

The ultimate investigation-based numeracy program for the Australian Curriculum Foundation to Year 6



Everything you need to: plan |teach | investigate | assess www.imaths.com.au

What is iMaths?

iMaths is an investigation-based numeracy program, written for the Australian Curriculum. The program provides everything you need to plan, implement and assess a comprehensive maths program that meets the individual requirements of any classroom.

By using Investigations to consolidate traditional teaching practices, students develop a deeper understanding of maths concepts and improve problem solving skills.

The complete iMaths program is made up of four components: Student Book, Tracker Book, Teacher Book and iMaths Online.





Student Book



Tracker Book



Teacher Book

Get interactive!

iMaths Online is an integral part of the iMaths program.

imathsonline.com.au

At imathsonline.com.au you'll find everything teachers need to conduct Investigations and teach the Topics, including:

- Black Line Masters
- Projectable Student Book Pages
- Assessment rubrics for investigations
- Links to relevant websites
- Differentiation tasks 3 levels
- Downloadable Data and Tear-out pages
- And much more.



imaths<mark>kids</mark>.com.au

imathskids.com.au is the iMaths Online student area. Students are given a class Access Code, which grants access to:

- Black Line Masters
- Links to appropriate websites
- Downloadable Data and Tear-out pages.

How to use iMaths

Implementing an iMaths program involves 4 basic steps:

Create a yearly program using iMaths iPlanner electronic planning tool. Simply select the Investigations you will conduct and add them to the program. Pre-requisite Topics for the Investigations are automatically included. Then, add the remaining Topics to ensure all Australian Curriculum content is covered.

Teach

Plan

Following your plan, teach the pre-requisite Topics and problem solving strategies, building your students' maths knowledge and skill base. Three levels of differentiation tasks are provided for each Topic to cater for all student abilities.

Investigate

Conduct the Investigation with your students, allowing them to apply their maths knowledge and the skills developed in the Topics. Investigations foster a deep understanding of maths concepts, as students use critical and creative thinking skills within real-life situations.

Assess

Assess the content and proficiency strands of the Australian Curriculum using the assessment items in the Student Tracker Book and Investigation rubrics. These two assessment tools are used to make judgments about the A to E achievement levels of your students.

Teach

The iMaths Topics have been designed to comprehensively address the three content strands of the Australian Curriculum – Number and Algebra, Measurement and Geometry, and Statistics and Probability.

All Topics must be taught to completely cover the curriculum requirements.

All resources needed to teach and assess the Topics are available by using a combination of the Student Book, Teacher Book, Student Tracker Book and iMaths Online.

On this page, you'll find excerpts from Topic NA33: Investigating patterns, as well as supporting resources, taken from the iMaths 4 program.



Student Book Topics



NA33 Investigating patterns

When investigating patterns, a table may be used to record information. The table, called a **table of values**, lists each term and helps to identify a growing pattern.

A growing pattern involves a change between one term and the next. This change can be described using a rule. The rule may then be used to predict further terms.



Look at the pattern of tables and chairs for a banquet below.



Try this

There are two more chairs used in each term so the rule is 'add two chairs'. Using this rule, the next five terms are 14, 16, 18, 20, 22.

- **1 a** Complete the table of values to the 5th term.
- b Describe the pattern using a rule.c Continue the table of values to the 10th term.

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 Image: Constraint of matcheticks

 Image: Constraint of matcheticks

Answers to all Student Book activities are provided in the Teacher Book. Answers are also given for all Problem solving tasks, Challenges, Mental computation activities and Student Tracker Book activities.

The iMaths Online Teacher Area has downloadable differentiation tasks, which allow you to cater for students of varying abilities. There are three levels of differentiation – support, consolidation and extension.

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the close do students, have could these totales be entropyed Entry task and must be first of the noam.

The iMaths Online Teacher Area has projectable versions of all Student Book Topics, which are compatible with digital projectors and electronic whiteboards.



Assessing Topics

The Student Tracker Book contains structured assessment items for each Topic in the Student Book. These items assess the content strands and are divided into two groups – Know and Apply.

The Know questions assess students' basic understanding of the concept. The Apply questions assess the applications of their knowledge in a variety of contexts.

A range of Mental computation strategies can be found at the back of the Student Book. By developing a repertoire of effective computation strategies, students become more numerically fluent.



Most of the Topics contain a Challenge, which requires higher level thinking skills in the application of the concept. Student Book mental computations

3	Menta	al computation strategies			
A	Multiplication st	rategies	A Doubles B Double doubles C Ten and halve D Friendly and fix E Place value		
	Question	Strategy: Double the number for x2.	Answer		
	1 32 x 2	Double 30 and	double 2	64	Ì
	2 63 x 2	Double 60 and	double 3	126	
	3 95 x 2	Double 90 and	double 5	190	
В	Double doubles Question	Strategy: Double the number and doub	ole again for x4.	Answer	
	1 8 × 4	Double 8 and do	uble again	32	
_	2 31 x 4	Double 31 and do	ouble again	124	



Problem solving tasks provide explicit opportunities to develop problem solving skills in the context of the Topics.

