Catalogue of digital curriculum resources

2011

Contents

Introduction

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

The Chance 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 on TLF's website.

www.thelearningfederation.edu.au

Learning objects

Spinners series (Years P–6)

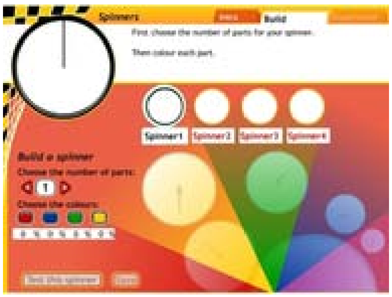
Students construct spinners to investigate and test the relationship between the structure of a random generator and the likelihood of individual outcomes or results from a series of outcomes.

Features include:

- a dynamic display of experimental results in graphs and tables
- a tool enabling the user to construct area-based random generators to run trials to generate both short-run (10 spins) and long-run (10,000 spins) data
- a spinner tool to maximise student choice, control and creativity as they explore the results from making various spinners.

Students:

- construct or select spinners to investigate the likelihood of outcomes occurring.
- compare theoretical outcomes and actual results
- explore the relationship between a sample space (spinner) and the likelihood of particular outcomes by constructing spinners according to given criteria
- create mathematically equivalent spinners given specific criteria for their construction.
- explore the difference between the information provided by short-run, medium-run and long-run data
- use proportional thinking to predict and compare the outcomes of random generators.

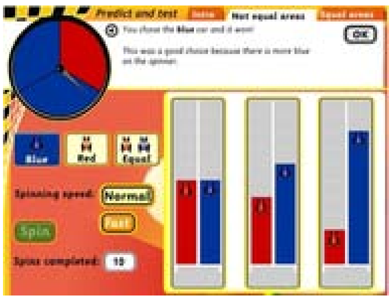


Spinners: basic builder
L2376 – Years 3–4

The student uses the spinner-making tool to build their own spinners, choosing up to 6 sides and 4 colours. As they spin their spinner, they are able to see the actual results compared with theoretical results on an accompanying graph.

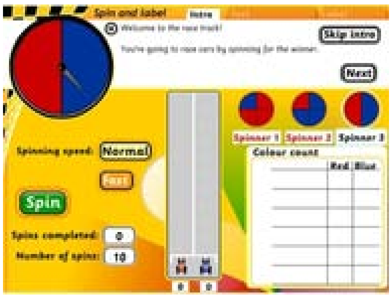
Spinners: advanced builder
L2377 – Years 3–6

This is similar to 'Spinners: basic builder' however the students can choose up to 12 sides and 5 colours. Seven challenges require students to build spinners to specifications.



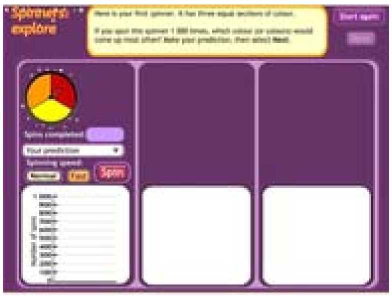
Spinners: predict and test
L2378 – Years P–1

The spinner represents movement of two different coloured cars along a race track of 10 spaces. The student assesses the likelihood of each car winning the race when using a spinner of equal or biased nature to determine which car moves further.



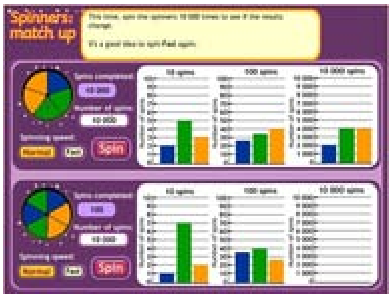
Spinners: spin and label
L2379 – Years 1–2

The student chooses one of three spinners in response to a series of likelihood statement, then 'tests' the spinner with 20 spins.
After the testing the spinners, students select likelihood statements to match to each spinner.



