Clive Disher Science Camp (Bairnsdale and Sale Joeys).

Our science camp explored soundwaves, gravitational and mechanical waves.

Our photo story and short videos from the Clive Disher Science Camp can be viewed here: https://youtu.be/ha0m55iWiuk

Details of each of the science experiments can be viewed here:

RISK WARNINGS ARE HIGHLIGHTED THROUGHOUT

To defeat the evil mad scientist, we need to conquer a number of challenges to find the invisible energy waves. For every challenge you complete you will collect 1 piece of a jigsaw. Once all the challenges are complete you will be able to complete the 12-piece jigsaw (jigsaw template on page 9 of document), unlock the evil mad scientist box and destroy his super power energy source.

There will be two groups each competing for separate hidden energy treasure (a mixture of Joeys).

At the start everyone gets a large bag with a label to store their own science experiments, so they can take them home. This becomes their science bag!

To find these invisible energy waves, first, we need to talk about what a wave is.

HAND SANITISER TIME

Challenge 1: Can we work as one big group to make a huge model of a wave to show how waves work?
Using the following video as a wave machine guide:
https://www.youtube.com/watch?v=VE520z_ugcU
Equipment required (one group)

- >50 Kebab sticks [WARNING KEBAB STICKS CAN BE SHARP]
- Duct tape (4m)
- Scissors (save the scissors for future experiments) [WARNING SCISSORS ARE SHARP]
- >100 Marshmallows

What happens if I lift the marshmallows higher or lower to start the wave?
What happens if I start the wave more quickly / more slowly?
What happens if we remove the marshmallows?
[DISPOSE OF WAVE MACHINE IN THE RUBBISH BIN WHEN COMPLETED]

Sound is a wave. And most sound like my voice, right now, is travelling through air.
So, let's find out more about air. Air might seem invisible but air is made from matter.

Challenge 2: If air is made of matter it must have a mass.

But when I look at the empty kitchen scales. There is air on the scales but the scales say zero grams - are you sure?

Can we weigh air?

Using the following video as a balloon scale guide:
See: https://www.youtube.com/watch?v=o5LT_wfl98w
Equipment (group experiment – Demonstration):

- Kitchen Scales
- Two Balloons [CAREFUL INFLATING THE BALLOONS – USE A PUMP IF NECESSARY]
- Long Stick (from campsite)
- Three Pieces of string (about 50cm each)
- Scissors (save the scissors for future experiments) [WARNING SCISSORS ARE SHARP]

[DISPOSE OF BALLOONS AND STRING IN THE RUBBISH BIN WHEN COMPLETED]

Did we show that air has a mass and therefore contains matter. Yes. Challenge completed!

Challenge 3: If air contains matter, can that matter move? Can we move the matter in air to launch a rocket?

To make paper rocket launchers, see the following video as a guide:
https://www.youtube.com/watch?v=ePRzvS3sceQ
Equipment (individual experiment):

- Paper (small square of paper per person)
- Sticky tape (save the sticky tape for future experiments)
- Scissors (save the scissors for future experiments) [WARNING SCISSORS CAN BE SHARP]
- Textas (save the textas for future experiments)
- Paper Straw (one per person) [NO SHARING OF STRAWS OR ROCKETS]

Did we move air matter to launch a rocket? Yes. Challenge completed! Store rockets in your science bag.

HAND SANITISER TIME

Challenge 4: If air contains matter can we control the way we move objects? Can we move chocolates by moving air?

Sucking up smarties with straws
See the following video as a guide: https://elliekellyblog.co/the-smartie-race-game/
Equipment (individual experiment):

- Paper Straw (one per person) [NO SHARING OF STRAWS, CUPS OR CHOCOLATES]
- Two paper cups
- Two bags of chocolates (Smarties/M&M and Maltesers)

Did we move air matter to lift chocolates? Yes. Challenge completed!

Joey energy booster required. Joeys can eat their own Smarties and Maltesers. Dispose of remaining material in the recycling.

HAND SANITISER TIME

You might still not be convinced? How do we know that it is this moving matter making the sound. Well we can feel it. Hum a note and place your hand gently against your throat. You can feel the vibration of the air. The same happens in some musical instruments.

