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Introduction
This catalogue contains details about digital curriculum resources for the Mathematics and numeracy strand Data available from The Le@rning Federation (TLF). The content has either been created by TLF or licensed from other sources and made available by TLF to all schools in Australia and New Zealand.

The Data digital content supports and enhances students' understanding of key Mathematics concepts in a range of contexts for the P–12 years.

TLF-created content
Mathematics and numeracy digital curriculum resources created by TLF are interactive multimedia learning objects. The learning objects are based on current research findings in Mathematics education and pedagogy. They focus on concepts that are often the most difficult for students to learn and for teachers to teach, and encourage higher-order thinking and problem-solving approaches.

The learning objects make use of the digital environment in innovative ways to enhance student learning. For example, some objects allow teachers to set up learning opportunities in Mathematics that are normally too complex in a standard classroom; others allow students to visualise and apply Mathematics concepts in new ways; others provide opportunities for repeated use by students through randomisation of learning activities; relevant and authentic contexts for exploration and skill application are a feature of others.

Scaffolding of student learning and feedback in various multimodal formats are incorporated into all the learning objects.

The learning objects are generally published in series and some learning objects within a series are aggregated into single learning objects. Aggregated learning objects are identified with the symbol.

Some learning objects contain non-TLF content. See the acknowledgements and conditions of use in the learning objects for details.

Content from other sources
TLF licenses digital content from other sources to include in the pool of online curriculum content available to Australian and New Zealand schools. Mathematics and numeracy content licensed from the National Library of Virtual Manipulatives, USA, and from Alberta Education, Canada, is now available.

Other catalogues
You can download catalogues for each of the Mathematics and numeracy strands at: www.ndlrn.edu.au

A comprehensive Index of Mathematics and numeracy digital curriculum content is also available for download.

Accessing and viewing the content
Government and non-government education authorities in each Australian state and territory and in New Zealand have responsibility for facilitating access to the pool of digital content. Full details about how to access the content, including the necessary technical and software requirements for viewing it, can be found at:

www.ndlrn.edu.au
Learning objects

**Scatter plots series (Years 5–9)**

Students explore the characteristics of scatter plot graphs and use a line of best fit to identify if there is a positive, negative or no clear relationship between two variables.

**Features include:**
- introduction to the features and uses of scatter plots
- assistance to choose axes and scales while constructing a scatter plot
- ability to enter personal data for a statistical investigation
- a dynamic display of data values on a scatter plot
- experimental conclusions related to patterns in scatter plots.

**Students:**
- explore the characteristics and uses of scatter plots
- use scatter plots to identify positive or negative relationships between a pair of variables
- interpret bivariate data in tables and graphs.

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**Scatter plots: about scatter plots**
L5858 – Years 5–9

Students are introduced to the features of scatter plot graphs and learn how to construct and interpret them.

**Scatter plots: height and bellybutton height**
L5859 – Years 5–9

Students plot their personal data together with a real data set for height and bellybutton height.

**Scatter plots: foot length and hand span**
L5861 – Years 5–9

Students plot their personal data together with a real data set for foot length and hand span.

**Scatter plots: age and reaction time**
L5860 – Years 5–9

Students plot their personal data together with a real data set for age and reaction time. Reaction time is measured through a reaction timer in the learning object.
**Scatter plots: create your own data**  
L5862 – Years 5–9

Students enter data for 20–30 people and create scatter plots for each of the three options: height and bellybutton height, age and reaction time, and foot length and hand span.

**Scatter plots**  
L5857 – Years 5–9

This is an aggregated learning object combining the five other learning objects.
Scatter plots series (ESL) (Years 5–9)

Students explore the characteristics and uses of scatter plots.

Features include:
- modified language for English as a Second Language users
- a glossary of terms used in the activity
- an introduction to the features and uses of scatter plots
- support to help students choose axes and scales while constructing a scatter plot
- an option for students to enter personal data for a statistical investigation.

Students:
- use a scatter plot to identify if there is a positive or negative relationship between a pair of variables
- interpret bivariant data in tables and graphs.

### Scatter plots: age and reaction time (ESL)
L9916 – Years 5–9

Students find out what a scatter plot is and how it can be used to investigate relationships between two variables. They analyse data for a pair of variables: a person's age and the time it takes them to react to a signal. They then use a line of best fit to identify if there is a positive or negative relationship between the two variables.

