



**ZIP**  
WORLD

SCHOOLS

**PENRHYN QUARRY**



# WE'RE GOING ON AN ADVENTURE!

## PENRHYN



## QUARRY TOUR

## QUARRY FLYER



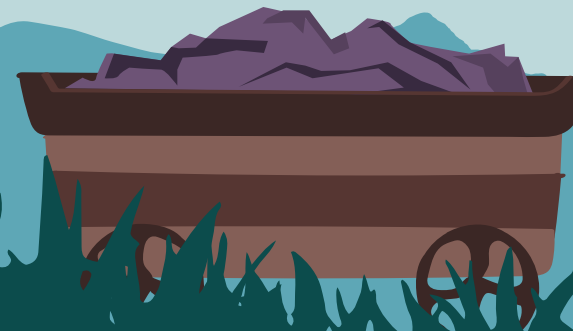
We will be taking a tour on one of Zip World's giant trucks around what was once the world's largest slate quarry as well as flying 200 metres through the air from the top of the Penrhyn Quarry adventure terminal in a dual zip line adventure.

# LET'S LOOK AT WHERE WE'RE GOING

Penrhyn Quarry has been in existence for hundreds of years and was once the largest slate quarry in the world.

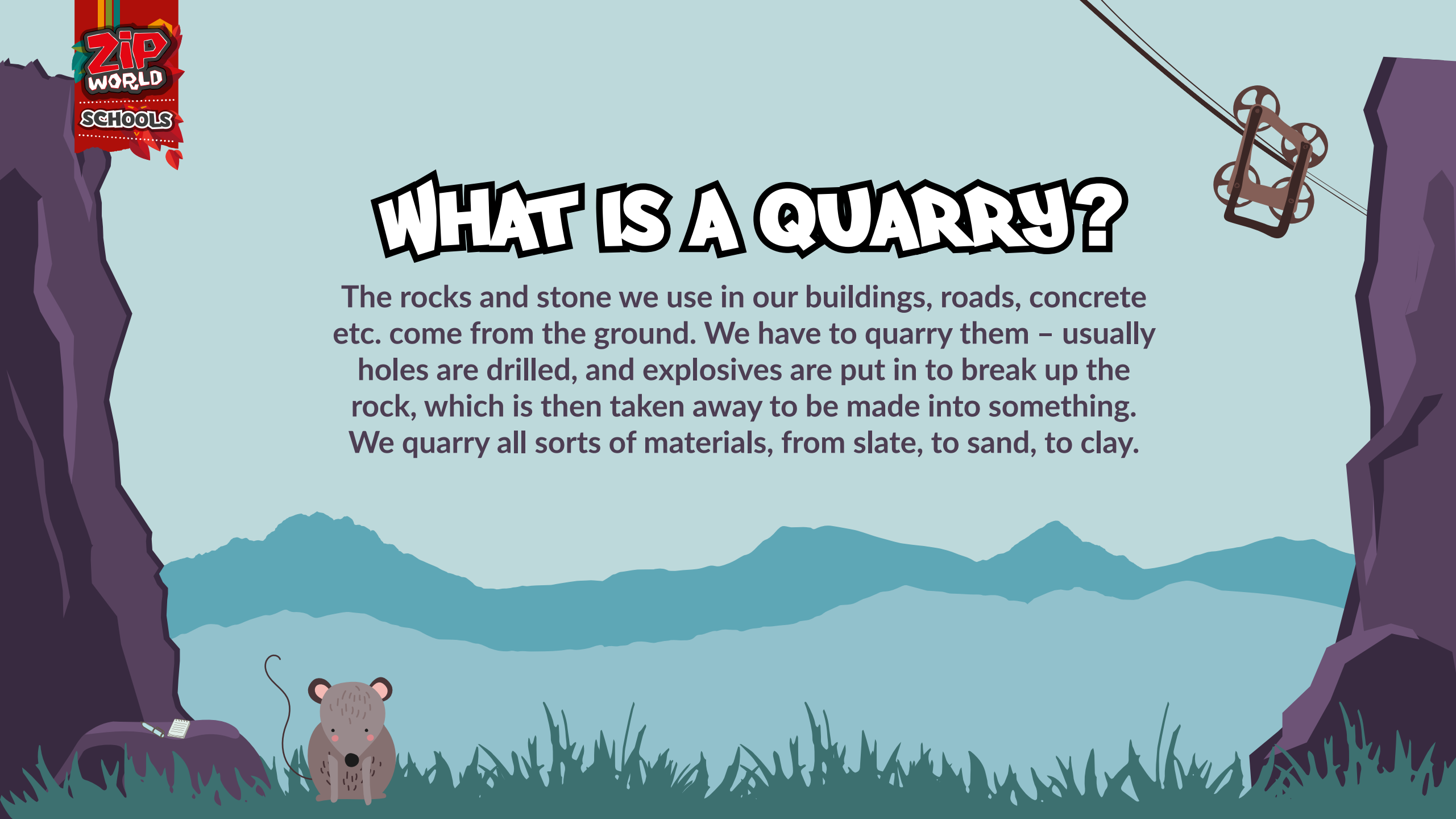
It was very dangerous as the quarry men were suspended from ropes along the rock-face and used explosives to remove large slabs of rock. Many died or lost limbs.