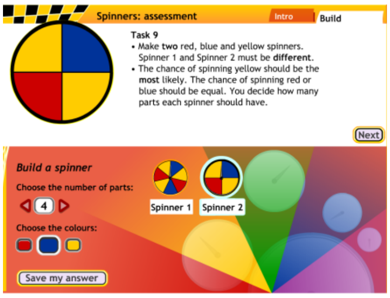
Spinners: explore
L2380 – Years 2–3

Students predict the outcome of a spinner with three equal sized colours. A graph shows the results of 1000 spins. Students alter the sizes of sectors for two more spinners and predict the outcomes of 1000 spins.



Spinners: match up
L2381 – Years 4–5

Students select two spinners they think would be likely to produce similar results from a set of spins.
They test 10, 100 and 10,000 spins and view the resulting graphs. Students indicate whether they think the data confirms or contradicts their prediction of 'sameness'.



Spinners: assessment
L8277 – Years 3–6

Students complete 16 tasks to assess their understanding of the language of chance (equally likely, more/less likely, impossible, certain, relative percentage) and their ability to apply it to construct spinners according to given criteria.

The slushy sludger series (Years 2–4)

Students are presented with the sludger that randomly delivers different flavoured slushies such as Pink slub, Blue goo or Yellow ooze.

Features include:

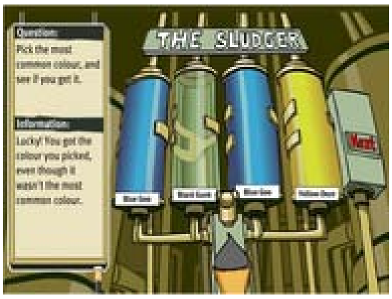
- feedback emphasising the concept that with random devices the outcome can be something other than the mathematical likelihood.

Students:

- explore the tension between theoretical probability and randomness
- use yes, no or maybe to describe probability situations.

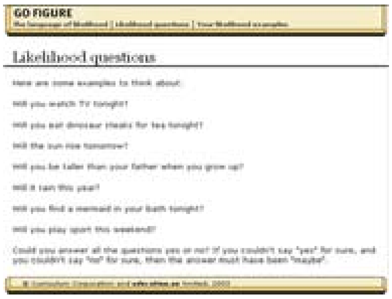
The slushy sludger: questions
L115 – Years 2–4

Students select yes, no or maybe in 'auto fill' mode to best describe the mathematical chance of the sludger serving a particular flavour. Students then select the serve button to see if their prediction is correct.
In the second sequence of activities students are asked to fill the sludger to conform to a particular statement of probability, for instance: 'Will you get Green slime? Select the flavours so that the answer is yes'. Students can choose to return to the auto fill mode at any time once the fill mode is activated.



The slushy sludger: best guess
L116 – Years 2–4

Students explore the idea of probability. They 'select the most common colour' and then see what happens when the sludger serves a slushy. The idea is that the most common colour is also the most likely slushy to be served but the random nature of the machine may result in an unlikely event occurring.



The slushy sludger: go figure
L117 – Years 2–4

'The slushy sludger: go figure' learning object is amenable to a screen reader and could be used for whole class or small group discussions led by the teacher.

Mystery spinner series (Years 3–6)

Students explore the relationship between sample space and likelihood of outcomes, using area-based random generators in the form of spinners.

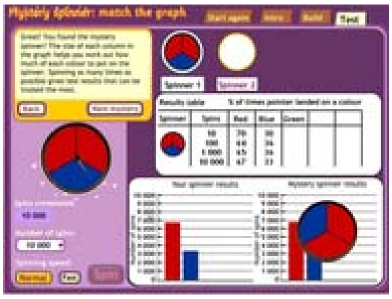
The Mystery spinner series complements and extends the Spinner series of learning objects.

Features include:

- dynamic display of experimental results in a column graph and a table that shows both theoretical outcomes and actual results
- a tool enabling students to construct area-based random generators in the form of spinners and to run trials to generate short-run, medium-run and long-run data
- opportunities to use frequency graphs and data tables to compare theoretical outcomes and actual results
- support for both visual and numerical strategies through use of random generators, graphs and tables
- a spinner tool to maximise student choice, control and creativity as they explore the results from making various spinners.

