THE SCIENCE OF ROLLERCOASTERS

LESSON CONTENT: POST TRIP LESSON

This lesson is designed to be delivered after your school visit to THORPE PARK Resort

KEY STAGE 4

RESOURCES:

Completed copies of Student Worksheet 3
The Science of Rollercoasters presentation (post visit slides)
Student Worksheet 4

RECOMMENDED RESOURCES FOR BUILDING A ROLLERCOASTER

Tennis balls, cardboard tracks, clamp stands, metre rulers, stopwatches OR marbles, foam pipe insulation, masking tape, clamp stands, metre rulers, stopwatches OR ball bearings, curtain rails, masking tape, clamp stands, metre rulers, stopwatches.

KEY WORDS: Speed, distance, time, balanced forces, unbalanced forces, energy, motion

STUDENTS WILL LEARN ABOUT:

- Calculationas involving speed, distance and time
- Balanced and unbalanced forces
- Energy transfers
- Meeting success criteria

LESSON PLAN

STARTER

- Using the completed worksheets from the trip, run through the answers to the Average Speed exercise on slide 2
- Students should then consider the heart rate data they collected from the trip
- Which ride had the greatest impact on their heart rates?

MAIN

- Now students have visited the Resort and have an understanding on what makes a white-knuckle ride, they should be tasked with designing their own rollercoaster rides using a selection of resources from the suggestions listed above
- Group the class into small teams (of around 4 people) and distribute Student Worksheet 4 (one per group)
- Slide 3 and Student Worksheet 4 outline the project brief and will help focus the teams on the aims
- Create your own risk assessment for this activity

SOME POTENTIAL AREAS TO COVER ARE:

- Take care with rolling objects on the floor
- Check if any students have irritant issues with handling foam pipe
- Give students an appropriate sized workspace
- Take care with cutting any materials

PLENARY

Refer to the initial success criteria and nominate a winning group.
This should be the team that meets the most criteria in the most detail.

THE SCIENCE OF ROLLERCOASTERS

WORKSHEET 3

1. The table below shows the track length for some of the rides at THORPE PARK Resort. Time how long each ride takes from start to finish and then calculate the average speed of each ride.

RIDE NAME	TRACK LENGTH / m	RIDE DURATION / s	AVERAGE SPEED / (m/s)
THE SWARM	775		
STORM SURGE	213		
SAW — THE RIDE	700		
STEALTH	500		
COLOSSUS	850		
NEMESIS INFERNO	750		
TIDAL WAVE	850		

2. Choose which rides you want to go on. Measure your heart rate before and after the ride and work out which ride has the biggest impact. Use the table below to note down your results.

RIDE NAME	HEART RATE / BPM	RIDE DURATION / s

THE SCIENCE OF ROLLERCOASTERS

WORKSHEET 3

WORKSHEET 3 CONTINUED 2/2:

FINDING YOUR PULSE

You can find your pulse in places where an artery passes close to your skin, such as your wrist. To locate the pulse in your wrist:

- Hold out one of your hands with your palm facing upwards and your elbow slightly bent
- Put the first finger (index) and middle finger of your other hand on the inside of your wrist, at the base of your thumb
- Press your skin lightly until you can feel your pulse. If you can't feel anything, you may need to press a little harder or move your fingers around

CHECKING YOUR PULSE

When you find your pulse:

- Count the number for 30 seconds and then multiply it by two
- The figure you get is the number of times per minute your heart is beating. This is known as your heart rate

WHAT'S NORMAL?

Most adults have a resting heart rate of 60-100 beats per minute (bpm). The fitter you are, the lower your resting heart rate is likely to be. Athletes may have a resting heart rate of between 40-60 bpm or lower

3. Now design a quiz about THORPE PARK Resort that could be downloaded as an app. Details of the rides are in the promotional materials around the park and you can use your own results. Example of a typical question:

Which rollercoaster ride lasts the longest?

a) THE SWARM ☐ **b) SAW - The Ride** ☐ **c) Nemesis Inferno** ☐

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POST VISIT WORKSHEET 4

Name: Class: Date:

DESIGN YOUR OWN RIDE: SUCCESS CRITERIA

- Work as a team - suggested group size 4 people
- Name your ride
- Produce a 2 minute presentation about your ride
- Use PowerPoint if available
- Write a script so that you know what you are going to say
- Everyone in the group must be involved
- Make a working model of your ride
- Aim to include one 'loop the loop' in your ride after a drop near the start
  - Include data about your ride - for example - Track dimensions, rack length, speed, duration, initial
  - Describe the energy transfers in your ride
  - Describe the forces in action in your ride
  - Be creative

SKETCH AREA

The team that best meets the ride criteria is the winner.

Share your winning rollercoaster design with THORPE PARK Resort online #thorpeparkresort.