In 1900 men at the quarry decided to strike to try and improve their working conditions. It was the longest strike in British history. Afterwards, orders for Welsh slate dropped and the slate quarry never really recovered. It is much smaller today.



# WHAT IS A QUARRY?

The rocks and stone we use in our buildings, roads, concrete etc. come from the ground. We have to quarry them – usually holes are drilled, and explosives are put in to break up the rock, which is then taken away to be made into something. We quarry all sorts of materials, from slate, to sand, to clay.



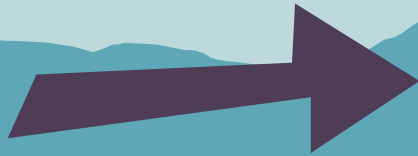


Zip World decided to turn the disused section of the quarry into something new, and bring back a bit of life into the area. So now, you can zip across it, learn about the history and take in the stunning geography around you all at the same time!



# FORCES

But Zip World wouldn't exist if it weren't for forces. We are going to learn all about them so that we know what is making us 'zip' at Zip World!



# QUARRY FLYER

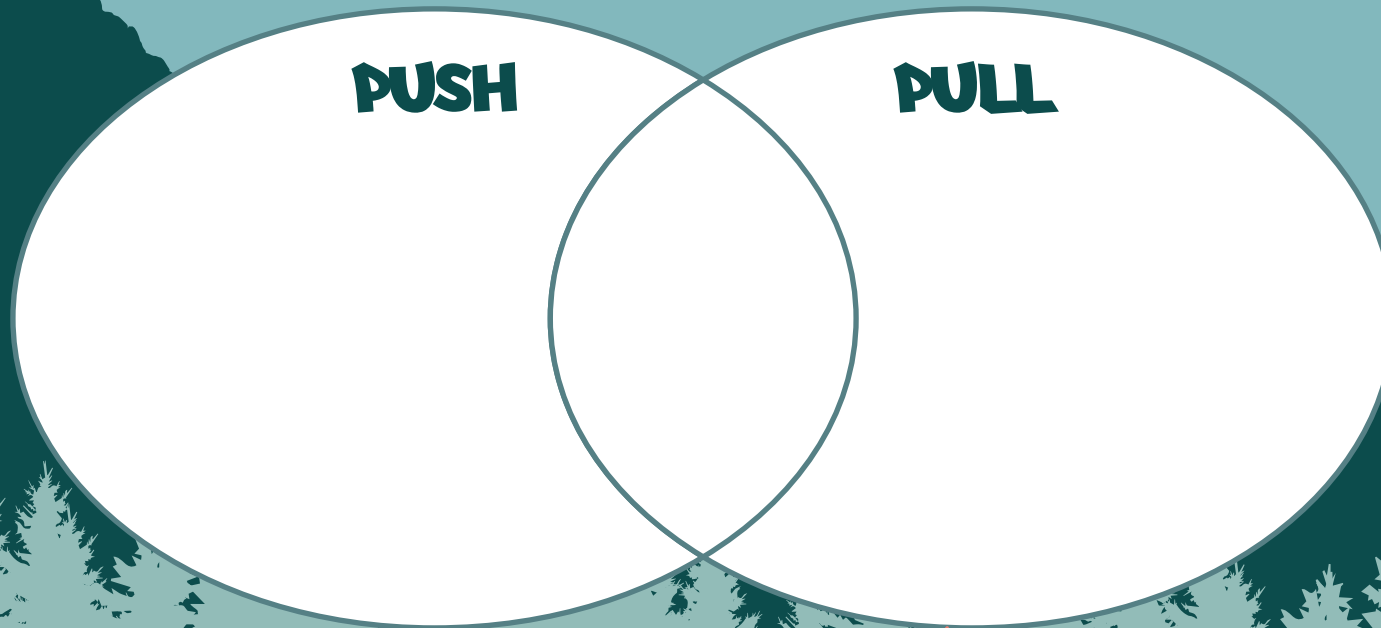




# FORCES ARE ALL AROUND US!

They act on all objects. Forces are pushes and pulls.

Look around your classroom or playground and find examples of things that show the push or pull force when they are moved. Put them in the Venn diagram below.



You cannot see a force,  
but you can see  
the effects of the force.



