Simple Machines

What are simple machines?

Simple machines are machines that we use to make work easier. There are six simple machines. Can you find them in the word search?

H	E	C	E	L	P	N	E	E	A	U	E	M	V
M	P	S	A	L	E	A	A	E	C	M	L	E	N
A	E	I	R	X	N	A	Y	L	D	E	W	M	C
C	P	M	E	C	A	L	S	E	E	I	H	I	E
H	R	P	E	I	L	A	I	E	L	P	C	A	I
I	P	L	L	L	P	M	X	E	M	L	N	N	L
N	L	E	I	R	L	E	W	L	L	L	U	A	E
E	S	L	L	C	L	L	W	L	E	I	M	P	X
S	G	R	L	N	L	E	E	W	L	H	Y	M	S
W	N	G	M	W	D	E	N	I	L	C	N	I	E
E	W	H	E	E	L	V	P	P	E	P	C	L	A
C	E	L	L	W	E	R	C	S	H	I	L	C	L
L	W	E	D	G	E	N	N	L	E	E	E	E	E
E	R	E	V	E	L	H	A	I	E	E	E	E	R

SIMPLE
MACHINES
WHEEL
AXLE
PULLEY
INCLINED
PLANE
LEVER
WEDGE
SCREW

Simple Machines help us by making work easier. **They give us a mechanical advantage** to the work we are doing.

They do this by increasing or changing the direction of a force.

Simple machines are all around us and by combining simple machines we can make more complex machines.

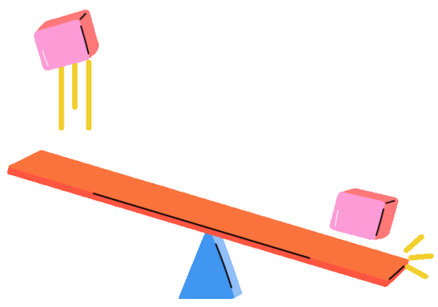
Simple Machines

Match Me

Match the picture to the name of the simple machine and find out more about how they work.

1

2



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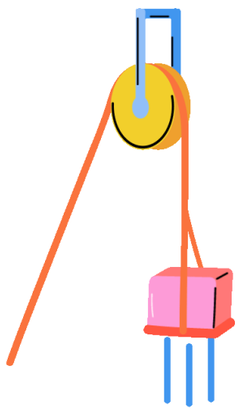

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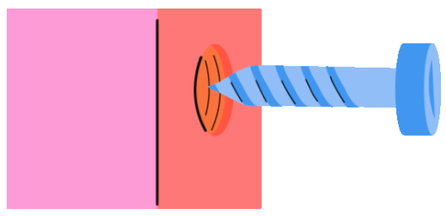

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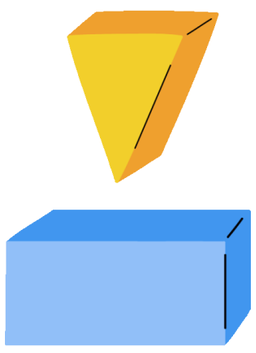

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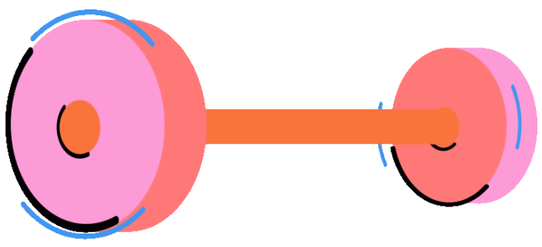


A Wedge

What Two inclined planes together to create a sharp edge, helping to split an object in half.

Where The head of an axe is a fine wedge to make chopping wood easier!

B Inclined Plane

What A ramp

Where I bet you have played on an inclined plane before. Do you like playing on slides?

C Wheel and Axle

What Using a wheel and a rod (axle) this simple machine can help lift or move loads through movement.

Where Have you ever ridden a tricycle?

D Pulley

What A wheel with a rope that is looped over it to redirect force.

Where An lift is a complex machine using lots of pulleys to move the elevator up and down.

E Screw

What A slide (inclined plane) around a nail (rod).

Where Screws in furniture and construction (but we mostly see the screw head, not the whole screw).

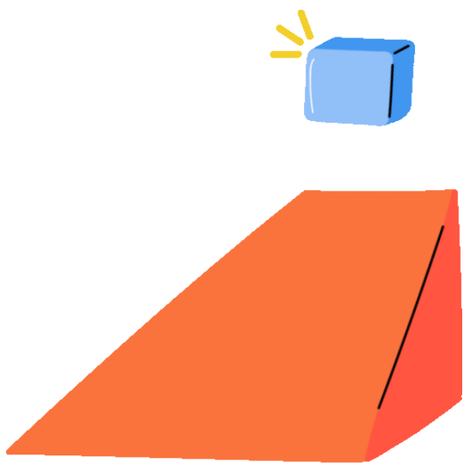
F Lever

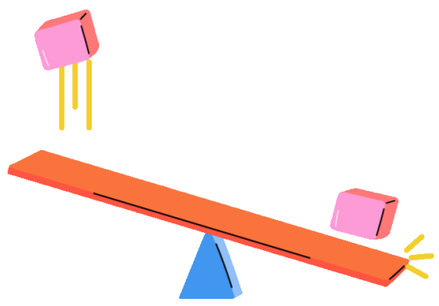
What A straight object which uses a pivot as a turning point.

