Jumping Fun Frogs (or Flick Flacks)

What makes things jump? ***#JumpingFunFrogs***

Suggested outcomes

(NOTE: This is by no means an exhaustive list of possible outcomes, neither is it intended that ONLY these outcomes can or should be met. Science is a deeply interrelated activity, and you may find cross curriculum links you can use.)

Science understanding

- Physical sciences F: The way objects move depends on a variety of factors, including their size and shape (ACSSU005).
- Physical sciences 2, 4: A push or a pull affects how an object moves or changes shape (ACSSU033).

Science inquiry skills

- Planning and conducting 2. Participate in guided investigations to explore and answer questions (ACSIS038).

Science as a human endeavour

- Nature and development of science 2: Science involves observing, asking questions about, and describing changes in, objects and events (ACSHE034)

Science vocabulary words

Tier 1 (Everyday words) – move, stretch, stop, go, wait

Tier 2 (Dual meaning)

Energy sources

Do not confuse KINDS of energy:

- Light
- Heat
- Sound
- Potential energy

With the SOURCE of that energy (which is the way the word is usually used by the media)

- Coal
- Wind
- The sun
- Batteries, etc.

You can hold sources of energy, you cannot hold energy itself.

Tier 3 (Specialised vocabulary):

Energy -

- Energy is the ability to DO something (to be precise, to move a mass from one position to another).
- Energy is just a concept, not a substance.
- Energy never runs out, it only changes into something we can't or don't want to use.
- Energy can be transformed into other kinds of energy (light can heat things up, for instance), or transferred into other objects (a toaster heats up toast, for instance).

Warning

- Rubber bands require careful management – they are bite sized and can snap back on unprepared fingers. Also, in cutting sticky tape, please exercise appropriate caution.
- Scissors and paper will be used in this activity, please use all appropriate caution.
- Stand back when you launch your frog – or even better, use safety goggles. You could get hit in sensitive places, such as your eye.

Preparation

Always try something yourself before turning up before a class. Also, this lesson plan here assumes you have at least one flicking flying fun frog to demonstrate before the class to get their science thinking happening.

This is an old science activity standard, and while a classic for early childhood and prep groups can also work for students right through primary school. It compliments any unit on animals or the environment, as well as units on toys and energy.

With pictures to paint and toys to build, art and technology are right in there as well. Songs about frogs (or other things that can suddenly jump, such as crickets or spiders) are welcome. But even as a toy, the key to understanding its operation lies in science…

Materials

- Jumping fun frog picture or equivalent
- Scissors, sticky tape dispenser (thinner varieties are best)
- Colouring pens (optional)
- Rubber bands (not too large)

Suggestions for other year levels

As always, more material is presented here than can be used by the average class during the average lesson time. However, since the students' questions can and should guide student learning, more material is presented for your convenience. Remember, it is not uncommon for students to only remember those points which answered their personal questions.

Younger:

This activity is well suited to this age group. Children at this age can have difficulty with focus. Avoid tangents if you're attempting to make a key point.

Middle:

Extend learners by allowing them to use flick flacks as part of a unit on movie special effects or practical jokes.

This activity makes a great study of *variables.* Try to find out the other variables that effect the success of the jumping fun frogs – Humidity? Temperature? Time of day?

Teen:

Use maths – try to develop a correlation between tension in the rubber band and height obtained. Look into other ways of storing energy and transforming it into other kids of energy.

Engage

- ⇨ Make sure all students write down any questions they may have generated during this phase regarding the topic for today.

Particularly in early childhood, teachers can demonstrate the frog's actions with a little song *(start with Mr Frog standing on the table)*:

Mr Frog jumped out of the pond one day,

And found himself in the rain,

Said he "I'll get wet, and I might catch a cold."

(ready frog for releasing by pushing down on his head)

So he… JUMPED *(release frog quickly)* in the pond again[1]!

[1] "Mr. Frog" Lyrics John Schumann, taken 1 nov 2018 from https://www.letssingit.com/john-schumann-lyrics-mr.-frog-mp974x7

Ask students:

What makes the Frog jump up? (Don't show them yet!)

Can they think of how this toy might work without looking inside?

Can they make a prediction regarding what is going on inside the frog? Have them draw their ideas for testing later on.

