

Science at Jamberoo



Anyone can enjoy the rides at Jamberoo, but in order to really control the action you need to understand how it all works!

SURF HILL - Calculating Average Speed

Surf hill is a great ride for racing your friends to see who is the fastest down the slides. But how can you calculate exactly how fast someone is going?

To work out the average speed of a rider you need 2 pieces of information:

1. How long is the track (distance)
2. How long does it take to travel the track (time)

To save you from having to measure the surf hill slides, we can tell you that the length (distance) of each slide is 60m.

Question 1

To accurately measure time it is best to use a stop watch, but if you don't have a stop watch you can also count seconds (this is good to try for calculating your own speed). Choose an area at the bottom of Surf Hill where you can see the traffic lights at the top of the ride. When these turn green you can start your count. Time how long it takes for a person to push off at the top of Surf Hill until they come to a full stop at the end of the slide (time).

Time = _____s

Question 2

Now that you have the distance travelled and the time it took to travel it, you can calculate the average speed of the traveler using the following:

$$\text{Speed} = \frac{\text{Distance (m)}}{\text{Time (s)}} = \frac{60\text{m}}{\text{_____s}} = \text{_____}$$

Your answer will be in metres per second. Can you work out how many kilometers per hour this is?

If you would like to measure some other average speeds, the length of the Taipan Tubes are 160m and the green toboggan track is 1.2km while the blue track is 800m. How do these rides compare in speed to each other?

Question 3

Do you think the riders would be able to reach the same speeds if there was no water on the slides? _____

Explain how water reduces friction

Question 4

Why does a rider stop at the bottom of surf hill? What slows them down enough to stop?

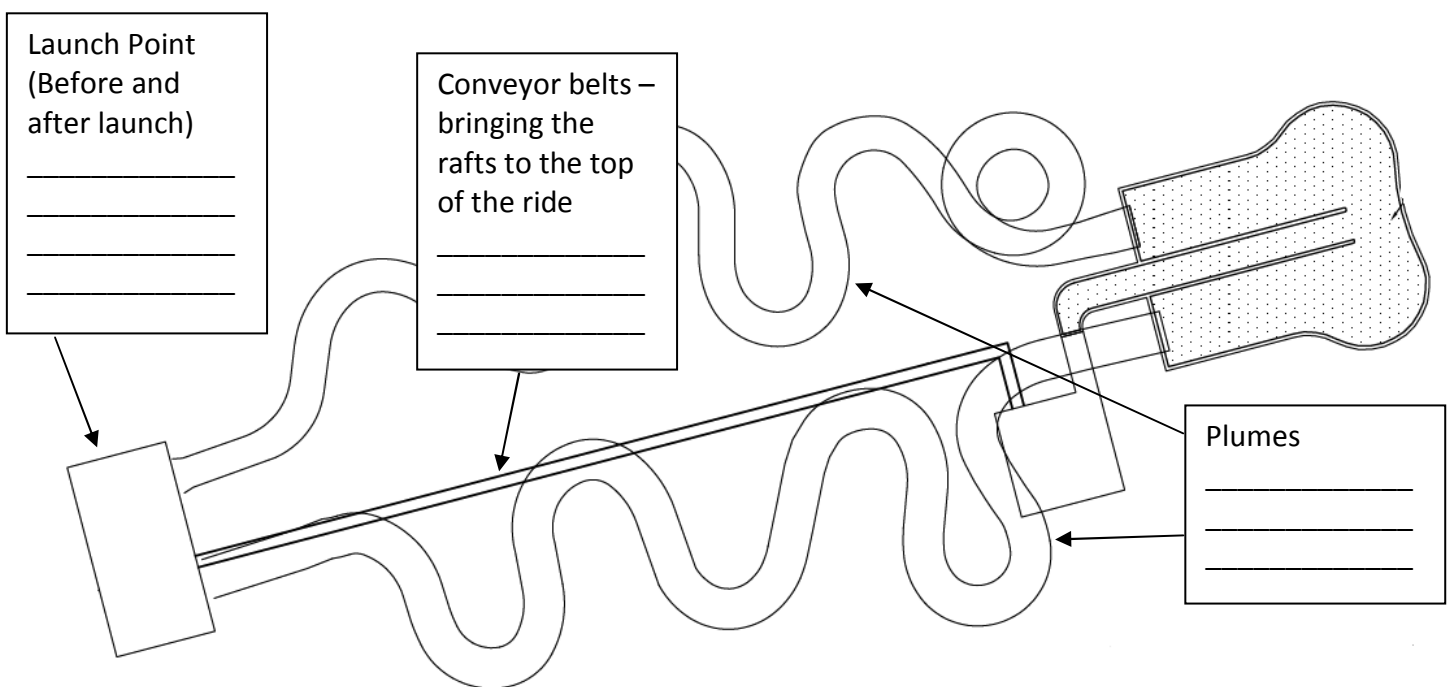
THE TAIPAN - Energy Transformation

There are many different types of energy. The types we will be concerned with are:

