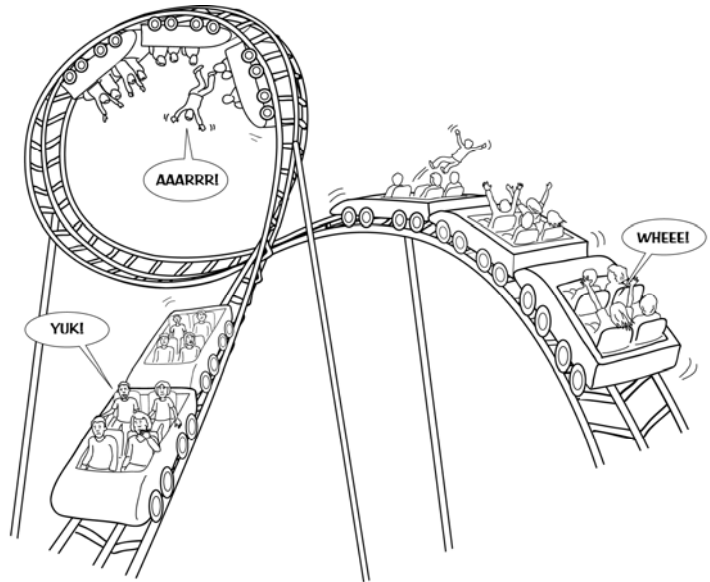


Science ILT

Rollercoasters continue to be a big attraction at theme parks and the designing and building of ever faster and more thrilling rides is big business.

Your task is to brief the purchasing team for a theme park about the science behind rollercoasters before they consider several designs for a new ride that have been sent in by rival companies.



What you need to do

You need to prepare a presentation to give to the purchasing team. You could use paper posters and charts to do this or computer software (ie PowerPoint). Your presentation needs to include descriptions of:

- the way that a rollercoaster transfers energy from the moment it sets off from the platform until it returns to the platform
- some of the safety features built into a rollercoaster ride.
some of the accidents that have occurred on theme park rides over the last few years
- some of the forces that make rollercoaster rides thrilling.
- the wider impact of theme parks in a society and their effect on a local community

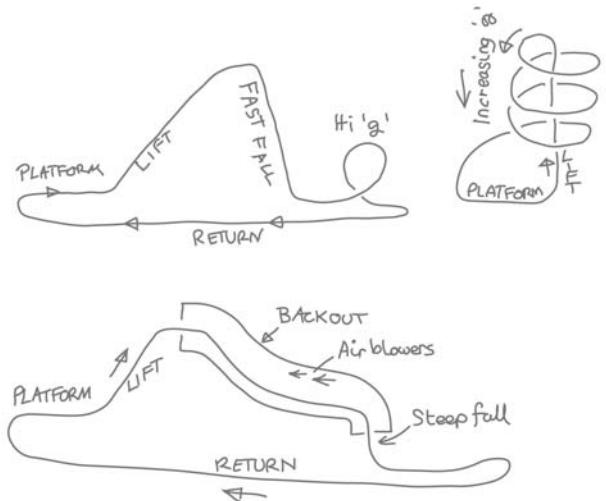
Extension/ higher levels

- How some developments of science and technology have led to more advanced rides, particularly because of the use of computers.

Equipment

You may need:

Access to internet/ library,
coloured pencils/crayons,
computer, display paper, glue
sticks, graph paper, presentation
software, scissors.



Self assessment

Use the following level ladders as a guide to what you need to do/ include to achieve each level. You may not have to include all things listed to achieve each level but will provide you with some ideas of what is needed to improve your ILTs.

	AF2 Understanding the applications and implications of science	AF3 Communicating and collaborating in science
3	<p><i>To reach this level I could have:</i></p> <p>a explained why people like to experience new rollercoaster rides.</p> <p>b explained that gravity pulls the rollercoaster cars downwards.</p> <p>c described how science has allowed rides to become more and more scary since the first rollercoasters were invented, e.g. because of better materials.</p> <p style="text-align: right;"><input type="checkbox"/></p>	<p><i>To reach this level I could have:</i></p> <p>a presented some data in different ways, e.g. a table and a bar chart.</p> <p>b used scientific words when describing changes in energy during the ride, e.g. energy, force.</p> <p>c described why it was useful to work as part of a team on this presentation.</p> <p style="text-align: right;"><input type="checkbox"/></p>