### Scatter plots: create your own data (ESL)
L9918 – Years 5–9

Students gather and analyse data for a pair of variables such as hand span and foot length. They enter their data set and plot it on a graph. Students then use a line of best fit to identify if there is a positive or negative relationship between the two variables.

### Scatter plots: foot length and hand span (ESL)
L9917 – Years 5–9

Students find out what a scatter plot is and how it can be used to investigate relationships between two variables. They analyse data for two variables: hand span and foot length.

### Scatter plots: height and bellybutton height (ESL)
L9915 – Years 5–9

Students analyse data for a pair of variables: a person's height and the height of their bellybutton. They enter their personal data and plot it with other data on a graph. Students then use a line of best fit to identify if there is a positive or negative relationship between the two variables.
Fix the matchbox machine series (Years 5–9)

Students discover how to construct and interpret boxplots to fix a matchbox machine which is not working correctly.

**Features include:**
- assistance to enable students to relate boxplots to variation between samples
- highlighting maximum, median, minimum, first and third quartile values on a boxplot
- illustrations of how a tolerance range is tested in quality management
- testing data interpretation by getting students to restate conclusions
- emphasis on the importance of minimum sample size
- ease of repeated use by randomly generating values for variables
- automatic construction of boxplots.

**Students**
- interpret boxplots to identify whether quality control parameters are within a tolerance range
- explore how the shape of boxplots is affected by adjusting variables.

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**Fix the matchbox machine: scoop size and speed**
L2343 – Years 5–8

Students adjust the scoop size (population mean) and the speed (population standard deviation) to achieve five samples within the tolerance range.

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**Matchbox machine: varying scoop size**
L2336 – Years 5–8

Students adjust the scoop size (population mean) to achieve five samples within the tolerance range.

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**Matchbox machine: varying speed**
L2337 – Years 6–9

Students adjust the speed (standard deviation) to achieve five samples within the tolerance range.
Data handler series (Years 5–9)

Students are introduced to the use of dot plots to solve logistical problems for a sports carnival.

Features include:
- provides data to create a graphical representation; in this case a dot plot
- illustrations of how a dot plot can be used to represent data
- opportunities for students to interpret data on a dot plot
- scenarios for students to use a dot plot to group data according to predefined rules
- support for repeated use through multiple data sets
- immediate feedback to guide students.

Students:
- plot numerical data on a dot plot
- group data into classes which are mutually exclusive and exhaustive, and which reflect the basis for the groupings
- interpret data from a dot plot to draw conclusions based on the reasonableness of groupings.

Data handler: bus timetable
L8239 – Years 6–9

Students help to plan their school sports day by organising buses for all the students, deciding the minimum number of buses required and departure times to suit all students.

Data handler: sock order
L8238 – Years 6–9

As part of planning for their school sports day, students order special socks for the participants, deciding on the sizes and numbers of pairs of socks to order in each group.

Data handler: T-shirt order
L8237 – Years 6–9

Students help plan their school sports day by ordering special T-shirts for the students, deciding on the sizes and numbers of T-shirts to order in each group.

Data handler
L5988 – Years 6–9

This is an aggregated learning object combining the three other learning objects.
Matchbox machine series (Years 6–9)

Students discover how to construct and interpret box plots to assess a quality assurance process for matchboxes.

Features include:
- maximum, median, quartile and minimum values in an array
- automatic collation of sample results
- emphasis on the importance of sorting data before analysis
- drill practice to reinforce the five-point summary needed to construct a boxplot
- demonstrations of why some quartile values are not whole numbers
- getting students to restate conclusions as a way of testing understanding of data interpretation
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion.

Students:
- identify the maximum, minimum, median, first and third quartiles from a set of data
- construct and interpret boxplots
- analyse sample variation by constructing and interpreting boxplots.

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**Matchbox machine: take a sample**
L2338 – Years 6–9

The student observes a sample of matchboxes being taken then builds a single boxplot and answers a quiz to show understanding.

**Matchbox machine: plot the variation**
L2339 – Years 6–9

The student builds a single boxplot and answers a quiz to show understanding. A further nine samples are taken and the student builds a series of boxplots for these and answers an additional quiz.

