



Investigation 1

How do I measure up?



About the Investigation

Children enjoy collecting data and information about themselves. This Investigation requires students to collect and compare their own body measurements in order to find relationships between various body parts, such as, 'my arm span equals my height.' Students will write comparative statements about their own body measurements. This activity reinforces literacy skills and integrates well with a *Getting to Know You* unit.

Planning the Investigation

Expected duration of Investigation:

3 weeks

Recommended group size:

Pairs

Students will need:

- ☆ internet access
- ☆ **Tear-out 1** - *My Data*
- ☆ coloured pencils
- ☆ calculator
- ☆ digital camera
- ☆ tape measure, ruler
- ☆ craft materials - string and rolls of paper, butcher's paper, glue, scissors, sticky tape

Topics for this Investigation

Before starting the Investigation, teach the following Topics...

MG1 Measurement with metres

MG2 Measurement with centimetres

MG3 Grams and kilograms

SP3 Column graphs

SP5 Interpreting graphs

Curriculum match for Investigation 1

The table below shows how the Topics in Investigation 1 match the content requirements of the Australian Curriculum.

Content descriptions	iMaths 3 Topics
<p>Measurement and Geometry</p> <p>Using units of measure</p> <ul style="list-style-type: none"> Measure, order and compare objects using familiar metric units of length, mass and capacity. 	<p>MG1 Measurement with metres</p> <p>MG2 Measurement with centimetres</p> <p>MG3 Grams and kilograms</p>
<p>Statistics and Probability</p> <p>Chance</p> <ul style="list-style-type: none"> Conduct chance experiments, identify and describe possible outcomes and recognise variation in results. <p>Data representation and interpretation</p> <ul style="list-style-type: none"> 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. Interpret and compare data displays. 	<p>SP5 Interpreting graphs</p> <p>SP3 Column graphs</p> <p>SP3 Column graphs</p>

The table below shows how students will apply the proficiency strands during each task in this Investigation.

Proficiency strands	Investigation 1 criteria
<p>Understanding, Fluency and Problem Solving</p>	<p>Step 3: Measure personal characteristics and record the results.</p> <p>Step 4: Use a column graph to represent the data.</p>
<p>Reasoning</p>	<p>Step 5: Use information on the graphs to write some compare and contrast sentences about personal data.</p>

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Investigation 1 How do I measure up?

Essential word list

Students will need to understand the following terms:

- ☆ arm span
- ☆ double
- ☆ relationships
- ☆ life-sized
- ☆ circumference
- ☆ fascinating
- ☆ personality
- ☆ compare
- ☆ comparisons

The rubric

Read and discuss the rubric. Discuss the criteria and have students identify which step of the Investigation each one is describing. The rubric should be revisited after the *Understanding the Investigation* stage, both during and after the *Using maths* stage and during the *Reasoning and reporting* stage.



Investigation 1 How do I measure up?

Our body measurements can be fascinating.

Did you know that your arm span could be the same as your height?

Make a collection of your own body measurements and investigate the relationships between them.

Create a life-sized graph and see how many interesting comparisons you can make.

Could your leg be twice as long as your arm? How does the length of your ear compare with the length of your little finger?



✓ Topics

Before you start the Investigation you need to know...

- | | |
|---|--|
| <input type="checkbox"/> MG1 Measurement with metres.....p100 | <input type="checkbox"/> SP3 Column graphs.....p136 |
| <input type="checkbox"/> MG2 Measurement with centimetres.....p102 | <input type="checkbox"/> SP5 Interpreting graphs.....p140 |
| <input type="checkbox"/> MG3 Grams and kilograms.....p104 | |

Understanding the Investigation

I Read and plan.

Make sure you understand the meanings of: *armspan*, *relationships*, *circumference*, *personality*, *comparisons*, *double*, *life-sized*, *fascinating* and *compare*.

Read and discuss the rubric.

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

Teacher note

- Comprehensive lesson notes, suggestions and resources are available in *iMaths 3 Teacher Book*.
- The Tear-out and Investigation plan for this Investigation can be downloaded from www.imathsteachers.com.au.

1 Read and plan.

Read the introductory text and discuss the premise of the Investigation.