Explore

- ⇨ Encourage and validate student explanations of this phenomenon. You may like to ask students to write or draw their explanation personally to avoid embarrassment to students unfamiliar with this material. Remember, 'I don't know' is a valid explanation in science – it is the beginning of learning new things!

Then, allow them to explore the frog in order to test their predictions.

Now that they've had a look inside to see how it works, encourage them to explain why pushing him down and lifting your hand up can make him jump. Listen to their ideas and theories of how it works. Reward science thinking and terminology; science is all about ideas and then thinking of ways to test them. You might also be able to try out some of their ideas, for example, will it work for frogs without a rubber band? Will it work on rubber bands not stuck onto frogs? Will it work if you cover up the frog?

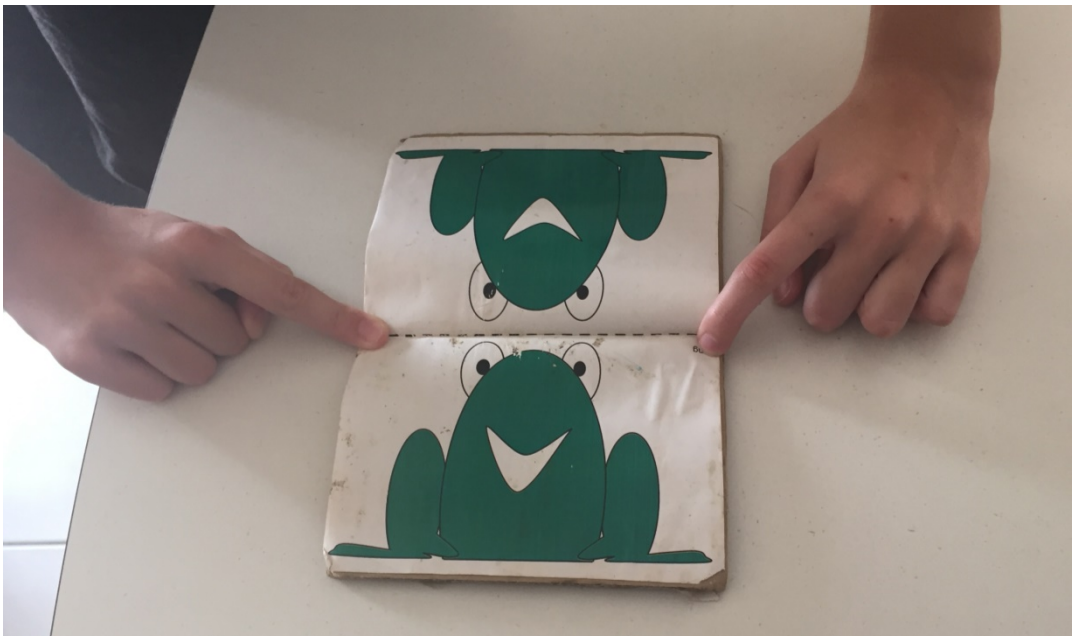
Now your students might like to try building one of their own!

Explain

Simple terminology will often suffice to explain the workings of the frog ('the rubber band is stretched when the frog is squashed down, and when you let go it snaps back again, pulling the sides in again, and the sides push on the ground making the frog jump up.)

Using more 'sciency' words might sound something like this - "Energy is stored in the rubber bands when they are stretched out. When you release the frog, the energy helps pull the rubber bands back in again. This causes the frog's feet to push off on the ground and he jumps up!"

Concept Application



What is energy? (The ability to *do* things)

What other examples of storing energy can you find? (batteries, food)

What other uses are there for stretched rubber bands? (holding hair in, flicking things around, making music)

Now, if you haven't done so yet – go and build your Jumping fun frogs!!

Elaborate

- ⇨ Ask students if they can design new ways to test this explanation, is it really sufficient? Can they think of further or better explanations, and the experiments needed to test them?

Extension – older children

This is a good chance to explore **variables** – what makes the frog jump higher, and how will you measure and record your results? What differences do the following make?

- How tense the rubber band is?
- If strong material works better than flexible material?
- If light material works better than heavy?
- Can you decorate Mr Frog and is he more 'fun' if you do?
- Is a big rubber band better than a small one?
- Is a loose rubber band better than a rigid one?
- Etc ad infinitum (email us if your class tries a different one!)