**Matchbox machine**
L2340 – Years 6–9

This is an aggregated learning unit combining 'Matchbox machine: take a sample' and 'Matchbox machine: plot the variation'.
Rice crisp machine series (Years 6–9)

Students discover how to construct and interpret boxplots.

Features include:

- maximum, median, quartile and minimum values in an array
- automatic collation of sample results
- emphasis on the importance of sorting data before analysis
- drill practice to reinforce the five-point summary needed to construct a boxplot
- demonstrations of why some quartile values are not whole numbers
- getting students to restate conclusions as a way of testing understanding of data interpretation
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion.

Students:

- identify the maximum, minimum, median, first and third quartiles from a set of data
- construct and interpret boxplots
- analyse sample variation by constructing and interpreting boxplots.

Rice crisp machine: take a sample
L2342 – Years 6–9

Students build a single boxplot and answer a quiz to show understanding.

Rice crisp machine: plot the variation
L3192 – Years 6–9

After building a boxplot, students then take a further nine samples and build boxplots for these. Students answer an additional short quiz.

Rice crisp machine
L2341 – Years 6–9 🌱

This is an aggregated learning unit combining ‘Rice crisp machine: take a sample’ and ‘Rice crisp machine: plot the variation’.
Skateboard survey (Years 6–9)

Students investigate the safety height for skate ramps then explore the complete survey process including the selection of appropriate questions to gather data as well as the analysis and display of data.

Features include:
- modelling the process of conducting surveys, including the analysis and display of data
- automatic collation of survey results in a sortable table displayed in a boxplot
- introduction of relationships between sample size, error tolerance and cost
- a printable summary of survey design, results and conclusions.

Students:
- relate sample size to error tolerance and cost
- interpret data from tables and boxplots.

Skateboard survey
L2394 – Years 6–9

Simulates a survey to work out the best height for a neighbourhood skateboard ramp. Presents data in a sortable table as well as in a box plot to enable students to analyse the data.
Leisure survey series (Years 6–9)

Using leisure activity data, students explore the complete survey process including the selection of appropriate questions to gather data as well as the analysis and display of data.

Features include:
- modeling for the process of conducting surveys, including the analysis and display of data
- automatically collating survey results in a sortable table and displaying them in an optimal graph format identified by the user
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion
- a printable worksheet which prompts students to complete an article based on the survey results.

Students:
- identify types of graphs suited to displaying data sets according to the number and type of variables
- interpret data from graphs and tables.

Leisure survey: team sport
L3155 – Years 6–9

Students deal with continuous data and graph this in histogram format.

Leisure survey: popular sports
L3156 – Years 6–9

Students deal with data which is not mutually exclusive and graph this in bar graph form.

Leisure survey: artistic activities
L3157 – Years 6–9

Students deal with data on a single dimension where responses are mutually exclusive, and graph this in pie graph form.

Leisure survey
L3154 – Years 6–9

This is an aggregated learning unit combining the three other learning objects.
DATA LEARNING OBJECTS

[Image of a survey with questions: What makes your heart race? Do you need more time than others to change their mind? What sports do kids you know? What artistic activities do kids you know?]
Leisure survey series (ESL) (Years 6–9)

Using leisure activity data, students explore the complete survey process. This includes the selection of questions appropriate to gathering data, as well as the analysis and display of data.

Features include:
- a model of the process of conducting surveys, including the analysis and display of data
- automatic collation of survey results in a sortable table, and their display in an optimal graph format selected by the student
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion
- a printable worksheet on which the student completes an article based on the survey results
- modified language for English as a Second Language users
- a glossary of terms used in the activity
- a cloze activity revising word order in 'wh' questions and 'yes-no' questions.

Students:
- identify that a histogram is best suited to displaying data containing a continuous variable such as age
- interpret data from graphs and tables.

Leisure survey: team sport (ESL)
L10251 – Years 6–9

Students choose a survey question to find out how many kids play sport and whether they play in teams. Then they display the results using a suitable type of graph (pie chart, bar graph or histogram), before writing a report based on the survey results.

Leisure survey: popular sports (ESL)
L10252 – Years 6–9

Students choose a survey question to discover which sports children like to play, for example, basketball, tennis or netball. Then they display the results using a suitable type of graph (pie chart, bar graph or histogram), before writing a report based on the survey results.

