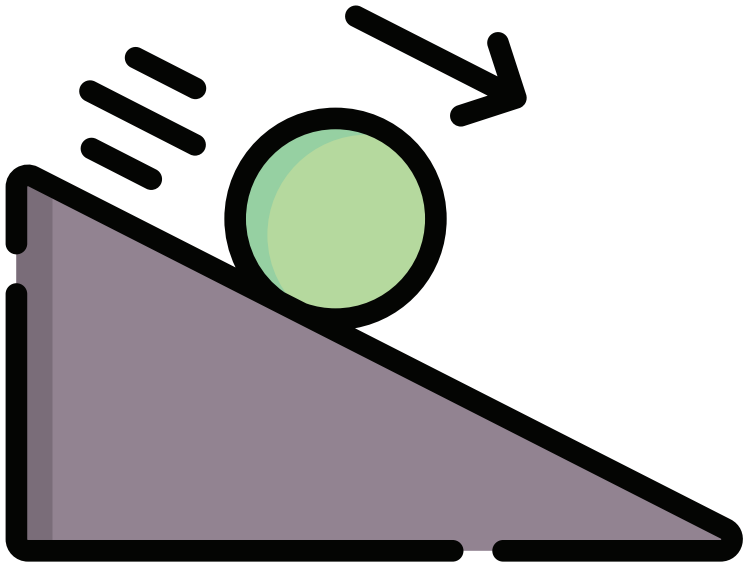
INTERMEDIATE

PHYSICS

at the Santa Cruz Beach Boardwalk



Includes:
Basic Physical Principals, Conversions, Equations, and 6 Ride Worksheets

Santa Cruz Beach Boardwalk

PHYSICS IS PHUN!

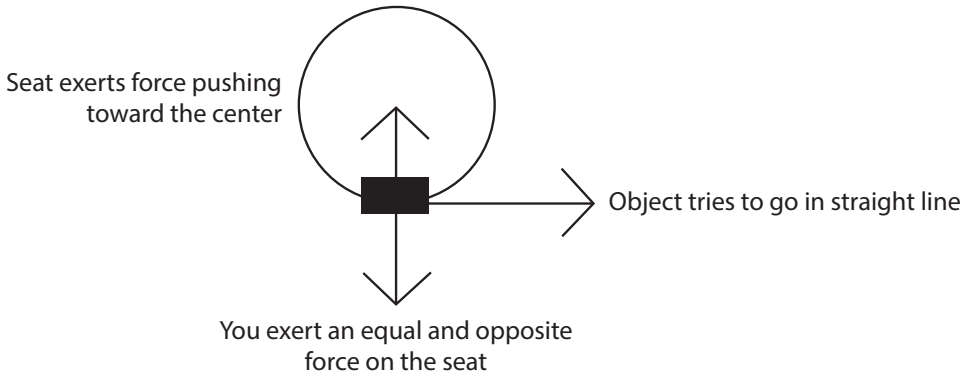
On the rides at the Santa Cruz Beach Boardwalk you will experience several different sensations pulling and pushing at you from different angles and with different forces. As you feel these sensations you will be experiencing Physics hands-on! Below are some of basic "physical principals" that will help you understand the sensations you experience!

"Physical Principals"

INERTIA = The tendency for an object to keep on doing whatever it is doing. Specifically, inertia is an object's tendency to resist a change in its motion. The harder it is to change something's motion (ie: elephant vs. a pillow), the higher its inertia.

ACCELERATION = A change in motion by increasing speed, decreasing speed, and changing direction. The quicker the change in motion the larger the acceleration (ie: zero to 60 in five seconds is a larger acceleration than zero to 60 in ten seconds.)

CENTRIPETAL FORCE = Causes you to feel like you are being thrown to the side of a ride as it moves in a circle. This is because an object tries to move in a straight line even though it is going in a circle (Newton's First Law). It cannot go in a straight line because the ride seats are attached to a central pivot point, and the seats exert force in that direction (Newton's Second Law). The seat's force pushes you toward the center of the ride, while you exert an equal and opposite force on the ride seat (Newton's Third Law) therefore continuing in a circular motion.



CONVERSIONS
1 mile = 5280 feet
1 meter = 3.28 feet
1 minute = 60 seconds

EQUATIONS
Radius of a circle = 1/2 diameter of the circle
Speed = length traveled ÷ time it takes to travel (ie: MPH is miles ÷ hours)

Now answer the questions on the following worksheets as you discover just how PHUN Physics can be!

GIANT DIPPER

1. The track is 800 meters long. How many times would you have to ride in order to go at least 1 mile? Show your work.

2. Count the cars on the train and the maximum number of riders per car. If the ride is full, how many people can ride at a time. Show your work.

3. The ride takes about 50 seconds, convert this to a fraction of a minute. Be sure to state in simplest form.

4. Use your answer to #2 to help you. The park hopes to run 1400 people per hour.
   If it was full each time, how many times must we operate the Giant dipper each hour?

5. Which way are you being forced (up, down, or sideways)

   At the bottom of the first drop? _____
   Around a corner? _____
   At the top of the second hill? _____

   Why?

   What "physical principal" is at work here?

6. What happens to the size of the hills during the ride? _____

   Why?

BUMPER CARS

1. The distance between the two end pillars is 11m. Time a car going full speed from pillar to pillar. _____ seconds.

2. Calculate the speed of the car. Be sure to find the simplest form. _____ meters/second

3. When your car stops, which way are you thrown? _____

4. When you are in a head on crash, which way are you thrown? _____

   Why?

5. When you are hit from behind, which way are you thrown? _____

   Why?

PIRATE SHIP

1. What motion does this remind you of?

2. When does the ride seem to be speeding up (accelerating)?

3. When does the ride seem to be slowing down (decelerating)?

4. Sit at either end of the Pirate Ship for one full ride. Sit in the middle of the Pirate Ship for one full ride. Compare the forces you feel during the ride while sitting in these seats.

   Are they the same?

   How are they different?

5. The height of a full swing is 66 feet. Convert this to meters.
   Show your work and be sure to find the simplest form.

LOOFF CAROUSEL

1. As the ride turns, is your body thrown slightly inwards or outwards? _____
   What "physical principal" is at work here?

2. Do all the animals on the ride go up and down at the same time? _____

3. Do you feel slightly lighter or slightly heavier when your horse is moving up?
   How about when your horse is moving down?

4. Do the ride animals on the inside or the outside go faster around the circle? Keep in mind the equation for speed.

5. This ride has a lot of music. Study the Ragtime Automated Music on the West side of the exit. Name the simple machines used to play two of the instruments.

   1) Instrument _____ Machine _____

   2) Instrument _____ Machine _____

SEA SWINGS

1. Why do the seats pull outward?

2. What "physical principal" is at work here?

3. The seat exerts a force pushing you toward the center of the ride, and there is a force pulling you outward as the seat car tries to continue in a straight line.

   Which force is greater?

4. There are two rings of seats; an inner and an outer ring. Would riders on the outer ring be traveling faster, slower, or the same speed as riders on the inner ring? Why?

5. As the ride spins, the riders get angled out due to the principle in Question #2. If you had a heavier rider, would they angle out more, less, or the same as a lighter rider?