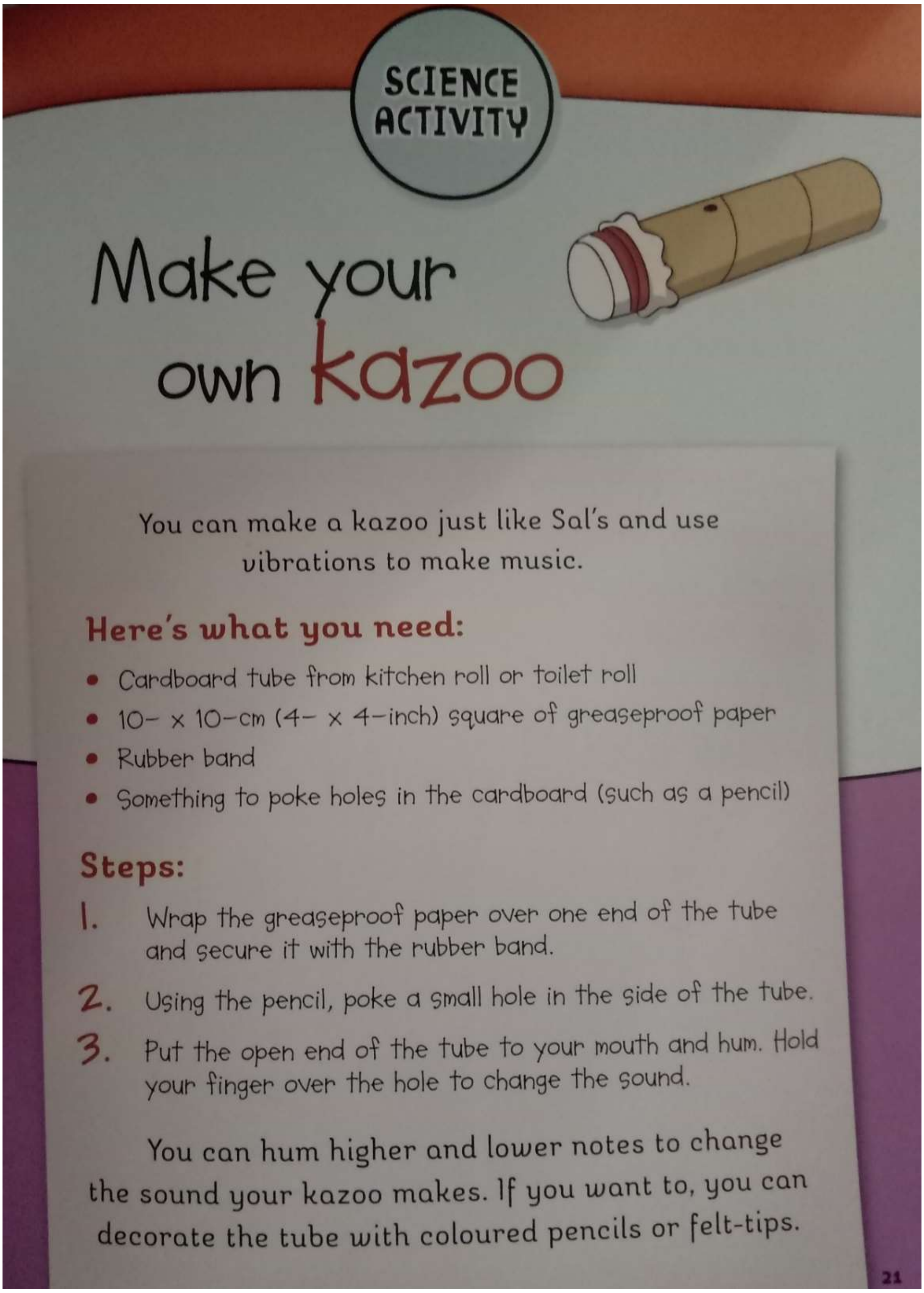
Challenge 5: Can we make a musical instrument where we can feel the soundwaves moving?

To make paper towel Kazoos, you need:
Equipment (individual experiment):

- Paper towel roll (one per person)[NO SHARING OF PAPER TOWEL ROLLS]
- Scissors (save the scissors for future experiments) [WARNING SCISSORS CAN BE SHARP]
- Baking paper (15cm x 15cm square)
- Rubber bands (one per person)
- Textas to share for decoration (save the textas for future experiments)

Instructions to make are on the next page.

Did we make an instrument and feel the soundwaves? What did they feel like? Challenge completed. Store the paper towel Kazoo in your science bag.


SCIENCE ACTIVITY

Make your own kazoo

You can make a kazoo just like Sal's and use vibrations to make music.

Here's what you need:

- Cardboard tube from kitchen roll or toilet roll
- 10- x 10-cm (4- x 4-inch) square of greaseproof paper
- Rubber band
- Something to poke holes in the cardboard (such as a pencil)

Steps:

1. Wrap the greaseproof paper over one end of the tube and secure it with the rubber band.
2. Using the pencil, poke a small hole in the side of the tube.
3. Put the open end of the tube to your mouth and hum. Hold your finger over the hole to change the sound.

You can hum higher and lower notes to change the sound your kazoo makes. If you want to, you can decorate the tube with coloured pencils or felt-tips.

21

Picture of the instructions taken from science reader "Curious Pearl, Science Girl: Masters Sound" pg 21.

So I think we know what waves look like and are now convinced that Air contains Matter – so air contains stuff.

So lets think of an ocean. Waves are made up of moving water.

Sound is also a wave and needs to travel through "stuff" – air, water, objects, etc…
Soundwave travels through the air because there is "stuff" in the air.

In outer space there is no matter, you can not hear, there is no sound.

The waves at the beach all look the same, but soundwaves are not all the same. We made different waves on our wave machine. We can make high sounds and low pitch sounds and loud and quiet sounds. If sound travels through the air like waves then how do we make different sounds. How does a musical instrument work?

Challenge 6: Can we make different sounds by changing the length of tubes of air?

