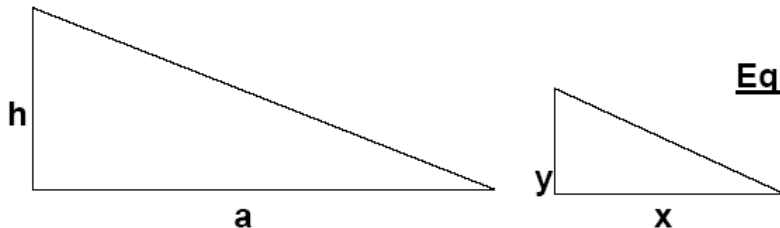
Since you cannot interfere with the normal operation of the rides, you will not directly be able to measure heights, diameters, etc. Using the following methods, most of the distances can be measured remotely to give you a reasonable estimate. Try to keep consistent units (i.e. meters, centimeters, etc.) to make calculations easier.

- **Pacing:** Determine the length of your stride by walking at your normal rate over a measured distance. Divide the distance by the number of steps to get an average distance per step. Knowing this, you can pace off horizontal distances.

Using Ratios and Proportion

Legend:

h = height of the object
a = length of shadow of the object
y = height of the observer
x = length of shadow of the observer



Equation to solve (solve for h):

$$\frac{h}{a} = \frac{y}{x}$$

THROUGHOUT THE PARK

Mission: Identify systems

- Locate a simple machine within the park.
 - Simple machine: _____
 - Location: _____
 - How machine changes the direction, amount of force, or distance and speed of force required to do work.

- Locate one complex machine within the park.
 - Complex machine: _____
 - Location: _____
 - List of simple machines that make up the complex machine:
 - _____
 - _____
 - _____
 - _____

Mission: Estimating and Communicating

Parks like Six Flags Great Escape are designed to anticipate the number of people that can safely be in the park at one time. Engineers estimate the number of people who can fit in line for one ride and the number of people who can ride at one time for safety reasons.

- Choose two rides and estimate the number of people that can wait in line for each ride each at one time.
- Describe your answers by describing the process you used to arrive at your estimation.

| Ride | Explanation |
|------|-------------|
| | |
| | |

Have you ever noticed that your heart seems to beat faster when you get off of a ride? What effect does a ride have on you?

Mission: Differences in pulse rates

- Find a pulse point on your body (your wrist, neck or temple – be sure to use your pointer finger and not your thumb to count the number of beats.)
- Using the second hand on a watch or a stopwatch, count the number of pulses in 15 seconds and multiply by 4.
- Take your pulse rate **before** riding and again **after** riding a ride. Answer the questions below.

Why should the pulse be taken with your pointer finger and not your thumb?

Name of ride: _____

Pulse rate before ride: _____ bpm

Pulse rate after ride: _____ bpm

Is there a difference? _____ Why is this so? _____

Name of ride: _____

Pulse rate before ride: _____ bpm

Pulse rate after ride: _____ bpm

Is there a difference? _____ Why is this so? _____

The Grand Carousel

Mission #1: Rate of Motion

- Each member of the group should choose a different moving animal to observe. Count the number of times the animal goes up and down in one minute. Record and compare your data below.

| Animal | Number of times in one minute |
|--------|-------------------------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Mean number of times of all data collected: _____

- Determine the time it takes for one complete rotation of the carousel. To do this, chose one animal and time how long it takes to complete an entire rotation. Record your results and repeat this procedure to check for accuracy.