	AF2 Understanding the applications and implications of science	AF3 Communicating and collaborating in science
4	<p><i>To reach this level I could have:</i></p> <p>a described advantages and disadvantages of rollercoasters, e.g. they are fun but accidents can happen.</p> <p>b explained why rollercoaster cars are carried up very high at the start of the ride.</p> <p>c pointed out that rollercoaster designers need a good understanding of forces and materials.</p>	<p><i>To reach this level I could have:</i></p> <p>a sketched a line graph to show the changes in energies as a rollercoaster is pulled up the first hill and then released.</p> <p>b correctly used scientific words when describing aspects of the way that the rollercoaster ride is designed, e.g. gravitational potential energy.</p> <p>c talked about forces and energy using the correct scientific units.</p>

	AF2 Understanding the applications and implications of science	AF3 Communicating and collaborating in science
5	<p><i>To reach this level I could have:</i></p> <p>a described some different points of view about rollercoasters, e.g. they're fun, they're too scary, they make me feel sick, they look ugly, they cost too much, they make too much noise.</p> <p>b described some of the different effects that a rollercoaster has on different people, e.g. some people are scared, others feel sick, others are thrilled.</p> <p>c described why some people might feel that building rollercoasters is a waste of money.</p> <p>d described why the careful maintenance of the wheels on a rollercoaster to keep friction down is vital for the effective movement of their vehicles, or why the shape of the front of a rollercoaster is often rounded.</p>	<p><i>To reach this level I could have:</i></p> <p>a described the difference between what people might say about a rollercoaster, e.g. it went faster than a plane, there was a vertical drop, and how these things are measured, e.g. light gates to measure actual speed, protractor to measure the angle of a drop.</p> <p>b used a mixture of line graph and bar charts in my presentation, making sure that I have chosen the best way of presenting each set of data.</p> <p>c explained how energy is transferred and mentioned the different forms that the energy is transferred to during a rollercoaster ride.</p> <p>d described how teamwork when finding information about rollercoaster rides helped to improve the range and quality of the information gathered.</p>

	AF2 Understanding the applications and implications of science	AF3 Communicating and collaborating in science
6	<p><i>To reach this level I could have:</i></p> <p>a explained why there are more technologically advanced theme parks in richer countries.</p> <p>b Explained why some groups of people are forbidden to ride on rollercoasters, e.g. pregnant women, small children, people with heart conditions.</p> <p>c described how the ability to monitor the physical responses of humans to rides has enabled engineers to improve the quality of the experience a ride offers.</p> <p>d described how a rollercoaster designer uses a knowledge of forces and materials when coming up with a new design.</p> <p style="text-align: right;"><input type="checkbox"/></p>	<p><i>To reach this level I could have:</i></p> <p>a explained how a rollercoaster manufacturer is likely to play down any incidents that have taken place with their or other machinery.</p> <p>b given speeds in units such as m/s but described the feelings that people have on different parts of a particular rollercoaster ride.</p> <p>c included descriptions of where the data I have used is from and said whether it is primary data, collected for a particular reason or secondary data that was already available.</p> <p style="text-align: right;"><input type="checkbox"/></p>

	AF2 Understanding the applications and implications of science	AF3 Communicating and collaborating in science
7	<p><i>To reach this level I could have:</i></p> <p>a described some of the health and safety rules that rollercoaster ride designers have to take account of.</p> <p>b discussed some of the wider concerns that a local community might have when new rollercoaster rides are installed, e.g. spoils the surroundings, will cause too much noise/litter, will create jobs, will be fun, will cause too much traffic.</p> <p>c described how using themes for a ride such as famous places or characters creates new ideas for rollercoaster designs.</p>	<p><i>To reach this level I could have:</i></p> <p>a described how data about accidents involving rollercoaster rides may be presented to minimise the apparent seriousness of the information.</p> <p>b used Sankey diagrams to describe the energy transfers that occur on a rollercoaster.</p> <p>c described the roles of a range of scientific and engineering areas involved in the building of a ride, e.g. geologists to check the ground, structural engineers, materials scientists, health and safety experts, doctors.</p>