To make Paper Panpipes see the following video as a guide: https://www.youtube.com/watch?v=BaymX3qJRbQ
Equipment (individual experiment):

- 2-3 paper straws [NO SHARING OF STRAWS]
- Sticky tape (save the sticky tape for future experiments)
- Scissors (save the scissors for future experiments) [WARNING SCISSORS CAN BE SHARP]

What did you notice? Are the longer tubes of air – higher or lower pitch notes?

Did we make different sounds? Yes. Challenge Completed. Store the paper panpipes in your science bag.

HAND SANITISER TIME

Challenge 7: Now can we make those different sounds into a tune? Using what we know about different lengths of tubes, can we make music?

To make glass bottles sing instructions, see the 'Make glass bottles sing' SciScout challenge card. See page 17-19 of document for a copy.
Equipment (group experiment):

- 6 identical glass jars per group [WARNING USE JARS CAREFULLY AS GLASS CAN BREAK]
- Water [WARNING – WATER CAN BE A SLIP HAZARD IF THERE IS A FLOOR- NOT AS RELEVANT ON GRASS]
- 6 Spoons
- Musical tunes cards. See page 10-11 of document for printable copies.
- Musical jar labels. See page 12 of document for printable copies.

Could we make a tune from the sounds? Yes. Challenge Completed.

[TIP OUT WATER CAREFULLY AND ADULTS DISPOSE OF GLASS JARS IN RECYCLING]

Hey. I said at the start that sound is a wave and needs to travel through "stuff" – air, water, objects, etc… Can we get sound to travel long distances through objects?

Let's try?

Challenge 8: Can we get sound to travel long distances through objects?

To make string telephones, see the 'String telephones' SciScout challenge card (page 20 of document).
Equipment (individual experiment / work in pairs):

- Two paper cups per person
- String (about 3-4m per person)
- Two Paper clips (if necessary)
- Pencil or nail to poke holes in the base of the cups [WARNING NAILS ARE SHARP. ADULT HELP REQUIRED]

What happens when the string is loose?

What happens when the string is tight?

Which is better to transmit the sound?

Did we get sound to travel long distances through objects? Yes. Challenge completed.

[CAREFULLY UNDO CUP USED BY PARTNER AND SWAP WITH YOUR PARTNER. REMAKE TELEPHONE SO BOTH CUPS WERE THE ONES YOU PUT TO YOUR MOUTH. MAKE SURE LEADERS HAVE NAILS STORED SECURELY] Store Telephone in your science bag.

HAND SANITISER

Half-day review and reflect: I think that these first eight challenges have shown us what a wave looks like, how waves can change in size – big and little (amplitude) and speed – fast and slow (frequency). We have proven that air has matter and that sound travels like waves through that matter. But are there other types of invisible waves other than sound?

Joey energy booster required. Put ALL items aside and break for a meal.

HANDWASHING TIME

There are other types of invisible waves other than sound? We are now going to learn about gravity, mechanical waves and forces.

Blow up a balloon and release it.

[CAREFUL INFLATING THE BALLOONS – USE A PUMP IF NECESSARY. DON'T AIM FOR ANYONE]

What happened? It flies everywhere. It falls to the ground. [FIND BALLOON AND DISPOSE IN THE RUBBISH BIN]

Challenge 9: Can we control this motion (movement)?

To make a balloon on a string, see: https://sciencebob.com/make-a-balloon-rocket/
Equipment (group experiment)

- Balloon [CAREFUL INFLATING THE BALLOONS – USE A PUMP IF NECESSARY]
- Straw
- Sticky tape (save remainder for later experiments)
- String (3m long)

Did the balloon go in one direction? What direction did the air go, what direction did the balloon go?

The filled balloon had stored energy that when released became motion. Challenge completed.

[DISPOSE OF EXPERIMENT IN THE RUBBISH BIN]

Challenge 10: Can I change its direction and speed?

Drop a bouncy ball. **What happened?**

Why did the ball fall? What is the roll of gravity?

The lifted ball had stored energy that when released became motion.

To make a pendulum, see the ‘Pendulum’ SciScout challenge card. See page 15-16 of document for a copy.
Equipment (group experiment)

- Small rock or twig (instead of Lego brick)
- String (~80cm)
- Scissors (save for future experiments)
- Blue Tac
- Timer (use mobile phones)

How long does ten swings take?

What happens if you change the mass of the rock/twig? Do the ten swings happen faster/slower/the same?

What happens if you lift the rock/twig higher to start? Do the ten swings happen faster/slower/the same?

The lifted ball again had stored energy that when released became motion. Challenge Completed.

[DISPOSE OF EXPERIMENT IN THE RUBBISH BIN]

Challenge 11: Can I create something to launch a ball?

To make a catapult, see ‘Projectile motion’ SciScout challenge card. See page 14 of document for a copy.
Equipment (individual experiment):

- 5 Popsicle sticks
- 5 elastic bands
- Wooden spoon
- Pom pom
- One central cup/tub/bucket [WARNING AIM AT BUCKET NOT AT PEOPLE]

What happens if you change the size of pom pom? What happens if you bring the catapult closer or further from the bucket? What happens if you pull down harder on the spoon before releasing the pom pom?
The catapult had stored energy when pulled back and then when released the energy became motion. Challenge Completed. Store the catapults in your science bag.

