



ZIP WORLD

SCHOOLS

WE ARE GOING ON AN ADVENTURE!



THE RIDES AT ZIP WORLD WORK BECAUSE OF THE FORCES



TREETOP
NETS



FFOREST
COASTER



PLUMMET
2

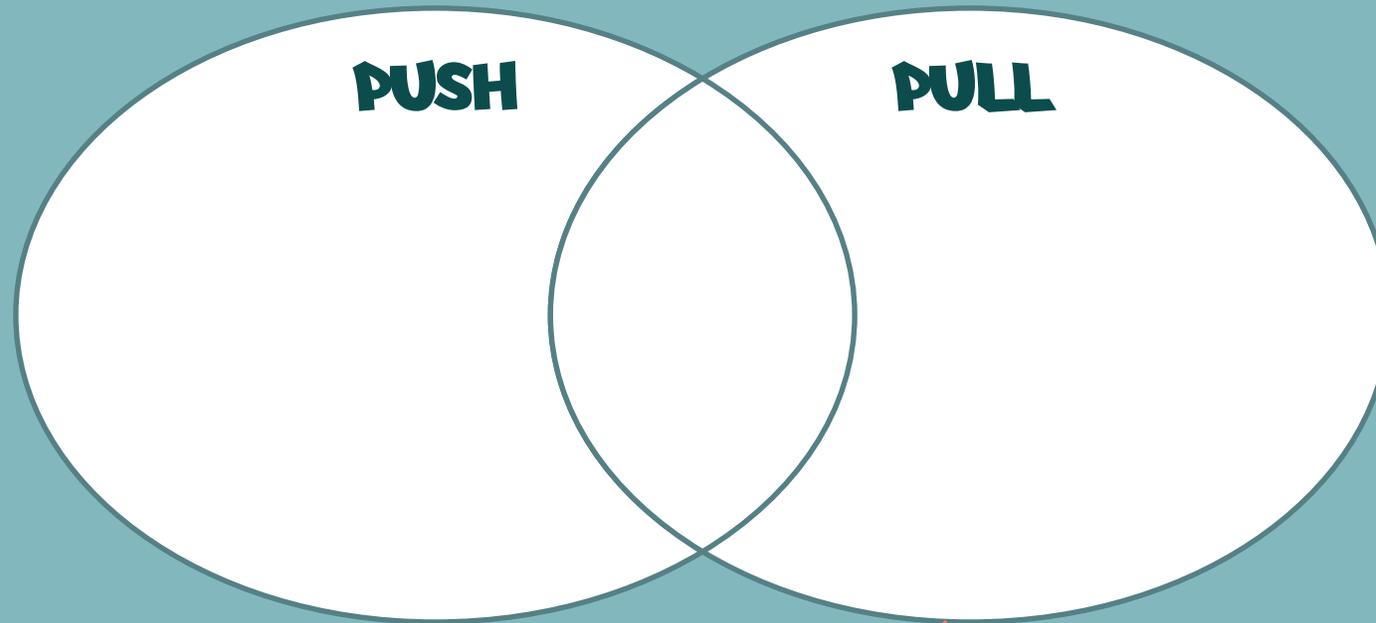
Today we are going to learn about what forces are and the effect they can have on objects.



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.





**WHAT FORCES HAVE YOU
HEARD OF BEFORE?**





When you jump in the air, your energy pushes your body off the ground, but it is gravity that pulls you back down.

Weight is the force of gravity acting on an object. You would weigh less on the moon because the moon has less gravity.

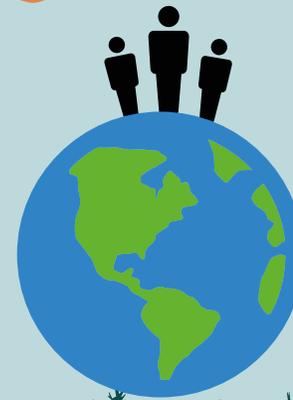
Gravity attracts all objects towards each other.

GRAVITY

How much gravity an object has depends on how big it is (its mass) as well as how close it is.

Gravity is a force that pulls objects towards the ground (the centre of the Earth).

Gravity always pulls, it never pushes.





Air resistance is a friction between air and an object. When objects move, they have to push air out of the way.

Friction is a push against a moving object. It slows it down. It happens when there is contact between two objects.

FRICITION

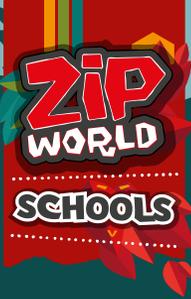


Can you think of a time when we might want lots of friction?
And an example of when we want to have the least possible friction?



