ELEMENTARY SCHOOL
PHYSICS DAY

The Adventuredome™ THEME PARK
CIRCUS CIRCUS LAS VEGAS

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BEFORE YOU RIDE:

1. How long does it take for the roller coaster to complete the track from departure to return?

2. Estimate the length of one car. Based on that estimate, what is the length of the entire train?
   One car estimate:
   Entire train estimate:

3. If the train is traveling at an average speed of 55 mph and it takes it _____ seconds to complete a run. How long is the track?

4. Observe and describe the wheel assembly on the train. How many wheels are on one car?
   Sketch a diagram:

   What is the role of each of the wheels?

5. How is the train pulled to the top of the dome? What simple machines are used?

AFTER YOU RIDE:

6. How does your stomach feel after one ride?

   Imagine after five rides?

   Why do you think it feels the way it does?

7. Did this ride have more potential energy or more kinetic energy? Explain your reasoning.

8. Where was the potential energy greatest? (Feel free to sketch the coaster and label energy flow.)

9. Where was the kinetic energy greatest?

10. Would you recommend this ride to a friend? Why or why not?

SPONGE BOB 4-D

BEFORE YOU RIDE:

1.   Describe the mood set by the design of the walkway leading up to the Entrance.

2.   Why and how is the "holding room" an important part of the ride?

AFTER YOU RIDE:

3.   How is the illusion of moving forward created?

4.   What shape is the screen and why is it an important feature?
        Draw a picture of the screen:

5.   Why is this ride considered 4-D?

6.   If you watched the different movies which movie did you prefer? Why?

7.   How did the ride designers create the feeling of being on a roller coaster or moving?

8.   Would you recommend this ride to a friend? Why or why not?

RIM RUNNER

BEFORE YOU RIDE:

1.   Describe the shape of the boat, especially the front. Which simple machine is used? Why is it blunt rather than sharp? Include a sketch.

2.   Are there any wheels on the boat ride? If so, why? If not, why not?

3.   Describe the following:
              a) The number of possible riders in each of the boats.

              b) How long it takes the boat to travel down the final hill.

              c) What causes the boat to slow down at the bottom of the final hill? What law of motion is involved?

AFTER YOU RIDE:

4.   How did your position in the boat affect your experience on the ride?

5.   The boat falls 60 feet in the chute, where it travels at a speed of 40 feet per second. How long does it take to travel down the chute? (Hint: Speed = Distance / Time). Show your work.

6.   Would you recommend this ride to a friend? Why or why not?

General observations or notes about this ride:

ROCKIN' CANYON CARS

BEFORE YOU RIDE:

1.   Estimate the area of the floor of the track. (A = L x W) Show your work.

2.   How does each car receive its energy to move?

3.   How do the attendants control the energy of the ride?

4.   Which of Newton's Laws of Motion is illustrated when one bumper car hits another?

AFTER YOU RIDE:

5.   All the cars are the same size. Explain what will happen to each car in the following circumstances:
           a) Your car is not moving and gets hit from behind.

           b) Your car is moving and hits a car that is not moving.

           c) Your car is moving and hits a moving car from behind.

6.   According to the above, in which circumstances would you feel the greatest impact?
        Explain your choice.
                _____a
                _____b
                _____c

7.   Why do the cars have rubber bumpers?

8.   Why wouldn't you design a bumper car with very soft bumpers?

9.   Would you recommend this ride to a friend? Why or why not?

You must be 48" tall to ride the Sand Pirate.

BEFORE YOU RIDE:

1. How long does it take for one complete period (all the way, back and forth)?

2. Using the words "kinetic" and "potential," fill in the blanks:
Between the highest and lowest point of the ship, _____ energy is changed into _____ energy.

AFTER YOU RIDE:

3. Where on the ship do you experience the greatest acceleration?

4. At what point on the ride is your "weight" the greatest (include both position of the ride and the rider's position in the boat)?

5. At what point of the pendulum swing did you feel:
   a) The strongest push against your back?

   b) The most pressure against your seat?

   c) The least pressure against your seat?

6. Estimate the maximum angle the ride achieves from the platform.
Maximum Angle of Swing
Platform

7. Why doesn't a pendulum go on swinging forever (Newton's First Law of Motion)? What slows it down and brings it to a stop?

8. How is this ride like the E-can?

9. Would you recommend this ride to a friend? Why or why not?

General Notes or observations:

CHAOS OR ROAD RUNNER

BEFORE YOU RIDE:
1.   Where during the ride (spin of the wheel) do you expect to feel the most force?

AFTER YOU RIDE:
2.   Where during the ride did you actually feel the most force?

3.   Which person in what seat experienced the greatest force? Why?

4.   Where on your body did you feel the most force?

5.   Did you ever experience weightlessness? If so when and how was this feeling created by the motion of the ride? (Applies to Chaos)

7.   Which previous experiment most relates to this ride? How?

REVIEW

THE LAWS OF MOTION

1.   Which ride do you think is the best example of Newton's First Law of motion? Explain your answer.

2.   Which ride do you think is the best example of Newton's Second Law of motion? Explain your answer.

3.   Which ride do you think is the best example of Newton's Third Law of motion? Explain your answer.

SIMPLE MACHINES

The six simple machines are the lever, the pulley, the wheel and axle, the inclined plane, the wedge and the screw.

Observe as many examples as you can for each of the simple machines, and list their locations at the amusement park and tell how they reduce the force necessary to do work. Try to find at least one example of each if possible.

1.   Lever

2.   Pulley

3.   Wheel and Axle

4.   Inclined Plane

5.   Wedge

6.   Screw

GLOSSARY

Acceleration – the rate of change in velocity of an object

Centrifugal force – the tendency of a moving object to move outward into space along the same straight line (not a "force" at all, but a description of a behavior)

Centripetal force – the force needed to create and maintain circular motion

Energy – the ability to do work

Force – a push or pull, measured in newtons or pounds

Friction – a force created by the rubbing of two objects against each other

Gravity – the force of the Earth's pull on an object (this is partial definition only)

Inertia – the tendency of an object at rest to stay at rest and an object in motion to stay in motion

Kinetic energy – the energy of motion

Mass – a measure of how much material an object contains for the space it takes up (that is, its volume)

Momentum – has to do with the amount of energy a moving object has; expressed as the mass of an object multiplied by its velocity (Momentum = Mass x Velocity)

Newton's First Law of Motion – An object at rest will stay at rest, and an object in motion will stay in motion, unless acted upon by an outside force. Also known as the Law of Inertia.

Newton's Second Law of Motion – This has two parts; a) if a force acts on an object, the object moves faster, or accelerates, in the direction of the force, and b) the more force used to push an object, the more the object will move, but the more massive an object is, the more push (force) it takes to move it. Also know as the Law of Constant Acceleration.

Newton's Third Law of Motion – For every action, there is an equal and opposite reaction. Also known as the Law of Conservation of Momentum (or Interaction).

Potential energy – an object's stored energy

Speed – the rate at which an object moves; speed is the distance the object has traveled divided by the time it took to travel (Sped = Distance / Time)

Velocity – the speed of an object in a particular direction

Volume – the amount of space an object occupies

Weight – a measure of how much gravity is pulling down on an object