Challenge 12: Can we do the same for Paper?

To make paper aeroplanes there are some different models of paper airplane instructions on the following page.

Equipment (Individual experiment):

- Paper [WARNING DON’T AIM PLANES AT PEOPLE]
- Textas (for decoration)

What changes the way they fly? What makes the plane move?

Throwing the plane gives the plane thrust, the wing design gives the planes lift (keeps the plane flying), gravity is pulling the plane downwards too. Store the planes in your science bag.

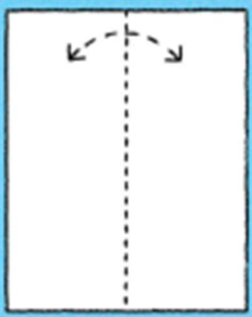
This is the final experiment, so pack away in a box all of the reusable items like scissors, kitchen scales etc.

Review & complete the 12-piece jigsaw to find the secret energy source. There you will unlock the evil mad scientist box and destroy his super power energy source.

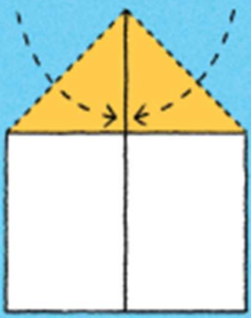
HAND SANITISER

ULTRADART

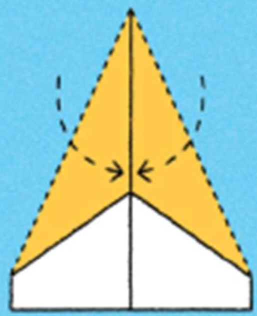
Launch the Ultradart firmly for fast, straight flights.
How far can you make it zoom?



1. Fold the paper in half and open it out flat again.

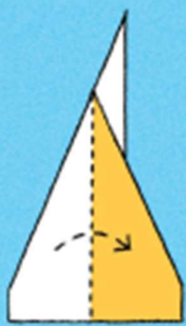


2. Fold the top left and right corners to the middle.



3. Fold the top corners down again.

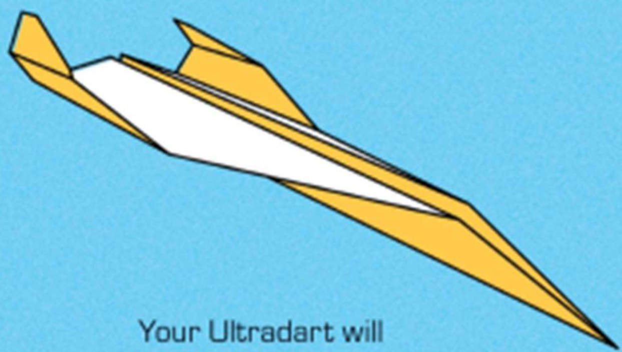
4. Fold the plane in half from right to left.



5. Fold like this, to make a wing. Repeat on the other side.

6. Fold the wing in half, then unfold it. Repeat on the other side.

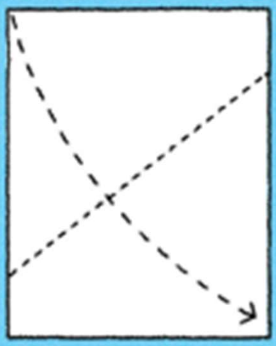
7. Fold back the wing tip. Repeat on the other side.



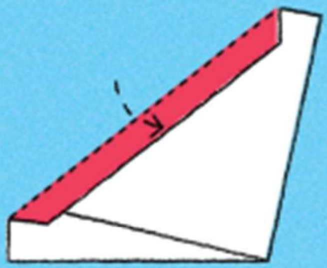
Your Ultradart will look like this.

SKY FIN

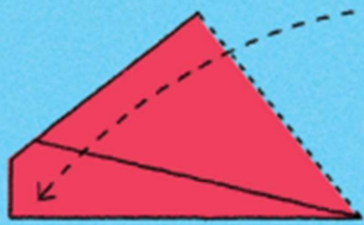
To find out how many ways this plane can fly, tilt its wings up or down at different angles.



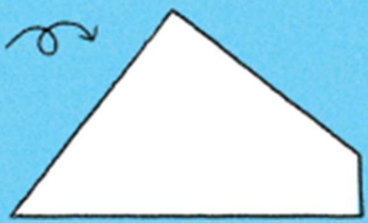
1. Fold the top left corner down to the bottom right corner.



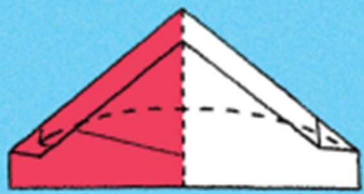
2. Fold down the sloped edge, as shown here.



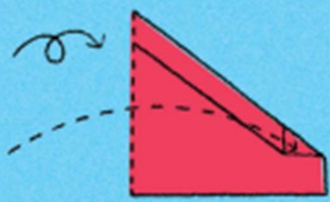
3. Fold as shown, so the top right corner meets the bottom left corner.



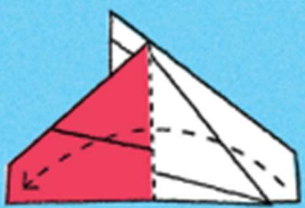
4. Turn the paper over.



