

ZIP
WORLD

SCHOOLS

LLECHWEDD



WE'RE GOING ON AN UNDERGROUND ADVENTURE!

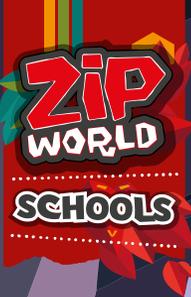
**BOUNCE
BELOW**



**Deep Mine
Tour**



We will be bouncing our hearts out on a subterranean net playground, jumping and sliding our way through a disused mine, as well as travelling 500 feet underground to learn about the history of the Welsh mines!



The ability to do work.

BEFORE WE BOUNCE

We need energy to do everything.

We need to understand the science behind the fun...

...let's remind ourselves about forces!

Today you will be working in teams, talking to and teaching each other, while I will be observing and helping!

Energy is everywhere and takes lots of different forms.

There will be a short activity on each table. You will have about 5 minutes at each table before I ask you to move on to the next one.

Without energy, nothing can move or change.



It does not matter if you do not finish activity – I will be listening to your discussions and watching how well your team works together.

If you do finish, there is an extension idea on each card.

If you are unsure of something, your group must try and talk it through and work it out, using what you have learned before, or what you have experienced, as well as your imaginations.

This activity is about working things out, not necessarily getting the right answer; we will talk about these at the end.

We need to **share**
the work, not rely
on one person.

We need to **listen**
to each other.

WHAT WILL HELP YOUR TEAM WORK WELL TOGETHER?

We need to share all
our ideas and **work**
things out together.

We must value each
other's opinions
and show **respect**
to each other.

GROUP ROLE CARDS

To help your team work well, you could share out these roles:

SCRIBE



- After the group has decided upon their ideas and answers, write them on the recording sheet

TIME KEEPER



- Make sure the group finishes on time

READER



- Read the information on the card out to the group

RESOURCE MANAGER



- Make sure that your group leaves each table as you found it (put all the objects back where they belong!)

QUALITY CHECKER



- Make sure the discussions are all relevant
- Check everyone is happy with the group's answers

FACILITATOR



- Keep things moving
- Be sure you know what the group should do next

PLENARY

Let's see what you found out and what ideas you came up with! Let's have a volunteer from each group tell us about one of the activities.

During your presentation, see if you can consider:

- What did you and your group learn/ what can you teach the rest of us?
- Was there anything you weren't sure of? How did you get round this?
- Did anyone in your team work particularly well at this task? What skills helped them?



ACTIVITY CARD 1

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

CONSERVATION OF ENERGY

Energy cannot be created or destroyed. It can only be stored and transferred between different types.

The types of energy below have their vowels missing. Work together to find out what they are.

lght	
ht	
snd	
kntc	
grvttnl ptntl	
chmcl ptntl	
lctrcl	
lstc ptntl	

Energy is measured in joules. In energy transfers there is an input energy and one or more output energies.

Extension: All energy falls into one of two states: potential or kinetic. Potential energy is energy that is stored in the position or the structure of an object, energy ready to go. Kinetic energy is energy an object possesses due to its motion. Can you sort the types of energy above into these two categories?



ACTIVITY CARD 2

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

ENERGY STORES AND TRANSFERS

Energy can be stored or it can be transferred from one store to another – as one store decreases, another increases.

Match each type of energy to its description.

Kinetic Energy	This store increases as an object is moved higher.
Elastic Potential Energy Store	This is the energy stored in the bonds of chemical compounds. The energy is released when the bonds are broken.
Chemical Potential Energy Store	This is the energy in moving objects. It is energy at work.
Gravitational Potential Energy Store	This store increases when an object is stretched or squashed.

Extension: Add two examples for each definition above – one to show an example of how the energy might increase and one to show how the store might decrease.