Leisure survey: artistic activities (ESL)
L10253 – Years 6–9

Students choose a survey question to explore kids' favourite artistic activities, for example, dancing, acting or playing an instrument. Then they display the results using a suitable type of graph (pie chart, bar graph or histogram), before writing a report based on the survey results.
Healthy life survey series (Years 6–9)

Using healthy living data, students explore the complete survey process including the selection of appropriate questions to gather data as well as the analysis and display of data.

Features include:
- modelling of the process of conducting surveys, including the analysis and display of data
- collation of survey results in a sortable table from which students identify the best graph format with which to display them
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion
- a printable worksheet which prompts students to complete an article based on the survey results.

Students:
- identify types of graphs suited to displaying data sets according to the number and type of variables
- select an appropriate display format to represent the data: histogram, bar chart or pie chart, then answer interpretive questions based on the graph
- interpret data from graphs and tables.

Healthy life survey: bringing lunch to school  
L3159 – Years 6–9

Students deal with continuous data and graph this in histogram format.

Healthy life survey: staying active  
L3160 – Years 6–9

Students deal with data which is not mutually exclusive and graph this in bar graph form.

Healthy life survey: lunchtime activities  
L3161 – Years 6–9

Students deal with data on a single dimension where responses are mutually exclusive, and graph this in pie graph form.

Healthy life survey  
L3158 – Years 6–9

This is an aggregated learning unit combining the three other learning objects.
Home internet survey series (Years 6–9)

Using home internet data, students explore the complete survey process including the selection of appropriate questions to gather data as well as the analysis and display of data.

Features include:
- modelling of the process of conducting surveys, including the analysis and display of data
- automatic collation of survey results in a sortable table from which students identify the best graph format with which to display them
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion
- a printable worksheet which prompts students to complete an article based on the survey results.

Students:
- identify types of graphs suited to displaying data sets according to the number and type of variables
- select an appropriate display format to represent the data: histogram, bar chart or pie chart then answer interpretive questions based on the graph
- interpret data from graphs and tables.

Home internet survey: who?
L3151 – Years 6–9

Students deal with continuous data and graph this in histogram format.

Home internet survey: what?
L3152 – Years 6–9

Students deal with data which is not mutually exclusive and graph this in bar graph form.

Home internet survey: where?
L3153 – Years 6–9

Students deal with data on a single dimension where responses are mutually exclusive, and graph this in pie graph form.

Home internet survey
L3150 – Years 6–9

This is an aggregated learning unit combining the three learning objects in the series.
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<thead>
<tr>
<th>Data Learning Objects</th>
<th>Learning Objects</th>
<th>Type</th>
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<th>Notes</th>
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<tbody>
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<td>500 MB</td>
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</tr>
</tbody>
</table>

*Note: All learning objects are available for free download.*
Home internet survey series (ESL) (Years 6–9)

Students explore the survey process. This includes the selection of questions appropriate to gathering data, as well as the analysis and display of data.

Features include:

- modelling of the process of conducting surveys, including the analysis and display of data
- automatic collation of survey results in a sortable table from which students select the optimal graph format with which to display them
- a range of alternative answers, including scenarios where the evidence supports more than one conclusion
- a printable worksheet on which the student completes an article based on the survey results
- modified language for English as a Second Language users
- a glossary of terms used in the activity
- a cloze activity revising the use of question words.

Students:

- identify types of graphs suited to displaying data sets, according to the number and type of variables
- select an appropriate display format to represent the data (histogram, bar chart or pie chart), then answer interpretive questions based on the graph
- interpret data from graphs and tables.

Home internet survey: who? (ESL)
L9962 – Years 6–9

Students choose a survey question to find out who uses the internet at home. They display the results using a suitable type of graph (pie chart, bar graph or histogram), then write a report based on the survey results.

Home internet survey: what? (ESL)
L9963 – Years 6–9

Students choose a survey question to find out what kids use the internet for at home. They look at the percentages of kids who use the internet for email, messaging, homework, news, playing games or downloading software. Then they display the results, using a suitable type of graph, and write a report based on the survey results.

Home internet survey: where? (ESL)
L9964 – Years 6–9

Students choose a survey question to find out where kids use the internet at home. They look at the percentages of kids who use the internet in a family room, study, bedroom or other room. Then they display the results using a suitable type of graph and write a report based on the survey results.
**Media report series (Years 6 –9)**

Students critically analyse and evaluate the ways in which data has been handled and represented in media reports.