5. Fold just the top layer over, as shown here.

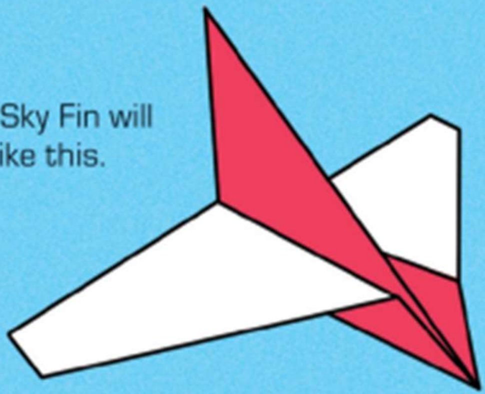


6. Repeat on the other side.



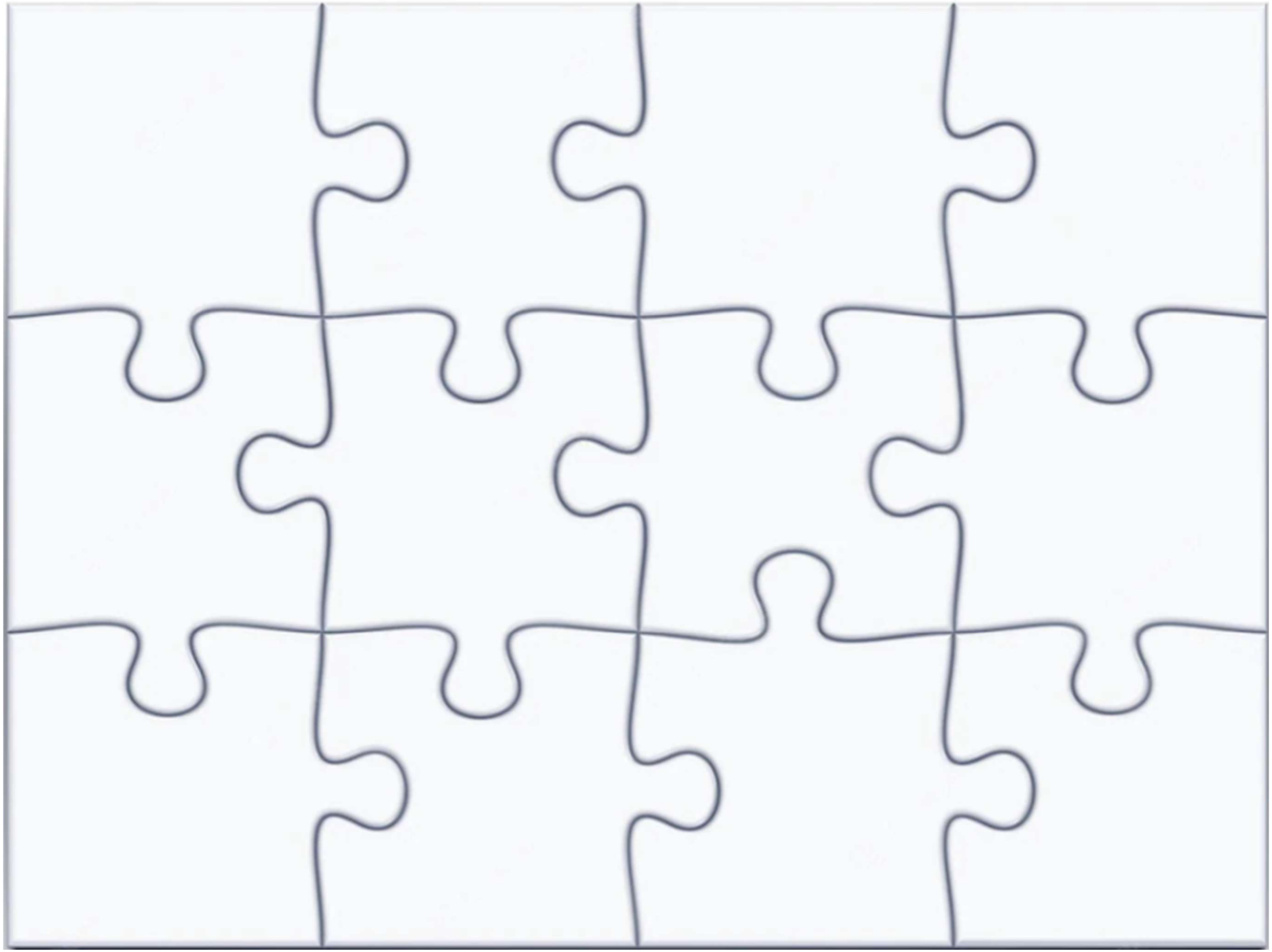
7. Fold back the wing tip. Repeat on the other side.

Your Sky Fin will look like this.



