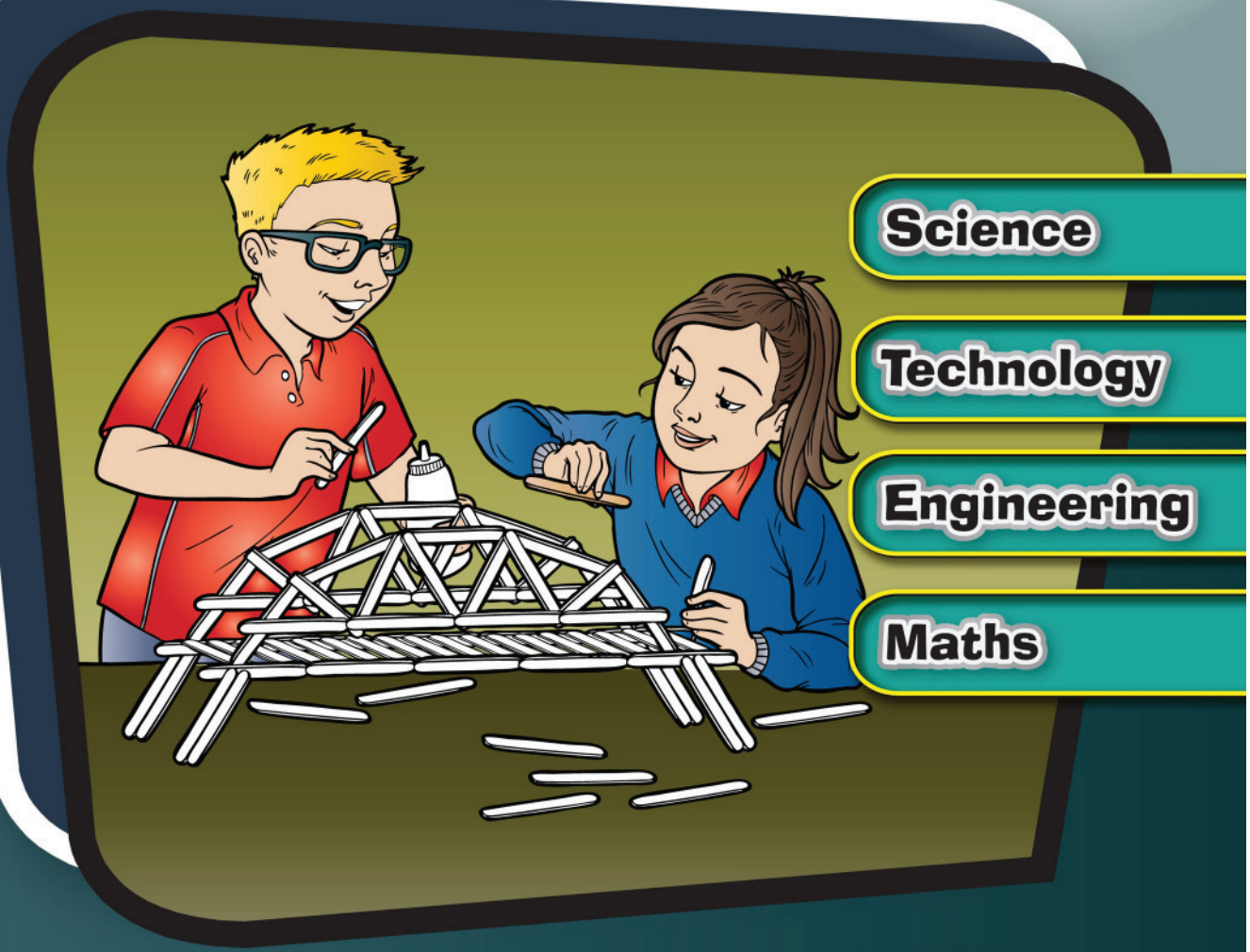
Ready-Ed Publications

PRIMARY LEVELS
Year 4 - Year 5

PHOTOCOPY MASTERS

STEM

Book 2



Science

Technology

Engineering

Maths

By Leonie Westenberg

Teachers' Notes

This book provides classroom teachers with the means to approach both the targets of inquiry-based mathematics learning and the introduction of coding, alongside science inquiry skills and content, use of engineering processes, and design and digital technologies. The activity sheets also emphasise literacy skills.