The smoother the surface, the less friction is produced.





AIR RESISTANCE

A large white arrow pointing to the left, indicating the direction of air resistance.

PUSHING FORCE

A large white arrow pointing to the right, indicating the direction of pushing force.

FRICTION

A large white arrow pointing to the left, indicating the direction of friction.



The cyclist with high handle bars experiences more air resistance. This will slow them down and make it harder to pedal.

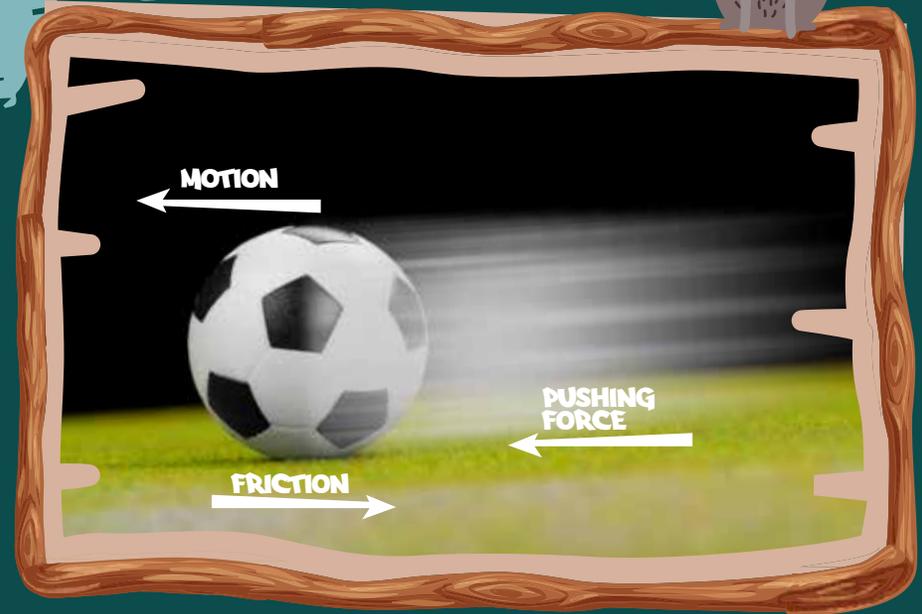
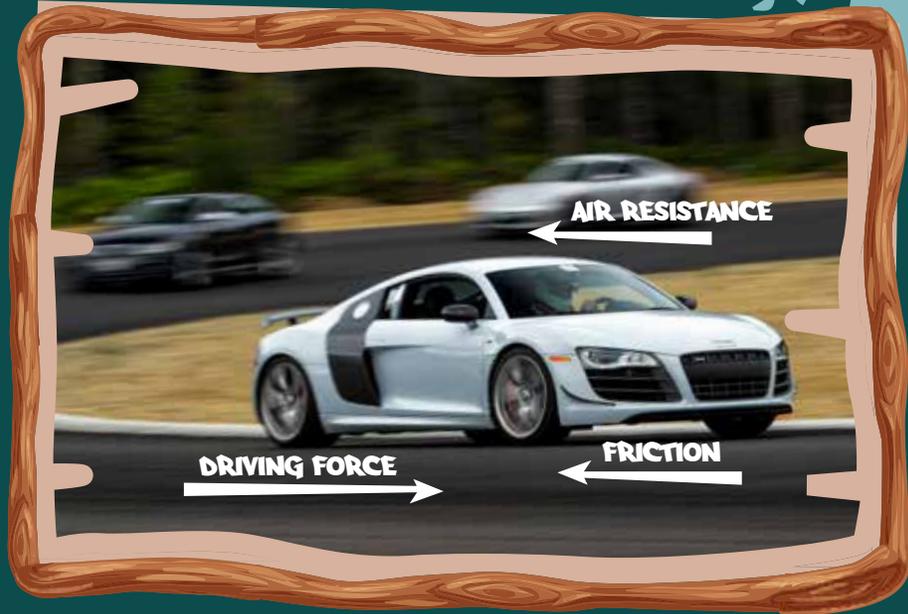




The ice is so smooth,
there was not much
friction between that and
the polar bear's feet!



The trampoline applies
an upward force on the
boy. Gravity acts on him in
the opposite direction.



All of these objects are moving. They have a pushing force pushing them forwards. Friction from the ground and air resistance are pushing against them.





Rubbing one hand against the other causes friction. Friction produces heat, which is why people do this when they are cold.