** Teachers might also like to discuss with students that this is a silly song – do frogs catch colds if they get wet? (They actually need to be moist all the time or they'll eventually die). Can you catch a cold if you are cold and wet for a long time?

Evaluate

You may like to use the frogs as part of an overall unit on the environment or science toys. Students can be assessed on oral or pictorial reports on their explanation of how and why the frog jumps (since they cannot *see* the rubber band stretched out if they want to make it jump on the table, they are using science to explain things they cannot directly observe… unless, of course, you have a see through table top!)

Prior learning:

Take time to focus on planned content material during the engage phase, for example;

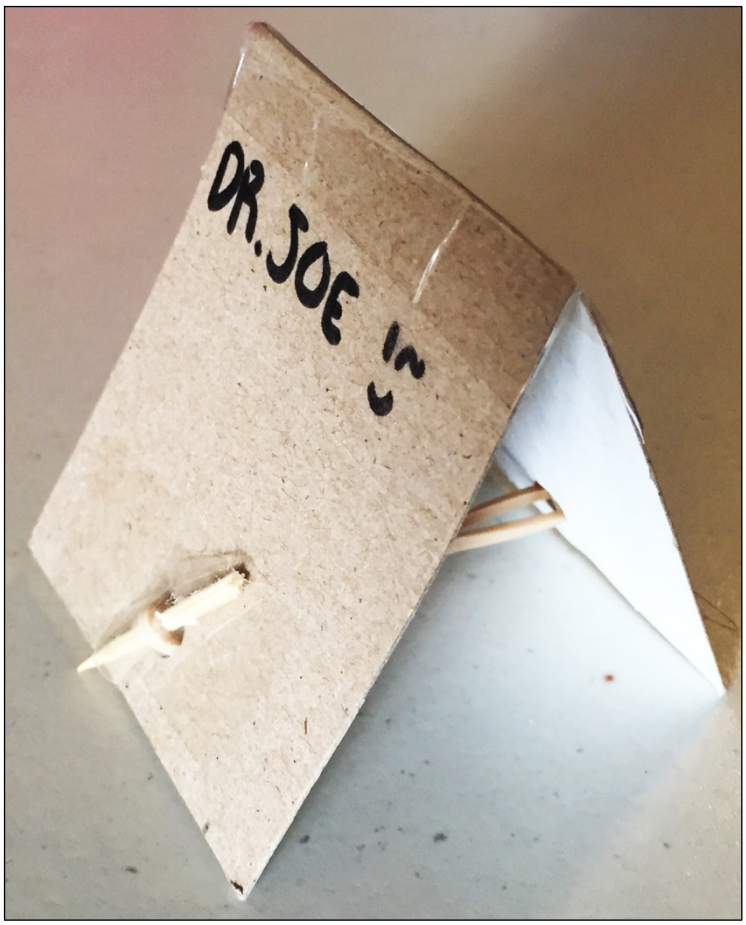
- What is energy?
- Where does energy come from?
- What does energy do?
- How can we store energy?

Formative:

Focus on the outcomes – how can we create the BEST scientific knowledge?

Be sure to watch out for the following common alternative conceptions:

- Things that aren't moving have no energy, such as the rubber band. [The rubber band has potential or stored energy. It is trying to do something, and will as soon as it can.]
- Do not confuse forms of energy with sources of energy, as described above.



Summative:

Help students consider ways they can communicate their new understanding to others, just as scientists need to do.

So what?

Energy *does* things, and we can *control* energy!

Creating science

Science understanding

As we made our frogs move and jump, we saw that;

- Physical sciences F: The way objects move depends on a variety of factors, including their size and shape (ACSSU005).
- Physical sciences 2, 4: A push or a pull affects how an object moves or changes shape (ACSSU033).

