Science Investigation 2)

Forcing It: Exploring the Forces at Play During the Game

Learning objective - To learn all about the science of **physics** using the game of rugby.

Let's look at our science terms:

1. Matter
2. Energy
3. Physics
4. Force

Here are some words that you will need to learn and use during this lesson:

- Push
- Thrust
- Pull
- Motion
- Direction
- Size
- Air pressure
- Drag
- Gravity
- Balanced
- Unbalanced
- Scrum
- Exert

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Science Term 1 – Matter

Anything that takes up space and has weight.

Matter is :

- You
- The air you breathe
- The water you drink

Matter makes up all:

- Solids
- Liquids
- Gases

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Science Term 2 - Energy

The ability to do work.

Energy is the fuel for movement.

In order to push or pull or interact with matter, you need to have energy.

LISTENING SPEAKING PROBLEM SOLVING

Think & Talk:
Where do these things get their energy from?

- Toys
- Plants
- You

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- Toys get their energy from **batteries.**
- Plants get their energy from the **sun.**
- You get your energy from what you **eat** and **drink.**

With that energy, rugby players can exert energy all over the pitch with:

- Pushes
- Pulls
- Blocks
- Runs
- Tackles
- Throws

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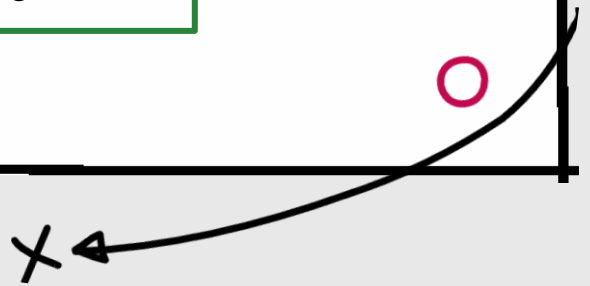
Science Term 3 - Physics

The branch of science used to study matter and energy.

It's all about how things move.



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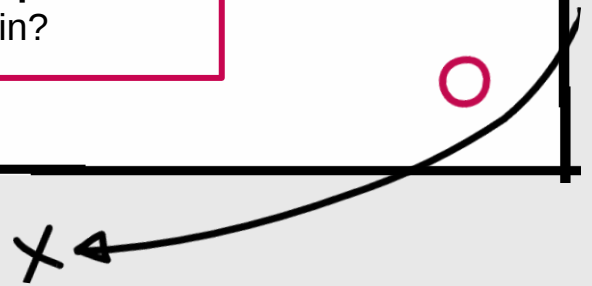
Science Term 4 - Force

A push or a pull interaction that starts or stops a motion.

Find something on your table to **push**.
What direction are you moving in?

Find something on your table to **pull**.
What direction are you moving in?



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Push and Pull

Think & Talk

Can you identify the players who are pushing and pulling?

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Balanced and Unbalanced

A force can be measured in **size** and **direction.**

That means forces can be **balanced** or **unbalanced.**

When forces are **balanced** it means forces are **pushing** or **pulling** on an object, but we don't see any movement.

Think & Talk:
Look around the classroom - are most things **moving** or standing **still**?

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Air Pressure and Gravity

Mostly **still**, but forces are acting on them. **Air pressure** and **gravity** don't stop just because something's on a table or hanging on a wall. If you're holding a tool, you're probably strong enough to hold it still in your hands. The force of **gravity** pulling the tool is **balanced** with your force **holding it up**.

Think & Talk:

What do you think will happen if you're asked to hold more and more things?

Remember to use some of the words you've learnt to answer the question.

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As you hold more and more things, eventually the **weight**, powered by **gravity** will **unbalance** those **forces** making them too **heavy** to hold anymore.
The **movement** of these things will bring them crashing down to the ground.

When **forces** are **balanced**, we tend to not see any movement.

We see movement when **forces** become **unbalanced**.
This is what we see acting on every player during the rugby **scrum**.

As you watch this video, **listen carefully** to the referee.