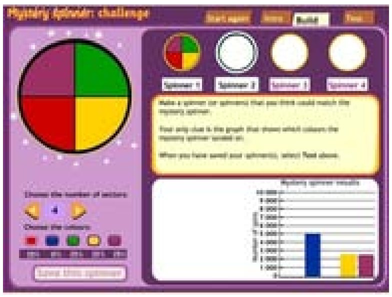
Students:

- analyse experimental data to identify mathematical equivalence in random generators
- explore the difference between the information provided by short-run, medium-run and long-run data
- explore the relationship between sample space and likelihood of outcomes
- interpret data in tables and graphs.



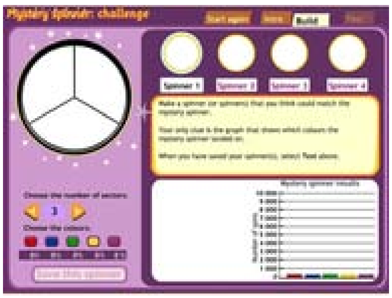
Mystery spinner: match the graph
L2383 – Years 3–4

Students construct a spinner with up to three equal-sized sectors and fill the sectors with up to three colours to match the frequency graph.



Mystery spinner: challenge
L2384 – Years 5–6

Students create a spinner with up to five equal-sized sectors and fill the sectors with up to five colours to match the frequency graph.



Mystery spinner
L2382 – Years 5–6

This is a combination of the two 'Mystery spinner' learning objects.

The vile vendor series (Years 4–6)

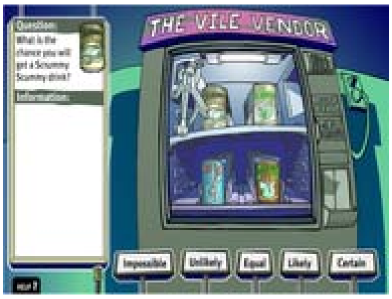
A drink-vending machine dispensing all sorts of weird and wonderful cans of Revolting radish, Warm worm and Rusty nail is the setting for this series of learning objects.

Features include:

- feedback supporting the idea that understanding mathematical probability can enhance your chances of choosing correctly but that unlikely events can still occur
- activities focussing on choosing chance words and most likely outcomes.

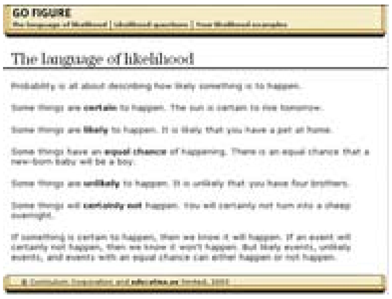
Students:

- explore the tension between theoretical probability and randomness
- use yes, no or maybe to describe probability situations.
- Students match probability situations with everyday chance words.
- Students explore the tension between theoretical probability and randomness.
- Students construct situations to match probability scenarios.



The vile vendor: questions
L118 – Years 4–6

Asks students to select a word from a bank of five – impossible, unlikely, equal, likely and certain – to describe the chance of the vile vendor serving a particular drink. Feedback is provided for both correct and incorrect responses to reinforce students' understanding of the language and the concept of randomness.



The vile vendor: go figure
L211 – Years 4–6

The vile vendor: go figure learning object is amenable to a screen reader and could be used by teachers to use to discuss probability and its associated language.

The vile vendor: best guess
L168 – Years 4–6

Students explore the idea of probability. They are asked to select the most common drink and then see what happens when the vendor serves a drink. The most common drink is also the most likely drink to be served, but the random nature of the machine may result in an unlikely event occurring.

The foul food maker series (Years 5–7)

Students are presented with a food maker that makes disgusting food. Will you get a stinky sandwich or slimy sushi or even a bug burger?

Features include:

- introduction to mathematical words and concepts for describing likelihood
- activities focusing on choosing words, matching statements and numerical equivalents.

Students:

- explore the tension between theoretical probability and randomness
- explore variations in samples and compare these with the theoretical result
- express theoretical probabilities as fractions, decimals or percentages
- match probability situations with everyday chance words.