The Student Tracker Book has working space for all Student Book problem solving tasks.

Investigate

Investigations are the core of the iMaths program. Investigations foster a deep understanding of maths concepts, as students use critical and creative thinking skills within real-life mathematical contexts.

For each year level, there are 12 high-interest and engaging maths Investigations to choose from, which consolidate the concepts taught in the Topics.

All resources needed to conduct the Investigations are available by using a combination of the Student Book, Teacher Book and iMaths Online.

On this page, you'll find excerpts from Investigation 1: Ripper Rides, as well as supporting materials, taken from the iMaths 4 program.

Student Book Topics



Before conducting Investigations, the relevant Student Book Topics should be taught. The Investigation allows students to revise and practise these Topics in a meaningful context. Want to see more? Trial an Investigation

in your classroom for free

www.imaths.com.au

Student Book Investigation



Investigation I Ripper rides

The iBoards Company is coming to the Australian market. iBoards is famous for making surfboards, skateboards and snowboards.

The company is looking for a talented young designer to create some exciting deck designs for its new Aussie iBoard range.

There are strict guidelines for design – each deck must have no more than $\frac{3}{4}$ of its surface covered by design and no less than $\frac{1}{4}$ of its surface covered by one solid colour. Investigate a way to prove that your pattern covers as close as possible to $\frac{3}{4}$ of the board.

The designs must be geometric and consist of a specific set of lines and shapes. Get designing!

✓ Topics

Before you start the Investigation you need to know	
NA23 Equivalent fractionsp76	MGI3 Area of irregular shapes p126
NA33 Investigating patterns	MGI4 Anglesp128
MG12 Area	MGI6 TessellationpI32

Understanding the Investigation

I Read and plan.

8 iMaths 4 Student Book

Make sure you understand the meanings of: Australian market, company, range, geometric, colour scheme, deck designs, regular, guidelines, patterned, enlarge, overlapped, represent, design elements and solid colour. Read and discuss the rubric.

Download your Investigation plan. This will help you with the organisation and understanding of the Investigation.

ISBN 978 | 74135 179 8

The iMaths Online Teacher Area provides teachers with access to downloadable resources, website links and planning tools that make Investigations easy to conduct.



eacher note

Comprehensive lesson notes

suggestions and resources an

available in iMaths 4 Teacher Book

The BLMs and Investigation plan for this

Investigation can be downloaded from

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Mark Description Address determine Value optimum Value optimum </td <td>New Processing Theorem for the formation of the second secon</td> <td></td> <td>nency and F</td> <td>Plan a board design using all of the required geometric elements.</td> <td>Independently used all the geometric elements accurately to draw a plan of the design.</td> <td>Needed prompting to use all the geometric elements to draw a plan of the design. The elements formed a clearty</td> <td>Needed some help to use all the geometric elements to draw a plan of the design. The elements formed a simple.</td> <td>Needed teacher guidance to use all the geometric elements in the design plan. The elements formed a users</td> <td>Did not understand what th geometric elements looked li The design was random with close pattern</td>	New Processing Theorem for the formation of the second secon		nency and F	Plan a board design using all of the required geometric elements.	Independently used all the geometric elements accurately to draw a plan of the design.	Needed prompting to use all the geometric elements to draw a plan of the design. The elements formed a clearty	Needed some help to use all the geometric elements to draw a plan of the design. The elements formed a simple.	Needed teacher guidance to use all the geometric elements in the design plan. The elements formed a users	Did not understand what th geometric elements looked li The design was random with close pattern
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IB Luty first beisond Gase unit respondent of hereit diversity that the set object of the set diversity of the set of the set diversity of the set diversity of the set of the set diversity o	at Justify the choice of Gave well reasoned and Briefly described why the Gave a simple explanation Reasons for choosing the The reasons for choosing the three heat these heat there heat the three h		as oning	Prove that $\frac{1}{2}$ of the board has been left blank for a solid colour.	Gave a clear and detailed description of an efficient method used to calculate $\frac{1}{6}$ of the board.	Described a reasonable method for calculating $\frac{1}{4}$ of the board.	Gave a simple description of the method used to calculate $\frac{1}{6}$ of the board.	Had difficulty describing the method used to calculate $\frac{1}{4}$ of the board.	Was unable to describe the method used to calculate $\frac{1}{6}$ of the board.
well balanced design.	design design design design		8	Justify the choice of the best three board designs. Explain how the elements combined to form an appealing and well balanced design.	Gave well reasoned and detailed arguments for their choice of the best three designs.	Briefly described why the elements on the three boards chosen combined to form an appealing and well balanced design.	Gove a simple explanation of the elements which helped them choose the best three designs.	Reasons for choosing the best three designs did not always relate to the elements.	The reasons for choosing the three best designs were confused and unrelated to th design elements.