Animal: _____

Trial 1: _____ for 1 rotation

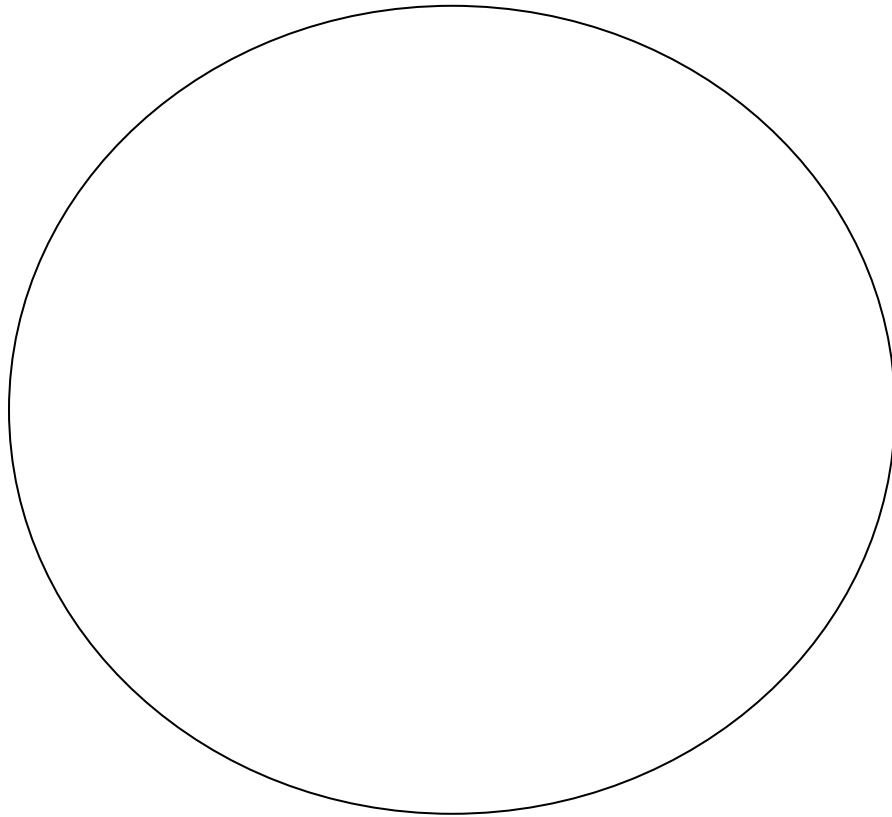
Trial 2: _____ for 1 rotation

Trial 3: _____ for 1 rotation

Mean: _____ for 1 rotation

Mission #2: Proportions and Predictions

- Imagine a birds-eye view of this ride. Fill in the diagram by drawing where the animals are in relation to the center of the circle. Be sure to include an accurate count of the total number of animals.



- Count the number of **moving** animals. Write this number as a ratio to the total number on animals on the ride.
- Using this ratio, predict the number of moving animals that would be on a very large carousel with 200 total animals.

_____ moving animals

CANYON BLASTER

Mission: Finding the distance

- Time the ride from beginning to end. If the average speed of the train is 35 mph, find the length of the ride by using this formula.

$$\text{Rate(the speed)} \times \text{time} = \text{the distance}$$

*hint: the time will need to be in terms of hours for the formula to come out accurate.

Total distance is _____ miles

Now, convert this distance to feet. (There are 5,280 feet in 1 mile.)

_____ feet

STEAMIN' DEMON

Mission: Potential and Kinetic Energy

Draw the main shape of the Steamin' Demon. Put a "P_e" at the location of examples of potential energy in the ride and a "K_e" for two examples of kinetic energy. Explain your answers.



Explanation:



BUMPER CARS

Background: The adult bumper cars feature a trolley pole conductor that contacts with the electric ceiling grid and moves across a slick metal floor. Sparks will fly as you “bump” your way to fun!

Mission: Determining Performance Factors

- While you are in line to ride the bumper cars, pick which car your group thinks is “best.” Decide on three criteria you would use to describe this “best” car.

Criterion #1: _____

Criterion #2: _____

Criterion #3: _____

- Observe your “best” car during at least two riding cycles. Compare the results of your criteria. List below what you observed.

- One member of the group should drive the “best” car. Afterwards, determine what that driver did that affected the performance of the car, good and bad. List below the driver’s findings and the results.

- List below the experience of driving another bumper car to compare the “best” car’s performance to the criteria your group developed. Explain any differences.

Cannonball Express

Mission: Using Problem-Solving Techniques

Have you and a friend ever written to each other in a secret code? Here is a mathematical secret code. See if you can figure it out!

Your friend asked you to meet him at the Cannonball Express. He gave you the following clues to determine where he was:

1. Draw a diagram of the ride labeling each car beginning with the number one.



2. Omit every other car starting with the #2 (the even numbered swings) until only one person is left.
3. Your friend is in car # _____.
4. Is there a pattern for predicting which is the correct swing for any number of swings?

If so, what is this pattern? _____

Flying Trapeze

Mission: Calculating the speed of a ride

- Time the ride from the moment it begins to the moment it ends. _____
- Count the number of rotations completed at that time. _____ rotations
- Compute the mean number of rotation per minute.

Alpine Bobsled

Mission: Determining the Wait

You must be back at the gate to meet your class in half an hour. You are in line to ride the Alpine Bobsled. After a quick count you realize you are the 100th person in the line. How long will you wait before getting on the ride? Will you be able to complete the ride in time to meet your class?

- Average length of time for 1 ride: _____
- Time to load the ride: _____
- Time to unload the ride: _____
- Total time per ride: _____
- Number of people per ride: _____

Using the information above, how long will it be until you are getting off the ride? _____

Will you be able to meet your class in half an hour? _____

The Comet

Mission: Collecting, Graphing, and Interpreting Data

- Observe the ride at least once as a group.
- Tally the number of males vs females during three ride cycles.

| Trial Number | Males | Females |
|--------------|-------|---------|
| 1 | | |
| 2 | | |
| 3 | | |

- Are there more males than females? _____ Why or why not? _____

On the graph below, make a double bar graph comparing the number of male and female riders for each trial. Be sure to include a key and use an appropriate scale.