PULL



PUSH



## WHY DID THE PAPER DROP TO THE GROUND?

# GRAVITY

## WHAT DO WE KNOW ABOUT GRAVITY?

Gravity is an invisible force.

That's why things fall to the ground when we drop them.

Weight is the force of gravity acting on an object.

Since nothing near us is bigger than Earth itself, all things and people are attracted to it and pulled towards the centre

The bigger the object, the more it attracts things.

Gravity stops things floating up into space.

Gravity attracts all objects towards each other.

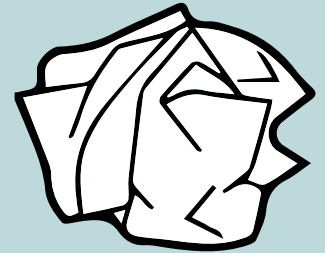
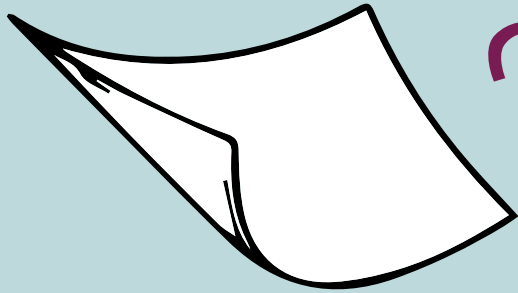




Air resistance is pushing upwards

Air resistance is pushing upwards

# AIR RESISTANCE



Because of its size, the flat paper has a lot of air resistance; it has to move a lot of air particles out the way as it falls.

Because of its smaller size, the scrunched up paper creates very little air resistance; it has to move fewer air particles out the way as it falls.

Gravity is pulling the paper down

Gravity is pulling it down





Air resistance is a friction between air and an object.

Friction always slows a moving object down as it works in the opposite direction to the motion.

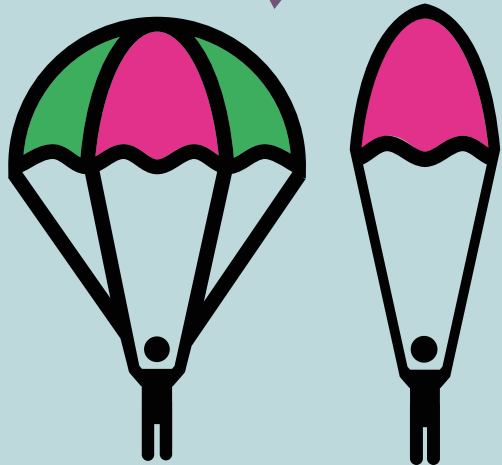


As we discovered with the paper experiment, the shape of an object can really affect how much air resistance it has.

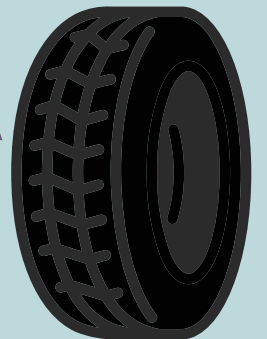
# FRICTION

The amount of friction depends on the materials from which the two surfaces are made. The rougher the surface, the more friction is produced.

Friction is a useful force because it stops us slipping, and stops car tyres skidding on the road.



Friction is a force between two surfaces that are touching.



**SEE IF YOU CAN  
ANSWER THE  
QUESTIONS ON  
YOUR CARD.**

**WORK WITH  
YOUR PARTNER.**



This person is travelling downhill.  
Which forces are acting against the  
movement? Why aren't they slipping  
downhill?



This truck is moving downhill.  
Which forces are acting against the truck?



Which force is making the people move  
downwards? Which forces are acting  
against them?



Look at the Quarry Truck's huge wheels.  
How do they help it to move up and down  
the steep slopes?



Which force is pulling the people  
downwards? Which forces are acting  
against them?



The closest two riders have an extra piece  
of material on their zip wires – why do you  
think this might be?





# YOUR CHALLENGE

Using all you know about gravity, friction and air resistance, can you design a harness for our toy so that it can travel down our zip wire? It likes thrilling rides, so you need to make it as fast as possible! Use your imaginations and be creative.

Work with a partner. Look at the different materials available and predict which you think will get the toy down the fastest. Why do you think this?

Design a harness and annotate your drawing, showing the forces at play.

When the class is ready, you will be testing out your designs!



QUARRY POST-VISIT LESSON WORKSHEET 2

NAME:

**A NEW RIDE—SIMPLES!**

You are going to design your very own exhilarating thrill ride for Zip World based on a simple machine. Use your imagination! Draw and annotate your design below and give your ride an exciting name.





# ENJOY YOUR TRIP!

AND TRY TO  
THINK ABOUT  
THE FORCES  
ACTING ON YOU  
WHEN YOU'RE  
THERE.

