Ready-Ed Publications

PRIMARY LEVELS
Year 2 - Year 3

PHOTOCOPY MASTERS

STEM

Years 2-3

Science

Technology

Engineering

Maths

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Teachers' Notes

"I have no special talents. I am only passionately curious." – Albert Einstein

Science, Technology, Engineering and Maths are the integrated learning areas known as STEM. STEM requires students to problem-solve and think critically and with a degree of flexibility. The workplaces of the future will increasingly rely on students to be able to think critically and flexibly to address the fast moving pace of the world.

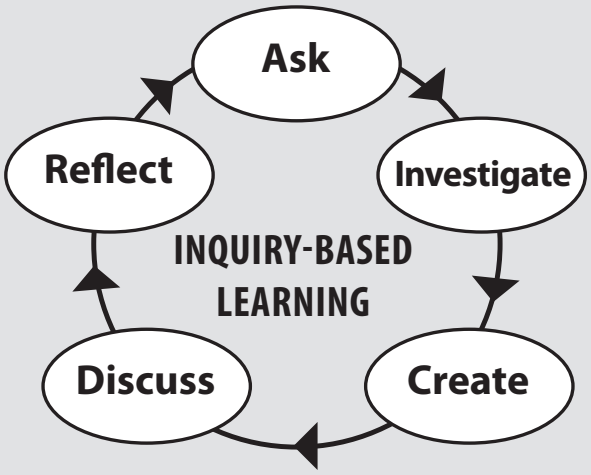
This book supports teachers to develop inquiry-based learning in the classroom across Science, Mathematics and Technologies. Literacy is also important and is interwoven in the tasks encouraging students to express their discoveries in a variety of ways.

This resource is written for students in Years 2 and 3. The book is broken into four main sections. The first section focuses on the core Science and Engineering skills with a variety of challenging investigations outlined. The content is generally outlined in the first part of each topic and more challenging investigations are then included.

The second section reviews the science of forces with opportunities for small and larger group investigations. Following from this, the third section comprises more in-depth inquiry-based investigations. These are group tasks all focussed on a particular question.

The final section is a series of shorter investigations that require the use of low-cost materials that are easily available. These investigations could be conducted as rotations with students in a weekly lesson.

Enjoy the ride with your students – STEM can take the students in many unexpected directions. This resource offers students opportunities to: practise working in small groups cooperating and collaborating; experience failure when activities have unexpected results; time to reflect on what happened and how things could be developed further. All of these opportunities are vital experiences for children. Embrace the unknown and look for the teaching moments to highlight. After all, according to T.S. Eliot, it is perhaps the journey that is most important and not the destination.



Gilbert Inquiry Framework (2014)

1. Establishing what we want to find out: Posing questions & planning inquiry
2. Finding out: Collecting & analysing evidence
3. Deciding what: Concluding, reflecting & responding to the inquiry

▸ http://dro.deakin.edu.au/eserv/DU:30079970/preston-inquirybasedlearning-2015.pdf

Natural Or Human-Made?

ACTIVITY

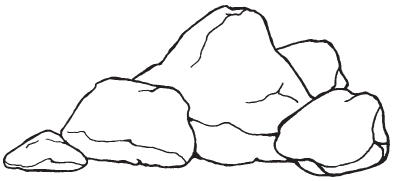
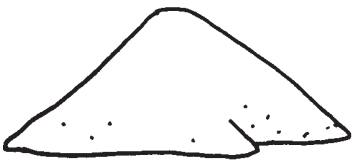
1. Talk to a classmate and list three things you know and three things you want to find out about natural and human-made things.

	What I know	To find out
Natural things		
Human-made things		

2. Take a close look at these items. What are they made of? Check off the list. below.

❍ steel	❍ wooden stake	❍ glass	❍ rubber	❍ concrete
❍ straw	❍ rope	❍ fabric	❍ hard plastic	❍ rocks

3. Where do you find these natural materials?

rocks	sand	natural fibres
		
_____	_____	_____

4. Class Discussion Why do we need to use human-made materials? What are the advantages and disadvantages?

5. Research It How is concrete made? What is the most used building material?

Igloos - Dome Structures

ACTIVITY

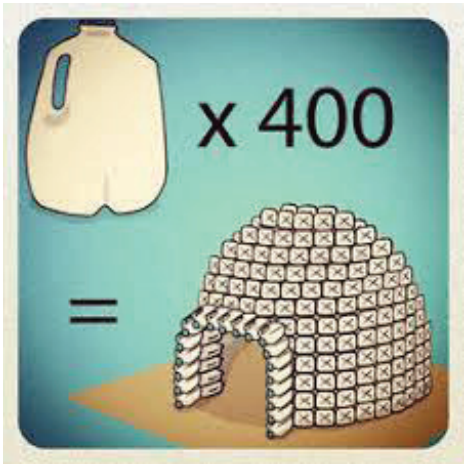
People make use of construction materials that are easy to find where they live. In cold climates, snow is easy to find and can be used to make dome-shaped homes known as igloos. Snow acts as an insulator - keeping warm air inside igloos. Igloos typically have small entrances to prevent heat from escaping.

