

# Breakfast investigation for Foundation-Year 7

The following investigation provides a context, child-friendly brief, lesson overviews and curriculum links for a 2-3 week-long unit on investigating and analysing data. If you have a multi-age class for years 4-7 you might like to use the work program supplied on pages 12-13 with the investigation.

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# Breakfast Investigation:

## Brief:

What breakfast foods are most commonly eaten by children in your class?

## Your job is to:

- design a survey to find out, including adjusting the questions as needed
- carry out your survey to collect your data,
- group or categorise your data and
- display your information appropriately
- present your findings



## Brainstorm your ideas here:

Include questions that you could ask, ideas for how to collect data, any difficulties that you think there might be, and ideas for how to group and display the data.

Questions	Collecting data
Possible categories	Displaying the data

## Teacher Brief

Investigating, collecting, categorising, displaying and interpreting data should take a couple of weeks of your program, so it is an ideal way to end out this term. If you are members of the Back to Front Maths website, you can find appropriate support lessons in section J: Data in the lessons bank for each year level. If not, follow the outline below.

## Lessons

### Lesson 1: Overview

“What did you have for breakfast today?” Gather responses and write list.

#### Foundation

1. “Did you have toast today?” Ask students to stand in different parts of the room.
2. “What do you notice about the two groups we’ve made?” Ask students to suggest what is the same or different about the groups. Ask students to prove what they are saying e.g. “How can we be sure there are more boys who eat toast?”
3. Ask another yes/no question “Did you have cereal today?” (repeat steps 1 and 2 for all listed items)

#### Year 1 and 2

1. Ask students to put their hand up to show who had each suggestion as it is listed.
2. “Do we eat the same thing every day or does it change? What might change?”
3. “What could we find out about the breakfasts our class eat? – Think, Pair, Share
4. Make a list of ideas “Do we want to find out about all of these things or will we narrow it down? Which one/s will we choose?”

#### Year 3 - 7

As for Year 1 and 2 plus

1. “What if we wanted to find out about the breakfasts that other people eat? Who else could we include?”
2. “What could we do to find out?”

### Lessons 2-3: Designing good questions

#### Foundation

1. Repeat Lesson One but give students something that can represent their response (e.g. name card, ‘yes’ or ‘no’ card, block or counter) and ask them to place their token in a particular spot according to their yes/no response.
2. Experiment with constructing different displays with the tokens e.g. placing them in hoops, lining them up beside each other. Ask students to describe what they can find out from the displays.

#### Year 1-2

1. Surveys need to have well-designed questions so that our data is accurate. Ask students to work in pairs. “Choose one of the ideas from Lesson one and come up with a question you could ask to find out what you want to know.”
2. “What answers might people give to your question?”

3. Ask students to try their question/s out with other students. “Were they able to answer easily? Had you thought about all of the different responses you might get?”
4. Encourage groups to refine their question and the possible responses.

#### Year 3-7

1. Surveys need to have well-designed questions to obtain accurate data and avoid ambiguity. Show examples. Ask students to consider any issues that might arise and what they mean for the accuracy of the data. For example: “What do we do if answers do not fit the possibilities? Are yes/no questions suitable for our investigation? Why/why not?”

Example questions:

- Do you eat toast or cereal for breakfast?
  - What days do you eat eggs?
  - What is your favourite breakfast food?
    - a) Cereal
    - b) Eggs
    - c) Toast
2. Have students work in groups to plan their investigation and answer the following:
    - What do you want to find out?
    - What form will the questions take? (e.g. multiple choice, free response)
    - What questions could you ask?
  3. Ask students to try their questions out on each other or their family.

Lessons 4-5: [Questions with more than two possible responses \(foundation\)](#)  
[Gathering and organising responses \(Yr1-2\)](#)  
[Designing the collection instrument and collecting data \(Yr3-7\)](#)

#### Foundation

1. Review “What did you have for breakfast today?”
2. Ask students to sit in groups for each of the responses.
3. “What does this tell us about what we eat for breakfast?”
4. Introduce idea of lining up along a common baseline to directly compare the number of students in each group.
5. Create a picture graph with the same elements – common base line, a picture or token to represent students and where they were standing.