**Features include:**
- grouped data and interpretations of graphs for students to verify and adjust as needed
- soundness criteria for students to validate data representation methods
- summary statements for students to restate conclusions consistent with data presented.

**Students:**
- interpret graphical representations of grouped data
- identify errors in construction of scales and misleading conclusions derived from that data
- edit a graph to conform with sound graphing practices.

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**Media report: junk food**
L2625 – Years 6–9

There are problems with the way that the data has been grouped on the graph in an article about junk food.

**Media report: music**
L2626 – Years 6–9

There are problems with the way the vertical axis of the graph has been labelled in a magazine article about how people access music.

**Media report: cost of petrol**
L2627 – Years 6–9

There are some problems with the way the data has been represented in the graph in a magazine article about the real cost of petrol.

**Media report 1**
L2393 – Years 6–9

This is an aggregated learning unit combining the media report learning objects about junk food, music and the cost of petrol.
There are some problems with the way the data has been grouped in a magazine article about the future plans of year 12 students.

**Media report: starting salaries**

There are some problems with the way the vertical axis of the graph has been labelled in a magazine article about the starting salaries for different occupations.

**Media report: water usage**

There are some problems with the way the data has been represented in the graph in a magazine article about water usage.

**Media report 2**

This is an aggregated learning unit combining the media report learning objects about future plans, starting salaries and water usage.
**Graph investigator series (Years 7–9)**

Students explore the features and uses of different graph types including histograms, stem-and-leaf graphs, box-and-whisker plots, scatter plots, pie graphs, line graphs and column graphs.

**Features include:**
- assistance for students to choose appropriate data relevant to a specific investigation
- detailed descriptions of different graph types and the kind of data they can represent
- assistance for students to select an appropriate graph type and draw a conclusion from the selected data representation
- examples of how data and graph type selections depend on the question being investigated
- feedback to support selection of appropriate data or graph type.

**Students:**
- select appropriate information to answer questions or investigate an issue
- analyse data and data-handling processes to assist in decision-making
- observe the same data presented in different graph forms.

<table>
<thead>
<tr>
<th>Graph investigator: types of graphs</th>
<th>L5904 – Years 7–9</th>
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</thead>
<tbody>
<tr>
<td>This is a tutorial introducing students to the different graph types and enabling them to compare their different features and uses.</td>
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</table>

<table>
<thead>
<tr>
<th>Graph investigator: reaction time</th>
<th>L5905 – Years 7–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do girls have faster reaction times than boys? Successful choices are box plot or back-to-back stem-and-leaf graphs.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Graph investigator: hand preference</th>
<th>L5906 – Years 7–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do left-handed and right-handed students have different reaction times? Successful choices are box plot or back-to-back stem-and-leaf graphs.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graph investigator: getting to school</th>
<th>L5907 – Years 7–9</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the most common travel time for getting to school? Successful choices are pie charts or stem-and-leaf graphs.</td>
<td></td>
</tr>
</tbody>
</table>
Graph investigator: concentration
L5908 – Years 7–9
Do students with better concentration have faster reaction times? Successful choice is scatter plot.

Graph investigator: homework hours
L5909 – Years 7–9
Does the average number of hours spent on homework increase with year level? Successful choice is column graph.

Graph investigator: home internet access
L5910 – Years 7–9
What percentage of students has internet access at home? Successful choices are bar chart or pie chart.

Graph investigator
L5903 – Years 7–9
This is an aggregated learning object combining the seven learning objects in the series.

Data samples from the Australian CensusAtSchools online education project, 2006, have been provided courtesy of the Australian Bureau of Statistics. The examples in the introduction (type of graphs) contain fictional data.
Graph investigator series (ESL) (Years 7–9)

Students explore the features and uses of different graph types, which include histograms, stem-and-leaf graphs, box-and-whisker plots, scatter plots, pie graphs, line graphs and column graphs.

Features include:
• assistance for students on how to choose appropriate data relevant to a specific investigation
• detailed descriptions of different graph types and the kind of data they can represent
• assistance for students on how to select an appropriate graph type and draw a conclusion from the selected data representation
• examples of how data and graph-type selections depend on the question being investigated
• feedback to support selections of appropriate data or graph type
• modified language for English as a Second Language users
• a glossary of terms used in the activity
• audio support for all text in the activity.