Even stationary objects have forces acting on them. Here, gravitational force is pulling the boy down. And the chair is reacting by pushing back up. The forces are the same size; they are balanced. He is not moving.



The teams are pulling with the same force – the forces are **balanced**. There is no movement.

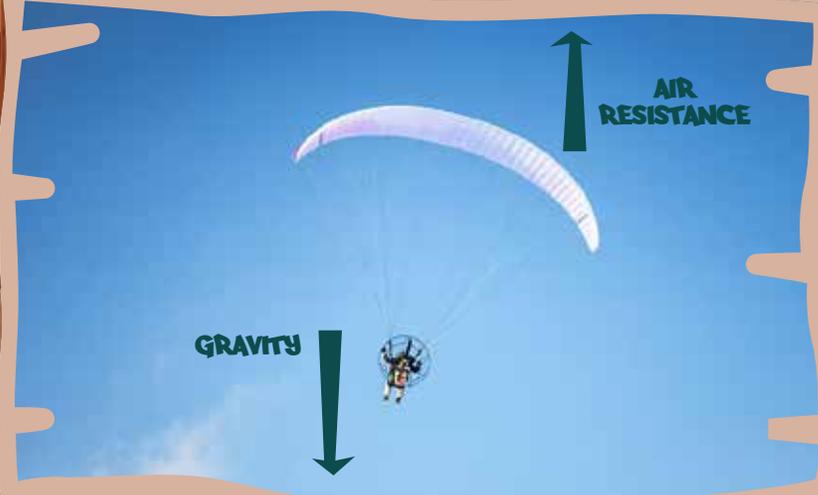


What happens when one team increases that force so that the forces are **unbalanced**?



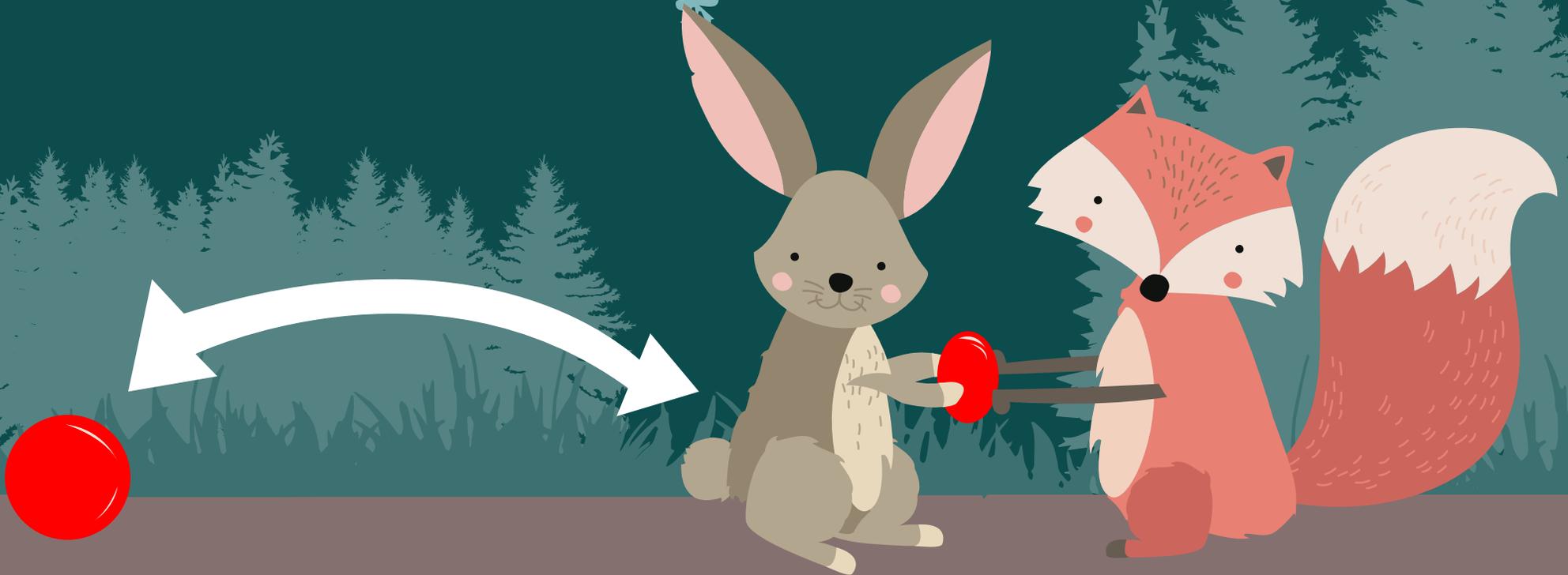


The ball changes direction after the batter pushes the ball with his bat.