#### Year 1-2

Students work in groups and/or as a whole class to:

1. Choose the question they will ask
2. Make suggestions about the results e.g. “What do you think most people will eat for breakfast?”
3. Decide on how many responses they want and who they will ask (small sample size)
4. Work out how they will record the responses
5. Collect the responses and organise them into categories (Introduce idea of using a table and/or tally marks)
6. Share and compare what they found out and their methods for recording the responses

Year 3-7 (Consider beginning in small groups but making whole class decisions for investigation for younger students)

1. Students work in groups to decide:
  - How many responses they want
  - How many each person will collect and who from
  - Make predictions about the responses they will get and the number of them
  - How they will record the responses e.g. Do they need multiple copies of a survey to complete? Will they ask the questions verbally and record the responses themselves?
  - How they will organise the information they gather e.g. Do they need a table to record responses on? Will they separate the responses from each person or group them together using tally marks?
2. Collect the data

Lessons 6-7: Questions with more than two possible responses (foundation)

Organising the data and displaying it (Year 1-2)

Combining and categorising the data, trialling display methods (Year 3-7)

Foundation

1. Ask students to suggest other questions that have more than one response.
2. Construct simple picture graphs to display results

Year 1-2

1. Combine data across the class
2. Design the categories they will use when displaying their data
3. Count and record the responses for each category
4. Design and construct a method to display the data using pictures, objects or tokens (Yr1) or graphs with 1-1 correspondence (Yr2)

Year 3-4

1. Combine data collected by class or group members as appropriate
2. Design categories for the data and discuss similarities and differences
3. Trial different ways to record and display the data including: lists, tables, picture graphs, column graphs. (Yr4 include displays where one picture or square can represent more than one data value)

**Note:** At this point, it would be appropriate to consider different types of data displays including examples of column graphs, dot plots and tables (Yr5-7); side-by-side column graphs (Yr6-7); stem-and-leaf plots and dot plots (Yr7). Compare examples of graphs and their usefulness.

Interesting examples can be found at <https://slowrevealgraphs.com/> This site contains graphs that slowly reveal information pertaining to the graph using a slideshow format. Students are encouraged to make inferences about the data at each step.

Year 5-7

1. Combine data collected by class or group members as appropriate
2. Design categories for the data and discuss similarities and differences
3. Trial different ways to record and display the data and decide on the most effective way to display their data.

Lessons 8-10: Describe and compare results (Year 1-2)

Display data, interpret results, compare data displays and evaluate their effectiveness (Year 3-7)

Summarising data using measures of centre and spread. (Year 7 optional extension task)

Year 1-2

1. Describe the results of the investigation e.g. Which category had the most/least responses? How can you tell?
2. Compare results obtained by different groups, if applicable
3. (Yr2) Compare the different display types. What is useful about each? Which displays were best for this investigation?

Year 3-7

1. Construct the display your group has chosen for your data and explain reasons for your choice
2. Interpret the data using your display. What information can you gain from your display? What comparisons can you make regarding the categories you chose? What doesn't your display tell you? How effective is the display you chose for answering the questions you chose for this investigation?
3. Share your data display and results with other groups.
4. Compare the data displays presented e.g. similarities and differences, effectiveness for this investigation.

Year 7 (extension task)

1. Design one or more questions that contain a numerical value in the answer e.g. How many times a week do you eat cereal? How many eggs does your family consume for breakfast each week?
2. Collect, organise and display the data
3. Calculate the mean, median and mode and show them on the data displays
4. Answer questions about how useful these measures are for applying to larger populations, variations in results and the effect of outliers.

## Curriculum Links

### Content Descriptions

#### Foundation

Answer yes/no questions to collect information and make simple inferences (ACMSP011)

#### Year 1

Choose simple questions and gather responses and make simple inferences (ACMSP262)  
Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays (ACMSP263)

#### Year 2

Identify a question of interest based on one categorical variable. Gather data relevant to the question (ACMSP048)  
Collect, check and classify data (ACMSP049)  
Create displays of data using lists, table and picture graphs and interpret them (ACMSP050)

#### Year 3

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)  
Interpret and compare data displays (ACMSP070)

#### Year 4

Select and trial methods for data collection, including survey questions and recording sheets (ACMSP095)  
Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values (ACMSP096)  
Evaluate the effectiveness of different displays in illustrating data features including variability (ACMSP097)