Students:
• select appropriate information to help them answer questions or investigate an issue
• analyse data and data-handling processes to assist in decision-making
• observe the same data presented in different graph types.

Graph investigator: home internet access (ESL) L10343 – Years 7–9
Students select the appropriate data sets and choose a useful graph type to investigate the percentage of students who have internet access at home.

Graph investigator: reaction time (ESL) L10338 – Years 7–9
Students select appropriate data sets and choose a useful graph type in an investigation into whether girls have faster reaction times than boys.

Graph investigator: hand preference (ESL) L10339 – Years 7–9
Students select the appropriate data sets and choose a useful graph type to investigate whether left-handed and right-handed students have different reaction times.

Graph investigator: getting to school (ESL) L10340 – Years 7–9
Students select the appropriate data sets and choose a
useful graph type to investigate the most common travel time for getting to school.

Graph investigator: concentration (ESL)
L10341 – Years 7–9

Students select the appropriate data sets and choose a useful graph type to investigate whether students with better concentration have faster reaction times.

Graph investigator: homework hours (ESL)
L10342 – Years 7–9

Students select the appropriate data sets and choose a useful graph type to investigate whether the average number of hours spent on homework increases with year level.

Data samples from the Australian CensusAtSchools online education project, 2006, have been provided courtesy of the Australian Bureau of Statistics. The examples in the introduction (type of graphs) contain fictional data.
**Stem-and-leaf graphs series (Years 7–9)**

Students use back-to-back stem-and-leaf graphs to investigate the truth about different conjectures.

**Features include:**
- the features and uses of back-to-back stem-and-leaf graphs
- facility for students to use authentic data sets and add personal data in the construction of stem-and-leaf graphs
- authentic data in the construction of back-to-back stem-and-leaf graphs
- a tutorial about stem-and-leaf graphs that is accessible at all points throughout the activities
- tests of student understanding of information revealed by the data
- dynamic display and sorting of data values on a back-to-back stem-and-leaf graph.

**Students:**
- interpret and explore two sets of data represented in back-to-back stem-and-leaf graphs
- use data and data handling processes to assist in identifying the truth behind a theory
- compare information derived from two data sets.

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**Stem-and-leaf graphs: an introduction**

L5912 – Years 7–9

This is a tutorial to help students understand the features of stem-and-leaf graphs and back-to-back stem-and-leaf graphs. They see how they the graphs are used to display data and observe how the mean and median of the data sets can be used to interpret information.

**Stem-and-leaf graphs: reaction time**

L5913 – Years 7–9

Do right-handed students have faster reaction times than left-handed students?

**Stem-and-leaf graphs: height**

L5914 – Years 7–9

Are 13-year-old boys taller than 13-year-old girls?

**Stem-and-leaf graphs: preferred hand speed**

L5915 – Years 7–9

Are reaction times using a person's preferred hand faster than using the non-preferred hand?
Stem-and-leaf graphs
L5911 – Years 7–9

This is an aggregated learning object combining the four learning objects in the series.

Data samples from the Australian CensusAtSchools online education project, 2006, have been provided courtesy of the Australian Bureau of Statistics.
The examples in the introduction (type of graphs) contain fictional data.
## Data manipulatives series (Years 2–12)

Students use manipulatives to explore and practise a range of concepts and operations relating to the use and interpretation of data.

### Features include:
- a template format with a description and instructions.

### Students:
- collect and interpret a range of data
- look at different ways of presenting data (charts, tables, graphs, etc).

