Thorpe PARK

SCIENCE AT THORPE PARK
KS5

FACTS & FIGURES

TIDAL WAVE

You get 2.7 bathtubs of water dumped on you in Tidal Wave

DETONATOR

During your ride on Detonator, you are dropped from the height of 7 double decker busses

STEALTH

Stealth has the world's fastest acceleration on a coaster

TRUE OR FALSE?

1. Most rollercoasters don't use power after reaching the top of the first slope

2. People sitting at the front of a rollercoaster experience the largest forces

3. Many rides (including drop towers such as Detonator, pictured) use magnets to slow down at the end

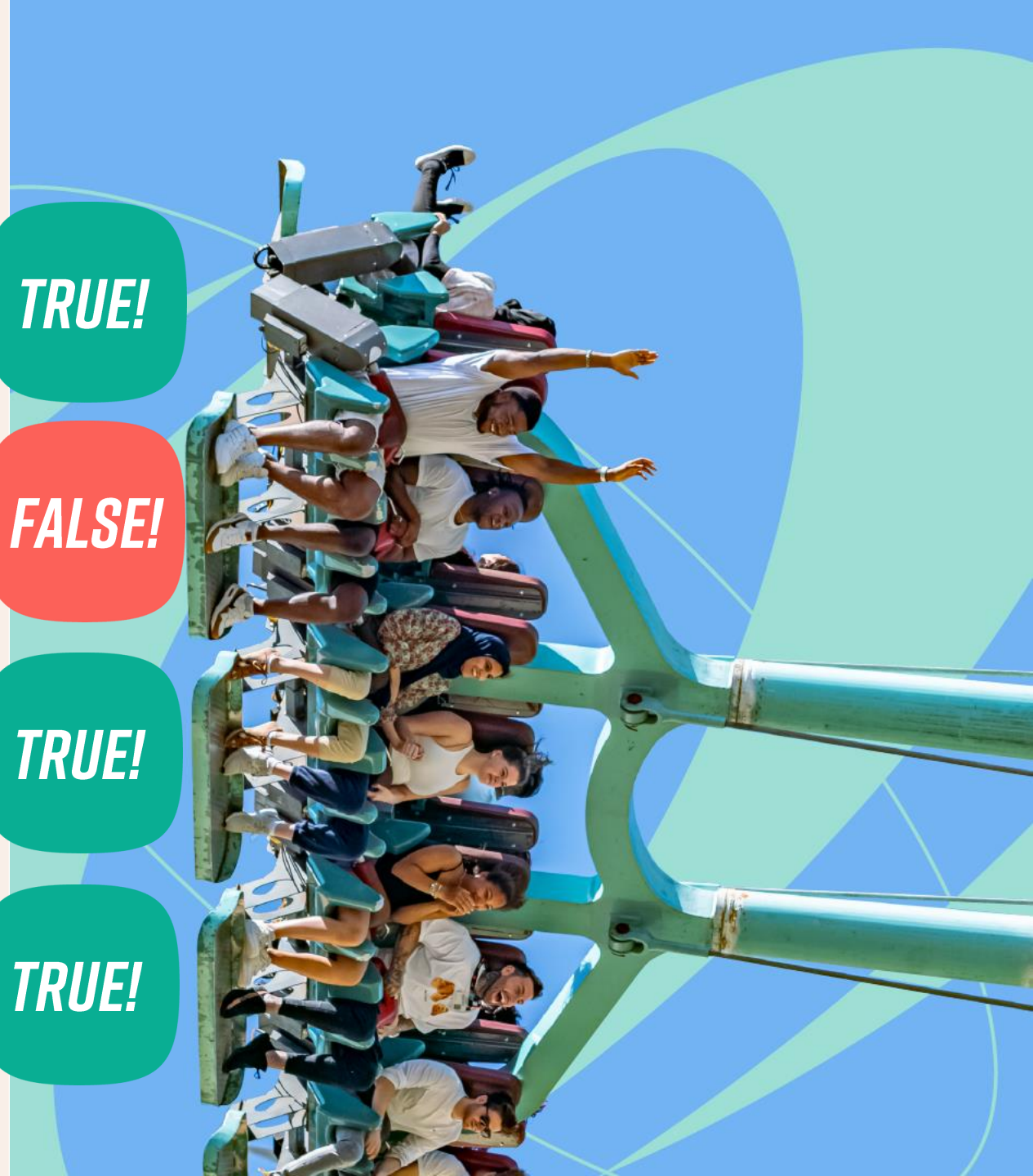
4. Rollercoaster cars have 3 sets of identical wheels to keep them on the tracks.