Both are taken from Usborne Activities “100 Jet Planes to Fold and Fly”

Jigsaw template:



MUSICAL
TUNE
CARDS
FOR
GLASS
JARS

Twinkle Twinkle Little Star

1 1 5 5 6 6 5

4 4 3 3 2 2 1

5 5 4 4 3 3 2

5 5 4 4 3 3 2

1 1 5 5 6 6 5

4 4 3 3 2 2 1

MUSICAL

TUNE

CARDS

Jingle Bells

3 3 3

3 3 3

3 5 1 2 3

4 4 4 4

4 3 3 3

3 2 2 3 2 5

MUSICAL
GLASS
JAR
LABELS

1	**2**	**3**
4	**5**	**6**
1	**2**	**3**
4	**5**	**6**

Clive Disher Science Camp (Bairnsdale and Sale Joeys)

Total quantities of Equipment required – Summary (Quantity estimates are for 30 kids)

Science-related Experiment Consumables

Large bottle of Hand sanitiser
Bamboo Skewers (1 pack containing at least 50)
Roll of Duct PVC tape (>3m required)
Rubber bands (1 pack of at least 210 bands)
30x ziplock large bags with labels
3x bags of Pascall Marshmallows 280g (for wave machine)
Paper straws (at least 150 required)
Ball of String (at least 150m required)
Paperclips (at least 60 required)
120x Paper cups
3x bag of fun-size chocolates – Smarties
3x bag of fun-size chocolates – Maltesers
Pack of 30 Textas
Pencils (12 pack)
A4 coloured paper (at least 90 sheets)
2-4 packs of Sticky tape with dispensers
2m of Baking paper
BluTak (small pack)
20x Balloons
Balloon pump (optional)
60x Wooden spoons
240x Popsicle sticks
90x Pom poms
Kitchen Scales
2-4x Scissors
Timer or use mobile phones
6x Nails
A Bouncy ball
An empty tub/bucket/box
Musical tunes cards (4 copies of each tune printed)
Musical jar labels (3 copies needed for 6 groups)
Paper plane instructions (15 copies of each printed – shared in pairs)
Two blank jigsaws (printed) and leaders to draw maps and cut up before day begins.
30x empty paper towel rolls
24x empty glass jars (4x 6 identical jars)
Water (at campsite)
Tables and chairs (at campsite)
Four Long Sticks (at campsite)
Small rocks or twigs (at campsite)
4-5x Labcoats (loaned from Secondary College) for evil scientists
PRIZE: Additional 2x bags of Pascall Marshmallows 280g

STEM Program
Projectile Motion

Plan

Materials needed:
1. Sticks
2. Rubber bands
3. Plastic or wooden spoon
4. Pom poms or marshmallows
5. Tape measure (optional to measure how far your projectile goes!)

Do

1. Make a stack of paddlepop sticks (we suggest a stack of 4 or 5) and join them together at each using rubber bands.
2. Take two additional sticks and stack them together. Rubberband them together on just one end.
3. Pull the two paddle pop sticks slightly apart and place the larger stack of paddlepop sticks in between them.
4. Place a rubber band around the stack of sticks to just the upper paddle pop stick.
5. Secure the two stacks together with another rubber band.
6. Wrap a rubber band or maybe 2 around the spoon to connect it to the upper paddle pop stick.
7. Place a pom pom or marshmallow onto the spoon.
8. Hold the catapult with one hand, and use the other hand to pull the spoon down. Release the spoon and watch your pom pom or marshmallow fly!
9. And if you're feeling competitive enough, you can try to catch the marshmallows in your mouth or try to see how far you can make your pom pom go!!!

Review

1. When you pull back the paddle pop stick, the potential energy, or "resting" energy gets stored up. And when you release the stick, the potential energy turns into kinetic energy or "moving" energy! Then gravity pulls the launched object back down to the ground.
2. What kind of theories and predictions can you make when using the catapults?
3. Does using different types of surfaces make a difference?

Want To Learn More?

- STEM Activity for Kids: Stick Catapults - Buggy and Buddy: https://bit.ly/PaddlepopCatapult
- Stick Catapult - STEM Challenges for Kids (www.science-sparks.com): https://bit.ly/StickCatapult
- Simple catapults: https://bit.ly/SimpleCatapults

SciScouts Physics of Waves

The SciScouts Physics of Waves is a National Science Week project, undertaken in collaboration with Fizzics Education. These instructions were prepared by Scouts for Scouts. This National Science Week project is supported by the Australian Government.

Scouting has always been strong on STEM skills. Maths to calculate catering quantities and navigate, the science of water purification, the physics of abseiling, and the engineering of pioneering structures – they all have their place. In the current program for our youth members, STEM and Innovation forms one of six Special Interest Areas that enable Scouts to set goals and pursue their own ideas.

national science week 2022

An Australian Government Initiative

Inspiring Australia

STEM Program

Pendulums

Plan

Materials needed:

1. A piece of string
2. Some Blu-Tack
3. 6 2x4 Lego bricks
4. A straight table edge
5. A way to record the time accurately (e.g., a stopwatch or phone)
6. Your thinking cap!

