Ready-Ed Publications

PRIMARY LEVELS
Year 2 - Year 3

PHOTOCOPY MASTERS

STEM

Years 2-3

- Science
- Technology
- Engineering
- Maths

CURRICULUM LINKED

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Contents

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 Australian Government through the National Innovation and Science Agenda (Australian Government, Department of Education and Training, December 2015) have shone a spotlight on the importance of students having problem-solving and innovative thinking skills. 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.

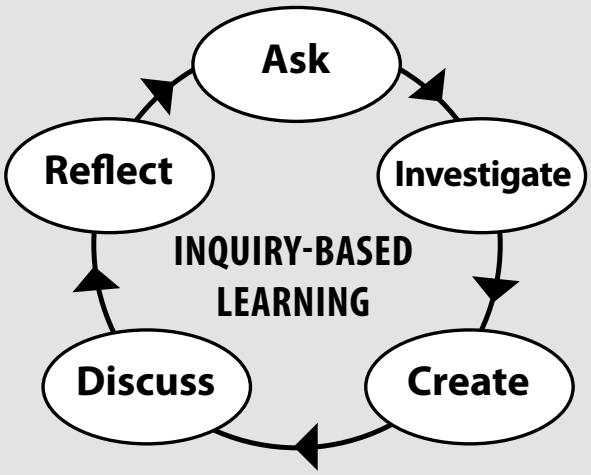
This book supports teachers to develop inquiry-based learning in the classroom across Science, Mathematics and Technologies. Literacy is also important as a General Capability and is interwoven in the tasks encouraging students to express their discoveries in a variety of ways (AC, v. 8.3, Literacy).

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 inquiry 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 focused 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 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

Curriculum Connections

This resource is linked to the Australian Curriculum and addresses key learning areas in Science, Maths, and Design and Technologies. There are links to be made also across Literacy and General Capabilities. On each activity page the predominant descriptor is included but it is important to be aware that other connections can also be made. For more detailed information regarding the Australian Curriculum please explore the website: www.australiancurriculum.edu.au

Mathematics	
Year 2	**Year 3**
Recognise, model, represent and order numbers to at least 1000 (ACMNA027)	Recognise, model, represent and order numbers to at least 10 000 (ACMNA052)
Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting (ACMNA028)	Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems (ACMNA053)
Solve simple addition and subtraction problems using a range of efficient mental and written strategies (ACMNA030)	Represent and solve problems involving multiplication using efficient mental and written strategies and appropriate digital technologies (ACMNA057)
Compare masses of objects using balance scales (ACMMG038)	Represent money values in multiple ways and count the change required for simple transactions to the nearest five cents (ACMNA059)
Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units (ACMMG037)	Measure, order and compare objects using familiar metric units of length, mass and capacity (ACMMG061)
Describe and draw two-dimensional shapes, with and without digital technologies (ACMMG042)	Tell time to the minute and investigate the relationship between units of time (ACMMG062)
Interpret simple maps of familiar locations and identify the relative positions of key features (ACMMG044)	Make models of three-dimensional objects and describe key features (ACMMG063)
Collect, check and classify data (ACMSP049)	Create and interpret simple grid maps to show position and pathways (ACMMG065
Create displays of data using lists, table and picture graphs and interpret them (ACMSP050)	Identify symmetry in the environment (ACMMG066)
	Identify angles as measures of turn and compare angle sizes in everyday situations (ACMMG064)
	Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording (ACMSP068)
	Collect data, organise into categories and create displays using lists, tables, picture graphs and simple column graphs, with and without the use of digital technologies (ACMSP069)

Curriculum Connections

Design & Technologies	
Year 2	**Year 3**
Explore needs or opportunities for designing, and the technologies needed to realise designed solutions (ACTDEP005) Generate, develop and record design ideas through describing, drawing and modelling (ACTDEP006) Use materials, components, tools, equipment and techniques to safely make designed solutions (ACTDEP007) Sequence steps for making designed solutions and working collaboratively (ACTDEP009)	Investigate how forces and the properties of materials affect the behaviour of a product or system (ACTDEK011) Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (ACTDEK013) Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to produce designed solutions (ACTDEP014) Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques (ACTDEP015) Select and use materials, components, tools, equipment and techniques and use safe work practices to make designed solutions (ACTDEP016) Plan a sequence of production steps when making designed solutions individually and collaboratively (ACTDEP018)

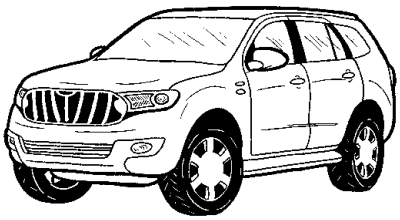
Natural Or Human-Made?