TRUE!

FALSE!

TRUE!

TRUE!



COASTER CONSTRUCTION

Constructing a rollercoaster is a very long process with lots of different stages.

Mechanical & electrical engineers, and physicists are involved throughout the process.

How long do you think it takes for a coaster to be built from initial conception to opening to the public?

4 YEARS!

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HOW ARE ROLLERCOASTERS POWERED?

POWERED

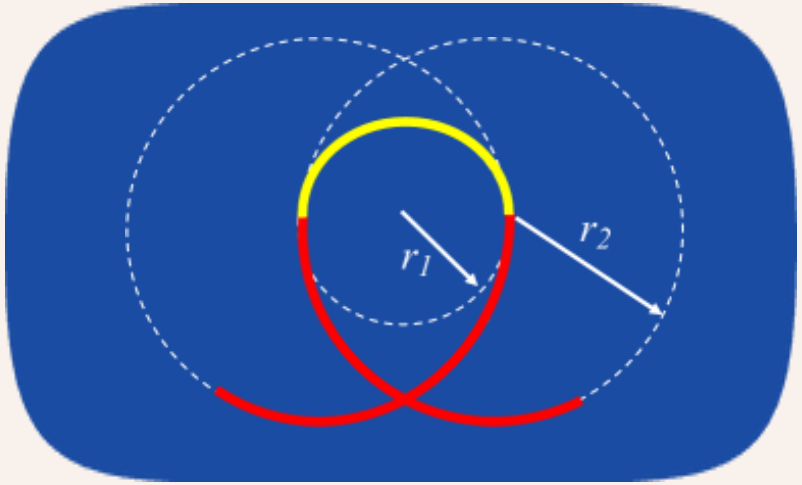
LAUNCH

TRADITIONAL LIFT

ENERGY TRANSFERS IN A ROLLERCOASTER

YOU CAN EXPERIENCE UP TO 5G ON OUR RIDES – WHAT DOES THAT MEAN?

WHY ARE “LOOP-THE-LOOPS” NOT CIRCULAR?



HOW DO THE BRAKES WORK?

Electromagnetic brakes

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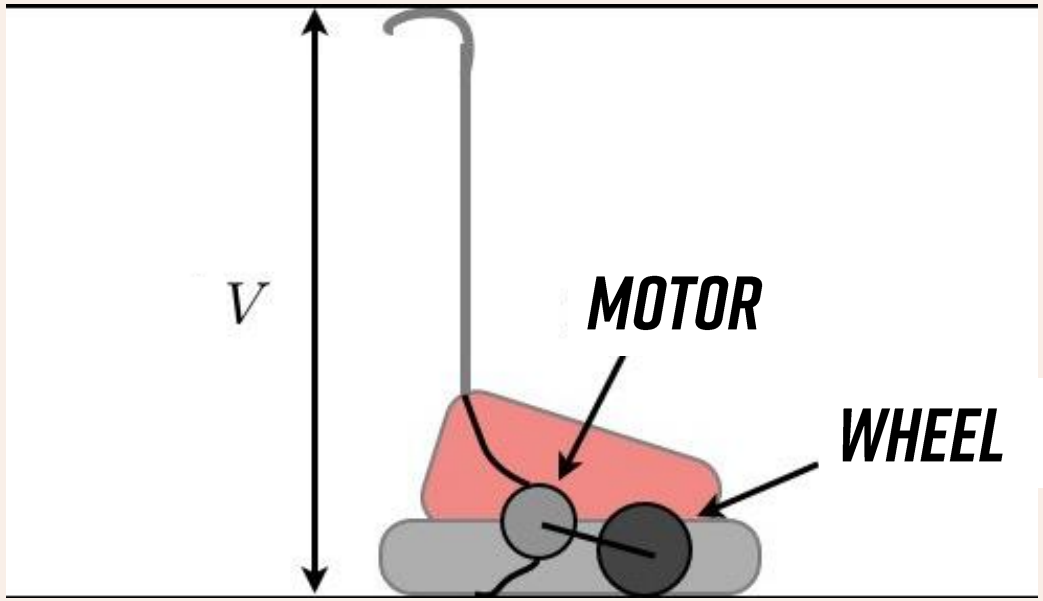
WHAT FACTORS MIGHT AFFECT THE SPEED OF A ROLLERCOASTER?