This book is divided into 5 sections. *Section 1: House Construction* provides activities that encourage students to develop critical thinking skills and mathematical problem-solving abilities through practical worksheets to test brick construction, scale and map drawing, and geometric shape. Students explore concepts of stability and instability.

Section 2: Bridges fosters group and team participation through worksheets involving challenges in constructing bridges with a variety of different materials within design limitations. This section has a focus on design technologies while building mathematical and writing skills.

Section 3: Domes continues the focus on the exploration and understanding of engineering and spatial concepts within the science, mathematics and technologies areas. Students work in small groups to research geodesic domes and construct domes with practical uses, hypothesising and testing the domes for stability.

Section 4: Pyramids begins with historical inquiry and activities that represent the geometric and spatial awareness outcomes of the mathematics area. Students are also guided in planning, designing, implementing and evaluating scientific inquiries with engineering challenges and hypotheses.

Section 5: Coding introduces students to coding for practical purposes (such as making games and apps) using free online tools. The process of initiating, designing, testing and evaluating digital technologies is experienced in guided worksheets before, during and after use of online coding tools. Students are introduced to design journals as a tool used in design and digital technologies and undergo an evaluative process that informs further work in both formative and summative assessment. Individual activities suggest a choice of tools to allow for differentiation of students and multimodal learning styles within the classroom.

Land Uses 1 - Page 9

Curriculum Focus

SOCIAL STUDIES

The importance of environments, including natural vegetation, to animals and people

Land Uses 2 - Page 10

Curriculum Focus

MATHEMATICS

Use scaled instruments to measure and compare lengths, masses, capacities and temperatures

Land Uses 3 & 4 - Page 11 and Page 12

Curriculum Focus

MATHEMATICS

Use scaled instruments to measure and compare lengths, masses, capacities and temperatures

Describe and interpret different data sets in context

- Elaboration: Using and comparing data representations for different data sets to help decision making

SOCIAL STUDIES

The environmental and human influences on the location and characteristics of a place and the management of spaces within them

Homes And Habitats - Page 13

Curriculum Focus

SOCIAL STUDIES

The environmental and human influences on the location and characteristics of a place and the management of spaces within them

Floor Plans - Page 14

Curriculum Focus

MATHEMATICS

Use scaled instruments to measure and compare lengths, masses, capacities and temperatures

SOCIAL STUDIES

The environmental and human influences on the location and characteristics of a place and the management of spaces within them