This parachutist is falling because gravity is pulling him towards the ground. Air resistance is pushing upwards, in the opposite direction.

**THE PUSHING FORCE ON THE BALL
HAS CHANGED ITS SHAPE.**





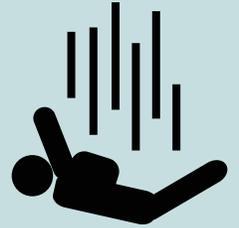
WE CAN SEE FROM ALL THOSE EXAMPLES THAT FORCES CAN CAUSE AN OBJECT TO...

FORCES CAN EVEN CHANGE AN OBJECT'S SHAPE...

CHANGE ITS SPEED

CHANGE ITS DIRECTION

MOVE OR STOP





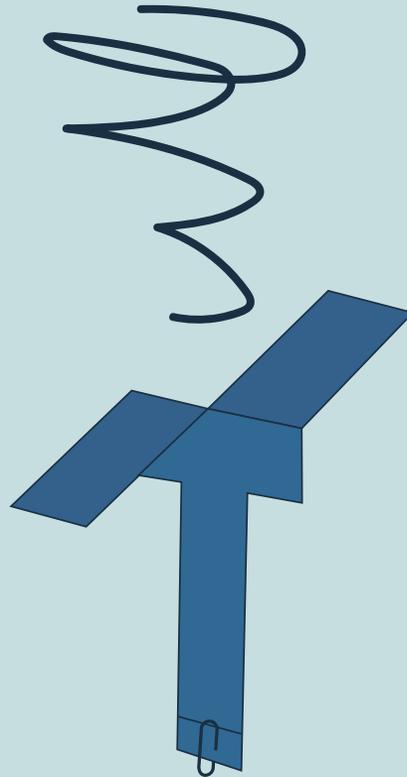
LET'S SEE FORCES IN ACTION!

In your groups, prepare your paper helicopter, using the instructions.

Stand on a chair and drop your helicopter – what happens?

WHICH FORCE IS
ACTING AGAINST THIS?

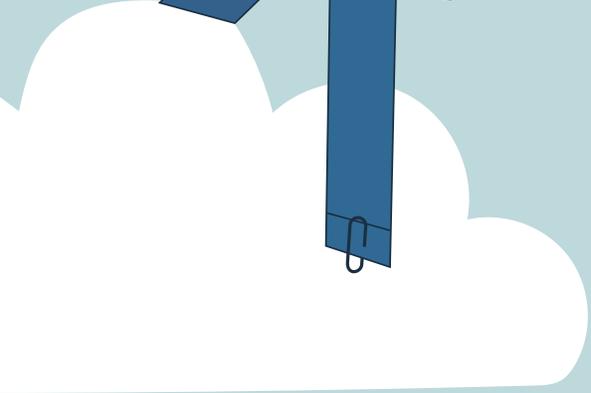
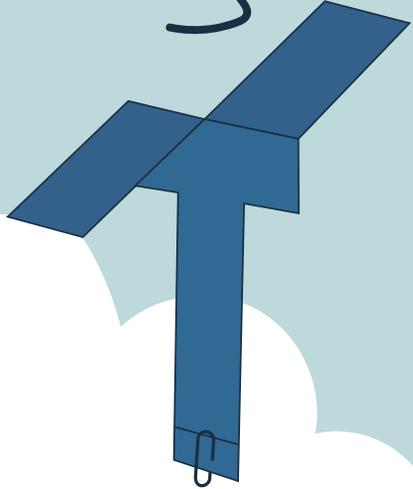
WHAT FORCE IS
PULLING IT DOWN?



Who in your class can
make their helicopter
stay up the longest?

If you have time, explore ways to make your helicopter faster/slower/spin more...Remember – scientists only change one thing at a time. Don't forget to consider how to measure your findings.