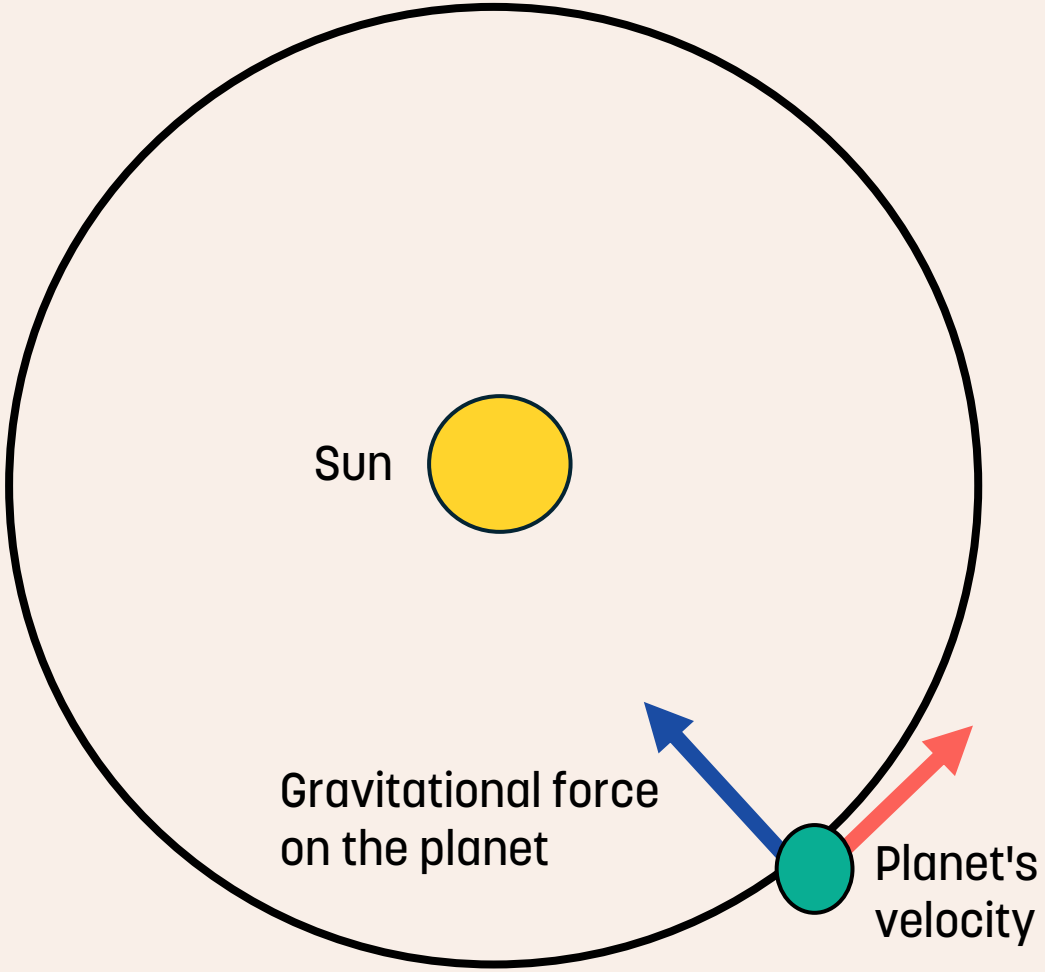
- **Temperature** – lubricant viscosity in warm temperature, reducing friction on wheels – this also reduces during the day as wheels warm up
- **Wind speed** - (increase/decrease)
- **Rain** – again reducing friction
- **Mass** - of train and passenger numbers
- **Wheel materials** - (hard nylon faster than softer polyurethane) – sometimes different materials used in different seasons
- **Trim brakes** - used along the track to deliberately adjust speed during the ride if necessary

HOW TO DODGEMS WORK?



V = Potential Difference or Voltage

SPINNING RIDES – WHY NO SAFETY RESTRAINTS?



STEALTH: 0-80 MPH IN 2 SECONDS! HOW?

The train hooks onto a ‘catch car’ which is catapulted down the track using hydraulic launch mechanism.