Teach the Topics (concepts) that provide the knowledge required to complete the investigation.

Re-read the introductory text and each step of the Investigation. Discuss any procedures to be used, how data will be organised and how solutions will be communicated.

Discuss new terms in the context of the Investigation.

Read and discuss the rubric. Clarify the criteria to be assessed. This rubric should be revisited throughout the investigative process.

Go to imathsteachers.com.au and print a copy of the Investigation plan for each student. Work through the plan as a class, in small groups or individually.

Focus questions

- What is this Investigation asking you to do?
- Which Topics are really important to this Investigation?
- What do you think you will be good at?
- What do you think you will need help with?
- Do you understand the meaning of the words on page 8?

Materials



Internet access



Tear-out 1



Coloured pencils



Calculator



Digital camera



Tape measure



Craft materials

Investigation 1

2 Get ready to measure.

Look at Tear-out 1 *My data* (p179). This is where you will record your personal measurements. Paste a photo of yourself on your page.

As a class, brainstorm parts of your body that would be suitable to measure.

On your *My data* page, make a list of the parts of your body that you will measure.

Using maths

3 Measure and record your details.

Find a partner. With your partner, discuss how you could make accurate measurements of parts of your body. String, tape measures, rulers and rolls of paper could be used.

Ask your partner to take your measurements. Write them on your *My data* page.

4 Make a column graph.

Use butcher's paper and string, or strips of paper to make a life-sized column graph of your measurements.

Name your graph. Label each axis and column and write a scale on the vertical axis.

Can you see any interesting relationships between the measurements?

Is any measurement double another?

Reasoning and reporting

5 Make interesting comparisons.

Write some interesting sentences comparing your measurements. For example: *The circumference of my head is almost three times my handspan.*

Hand in your *My data* page and explain how you made your measurements as accurate as possible.

Decorate your column graph. Display it to the class and describe your findings.

imathskids.com.au

Go to **imathskids.com.au** – The Investigation 1 area contains the Investigation plan, websites and Tear-out that you need to complete this Investigation.

Inquiry

What would you look like if your head, arms and feet doubled in size? To find out, have someone take a full-length digital photo of you, making sure your whole body is in the frame. Print the photo and use a ruler to measure the length of your arms and feet, and the size of your head. Double these measurements. Use your original photo to trace your neck, body and legs (normal-sized), then draw in your head, arms and feet using your new measurements. How do you look?

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iMaths 3 Student Book 9

2 Get ready to measure.

For this step of the Investigation, students will need **Tear-out 1**, *My data*. Students may also need measuring devices and butcher's paper.

As a class, read and discuss the questions in the introduction to the Investigation:

- "Did you know that your arm span could be the same as your height?"
- "Could your leg be twice as long as your arm?"
- "How does the length of your ear compare with the length of your little finger?"

Students may find it interesting to prove that a person's arm span is roughly the same as their height. They could do this by marking the length of a student's body while lying and compare this with a measured arm span.

Ask students to look at the *My data* table. This is where they will record the measurements they make in Step 3 of the Investigation.

On the *My data* table, there is space for students to put a photo of themselves. They could use a digital camera or bring a photo from home. If this is not possible, they may draw a self-portrait.

As a class, brainstorm possible body parts to measure.

Ask students to make a list of the parts of their bodies they intend to measure, such as handspan, length of foot, length of index finger, circumference of head etc. There is space on the *My data* table for 15 measurements, but students don't need to record that many. You could differentiate according to varying student abilities by adjusting the number and type of measurements to be taken.

Note: Body measurements can be a sensitive topic for some students. Avoid any situation that may be stressful to students, such as measuring weight or waist size.

5 Make interesting comparisons.

In this step of the Investigation, students write interesting sentences that compare their measurements.

Students can visit the Investigation 1 area of imathskids.com.au and follow the links to the websites listed for interesting comparisons students can explore.

With the class, make a list of appropriate vocabulary for comparative statements. For example:

- ... is longer than ...
- ... is twice as long as ...
- ... is nearly equal to ...
- ... is half the length of ...
- ... is shorter than ...
- ... is nearly the same length as ...

Ensure students write in complete sentences when comparing their measurements. For example:

"The circumference of my head is almost three times my handspan."