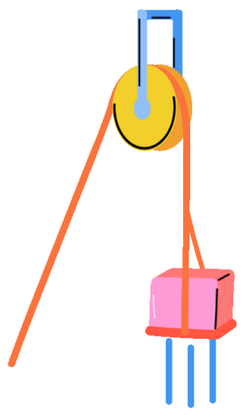
Where Have you played on a see-saw? Then you have played on a lever!

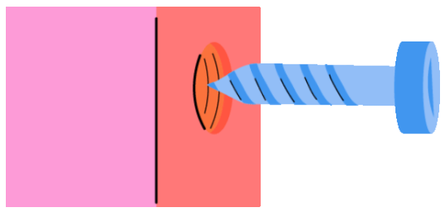
The Great Hunt for Simple Machines

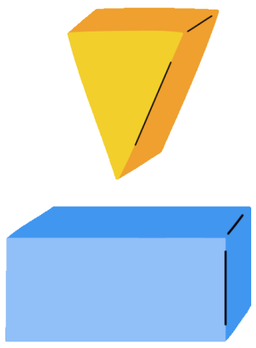
You can find Simple Machines everywhere when you know what to look for!
Hunt around your house to find simple machines and draw them in the spaces below.

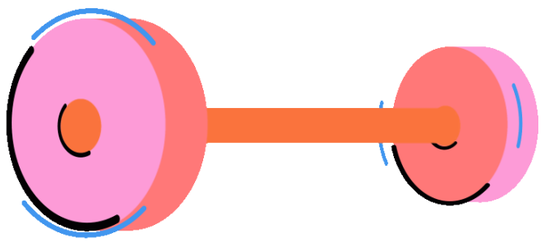










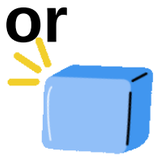


Tinker at Home

Did you know you can explore simple machines at home with everyday bits and bobs? Check out the ideas below and give it a go!

Inclined Plane

You need **a moveable flat surface (ie baking trays), a stack of books or cardboard boxes and a toy car.**



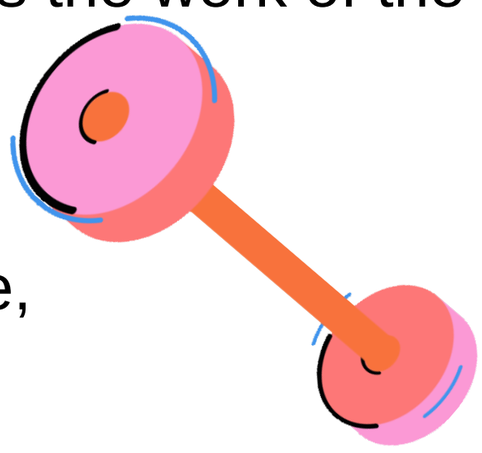
What? Make a ramp by leaning one end of your flat surface on top of your stack of books. Experiment how fast the car travels down the ramp depending on the height of the ramp.

Add and remove books to change the incline of the ramp and retest with your car. Does the car speed change when you change the incline?

How? Why do you think the incline changes the speed the car travels? As your ramp gets higher, your car will travel along it at a faster speed. This is because of the **mechanical advantage**. The incline of the ramp makes the work of the car easier.

Wheel and Axle

Did you know that wheels were used to create Stonehenge, making it easier to move the heavy stones.



You need **cardboard box, axles (skewers, straws, chopsticks, pencils) and wheels (CDs, paper plates, bottle tops),** and **adhesives (glue, sellotape, string, bluetak).**

What? Check out wheels and axles in motion. Pop your favourite toy into the cardboard box and push it along the ground. Notice how easy it is to push around.

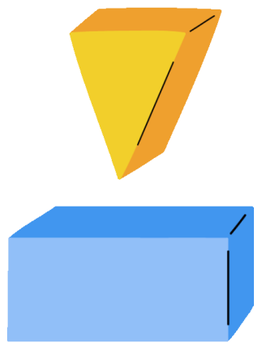
Using the bits and bobs you have collected, make some wheel and axle machines to attach to your box, creating a cart with wheels. Now try and push your toy around. Did the simple machine make it easier?

How? The wheel and axle work to reduce the force of friction allowing objects (ie cardboard boxes) to be moved with less energy (effort).