#### Year 5

Pose questions and collect categorical or numerical data by observation or survey (ACMSP118)  
Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies (ACMSP119)  
Describe and interpret different data sets in context (ACMSP120)

#### Year 6


Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables (ACMSP147)  
Interpret secondary data presented in digital media and elsewhere (ACMSP148)

#### Year 7




Identify and investigate issues involving numerical data collected from primary and secondary sources (ACMSP169)  
Construct and compare a range of data displays including stem-and-leaf plots and dot plots (ACMSP170)  
Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data (ACMSP171)

## Assessment Indicators



### Foundation

Probability & Statistics	<b>P1A</b> Answer simple questions, collect and interpret or explain information (may include simple displays).	<b>P1B</b> Answer simple questions and collect information to make simple inferences.	<b>P1C</b> Answer simple questions to collect information and make simple inferences. 	<b>P1D</b> Answer yes/no questions to collect information.	<b>P1E</b> Answer yes/no questions.
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### Year 1





Probability and Statistics	<b>P1A</b> Explain and interpret the data in displays.	<b>P1B</b> Explain the data in displays.	<b>P1C</b> Describe data displays. 	<b>P1D</b> Describe some data displays.	<b>P1E</b> Identify some data displays.
	<b>P3A</b> Design and ask appropriate questions and collect data.	<b>P3B</b> Ask appropriate questions and collect data.	<b>P3C</b> Collect data by asking questions. 	<b>P3D</b> Collect data by asking simple questions.	<b>P3E</b> Ask yes/no questions.
	<b>P4A</b> Draw simple but accurate data displays (picture graph, table independently and bar graph) and interpret the data.	<b>P4B</b> Draw simple data displays (picture graph, table independently and bar graph using a template) and make inferences.	<b>P4C</b> Draw simple data displays and make simple inferences (table, picture graph). 	<b>P4D</b> Complete simple data displays using templates (e.g. table, picture graph) and answer some questions about them.	<b>P4E</b> Attempt simple data displays using templates.

### Year 2






Probability and Statistics	<b>P2A</b> Analyse, describe and make inferences from collected information.	<b>P2B</b> Interpret and describe collected information.	<b>P2C</b> Make sense of collected information. 	<b>P2D</b> Describe some findings from collected information.	<b>P2E</b> Make statements about collected information.
	<b>P3A</b> Collect data from relevant questions, refine questions as needed, decide how best display this data by creating lists, tables and picture graphs, and interpret important features of the data.	<b>P3B</b> Collect data from relevant questions, display data, by creating lists, tables and picture graphs, and make inferences.	<b>P3C</b> Collect, organise and represent data to make simple inferences.  (NB: list, table, picture graph).	<b>P3D</b> Collect data by asking questions. Create lists and picture graphs.	<b>P3E</b> Collect data from yes/no questions. Create lists or picture graphs.








Year 3

Probability and Statistics	<p><b>P1A</b> 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.  (NB: one-to-many correspondence).</p>	<p><b>P1B</b> Collect data and create displays using lists, tables, picture graphs and simple column graphs. Interpret data displays (one-to-many correspondence).</p>	<p><b>P1C</b> Interpret and compare data displays.  (NB: one-to-one representations for lists, tables and picture graphs).</p>	<p><b>P1D</b> Compare one-to-one data displays (lists, tables or graphs).</p>	<p><b>P1E</b> Make statements about data displays.</p>
	<p><b>P3A</b> Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording. </p>	<p><b>P3B</b> Plan and conduct simple data investigations for categorical variables.</p>	<p><b>P3C</b> Conduct simple data investigations for categorical variables. </p>	<p><b>P3D</b> Conduct simple data investigations using templates.</p>	<p><b>P3E</b> Ask yes/no questions and record the results on templates.</p>