The foul food maker: questions 1
L212 – Years 5–7

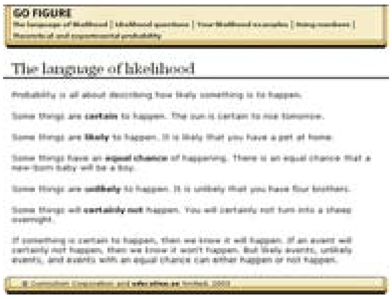
Students are first presented with the food maker and four different foods shown as possible outcomes. They select a word from a bank of five – impossible, unlikely, equal, likely and certain – to describe the chance of the food maker serving a particular food. Students select 'make' to see what is served. Selecting table/graph displays the theoretical probability in the form of a common fraction, a decimal fraction and a percentage. Students can choose to see what happens when 100 meals are served.

The foul food maker: questions 2
L213 – Years 5–7

Students are asked to enter numbers into blank spaces in the table. This demonstrates their understanding of equivalence between common fractions, decimal fractions and percentages.

The foul food maker: best guess
L214 – Years 5–7

Students predict which food will be served. Feedback reinforces the language used in the questions subseries. Teachers may find this a useful precursor to the questions subseries. The learning object has a Show results section that provides information on the number of correct predictions. This reinforces the idea that knowledge of theoretical probability will help with predictions but, with a random generator, chance will sometimes give an unexpected result.



The foul food maker: go figure
L215 – Years 5–7

'The foul food maker: go figure' learning object of this series is amenable to a screen reader, enhancing accessibility for visually impaired students. This learning object could also be used as the basis of a whole class or group discussion about theoretical probability and its associated language.

Dice duels series (Years 6–9)

Students explore even and uneven distribution and bias using dynamic, interactive tools in a range of dice-based tutorials, activities and games

Features include:

- demonstrations to show that conclusions based on small sample sizes can be wrong due to random variation
- automatic collation of experimental results displayed as frequency graphs
- scenarios involving uneven and uneven distributions.

Students:

- use dice to explore relationships between bias, proportions, sample size, random variation and statistical distributions
- collect and handle data about random events to test conjectures
- compare the shape of theoretical and experimentally derived data distributions
- interpret frequency graphs
- relate the shape of data distributions to statements about sample variation and sample size or compare the shape of theoretical and experimentally derived data distributions.

Dice duels: go-kart race
L2634 – Years 6–9

Students select a go-kart and observe how it performs in a race where the go-kart's progress is determined by the roll of a dice. They look for any patterns in the results of 100 races, increase the distance of the races and then observe the distribution of winners. Students consider how many rolls of the dice are required to get a winner of an individual race.

Dice duels: fair or unfair?
L2635 – Years 6–9

Students predict the result for 12 tosses of a fair dice. They observe what happens and record what they think about their prediction and the observed outcome. Students increase the number of tosses up to 9999 and observe the graph of the results.

Dice duels: uneven distribution
L2636 – Years 6–9

Students predict the result for 11 tosses of a pair of fair dice and observe what happens. They record what they think about their prediction and the observed outcome.

Students increase the number of tosses up to 9999 and observe the graph of the results. They then consider the following: Are these results reassuring that the dice are fair? How would you know if the dice are not 'fair'? Should such variation in the distribution of outcomes be expected in such an experiment? If the dice are loaded what would repeat runs of 9999 tosses show?

Dice duels: bike race
L2637 – Years 6–9

Students select a bike and observe how it performs in a race where the bike's progress is determined by the roll of two dice. They look for any patterns in the results of different bikes and in the results of 100 races. Students increase the length of the races and observe the distribution of winners. They consider how many rolls of the dice are required to get a winner of an individual race and consider if there any patterns emerging.

Dice duels: lucky 16 game
L2639 – Years 6–9

Students choose where to place 16 counters on a grid of numbers 2 to 12. Two dice are rolled and the sum calculated. One of the 16 counters is removed. The goal is to find a strategy to minimise the number of rolls required to remove all 16 counters from the grid. Students apply known underpinning mathematical theory or learn from experience.