Tinker at Home

Wedge

You need **paper, cardboard boxes or books of the same height (x2)** and **a pencil.**



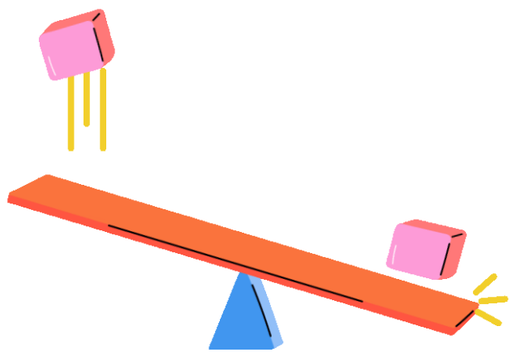
What? Explore the support of a wedge with this simple experiment. Lay two boxes/books down on a flat surface with a gap in the middle. Lay the piece of paper over the gap. With your pencil, use the flat end and attempt to make a hole in the paper. Using a fresh piece of paper, use the sharp end (wedge) of the pencil to make a hole.

Which end of the pencil was it easier to make a hole with?

How? Wedges give a **mechanical advantage** by multiplying the force along the inclined planes making the reaction stronger.

Lever

You need **flat surface (popsicle stick, ruler etc), fulcrum/pivot point (toilet paper roll, pencil, pen, binder clip, lego), container (paper cups, bottle lids etc), range of small objects (marbles, coins, lego etc), adhesive (glue, selloptape etc)**

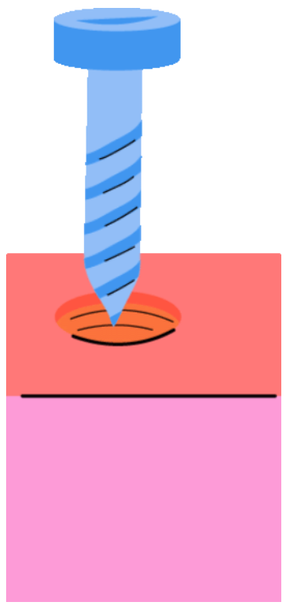


What? Attach your containers to one end of your flat surface. Place the flat surface onto your cylinder so that the cylinder is in the middle of the surface. This is your lever.

Place an object in the container and apply force on the other end of the lever. You have created a mini catapult using a lever!

How? The cylinder acts as a fulcrum (pivot point) for the lever. This means the effort used to push down the ruler is enhanced allowing your load to be lifted (and in some cases catapulted out!). You can move your fulcrum (cylinder) along the flat surface and experiment with the impact that has on the effort needed to catapult your object (move the load).

Tinker at Home



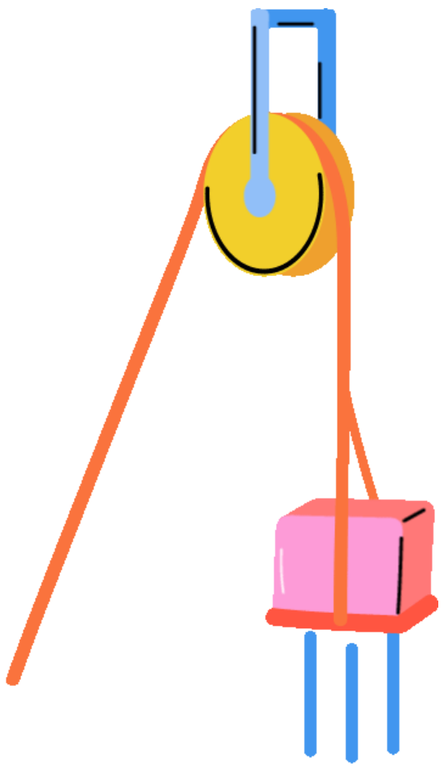
Screw

You need **a few screws, nails, screwdriver and 2 x cardboard.**

What? Try and nail your two pieces of wood together by screwing your nail through both pieces. Once you have joined the cardboard together try and pull the pieces apart.

Next try the same experiment using the screws. Was it easier to screw the pieces together with the screw or the nail? Which tool (screw or nail) held the cardboard together better? Which was stronger?

How? The rotational force of the inclined plane increases force to complete the task making the work easier to complete. The up and down force of the screw also adds additional strength, enabling objects to hold the two pieces together, making them harder to pull apart.



Pulley

You need **pulley wheel (rolling pin, wheel and axle), rope (string, ribbon etc), small bucket/container, favourite toys.**

What? Fill your container with some of your favourite toys. Connect your string to the container and try to lift the container with just the string.

Next have a friend hold the pulley wheel (so the wheel spins freely) and run the rope over the wheel. Attempt to pull the container up with the **mechanical advantage** of the pulley. Experiment with different objects and weights.

How? Due to the rotation of the pulley wheel, the force needed to life the object is reduced. For bigger weights you can use more ropes and wheels. If you use two ropes and wheels, the effort needed to lift the object is split into two.

We look forward to seeing you in Alert Level 1

te manawa
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