1. **Write down the years of each scrum.**
2. **In what year do we first hear the referee calling out commands?**

LISTENING PROBLEM SOLVING TEAMWORK

The Evolution of the Scrum

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Forces also help us to understand how:

aeroplanes fly us to other countries.

stadiums we play in are built.

Complete your activity sheets to show your understanding of the science of physics using the game of rugby.

PROBLEM SOLVING STAYING POSITIVE AIMING HIGH

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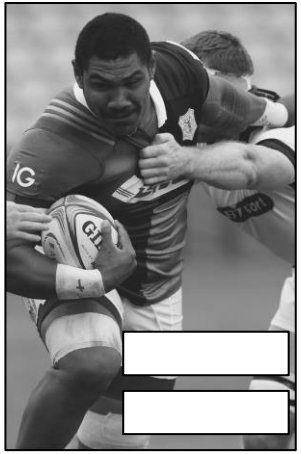
Activity 1 - Push or Pull? Start or Stop?

Look at the pictures showing different activities involving forces.
For each picture:

1. Write **push** or **pull** in the first force box**.**
2. Does the force cause the player to start or stop moving? Write **start** or **stop** in the second box.



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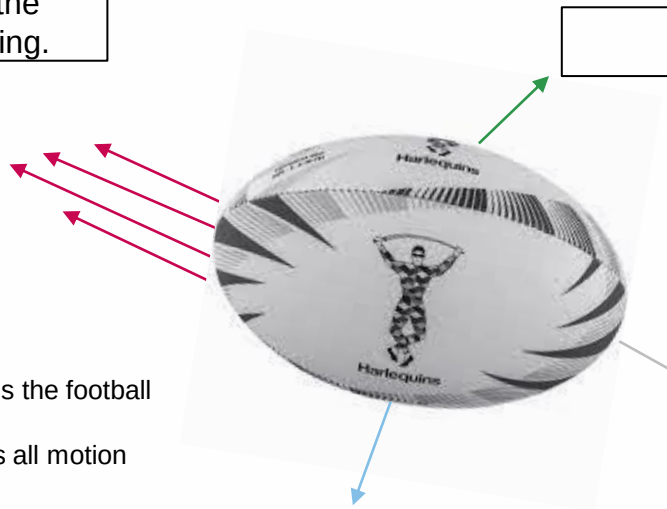
Activity 2 - Forces of Flight

Four opposing forces act on a rugby ball in flight. These forces are **lift, thrust, gravity** and **drag.** Because of the unique shape of the rugby ball, it can move in different ways when these forces are exerted on it.

Select each force to the way the ball is travelling.



Direction of travel

Thrust is the force that propels the football forward.
Drag is the force that opposes all motion through the atmosphere.
Gravity is the force that makes an object fall to the ground.
Lift is generated by air flowing over an object.

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Forcing It

How many words can you find?

Why not time yourself and challenge your classmates to see who can complete the wordsearch the quickest?

S	G	N	N	E	N	E	R	G	Y	E	Y	R	T
T	Y	O	T	T	T	N	O	T	E	U	U	I	S
A	N	I	H	H	H	B	A	L	A	N	C	E	G
P	C	T	R	O	A	D	E	A	S	O	Y	R	F
P	E	O	U	Y	T	S	I	T	P	Y	A	O	T
N	I	M	S	G	D	R	S	L	A	V	R	S	L
S	T	D	T	I	I	G	R	D	I	C	E	T	H
C	F	R	T	S	R	Y	T	T	E	L	T	E	H
I	R	A	R	L	E	A	Y	S	S	A	T	C	S
S	E	G	A	P	C	L	R	P	T	A	A	H	U
Y	L	I	T	U	T	H	U	U	O	C	M	F	P
H	I	R	S	T	I	C	O	L	P	S	C	E	E
P	I	E	C	V	O	A	F	L	C	R	N	F	M
E	P	I	I	R	N	S	R	S	N	T	O	T	S

DIRECTION
DRAG
MOTION
FORCES
STOP
PUSH
START
THRUST
MATTER
PULL
GRAVITY
PHYSICS
BALANCE
ENERGY

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