Dice duels: airport addition
L2323 – Years 6–9

Students choose which airport runway for your plane to queue in while waiting to take off. At Pot Luck airport the runways are numbered 2 to 12 and the order of take-off is determined by the toss of two dice and adding the faces. The task is to choose a runway that improves your chance of a prompt take-off. Knowledge of the underpinning theory relating to uneven distributions (included as a tutorial option) helps, but sometimes there are unexpected delays.

Dice duels: airport subtraction
L2640 – Years 6–9

Students choose which airport runway for a plane to queue in while waiting to take off. At Pot Luck airport the runways are numbered 0 to 5 and the order of take-off is determined by the toss of two dice and taking the difference between the faces. The task is to choose a runway that improves the chance of a prompt take-off. Knowledge of the underpinning theory relating to uneven distributions (included as a tutorial option) helps, but sometimes there are unexpected delays.

Dice duels: load one dice
L3671 – Years 6–9

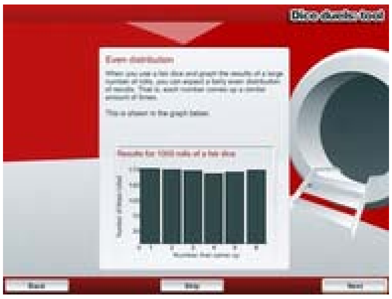
'Dice duels: load one dice' provides a tool for loading one face of a single dice. Students carry out one or more of the suggested investigations or test their own conjectures and theories. The 'What's the theory' option assists with the underpinning mathematical ideas.

Dice duels: load a pair of dice
L3672 – Years 6–9

'Dice duels: load a pair of dice' provides a tool for loading one or two faces (the same number or different numbers) of two dice. Carry out one or more of the suggested investigations or test your own conjectures and theories. The 'What's the theory' option assists with the underpinning mathematical ideas.

Dice duels: find the bias
L3673 – Years 6–9

Students use dice to explore relationships between bias, proportions, sample size, random variation and statistical distributions.



Dice duels: tool
L2645 – Years 6–9

Students explore numbers generated by a set of five dice, each having up to 12 faces. Choose how to combine the numbers rolled: add, subtract or multiply. Use the tool to run up to 9999 trials and graph the results. Find out whether some numbers come up more often than others. Compare the shape of theoretical data distributions with experimental results.

Dice duels
L2641 – Years 6–9

This is a combination of 'Dice duels: find the bias', 'Dice duels: load one dice' and 'Dice duels: load a pair of dice' learning objects.

Dice duels series (ESL) (Years 6–9)

Students explore relationships between bias, proportions, sample size, random variation and statistical distributions.

Features include:

- scenarios involving a range of even and uneven distributions
- on-screen tutorials to introduce students to mathematical ideas underpinning bias in even and uneven distributions
- modified language for English as a Second Language users
- a glossary of terms used in the activity.

Students:

- collect and handle data about random events to test conjectures about variation and bias
- interpret frequency graphs to compare experimental results with theoretical probabilities
- compare the shape of theoretical and experimentally derived data distributions in situations where there is bias
- relate the shape of data distributions to statements about sample variation, sample size and bias.

Dice duels: find the bias (ESL)
L10154 – Years 6–9

A dice has been weighted (loaded) to favour one of the six numbers. Students roll the dice to work out which is the favoured face. They explore how many rolls are needed to be reasonably sure of a conclusion.

Dice duels: load one dice (ESL)
L10152 – Years 6–9

Students make biased dice. They load a dice to favour one of the six numbers. For example, load the number six so that it is twice as likely to come up as any other face (probability 2/7). Students test ideas about bias by rolling a loaded dice.

Dice duels: load a pair of dice (ESL)
L10153 – Years 6–9

Students weight (load) dice to favour one of the six numbers. For example, load the number five on both dice so that it is three times more likely to come up than any other face. They test ideas about bias by rolling the loaded dice and examining the sum of the two numbers rolled.