1. Put these construction steps in order and you will know how to build an igloo.

	Stack each snow brick on top of one another.
	Make a 'brick' out of compacted snow.
	Mark a dome shape in the ice and show where the small entry will be.
	Leave small hole at the top for air ventilation.
	The heat from the people inside will melt the bricks together to make them strong.

2. Work in a small group to construct an ice igloo out of recycled plastic milk bottles. Look at the picture to help you plan. Think about:

- how many plastic milk bottles you will need
- how you will arrange the bottles
- creating a small entrance
- leaving a hole at the top for ventilation



Materials:
- plastic milk bottles
- glue or sticky tape

Results

Did your igloo stay up? _____

What could you have done better?

_____

_____

What was the most challenging part of the build?

_____

_____

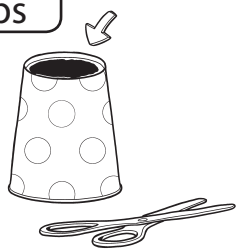
Potential And Kinetic Energy

ACTIVITY

❑ A marshmallow launcher works by potential and kinetic energy. Pair up, then follow the steps to make your own launcher.

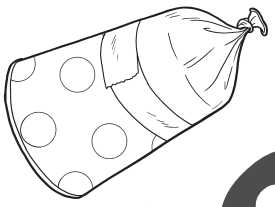
Materials:
- paper cup
- scissors
- balloon
- marshmallow
- tape measure
- duct tape

Steps



1. Cut out the bottom of the paper cup.

2. Cut the tip off the balloon.



3. Stretch the balloon over the end of the paper cup and tie a knot. Secure with duct tape.

4. Place a marshmallow inside the cup to shoot.

Operate

1. As you pull the balloon back, it builds up potential energy.
2. The further you pull back the balloon, the more potential energy is built up and generally the further the balloon will travel.
3. As you release the balloon, the potential energy is converted to kinetic energy.
4. Kinetic energy is what makes the marshmallow move through the air.

Results

1. Measure the distance of six launches (measure using a tape).

Launch 1- Distance:	**Launch 4**- Distance:
Launch 2 - Distance:	**Launch 5**- Distance:
Launch 3 - Distance:	**Launch 6**- Distance:

2. Complete the missing words.

When I pull back the balloon _____ energy is built up. The more _____ energy I build up the _____ the marshmallow will travel. As I release the balloon _____ energy changes into _____ energy. _____ energy is what makes the marshmallow travel through the air.

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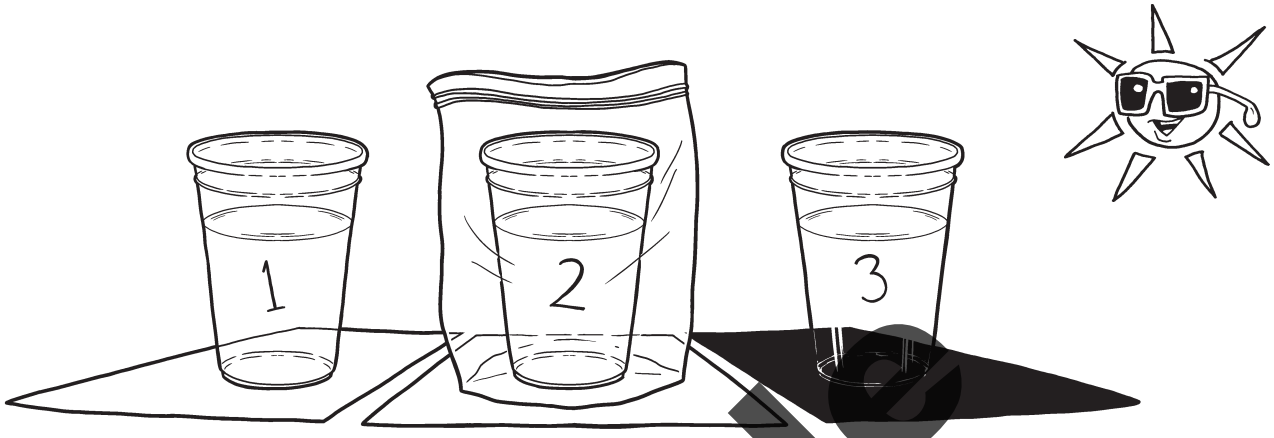
Solar Power 2

ACTIVITY

Converting Sunlight Into Heat

Materials: ● 3 identical plastic cups ● 2 sheets of white paper ● 1 sheet of black paper ● clear ziplock bag ● cold water ● thermometer



Steps

i. Label the cups 1, 2 and 3.

ii. Fill all cups with the same amount of cold water (same temperature).

iii. Place cups 1 and 2 on white paper and cup 3 on black paper.

iv. Place all cups in a sunny spot

v. Cover cup 2 with the ziplock bag

vi. Let all cups sit for 1 hour and then test the temperature using the thermometer. Record your results below.