Do

How to set up your pendulum experiment:

1. Tie your Lego bricks to your string, making sure that they're very secure
2. Find a solid table edge
3. Attach your string to the table using your Blu-Tack
4. Make sure that your pendulum doesn't hit anything when it swings
5. Measure the length of your string (It doesn't matter how long or short your string is)

The experiment:

1. Hold the end of the string at an angle (Again it doesn't matter what angle!)
2. Let go and time how long it takes to make 10 full swings (Forwards and backwards is one)
3. Use the formula of to calculate the gravity (l = length)(Period = swing forwards and back)
4. Repeat this with different lengths of string or angles

Keys and formula:
T = Time
G = Gravity
L = Length

Divide by ten to get times 1 swing

Time (T) of swings	
Measure T taken for 10 swings	Measure T taken for 1 swing

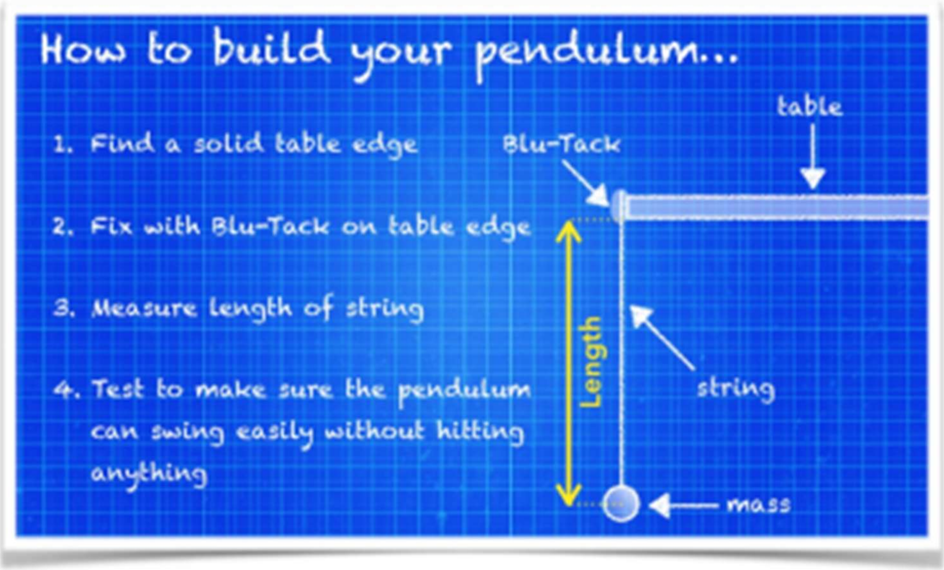
Formula:
$G = (4\pi^2 x L) / T^2$
$= (4\pi^2 x$ ____) / ____^{2}
(use an advanced calculator for ease)

Review

When you hold the pendulum at a big height, its potential energy is at its greatest, then as you drop the pendulum, the potential energy decreases and the mechanical energy is increased. In this the potential energy is unable to restore without physically making it not hit the same spot each time!

As a result of the formula, your calculations should be 9.8, although due to variable inconsistencies, any result from 9 to 10 is perfectly acceptable.

The shorter the length of the string, the more accurate you have to be with your measurements



STEM Program

Pendulums

Want To Learn More?

- Gravity Experiments for Kids - Galileo and Isaac Newton: https://bit.ly/GravityExperiments4Kids
- Teaching Engineering - Swinging Pendulum: https://bit.ly/SwingingPendulum
- Pendulum Experiment: https://explorable.com/pendulum-experiment

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An Australian Government Initiative

STEM Program

Make Glass Bottles Sing

Plan

1. Investigate friction and vibrations and how sound waves interact with different materials such as air and water. You might also want to investigate how moisture affects friction.
2. Investigate the concept of resonance and hypothesise why this might be important in music. You may also like to look at how an opera singer can break a glass with just their voice!
3. Examine how sound waves are measured and at what frequencies humans can hear. You might also want to look at factors that affect the frequencies that we can hear and why, and what frequencies different animals can hear.
4. Read the safety section of this challenge card and make sure that everyone is aware of the safety risks and requirements.
5. Collect all the necessary materials for your experiment.

Do

1. Place an empty glass bottle on a flat surface and half fill with water.
2. With a metal spoon, gently tap the side of the bottle and observe what happens. What sound is made? Does the sound differ if you hit above or below the water line?
3. With your mouth at the same level as the top of the bottle, gently blow across the top of the bottle and observe what happens. Does it make the same or different sound than when you hit the bottle with a spoon?
4. Fill some more bottles of the same size with varying levels of water and line the bottles up from fullest to emptiest.
5. Starting at the fullest bottle, gently tap each bottle and compare the notes produced.
6. Tune your bottle xylophone to a scale (think 'do re mi fa sol la ti') by adding or removing water.
7. Try playing a song with your bottle xylophone. If you are working in a patrol, each patrol member could play one bottle. Some suggested songs are provided in the supplementary information.

Review

1. Did you manage to get your bottles to sing? If you didn't, what do you think you could change to make it sing? If you did, did you find it challenging? Did it get easier with practice?
2. What did you enjoy the most from making bottles sing? What did you learn?
3. If you were to do this activity again, what would you do the same? What would you do differently? How could you improve your singing bottles?
4. Do you think the type of liquid in the glass might make a difference to the note produced?