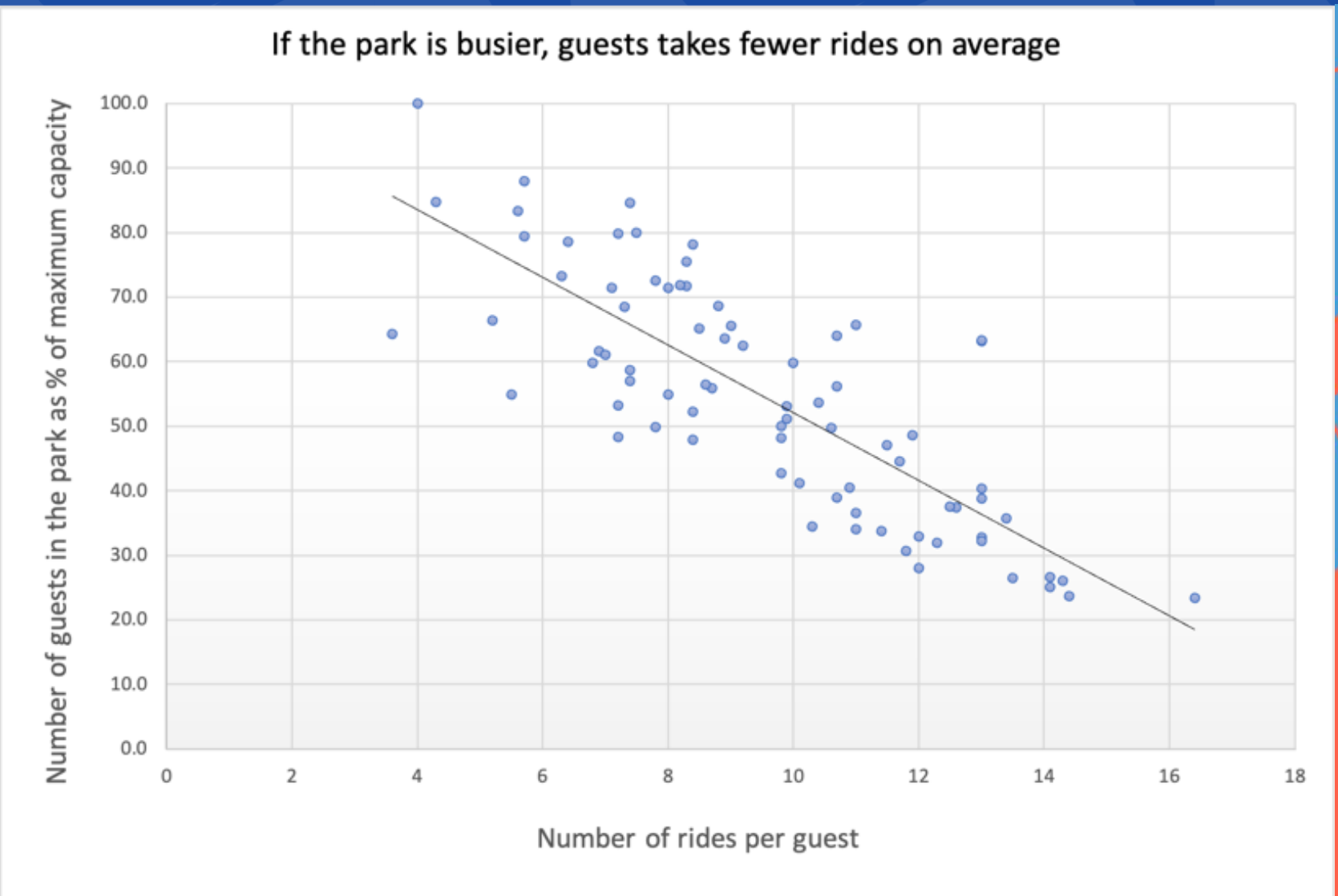
The force from the hydraulic system depends on the mass of the loaded train.

WHAT IS A ROLLBACK ON STEALTH?

A rollback on stealth occurs when the train does not have enough momentum to carry it over the top hat.

This is a video of a genuine rollback and shows how the train is brought to a controlled stop.

IS THERE A MAXIMUM NUMBER OF GUESTS?



ALWAYS INNOVATING!

What's that smell?

THE SCIENCE WE COVERED!

- Energy transfers: interchange between gravitational, kinetic and thermal stores
- Gravity and g-forces, both positive and negative
- Friction and electromagnetic induction in braking causing temperature rise; eddy currents; braking force proportional to speed; fail-safe braking
- Material properties; viscosity
- Potential difference causing electric current to flow
- Circular motion and centripetal force; Newton's first law; resultant force
- Pressure in liquids and gases (hydraulics and pneumatics)
- Rates and capacity; data and graphs; equation of a straight line

THANK YOU!