<table>
<thead>
<tr>
<th>Learning Object</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pie chart</strong></td>
<td>L3541 – Years 2–9</td>
</tr>
<tr>
<td></td>
<td>Students collect data and investigate its representation in a pie chart. Supports repeated use through dynamic generation of data.</td>
</tr>
<tr>
<td><strong>Spinners</strong></td>
<td>L3546 – Years 3–9</td>
</tr>
<tr>
<td></td>
<td>Students use a spinner and observe how often the pointer lands on each colour. Students create their own spinner by changing the colours, names, numbers and sizes of sectors then test the spinner over a number of spins. Students observe the graph build and the numbers change in the results table after each spin.</td>
</tr>
<tr>
<td><strong>Bar chart</strong></td>
<td>L3512 – Years 6–9</td>
</tr>
<tr>
<td></td>
<td>Students enter their own data then format a bar chart to accommodate their data.</td>
</tr>
<tr>
<td><strong>Box plot/Histogram</strong></td>
<td>L3513 – Years 6–9</td>
</tr>
<tr>
<td></td>
<td>Students enter data then manipulate data sets to see the effects on the shapes of the graphs and on the summary statistics. Students investigate the relationship between box plots and histograms.</td>
</tr>
<tr>
<td><strong>Scatterplot</strong></td>
<td>L3544 – Years 9–12</td>
</tr>
</tbody>
</table>
|                 | Students enter data into a table and observe as the
Exploring data series (Years 6–9)

Students use short digital activities to explore concepts and operations relating to the use and interpretation of data.

Features include:
- a template format with a description and instructions
- random generation of new data to support repeated use.

Students:
- explore and compare data representations.

### Exploring graphs
L6563 – Years 6–9

Students examine two graphs and compare the data represented then identify whether both graphs represent the same data.

### Exploring measures of central tendency
L6564 – Years 6–9

Students examine the mean and median values for a data set recording emergency response times. They predict changes to the mean and median as new results are added.

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**HOTmaths: using relative frequency** (Years 7–10)

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Students explore variation in short and long runs and investigate the reliability and variation in long runs.

**Features include:**
- a virtual fairground game
- opportunity to compare results from short and long runs of trials.

**Students:**
- identify that random events will provide random results
- explore the length of trials (number of marbles) required to predict the relative frequency for each bin
- calculate relative frequencies
- understand that long runs are required to make reliable predictions of random events.

**HOTmaths: using relative frequency**

**L10840 – Years 7–10**

Students watch marbles fall from a tube, bounce through some obstacles and land in a slot. They calculate the relative frequencies for the bins the marbles land in.

**HOTmaths: using relative frequency: solution sheet**
R11187

**HOTmaths: exploring relative frequency (Years 7–10)**

Students look at a common fairground game to explore randomness and bias.

**Features include:**
- opportunity to investigate if a common game can be biased.

**Students:**
- investigate a fair-ground game
- calculate relative frequencies in decimal and percentage form
- make the link between randomness and bias
- discover that if a game can be biased it is not random
- evaluate that the sum of relative frequencies is 1.

**HOTmaths: exploring relative frequency**

**L11105 – Years 7–10**

Students play a laughing clown game to investigate randomness.

**HOTmaths: exploring relative frequency: solution sheet**
R11186
HOTmaths: exploring measures of spread (Years 9–10)

Students investigate measures of spread and the range of distribution by manipulating a dot plot.

Features include:
- opportunities to investigate the changing of points in a distribution on the range, the mean, the inter-quartile range and standard deviation, using an interactive dot plot.

Students:
- investigate measures of spread and centre
- discover that the range of a distribution is only affected by changing the outliers of a distribution.

Graphing (Years 9–12)

These learning objects are short activities that allow students to walk through the construction of pie graphs and column graphs and explore the line of best fit.

Features include:
- An online graphing tool for students to check the accuracy of their estimates
- examples of calculations for pie and column graphs.

Students:
- enter data points, then estimate the position for a line of best fit
- complete a tutorial showing how pie graphs and column graphs are constructed.
EagleCat: scatter (Years 11–12)

Students test their understanding of the correlation coefficient and lines of best fit on a scatter plot graph.

Features include:
- a dynamic comparison of the least squares and 3-median regression lines, and the effect of outliers on each
- opportunities for students to enter their own data
- ideas for further development and extension of core concepts
- an option to print individual parts of the learning object.

Students:
- manipulate data in a scatter plot graph and observe changes to the least squares and 3-median regression lines
- identify the effect of outliers on the least squares and 3-median regression lines
- link data patterns to different values of the correlation coefficient, r
- estimate a ‘line of best fit’ and compare their estimate to the calculated least squares and 3-median regression lines.

EagleCat: scatter
L10087 – Years 11–12

Students drag data points around a scatter plot graph or enter their own data to explore changes in the following: the least squares and 3-median regression lines; the correlation coefficient; and the mean and median. They use a copy function to create different regression lines for different sets of data and observe how the lines change in response to outliers.

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