Building A Floor Plan 1 & 2 - Page 15 and Page 16

Curriculum Focus

SCIENCE

Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts

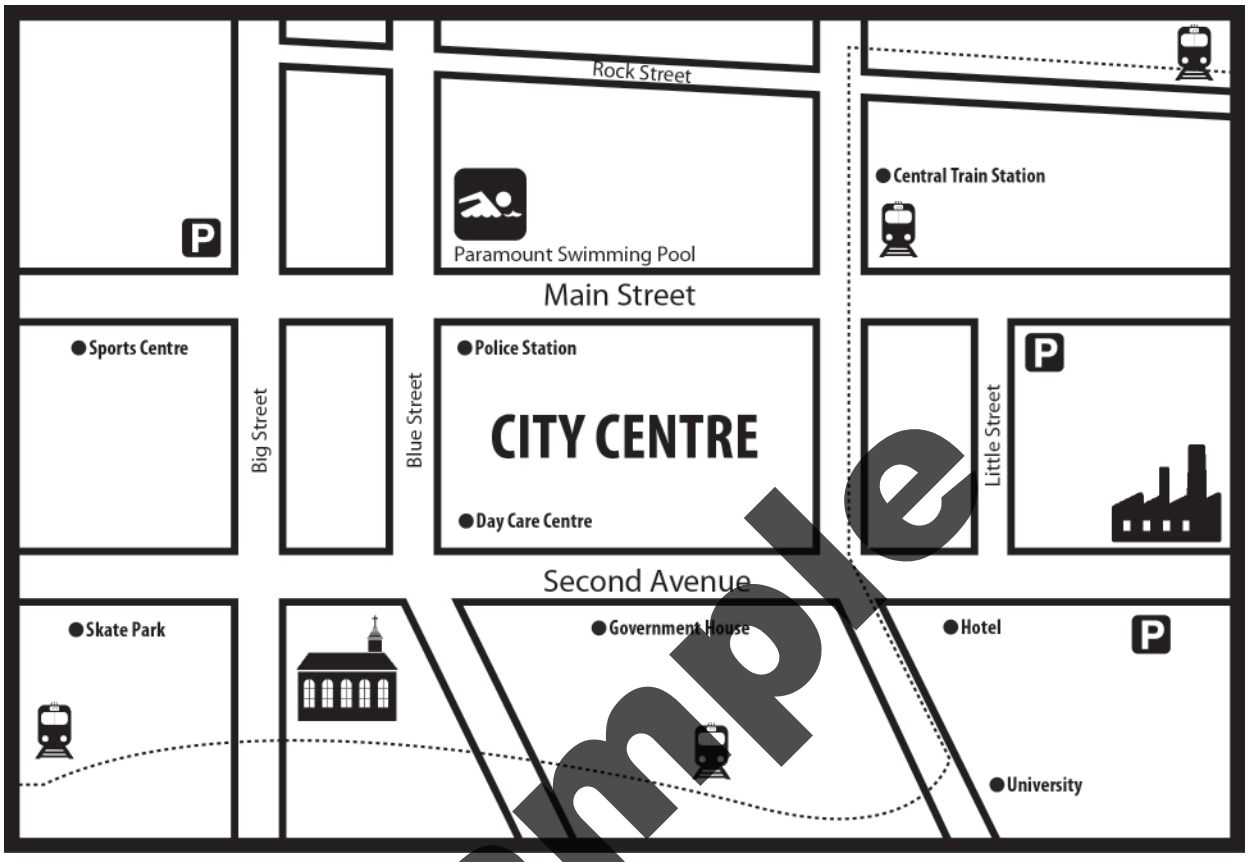
- Elaboration: Discussing how models represent scientific ideas and constructing physical models to demonstrate an aspect of scientific understanding

Compare data with predictions and use as evidence in developing explanations

Land Uses 2

ACTIVITY

Below is a simple map of the central business district (CBD). Take some time to study it.



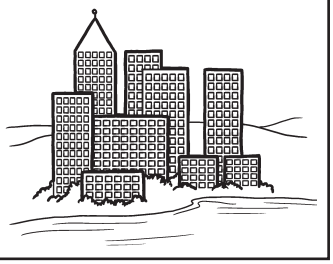
1. Look at the list of **land uses** for a city on the previous page. What land uses can you see on the map of the CBD above? Fill in the table.

Land Use	Example
recreation	*Paramount Swimming Pool*

Extra Activity

i. On the back of this sheet, draw a map of your street, using the map above as a guide. Label the **land uses** of your street.