- **Electrical Energy** (energy made available by the flow of electric charge through a conductor)
- **Kinetic Energy** (The energy possessed by an object because of its motion)
- **Potential Energy** (Potential energy can be thought of as energy stored within a physical system. It is called potential energy because it has the potential to be converted into other forms of energy)

Question 1

How do these different types of energy work on The Taipan? Below is a diagram of the Taipan ride. At each point, write what type of energy is being used.



Question 2 - At home exercise

What are some other mechanisms you can think of which use different types of energy?

Draw diagrams similar to the one above for the other rides at Jamberoo or mechanisms you are familiar with.

Question 3 - At home exercise

Design your own water slide and draw a flow chart for it similar to the one shown in this booklet

Chemicals at Jamberoo

Below are some of the chemicals used at Jamberoo:

- Chlorine
- Hydrochloric Acid
- Sodium Hypochlorite
- Algicide

Let's look at Chlorine a little more closely. Chlorine is a chemical used to kill bacteria in swimming pools which may be harmful to humans.

What is the History of Chlorine?

Chlorine was first discovered in the sixteenth century, and today is one of the most produced chemicals in the US, finding its way into a multitude of products.

How Chlorine is Made?

Chlorine is produced through the electrolysis of salt water. When electricity is passed through 2NaCl (salt) and $2\text{H}_2\text{O}$ (water), the atoms dissociate into Cl_2 (chlorine) + 2NaOH (sodium Hydroxide) + H_2 (Hydrogen). Cl_2 is isolated in its gaseous form, and used to create other chlorine compounds used for sanitizing, bleaching and production of plastics and related products.

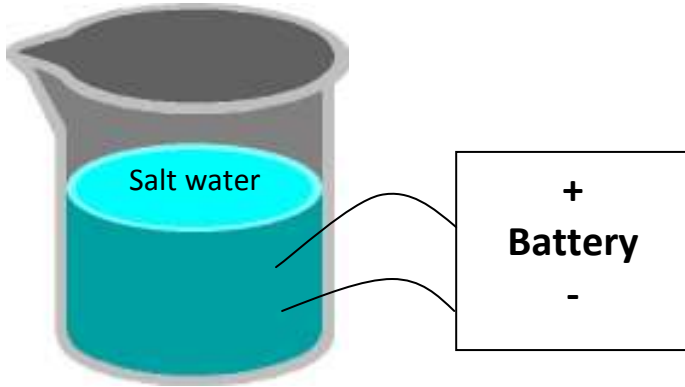
How Does Chlorine Work to Sanitize?

When chlorine is added to water, another dissociation occurs. When we add Cl_2 (chlorine) + H_2O (water), we get a reaction which leaves us with HOCl (hypochlorous acid) + HCl (hydrochloric acid). Hypochlorous acid is the active, killing form of chlorine. This is what does the real sanitizing work. The chlorine molecule or ion kills microorganisms by slashing through the cell walls and destroying the inner enzymes, structures and processes. When this occurs, the cell has been deactivated, or oxidized

Question 1

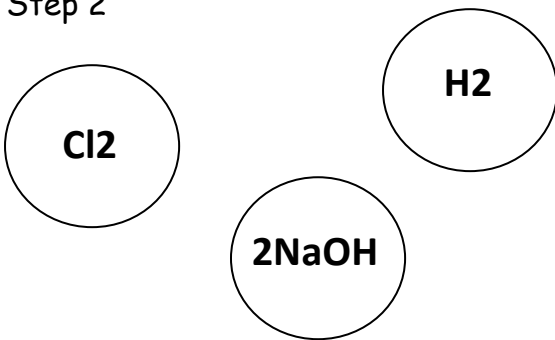
Using the above information can you complete the below flow chart to show the life cycle of chlorine from creation to sanitization?

Step 1



Explain what is happening in this step

Step 2



Explain what is happening in this step & name each of the elements / compounds

Question 2

How does chlorine kill microorganisms?