Dice duels: assessment series (Years 6–9)

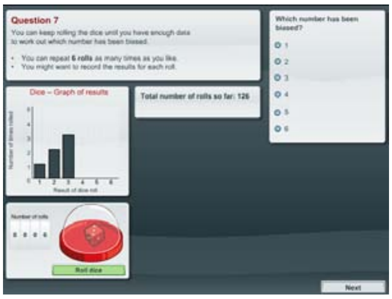
Students identify whether or not dice have been biased (loaded) by rolling the dice and interpreting the resulting graphical distributions. In addition, students are required to distinguish between biased and uneven distributions and bias dice to achieve a required skewed result.

Features include:

- assessment of student's knowledge and understanding of biased, even and uneven distributions
- assessment of student's ability to distinguish between biased and unbiased distributions
- randomised tasks to encourage repeated use
- a printable report of the student's performance for teacher–student discussion.

Students:

- interpret random events and test conjectures about sample size, variation and bias
- predict and interpret outcomes and probabilities arising from biased dice
- apply bias to dice to achieve skewed outcomes.



Dice duels: one dice: assessment
L9778 – Years 6–8

Students interpret graphical representations of the results of rolls of a dice to determine whether or not the dice has been biased. They use their understanding of even distributions, sample size and random variation to identify which face has been biased.

Dice duels: two dice: assessment
L9777 – Years 7–9
Students interpret graphical representations of the results of rolls of dice to determine whether or not dice have been biased. They bias two dice to achieve a desired skewed result.

Random or not series (Years 6–9)

At the Fantastic Fruit Jube factory, a machine packages jubes in random order into packets, each holding 12 jubes. Students learn about random events, and the patterns and variations occurring in such events.

Features include:

- sampling scenarios for students to explore relationships between proportions, sample size, uneven distributions and random variation
- demonstrations showing that conclusions based on small sample sizes can be wrong due to random variation
- automatic collations of experimental results, displaying them as frequency graphs.

Students:

- analyse data about random events to test conjectures about variation
- interpret frequency graphs to compare experimental results with theoretical probabilities
- compare the shape of theoretical and experimentally derived data distributions
- relate the shape of data distributions to statements about sample variation and size.

Random or not: explore numbers of jubes (1:1:1)
L2392 – Years 6–9

Students test a machine that randomly packages three types of fruit jubes: penguin, fish or frog. They look at patterns in numbers of jube types, such as 3 penguins, 4 fish and 5 frogs (the most common in a sample) then manually choose jube types for a new packet. Compare the results from larger samples. Identify whether the number of the most commonly occurring jube type in the manually produced packet is similar to the number most likely to occur in a randomly produced packet.

Random or not: explore numbers of jubes (1:1)
L3653 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: penguin or frog. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in numbers of jube types, such as 5 penguins and 7 frogs (the most common in a sample). Manually choose jube types for a new packet. Compare the results from larger random samples. Identify whether the number of the most commonly occurring jube type in the manually produced packet is similar to the number most likely to occur in a randomly produced packet.

Random or not: explore numbers of jubes (2:1)
L3654 – Years 6–9

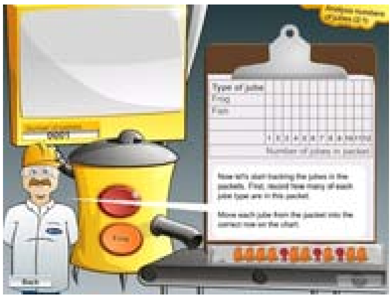
Students test a machine that randomly packages two types of fruit jubes: fish or frog. Notice that frog jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in numbers of jube types, such as 4 fish and 8 frogs (the most common in a sample). Identify whether the number of the most commonly occurring jube type in the manually produced packet is similar to the number most likely to occur in a randomly produced packet.

Random or not: analyse numbers of jubes (1:1:1)
L3655 – Years 6–9

Students test a machine that randomly packages three types of fruit jubes: penguin, fish or frog. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in numbers of jube types, such as 3 penguins, 4 fish and 5 frogs (the most common in this sample). Analyse the results of large samples. Compare the number of the most commonly occurring jube type. Identify the most likely number of the most commonly occurring jube type.

Random or not: analyse numbers of jubes (1:1)
L3656 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: penguin or frog. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in numbers of jube types, such as 5 penguins and 7 frogs (the most common in this sample). Analyse the results of large samples. Compare the number of the most commonly occurring jube type. Identify the most likely number of the most commonly occurring jube type.