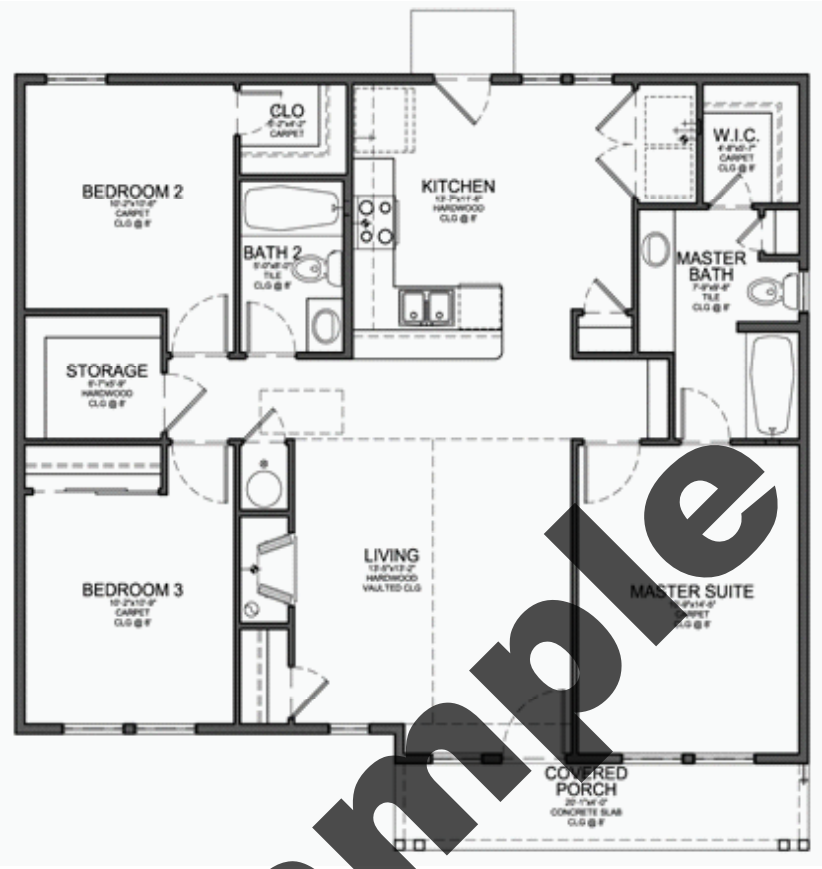
ii. Look at your city, town, suburb or street on Google maps - satellite and terrain. Discuss what details you notice with a friend.



Floor Plans

ACTIVITY

Below is a floor plan of a house. Take some time to study it. Does it look like your house? Use a highlighter to show if your house has any similar features to the one below.



■ Draw a floor plan below of your house. Label the different rooms. Use the sketch above to help you. You will need a pencil, ruler and eraser.

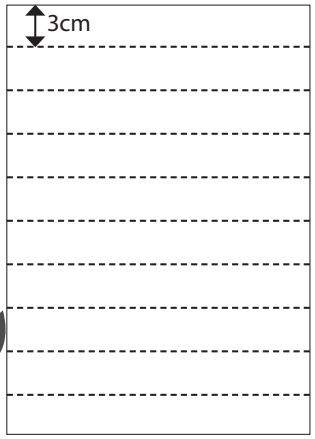
Triangular Bricks 1

EXPERIMENT

Think!

Would a structure, like a house or other building, be MORE or LESS stable if the bricks used in construction were a different 3D shape?

Experiment: Triangular Bricks



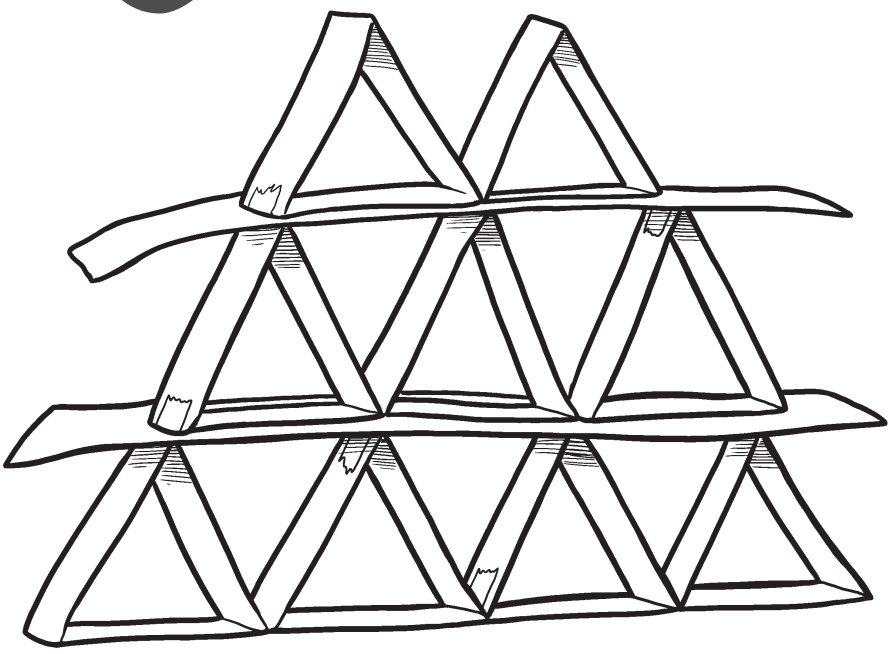
■ Today you will use triangular bricks to try to build a stable structure. Carry out the experiment below in a small group.