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.

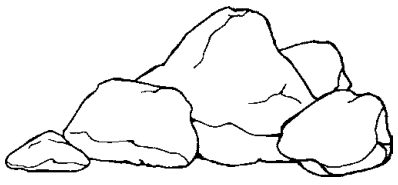
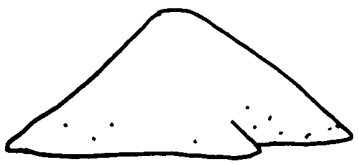
	What I know	To find out
Natural things		
Human-made things		

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



❍ steel	❍ wooden stak	❍ glass	❍ rubber	❍ concrete
❍ straw	❍ rop	❍ fabric	❍ hard plastic	❍ rocks

3. Where do you find these natural materials?

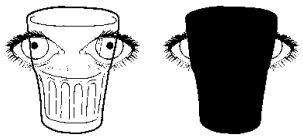
rocks	sand	natural fibres
		
_____	_____	_____

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

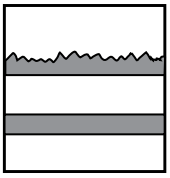
5. Research It How is concrete made? What is the most used building material?

Characteristics of Materials Fact Sheet

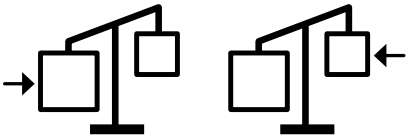
HOW DOES THE MATERIAL LOOK?



Is the material transparent or opaque?



Is the material rough or smooth?

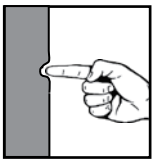


Is the material heavy or light?

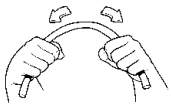
WHAT ARE YOU COMPARING IT TO?

IS YOUR MATERIAL ...

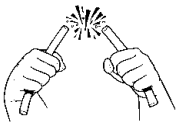
... hard or rigid?



... soft and squishy?



... flexible?



... breakable?

IS YOUR MATERIAL ...

... waterproof?

... absorbent?

... magnetic?

Does your material conduct electricity?

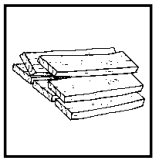
WHICH GROUP DOES YOUR MATERIAL BELONG TO?

... metal?

... plastic?

... stone/ glass?

... fibres?



... wood?

❑ Take a walk around your classroom or school. Make a list in the table below of natural and human-made items that you can identify. Use the fact sheet above to list two properties about each natural and human-made item.

Natural items	Properties

Human-made items	Properties

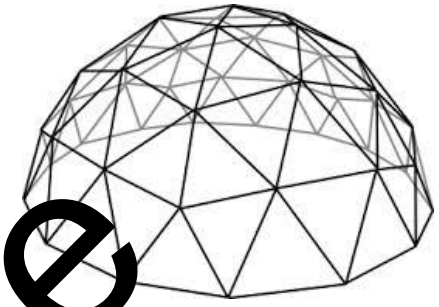
Click It: Play the materials game
http://www.bbc.co.uk/bitesize/ks2/science/materials/material_properties/play/

Investigating Domes

ACTIVITY

The geodesic dome structure was named and popularised by an American architect, Buckmister Fuller, in 1954. Domes are very strong and able to bear a heavy load - making them very sturdy structures.

1. Look carefully at this dome structure.
What shapes make up a dome structure?



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2. Challenge Task Build your own dome then draw it in the space below. Use the materials that are specified.