Science inquiry skills

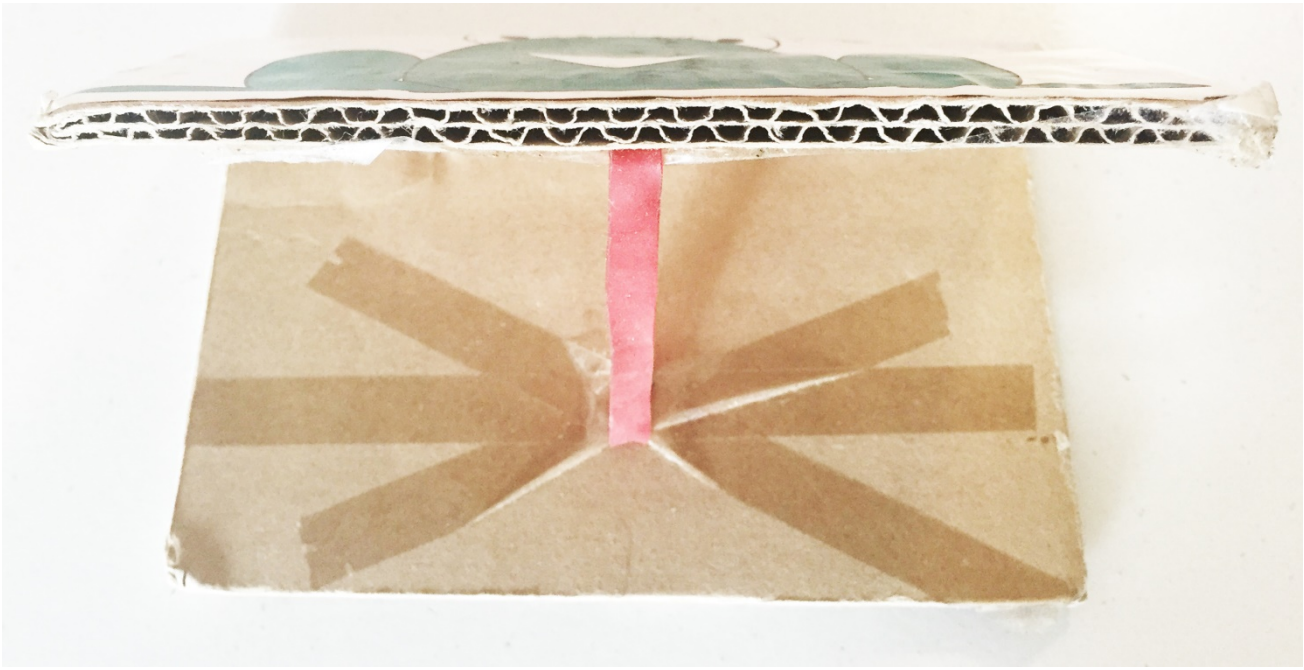
As we figured out how the frog worked, and as we learnt how to store movement energy and release it to make the frog jump, we saw that;

- Planning and conducting 2. Participate in guided investigations to explore and answer questions (ACSIS038).

Science as a human endeavour

As we further explored energy in our world, and what we do it harness and use it, we;

- Nature and development of science 2: Science involves observing, asking questions about, and describing changes in, objects and events (ACSHE034)



Building the Jumping Fun Frog!!

Warning

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Stand back when you launch your flyer – or even better, use safety goggles. You can get hit in sensitive places, such as your eye.

Preparation

Always try something yourself before turning up before a class. Also, this lesson plan here assumes you have at least one flicking flying fun frog to demonstrate before the class to get their science thinking happening.

Materials

- Jumping fun frog picture (see page over) or equivalent
- Scissors, sticky tape dispenser (thinner varieties are best)
- Colouring pens (optional)
- Rubber bands (not too large)

Building the Frogs

Copy or paste the frog pictures onto some rigid cardboard. This is the first big challenge of the activity – the cardboard needs to be fairly rigid or the frogs will not work properly. On the other hand, it cannot be too heavy or the frogs will not jump very high. Try experimenting with what works best for your class. We suggest packaging box cardboard, not breakfast cereal boxes.

If you want to colour in the frogs, now is a good time for it (but I recommend making a few practice copies first!)

Cut out your frogs (some children are old enough to do this themselves).

Fold along the dotted line (a ruler can help here). Fold away from the pictures so that when you stand your frog up it is looking out at the world. Remember that the frog needs to be joined or otherwise hinged at the top, or it may not jump up at all.

Stick one end of the rubber band to one side of the frog – on the INSIDE. (ie. Not the side where the pictures are). It's usually best to have the sticky tape go through the band and perpendicular to it, so they form a "T".

Stick the other side of the band to the other inside of the frog, so that it sits like a capital A from the side. The rubber band needs to positioned carefully so that it is stretched out as much as possible, without tearing the sticky tape or warping the frog! – It's as much a science as it is an art (or do I mean 'technology'…?). You're ready to go!