Some examples from below can be used:

- A boulder rolling down from the top of a hill
- A battery being recharged
- A parachutist jumping out of a plane
- A spring being compressed

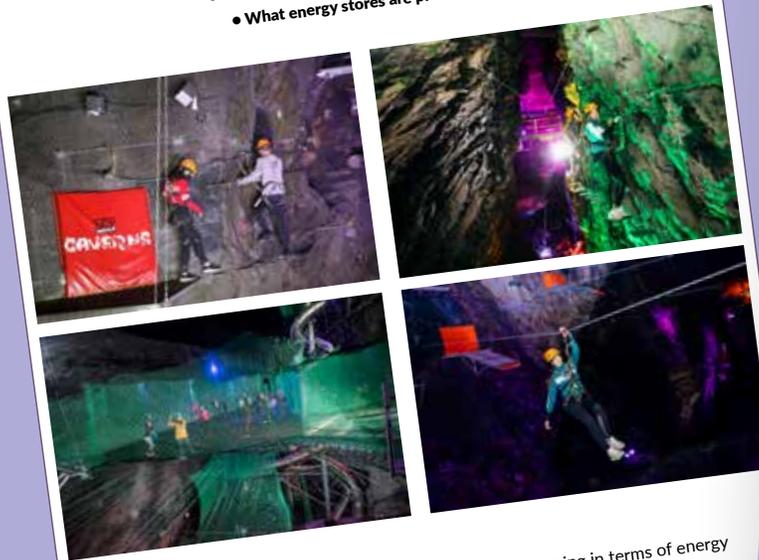
ACTIVITY CARD 3

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

ENERGY

Look at the pictures below and discuss:

- What energy types can you see in use in the pictures?
- What energy transfers are happening?
- What energy stores are present?



Extension: Write in full sentences to explain what is happening in terms of energy transfer and storage in one of the pictures.

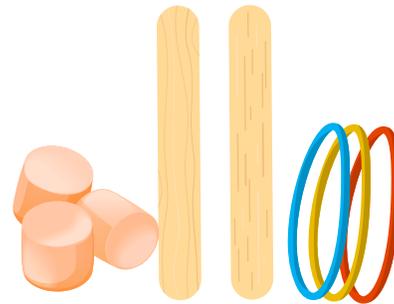
ACTIVITY CARD 4

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

ELASTIC POTENTIAL ENERGY

Things like springs and rubber bands are elastic - if you stretch or compress them, they can return to their original shape and size when the force is removed. Elastic potential energy is the work done on an elastic object for it to return to its original shape. The energy is transferred out of the object as kinetic or heat energy when it returns to its original shape. Objects that are hard to compress/stretch will store more energy because more work is done to compress/stretch them.

Using the lolly sticks and rubber bands on the table, create a simple catapult that uses elastic potential energy to move a mini marshmallow.



Extension: Write a definition of elastic potential energy. Draw a simple energy transfer diagram to explain the energy transfer happening when you press the catapult.

ACTIVITY CARD 5

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

GRAVITATIONAL POTENTIAL ENERGY

Gravitational potential energy is energy an object has because it is high up. This is due to gravity pulling it down. It only releases this energy when it falls down.

Look at the images from Zip World below and discuss who/what has gravitational potential energy in each picture and why. Annotate the pictures.



Extension: Choose a picture and explain what happens when the person falls – as the gravitational potential energy decreases, energy must be transferred (we know it cannot just disappear) – but into what? What happens to the energy store when the person actually hits the bottom?

ACTIVITY CARD 6

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

FORCES REVISION

Using arrows, draw the forces at work on these bouncers at Zip World. Remember, the longer the arrow, the greater the force. You may wish to include: gravity (weight); drag; friction; upward force.

Discuss: are the forces balanced or unbalanced? Contact or non-contact?



Explain what effect the forces are having on the nets and the bungee ropes to which they are attached.

ACTIVITY CARD 7

You and your group have approximately 5 minutes to read the information on this card and complete the activity.

WORK DONE AND SIMPLE MACHINES

Work is done when energy is transferred from one store to another or when a force causes an object to move. It is measured in Joules. The formula to calculate work done is:

$$\text{Work (J)} = \text{Force (N)} \times \text{Distance (m)}$$

We can make doing work easier by using simple machines. They allow us to change the direction that a force is applied. Make a list of the simple machines you can see around your classroom or from the window.

LEVERS



SCREWS



INVERTED INCLINE



WHEELS AND AXELS



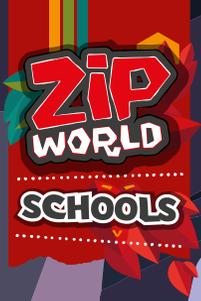
PULLEYS

WEDGES



Extension: Explain what effect the forces are having on the nets and the bungee ropes to which they are attached.

For example: I pushed my school bag with a force of 10N, 2.5 metres across the room. Calculate the work done.



Now you know a little more about how energy is transferred and stored, you will understand what's making you move at

ZIP[®]
WORLD

ENJOY YOUR TRIP