Materials:
- toothpicks
- bluetack or playdough

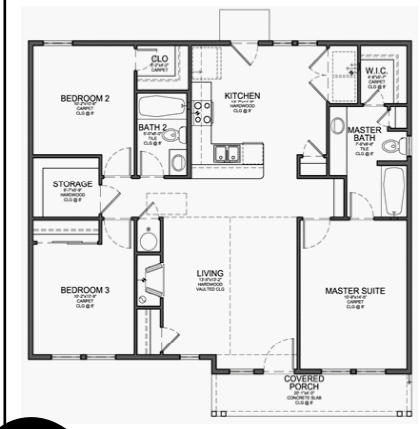
3. Extra Use exercise books to test the stability of your dome. How many books can you load onto the dome before it begins to collapse?

_____

What Features Do Homes Have?

ACTIVITY

1. Draw a bird's eye view of one room in your house. Use a pencil. Look at the example to help you.



2. Pair up. Compare your pencil sketch with your partner's sketch. What are two similarities and two differences between them?

3. What do you have to think about before building a home? There are many factors to consider. Number factors below in order of importance. Explain your thinking to the class.

	Climate – the weather conditions over time in an environment
	Location- flat site, rocky site, on a mountain, near the sea, desert
	Material – what are the best materials to use to build the house?
	Use – what is the home going to be used for? Family needs
	Cost – how much will the project cost?

First Law Of Motion

ACTIVITY

Without force, life on our planet would be very different. We wouldn't have movement and things wouldn't happen.

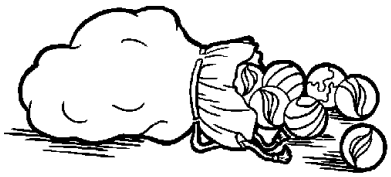
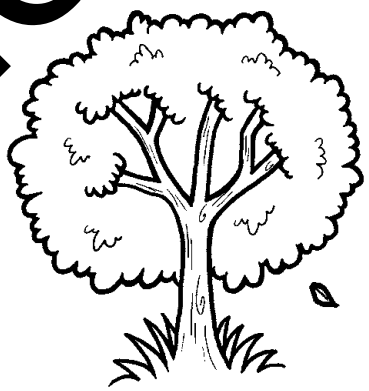
Sir Isaac Newton was famous for investigating three laws of motion:

A. First law: An object in motion will likely stay moving; an object at rest will likely stay at rest.

B. 2nd Law: If a force acts upon an object, it will impact speed and direction.

C. 3rd Law: For every force and action, there is an equal reaction.

❑ Here are three examples of Newton's first law of motion. Can you give three more examples? Either draw or find pictures. Label them.

Image 1	Image 2	Image 3
		

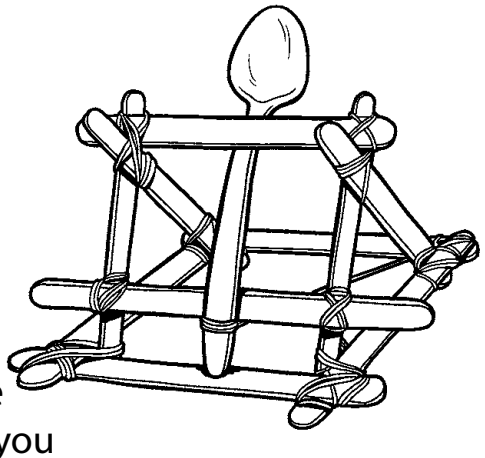
❑ My examples of Newton's first law of motion.

Image A	Image B	Image C

Build A Working Catapult

ACTIVITY

Catapults use potential and kinetic energy. Potential energy is built up when the 'launcher' is pulled backwards. When the 'launcher' is released, the potential energy turns into kinetic energy. The 'ammunition' moves through the air because of kinetic energy.



❑ Your task is to create a working catapult using the materials listed below. Look at the image to help you with your design. Work in pairs or small groups.

Materials:

- paddlepop sticks
- rubber bands or string
- plastic bottlecap or small plastic spoon
- glue

Questions To Ask

1. Which materials will make the best launcher? _____

2. How can I secure the base from moving? _____

_____

3. What will the item for launching go into? _____

4. Which materials do I need? _____

Test It Out

Trial	Distance	Modifications	New Distance
1			
2			
3			

Conclusion

5. What did I learn from this design challenge?

_____