Year 4

Probability and Statistics	<p><b>P2A</b> Select and trial methods for data collection, including survey questions and recording sheets.  (NB: this includes selecting a method based on a trial and evaluation of their effectiveness).</p>	<p><b>P2B</b> Collect data in different ways (survey, experiment, observation) and determine which was most effective.</p>	<p><b>P2C</b> Describe different methods for data collection and representation, and evaluate their effectiveness. </p>	<p><b>P2D</b> Collect data using different methods.</p>	<p><b>P2E</b> Collect data using templates.</p>
	<p><b>P3A</b> Construct suitable data displays, with and without the use of digital technologies, from given or collected data. Include tables, column graphs and picture graphs where one picture can represent many data values.  Evaluate the effectiveness of different displays in illustrating data features including variability. </p>	<p><b>P3A</b> Construct tables, column graphs and picture graphs from given or collected data. (NB: using one-to-many correspondence). Compare the effectiveness of different displays.</p>	<p><b>P3C</b> Construct data displays from given or collected data.  (NB: this includes column graphs, tables and picture graphs using one-to-many correspondence).</p>	<p><b>P3D</b> Construct tables, column and picture graphs with one-to-one correspondence.</p>	<p><b>P3E</b> Construct picture graphs with one-to-one correspondence.</p>








Year 5

Probability and Statistics	<b>P1A</b> Describe and interpret different data sets in context. 	<b>P1B</b> Describe and interpret different data sets.	<b>P1C</b> Interpret different data sets. 	<b>P1D</b> Describe given data sets.	<b>P1E</b> Make statements about data.
	<b>P3A</b> Pose questions and collect categorical or numerical data by observation or survey.  Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies. 	<b>P3B</b> Pose and refine questions to gather appropriate data. Construct data displays appropriate for the data (table, column graph, dot plot) following conventions.	<b>P3C</b> Pose questions to gather data, and construct data displays appropriate for the data.  (NB: includes column graphs with many-to-one correspondence, dot plots and tables).	<b>P3D</b> Collect data. Construct data displays (table or column graph).	<b>P3E</b> Collect some data using templates. Construct data displays using templates (table, column graph with one-to-one representation).

Year 6

Probability and Statistics	<b>P1A</b> Interpret and compare a range of data displays, including side-by-side column graphs for two categorical variables. 	<b>P1B</b> Interpret and compare a variety of data displays including for two categorical variables (two-way tables, column graphs, pie graphs).	<b>P1C</b> Interpret and compare a variety of data displays including those displays for two categorical variables.  (NB: two-way tables, column graphs and pie graphs).	<b>P1D</b> Interpret and compare some data displays (two-way tables, column graphs and simple pie graphs).	<b>P1E</b> Describe some data displays (column graphs and simple tables).
	<b>P2A</b> Evaluate secondary data displayed in the media and make judgements about its reliability, purpose and effectiveness.	<b>P2B</b> Evaluate secondary data displayed in the media and determine its effectiveness.	<b>P2C</b> Interpret secondary data displayed in the media. 	<b>P2D</b> Describe and explain secondary data displayed in the media.	<b>P2E</b> Describe some secondary data.

Year 7

<b>Probability and Statistics</b>	<i>None supplied.</i>	<i>None supplied.</i>	<b>P1C</b> Identify issues involving the collection of continuous data. 	<b>P1D</b> Identify issues involving the collection of data.	<b>P1E</b> Describe some difficulties encountered when data was collected.
	<b>P2A</b> Describe and interpret data displays using median, mean and range. 	<b>P2B</b> Describe the relationship between the median and mean in data displays and identify the range.	<b>P2C</b> Describe the relationship between the median and mean in data displays. 	<b>P2D</b> Identify the median and mean in data displays.	<b>P2E</b> Identify the mean or median in data displays.
	<b>P4A</b> Calculate mean, median, mode and range for sets of data. Interpret these statistics in the context of data. 	<b>P4B</b> Calculate and compare mean, mode, median and range for data sets.	<b>P4C</b> Calculate mean, mode, median and range for data sets. 	<b>P4D</b> Calculate mean, mode, and median for small data sets.	<b>P4E</b> Calculate mean, mode or median for small data sets.
	<b>P5A</b> Construct and compare a range of data displays including stem-and-leaf plots and dot-plots. 	<b>P5B</b> Construct and interpret stem-and-leaf plots and dot-plots.	<b>P5C</b> Construct stem-and-leaf plots and dot-plots. 	<b>P5D</b> Construct dot-plots, graphs and two-way tables.	<b>P5E</b> Construct graphs and tables.