Random or not: analyse numbers of jubes (2:1)
L3657 – Years 6–9

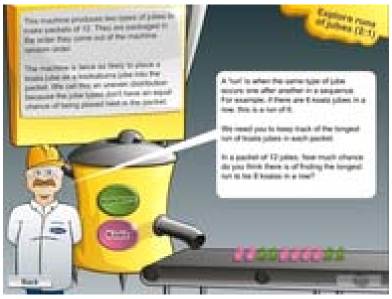
Students test a machine that randomly packages two types of fruit jubes: fish or frog. Notice that frog jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in numbers of jube types, such as 4 fish and 8 frogs (the most common in a sample). Analyse the results of large samples. Compare the number of the most commonly occurring jube type. Identify the most likely number of the most commonly occurring jube type.

Random or not: explore runs of jubes (1:1:1)
L3658 – Years 6–9

Students test a machine that randomly packages three types of fruit jubes: kookaburra, koala and kiwi. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 frog jubes occurring in a row. Manually choose jube types for a new packet. Explore the longest run of any jube type. Compare the results from larger random samples. Identify whether the longest run in your packet is similar to the longest run most likely to occur in a randomly produced packet.

Random or not: explore runs of jubes (1:1)
L3659 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and kiwi. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 kookaburra jubes occurring in a row. Manually choose jube types for a new packet. Explore the longest run of any jube type. Compare the results from larger random samples. Identify whether the longest run in your packet is similar to the longest run most likely to occur in a randomly produced packet.



Random or not: explore runs of jubes (2:1)
L3660 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and koala. Notice that koala jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 koala jubes occurring in a row. Manually choose jube types for a new packet. Explore the longest run of any jube type. Compare the results from larger random samples. Identify whether the longest run in your packet is similar to the longest run most likely to occur in a randomly produced packet.

Random or not: explore alternating jubes (2:1)
L3661 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and kiwi. Notice that kiwi jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in alternating sequences of jube types such as kiwi, kookaburra, kiwi, kookaburra, kiwi (run of 5). Manually choose jube types for a new packet. Explore the longest run of alternating jube types. Compare the results from larger random samples. Identify whether the longest run in the manually produced packet is similar to the longest run most likely to occur in a randomly produced packet.

Random or not: explore alternating jubes (1:1)
L3662 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and kiwi.. Look at patterns in sequences of jube types then manually choose jube types for a new packet. Explore the longest run of alternating jube types. Compare the results from larger random samples. Identify whether the longest run in your packet is similar to the longest run most likely to occur in a randomly produced packet.

Random or not: analyse runs of jubes (1:1:1)
L3663 – Years 6–9

Students test a machine that randomly packages three types of fruit jubes: kookaburra, koala and kiwi. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 koala jubes occurring in a row. Analyse the results of large samples. Compare the longest runs of any jube type. Identify the longest run most likely to occur in a packet.

Random or not: analyse runs of jubes (1:1)
L3664 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and kiwi. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 kiwi jubes occurring in a row. Analyse the results of large samples. Compare the longest runs of any jube type. Identify the longest run most likely to occur in a packet.

Random or not: analyse runs of jubes (2:1)
L3665 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and koala. Notice that koala jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as 3 koala jubes occurring in a row. Analyse the results of large samples. Compare the longest runs of any jube type. Identify the longest run most likely to occur in a packet.

Random or not: analyse alternating jubes (2:1)
L3666 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and koala. Notice that koala jubes are twice as likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as koala, kookaburra, koala, kookaburra, koala (run of 5). Analyse the results of large samples. Compare the longest runs of alternating jube types. Identify the longest run most likely to occur in a packet.

Random or not: analyse alternating jubes (1:1)
L3667 – Years 6–9

Students test a machine that randomly packages two types of fruit jubes: kookaburra and kiwi. Notice that each jube type is equally likely to be produced within a packet of 12 jubes. Look at patterns in sequences of jube types such as kookaburra, kiwi, kookaburra, kiwi (run of 4). Analyse the results of large samples. Compare the longest runs of alternating jube types. Identify the longest run most likely to occur in a packet.