"The length of my arm is nearly equal to three handspans."

Ask students to present their column graphs to the class, describing their measurements and demonstrating the accuracy of their comparative sentences.

Inquiry

Students who need an extra challenge could be engaged in the following activity, which extends the application of the Topics used in this Investigation.

What would you look like if your head, arms and feet doubled in size? To find out, have someone take a full-length digital photo of you, making sure your whole body is in the frame. Print the photo and use a ruler to measure the length of your arms and feet, and the size of your head. Double these measurements. Use your original photo to trace your neck, body and legs (normal-sized), then draw in your head, arms and feet using your new measurements. How do you look?

Students will need to get a friend to take their photo, ensuring their whole body is in the frame. Suggest they hold their arms straight out by their side and turn their feet so their toes are pointing outwards. Make sure the photo isn't too dark. Students will then need to print the photo (a black and white print out on regular copy paper is sufficient).

Students use a ruler to measure their arms, feet and head on the photo, then double these measurements. When measuring their head, students could draw vertical and horizontal lines through the head, measure the length and width then double both measurements.

Communicating and reflecting

The following questions are designed to help you assess students' proficiency in reasoning.

- Were any of your measurements a surprise to you? Why?
- What was your shortest measurement? Can you now think of an even shorter measurement you could have taken?
- How did you choose appropriate units of measure for each body part?
- Was the column graph a useful tool for showing the relationships between different measurements? Explain your answer.
- Can you prove one of your comparative sentences? How?
- Were there any errors in your data collection?
- What could you have done to improve the accuracy of your measurements?

Students should submit:

- Tear-out 1 – My data
- column graph of measurements
- comparative sentences.

Students will need another sheet of paper to trace an outline of their original photo. Holding up and resting their sheets of paper on a window will help if they aren't using tracing paper. Remind them to trace their neck, shoulders, body and legs only, leaving space for their arms, feet and head. They should then use their doubled measurements to draw freehand their head, arms and feet. To draw their head, they should lightly draw the vertical and horizontal lines with the doubled measurements, then draw an oval around the cross.

Students can then draw in their facial features, hair and clothing. Most students will find the result quite amusing.

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Name: _____ Due date: _____

Proficiency strands		A	B	C	D	E
Understanding, Fluency and Problem Solving	Step	Ability to...				
		Measure personal characteristics and record the results. Used the most effective and accurate measuring instruments. Recorded all measurements in the correct units of measurement.	Accurately measured most of the personal characteristics. Generally used the most suitable measuring instruments. Could have used more appropriate units of measurement in some cases.	Needed help to choose the most suitable measuring instrument when measuring and recording the personal characteristics. Did not always use the correct units of measurement. Made minor errors when measuring.	Needed teacher guidance to select the most appropriate measuring instrument, accurately measure personal characteristics and use the correct units of measurement.	Needed to be given an appropriate measuring device for each measurement. Did not start measuring from zero. Read the numbers on the measuring device but did not know what units of measurement they were.
Reasoning		Use a column graph to represent the data. The column graph followed the correct mathematical rules (labels, titles etc). The graph clearly and accurately represented all measurements.	Displayed the measurements using a column graph, which had only minor errors in title and/or labels. The graph represented all the data.	Needed to be reminded to include all the elements of a graph. Needed to revise some of the measurements on the graph to accurately reflect the measurements taken.	Needed teacher guidance to create a column graph that reflected the measurements taken.	Could not make an accurate graph of the measurements without a great deal of help from the teacher.
		Use information on the graphs to write some comparative sentences about personal data. Independently made some accurate observations about the relationship between the measurements on the graph. Used appropriate linking words in their comparative sentences. Commented on some possible sources of error when collecting data.	Made some observations based on the measurements on the graph, but needed some assistance to see the relationship between them. Used comparative linking words to construct sentences.	Made some simple observations about the data. Used comparative linking words to write the sentences.	Needed help to see any relationship between the measurements in order to write comparative sentences. Needed teacher guidance to help express their ideas clearly.	Was unable to make any comparisons between the measurements, even with assistance. Was unable to, or did not, write comparative sentences.

Teacher comments

Overall rating