## Multi-age 3 week work program for years 4-7

Monday	Tuesday	Wednesday	Thursday	Friday
<p>Use the <b>Breakfast Investigation</b> supplied in combination with the following lessons.            Back to Front Maths members can find the lesson plans and downloadable activities at these links: <a href="#">Year 4</a>, <a href="#">Year 5</a>, <a href="#">Year 6</a>, and <a href="#">Year 7</a></p>				
<p>Introduce data investigation with everyone (breakfast foods).            Use Journal Problem 27 (years 4-6) and 26 (year 7) to brainstorm and Blasts activity J1 to record questions and collection methods.            Year 4s also look through J2.</p>	<p>Collect data and record answers</p>	<p>Learn about how useful data is for classification and discuss and decide whether more collection is needed. Discuss targeted samples, question formation and categories for answers            Year 4: J3 (J4 as needed)            Year 5: J2, J3            Year 6: J2            Year 7: second half of J1</p>	<p>Collect additional data as needed, and classify it into categories.            Year 4: J5            Year 5: J4            Year 6: J3            Year 7: JP.26 questions</p>	<p>Analysing data: identifying range and variation. Discuss what range means and what variation means. Complete blast activities to consolidate.            Year 4: J7            Year 5: J6            Year 6: J4            Year 7: J2</p>
<p>Graphing and interpreting data: Data tables and two-way tables            Year 4: J6 tables with tally marks            Year 5: J8 (part 1: tables)            Year 6: J8 two-way tables, J14 interpreting tables            Year 7: J4 two-way tables, J9 interpreting tables</p>	<p>Graphing and interpreting data: Bar graphs years 4, 5            Year 4: J10 and J11            Year 5: J8 (part 3 bar graphs)            Year 6: work independently on J15            Year 7: work independently on J10 or on 6 Blasts J15</p>	<p>Graphing and interpreting data: Circle graphs using strips of paper years 5, 6, 7            Year 4 work on picture graphs from J8 and J9 independently, or begin entering data in spread sheet            Year 5: J9, creating circle graphs from approximate fractions            Year 6: J5 – creating circle graphs from approximate fractions            Year 7: use 6 Blasts J5</p>	<p>Graphing and interpreting data: Circle graphs years 5, 6, 7; years 4 and 5 data entry onto spread sheets            Year 4: begin entering data into spread sheet            Year 5: J10 – circle graphs and key percentages (15 mins with teacher combined with year 6 and 7, then begin entering data in spread sheet with year 4s)            Year 6: J6 – circle graphs and key percentages (15 minutes with year 5s and 7s) then 7 Blasts J3 – circle graphs from raw data (30 minutes with year 7s)            Year 7: 6 Blasts J6 – circle graphs and key percentages (15 minutes with year 5s and 6s) then 7 Blasts J3 – circle graphs from raw data (30 minutes with year 6s)</p>	<p>Graphing and interpreting data: spread sheets            All students use computer time to create spread sheets of data investigation            First half hour: teacher works with years 4 and 5 on creating various graphs (bar, line, circle) while years 6 and 7 do data entry.             Second half hour: teacher works with years 6 and 7 on creating various graphs (see instructions in 6 Blasts J7 for circle graphs). Years 4 and 5 continue to make graphs.</p>

<p><b>Interpreting and analysing data: averages (most common and middle answers)</b></p> <p>Years 4-7 all work on 5 Blasts J11: describing what is average in two ways (this is the same as 6 blasts J13 and overlaps with 7 blasts J7)</p>	<p><b>Interpreting and analysing data: averages (mean) years 6 and 7</b></p> <p>Years 4 and 5 work independently on calculating the most common (mode) and middle answer (median) for their data as well as the range.</p> <p>Years 6 and 7: 6 blasts J10 (10 minutes, altogether) 6 blasts J11 (20-30 minutes, altogether) Work on calculating the mean for our data</p>	<p><b>Interpreting graphs:</b></p> <p>Years 4-7 all complete JP.25 in their relevant Journals.</p>	<p><b>Year 7 specific graphs: year 7</b></p> <p>Years 4-6 all work on completing their data analysis for the investigation and writing up their findings. Year 6 needs to complete working out the mean, median and mode for our data.</p> <p>Year 7: J5 and J6 – discuss these and complete parts together as a group.</p>	<p><b>Completing investigation:</b></p> <p>Everyone works on completing the data investigation, writing up findings, completing graphs and making recommendations.</p>
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