STEM Program

Make Glass Bottles Sing

Variations

- Make your singing glasses colourful by adding some food colouring to each glass. This is especially effective if your glass bottles are clear.
- This challenge card pairs nicely with other challenge cards from the Magic of Music such as 'Make a Guitar' and 'Make an Idiophone' or other challenge cards about sound waves. In your patrol, you could make a range of instruments and play them together. Think about what other instruments that you may be able to make. To add an extra sciencey challenge to your glass xylophone, try playing the periodic table song (https://www.youtube.com/watch?v=rz4Dd1I_fX0) or another science-based song.
- Try making a xylophone using the same amount of water but different size bottles. Does this affect the sound?
- Try gently tapping the glass bottles with a different utensil or object. Does a knife or fork make a different sound to a pencil? Why might this be?

Safety Tips

- Sharps/glass warning: This challenge card uses glass and therefore there is the risk of breakage and cuts. Supervise younger sections around glass and if glass is broken, get an adult to safely clean the glass up.
- Slips and Spills: This challenge card uses water. As such, it should be performed in an area that can tolerate spills, but care should be taken if spills occur so that slipping does not occur.

Why Does This Happen?

Tapping the glass bottle or blowing air across the top of the bottle creates vibrations, or sound waves, which travel differently through different substances, meaning that these sound waves will travel differently through the glass, water, and the air. As such, different water levels and different bottles create different vibrations and sound waves and therefore different sounds.

SciScouts Physics of Waves

The SciScouts Physics of Waves is a National Science Week project, undertaken in collaboration with Fizzics Education. These instructions were prepared by Scouts for Scouts. This National Science Week project is supported by the Australian Government.

Scouting has always been strong on STEM skills. Maths to calculate catering quantities and navigate, the science of water purification, the physics of abseiling, and the engineering of pioneering structures – they all have their place. In the current program for our youth members, STEM and Innovation forms one of six Special Interest Areas that enable Scouts to set goals and pursue their own ideas.

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These tunes are printed on the earlier Musical Tune cards

STEM Program

Scouts AUSTRALIA

Make Glass Bottles Sing

Sound Waves – Magic of Music – Supplementary

Once you have made your glass bottle xylophone (or glass xylophone), you can try and play some songs. With the right notes, you can play any song that you like but here are some suggestions to get you and your patrol started. These songs are designed for a six-bottle xylophone but depending on the song, they may be able to be played with fewer bottles.
Before you play, number your bottles from 1 to 6, with 1 being the fullest bottle, which will produce the lowest note, and 6 being the emptiest bottle. These numbers will correspond to which bottle is played in the music below.

Twinkle Twinkle Little Star
1 1 5 5 6 6 5
4 4 3 3 2 2 1
5 5 4 4 3 3 2
5 5 4 4 3 3 2
1 1 5 5 6 6 5
4 4 3 3 2 2 1

Jingle Bells
3 3 3
3 3 3
3 5 1 2 3
4 4 4 4
4 3 3 3
3 2 2 3 2
5

We Will Rock You
4 3 2 1
2 2
2 2

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SciScouts PHYSICS

Fizzics Education

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STEM Program

String Telephones

Plan

1. Investigate sound and how it travels. Try model sound waves using a slinky to visualize how sound travels from one space to another. Play some loud music and either place your hand on the speaker, or feel the floor or table around you, what do you notice? You can also try placing your hand on your throat and making a long 'ahh' sound, what do you feel?
2. Collect the materials required for the activity. Communicate with your patrol and leaders if you need to bring items from home.
3. Read the safety requirements and discuss with you leaders/adults supervisors what supervision and safety requirements might be needed.

Do

1. Punch small holes in the bottom of two paper cups. You may need to use scissors, a sharp pencil, or a nail.
2. Thread a piece of string through the hole and tie the end on the inside to a paperclip so it doesn't slip out of the cup. Cut your string, and do the same to the other end.
3. Test out your string phone and call a friend! Get in position so the string is tight. Speak into the cup while your friend on the other end holds the phone to their ear to listen. Try to have a conversation!
4. See how far you can make your string phones reach. Experiment with different lengths of string.
5. Experiment with your cup phones. What happens if the string is loose? What happens if you place your hand on the string while using the phone?
6. Test your string phones with some communication games. Try sending a secret message on the string phone through your whole unit, passing the message along to each other one at a time. Did the secret message make it through the whole unit?

Review

1. How does the string phone work? How did the sound travel along the string to your cup?
2. What have you learnt about sound during this activity?
3. Do real telephones work the same way? What is the same, what is different?
4. If you were to do this activity again, what would you do the same? What would you do differently? What did you enjoy most about this activity?

Safety Tips

- Sharps warning: You may need to use scissors or other sharp objects during this challenge card, posing a risk for cuts. Ensure younger sections are appropriately supervised.

Why Does This Happen?

For help understanding how your string phone works visit: https://www.scientificamerican.com/article/talk-through-a-string-telephone-bring-science-home/ Sounds travel as a wave, which we can't see, we can feel as vibrations. When you speak into your cup the sound waves make the cup, and string start to vibrate, or shake. The vibrations then made their way along the string to the other cup where the vibrations fill the cup and can be heard as sound. This is why the string has to be tight, if the string is too loose the vibrations can't travel as well and get lost. Think about jingling a loose rubber band compared to the twang when the rubber band is tight.

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