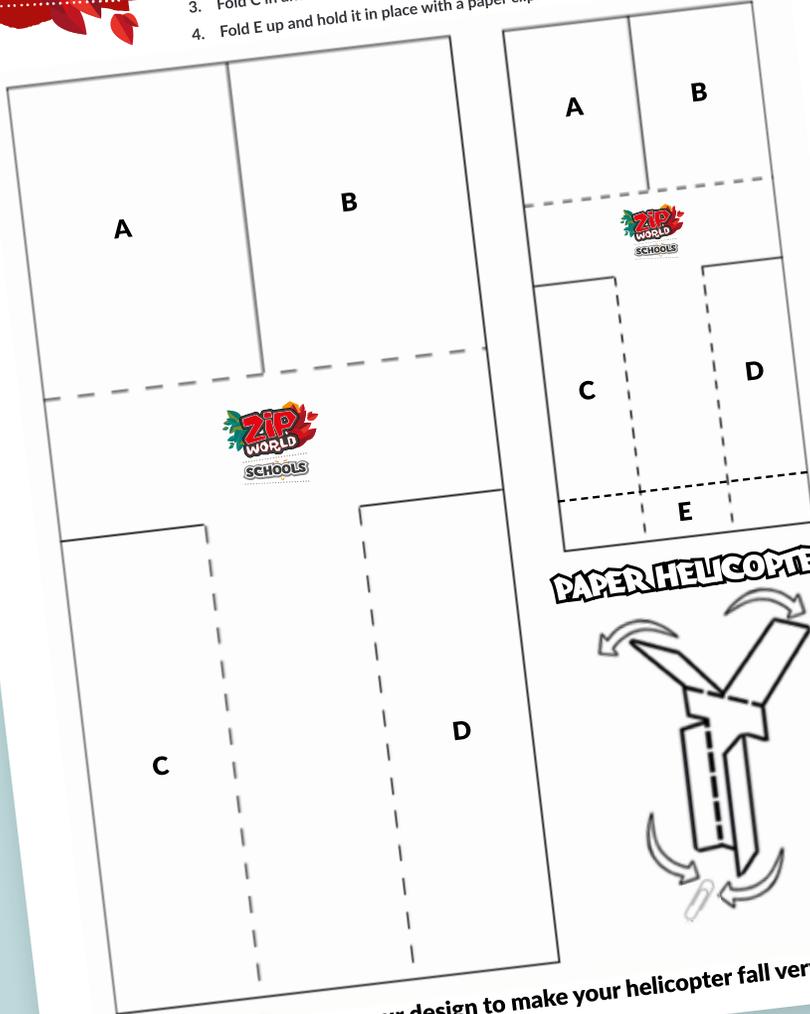
You may want to use more paperclips, different paper, cut the blades differently, try a different sized template or even use your imagination and create a whole new template!



FFOREST PRE-VISIT ACTIVITY SHEET 3

NAME: _____

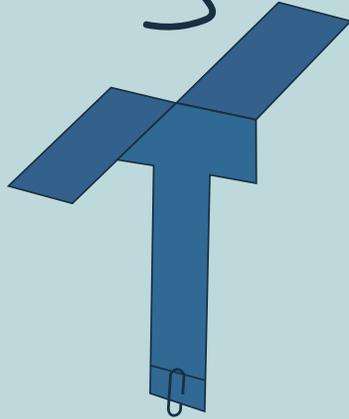
1. Cut along all the solid lines (don't cut the dotted lines!)
2. Fold A forwards and B backwards.
3. Fold C in and then fold D on top.
4. Fold E up and hold it in place with a paper clip.



PAPER HELICOPTER



CHALLENGE change your design to make your helicopter fall very slowly!



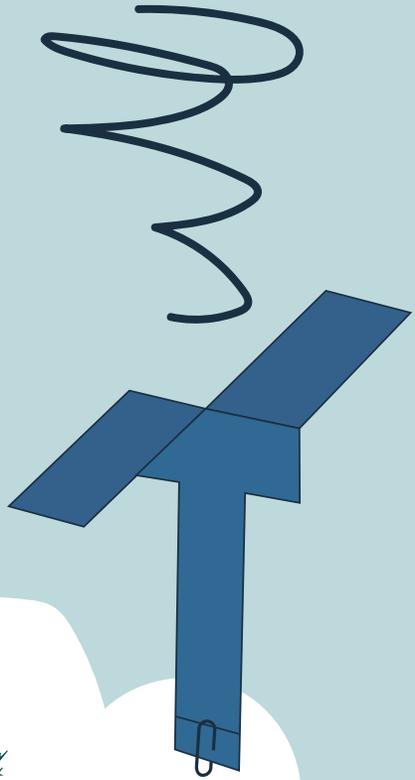


THE SCIENCE

BEHIND THE FUN

Gravity pulls the helicopter down.

The air resists the movement and pushes up each rotor separately, causing the helicopter to spin.





LOOK AT THESE PICTURES FROM ZIP WORLD.

Use what you have learned today to explain the forces in action in these pictures. When you are there, see if you can feel the effects of the forces acting upon you!



ENJOY!