Results

	Cup 1 (white paper)	**Cup 2 (white paper - ziplock bag)**	**Cup 3 (black paper)**
Temperature after 1 hour			
Temperature after 1.5 hours			

Conclusion

What did your results teach you?

_____

_____

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Build A Paper Table That Can Hold Weight

ACTIVITY

❑ Have a go at building your own table out of newspaper. Your table needs to be as sturdy as possible and hold a weight. It needs legs and a solid top.

❑ Work in pairs. Think about how you will fold newspaper into different shapes to use it for building stronger designs. TIP: Try rolling into tubes and taping together for extra strength.

Materials:
● masking or sticky tape ● newspaper ● books

Step 1 Questions to ask:

1. How will I make the top?

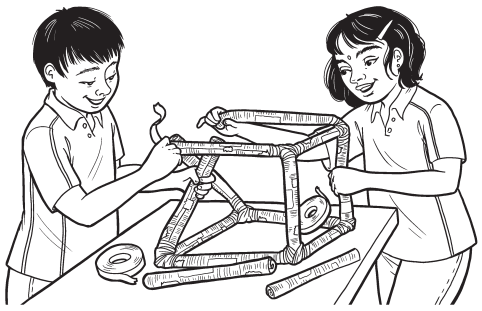
_____

2. How will I make the table legs to support the top?

_____

3. How big will it be? _____

Step 3 This is a sketch of our table design.



Step 4 Test it out - add a load! Tick if your table didn't collapse. Cross if it could not hold the load.

Trial	1st attempt ✓or ✖	2nd attempt✓or ✖	3rd attempt ✓or ✖
1 book			
2 books			
_____ books			

Paper Bag Pair 3: **Mosaics – Tile A Kitchen**

Materials:
● coloured cardboard ● scissors ● ruler ● tile shapes template

Task: Use cardboard to make tiles and then create your own floor design for a kitchen. Take a photo to save your design.

Two Stars and a Wish

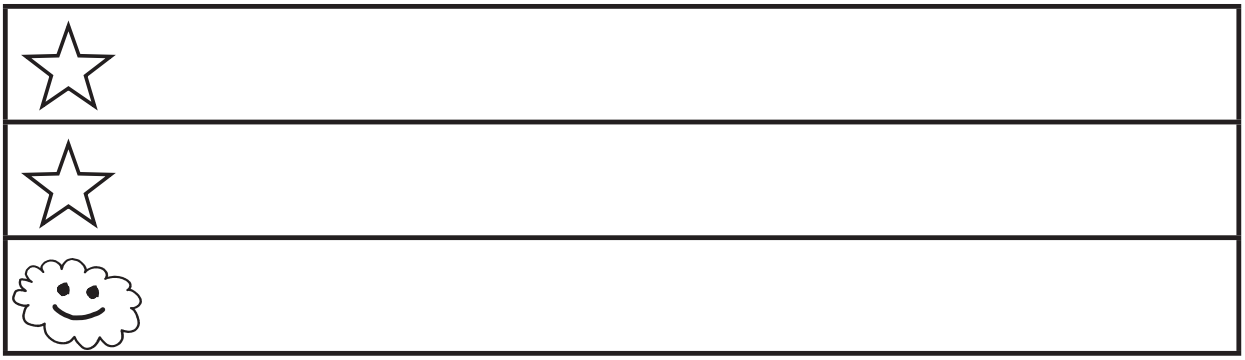
What's going on? Shapes can be assembled to make patterns that are used in buildings. This is an ancient art form and one that requires measurement and mathematics to make sure the patterns connect with the least amount of wasted tiles.

Paper Bag Pair 4: **Invent A Game**

Materials:
● cardboard ● masking tape ● paper ● recycled containers
● lids ● string ● rubber bands ● pebbles

Task: Use the materials to make a new game that could be played. Come up with the rules and write them down. Test it with your partner.

Two Stars and a Wish



What's going on? Games need an aim and also rules to help guide players. Clear communication is important so people understand the rules that are given.