Assessing Investigations

The Teacher Book makes assessment easy with an A-E rubric for each Investigation. These rubrics allow teachers to assess students' proficiency in understanding, fluency, problem-solving and reasoning.

The rubrics can be used to help students understand the criteria by which they will be assessed and enable self-improvement. They are also a great reporting tool, to keep parents informed of their child's progress.

The iMaths Online Student Area provides kids with direct access to essential downloadable resources, as well as links to relevant websites.



2 Look at other board designs.

Look at the size and shape of surfboards, skateboards and snowboards. Examine the deck patterns. Are there any with geometric patterns?

Choose your favourite board type and print out the appropriate template from BLMs 1.1–1.3. Keep in mind that only $\frac{3}{4}$ of the board will be patterned. You may need to enlarge the board template to A3 so you have a bigger design space.

Using maths

3 Calculate $\frac{3}{4}$ of the board.

Use the appropriate blank board shape (BLMs 1.1–1.3) to investigate a method to find $\frac{1}{4}$ of the area of your board.

Once you have $\frac{1}{4}$, it should be easy to find $\frac{3}{4}$. The area you find will be your design space.

🖡 Plan and draw your design.

Read the guidelines in the box to the right Experiment with designs that meet the guidelines. Arrange the geometric pattern to cover $\frac{3}{4}$ of the board. When you are happy with your design plan,

carefully draw it onto the outline of your board

Name your creation.

Reasoning and reporting

5 Find the most popular, accurate design. Make a class display of all designs. Group the boards by type. Explain how you have included all the geometric

design elements that were required. Prove that $\frac{1}{4}$ of your board has been left blank

for the solid colour. Choose the three boards you would select to

submit to iBoards. Give reasons for your choices.

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The Inquiry is an open-ended extension of the Investigation, which requires higher-order thinking skills and provides an extra challenge for students.



4 Plan and draw your design

Students have been asked to create a geometric design that will cover \$ of their boards. This task therefore is multidimensional. Fig 15 - Example de Students must consider where and how to place all the necessary geometric features, which include:

2 small triangles

c medium triangles 2 large triangles (these might look interesting overlapped!) 5 horizontal lines 5 vertical lines

6 vertical lines 6 sets of parallel lines

A intersecting lines An interesting shape that will tessellate at least 8 times An unusual shape that is flipped or reflected An acute, right and obtuse angle.

Students must also consider the fact that the design must only cover $\frac{3}{4}$ of the board.

Long cover go in exoting the purpose of the second seco

Problem solving Students could use the *draw a picture or diagram* problem solving strategy in the design stage to get a better feel for their overall design.

overall design. By drawing a rough sketch first and delineating the $\frac{1}{4}$ of the board they are going to design, students can more easily se how large or small each geometric design element needs to

Rough diagrams should be reworked and discarded until students are happy with the overall concept. Allow students plenty of time to experiment with the use of the geometric elements listed. Students should think about balance, colour, effect and appeal. Students could use a drawing program, basic shapes in a word processing program or hand draw and colour each element.

Encourage students to reflect on the suitability of their designs and check off each of the required elements. They may like to make several sketches before they decide on the final design. Remind students that their design way contain elements ather than those listed, as long as all the listed elements are included

Final design The final design could be drawn onto the enlarged board

The mini design could be drawn onto the enargies board shape template (see Fig. 15), or transferred onto a solid bass of cardboard or plywood. Ply or solid card could be painted a base colour. The design could be drawn and cut out, and the glued onto the ply or solid card.

Encourage students to take care when producing their final designs. They should use a ruler to ensure lines are straight designs. They should use a ruler to ensure lines are straight Before the creations are named, brinistarm vocabulary associated with surfboards, skateboards and anexboards. From these, the subdents could anome thair creation, for example Surf Skinnner, Speed Skate or Snow Swish. Allow students to look at samples of brand name before they choose a name and place it on their design. SBN 978 1 74135 172 9



Maths 4 Teacher Book 25

The Teacher Book contains teaching notes that describe how to guide students through each Investigation, as well as providing planning information, problem solving opportunities, working examples and solutions.

• 6 horizontal lines • 6 vertical lines • 3 sets of parallel lines 4 intersecting lines an interesting shape that will tessellate at leave 8 times
an unusual shape that is flipped or reflected
an acute, right and obtuse angle.

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The Investigation I area contains the Investigation plan, websites and BLMs that you need to complete this Investigation.

Guidelines for board design

2 medium triangles

• 2 large triangles

Inquiry

nvestigate and list 5 reasons why

boards come in so many different shapes, sizes, designs and materials

Maths 4 Student Book 9

The board design must include: • 2 small triangles

Go to **imathskids.com.au** -