Each small group will need:

- 5-10 sheets of thick paper
- scissors
- sticky tape
- rulers and lead pencils

What to do:

1. Place one sheet of paper vertically on your desk.
2. Using your ruler and pencil, draw nine horizontal lines across the paper. Each line should be 3cm apart (see example above right).
3. Cut along each line - this will give you 'paper planks'.
4. Fold each 'paper plank' equally into three sections. Unfold.
5. Make a triangular shape with each 'plank'.
6. Tape each triangle together.
7. Using another piece of paper, cut out more 'paper planks' - this time 4cm wide.
8. Using the straight 'paper planks' and the triangular 'paper planks' form a structure. Look at the example to help you.



Bridges 1

ACTIVITY

Today we are exploring STABILITY through bridges. Read the bridge facts below.

Bridge Fact 1

The most common bridges are beam bridges, arch bridges, suspension bridges, and truss bridges.

Bridge Fact 2

Bridge designs vary to suit the intended use of the bridge (for walking, for cars, for trains, or for a combination of these activities).

Bridge Fact 3

Bridge designs vary depending on the environment, materials available and cost.

Bridge Fact 4

The Sydney Harbour Bridge can rise or fall up to 18 cm because of temperature changes that affect the steel it is made from - the steel **expands** (moves higher) or **contracts** (moves lower) due to the weather.

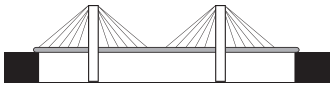
Bridge Fact 5

The West Gate Bridge in Melbourne collapsed in 1970. The bridge engineers and architects made a simple mathematical error when constructing the bridge that caused the bridge's steel girders to become unstable. When some of the steel expanded because of the heat, the bridge fell 40 metres to the ground. It has now been rebuilt.

Beam Bridge

Arch Bridge

Truss Bridge



Suspension Bridge

Answer the questions below thinking about what you have just read.

1. What problems could cause a bridge to collapse? Make a list.

●	●
●	●

2. What issues (factors) must be considered when building a bridge?

Environmental: _____

_____

Natural forces: _____

_____

Bridge Building Challenge 2

ACTIVITY

Begin making your bridge based on the planning on the previous page. You may have to make changes to your design as you construct it. After its construction complete the steps and questions below.

Test:

- Test your bridge for strength by placing a 1 kg weight on the bridge. Think about where on the bridge you will place the weight.

■ Questions:

1. Did your bridge pass or fail the strength test? Describe what happened to the bridge when you put the 1 kg weight on your model.

_____

_____

2. If you had to give your bridge marks out of 10 for stability what would you give it?

_____

3. Did you make changes to your design as you worked on its construction to make it more sturdy? Describe these changes.

_____

_____

■ Reflect:

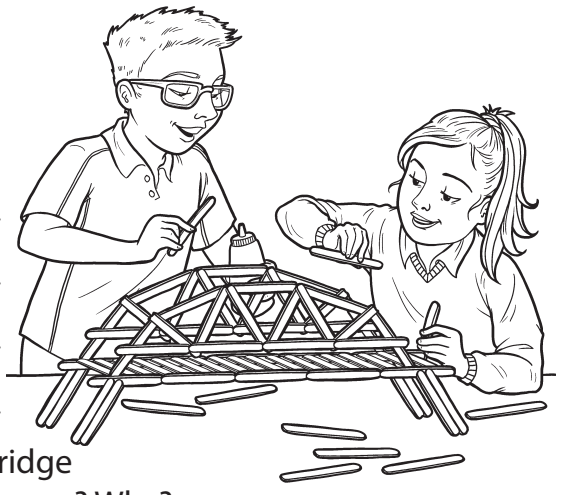
4. How do you think you could have made your bridge sturdier/stronger?

_____

_____

_____

_____



5. Do you think you would have made a better bridge on your own, instead of making a bridge in a group? Why?

_____

_____

_____

_____