Random or not: open investigations
L5835 – Years 6–9

Students test a machine that randomly packages two or three types of fruit jubes: penguin, fish and frog. Choose the ratio that each jube type is likely to be produced within a packet of 12 jubes. For example, choose a 2:1 ratio so that penguin jubes are twice as likely to be produced as fish jubes. Look at numbers of the most common jube type, patterns in sequences of one jube type or alternating sequences of jube types. For example, look at patterns such as penguin, fish, penguin, fish (alternating run of 4). Analyse the results of large samples. Compare the numbers of the most common jubes or longest runs of jube types. Identify the most likely number of the most commonly occurring jube type or the longest run most likely to occur in a packet.

Content from other sources

Tennis tournament: assessment (Years 5–8)

Students calculate the number of matches required for a tennis tournament and construct a round-robin tennis tournament within the parameters provided.

Features include:

- feedback to the student on set questions and tasks
- a mechanism for students and teachers to comment on the student's learning progress
- a printable report showing the student's input, feedback on answers, as well as the teacher's reflection on future improvement areas.

Students:

- demonstrate problem-solving skills in a practical situation.

Tennis tournament: assessment
L8492 – Years 5–8

Students are assessed on their ability to calculate the number of matches each of six players plays in a round robin tournament.

Chance manipulatives series (Years 5–12)

Students use manipulatives to explore and practise a range of concepts and operations relating to probability.

Features include:

- illustrations of how variation occurs in the trials of an experiment.

Students:

- compare and investigate data from random events
- investigate natural variation that occurs during individual trials of an experiment
- predict the relative chance of a random event occurring.

Hamlet happens
L3532 – Years 5–9

Select letters from the quote 'to be or not to be' to make words of between two and five letters. For example, choose words such as to, not and been. Watch as the letters are randomly typed until the word appears. Notice the number of draws it takes. Compare how long it takes for a two-letter word to be produced with a five-letter word. Identify the two-letter word that is most likely to be produced in the smallest number of draws.

Coin tossing
L3515 – Years 5–12

Toss a coin 100 times and watch the dynamic graph of results. See the longest run of heads. Set two out of three possible parameters such as the number of tosses, the longest run of heads and the probability of heads. Notice the variation in runs and the tendency to the theoretical probability.

Exploring probability (Years 6–9)

Students use short digital activities to compare theoretical and experimental probabilities in a snowboarding context.

Features include:

- random generation of experimental results for 10, 100 and 10 000 trials to encourage repeated use
- illustrations of a range of experimental outcomes using graphs, fractions and percentages
- a concrete context for comparing theoretical and experimental probability.

Students:

- compare experimental results with theoretical results
- uinderstand that unexpected outcomes may occur in experimental results, especially where sample size is low
- distinguish between experimental and theoretical probability for single events
- explore how experimental and theoretical probability are expressed using fractions and percentages
- use numbers to describe the probability of single events from experiments and models.

Exploring probability
L6567 – Years 6–9

Look at the probability of a snowboarder choosing any one of six ski runs down a mountain. Compare expected probabilities with experimental results. Examine outcomes illustrated in graphs and probabilities expressed as fractions and percentages. Notice there is likely to be a greater variation between expected and actual results when the number of trials is small.

Snakes and spinners: assessment (Years 7–8)

Students show their understanding of chance by answering questions about spinners.

Features include:

- a practical situation to assess students' understanding of chance
- a printable report showing the student's performance, as well as the correct answers.

Students:

- use a spinner to move a game character along a path, then answer a series of questions about three different spinners.

Snakes and spinners: assessment
L8868 – Years 7–8

Students answer questions about the least and most number of moves needed to finish a game. They also compare spinners to determine outcomes such as which will result in the greater average number of moves per spin.

Red balls: assessment (Years 7–8)

Using a game scenario, students use problem-solving strategies to find the location of two red balls hidden under two of eight possible covers.

Features include:

- feedback indicating whether one, two or no balls are under the two covers chosen
- a printable report with specific student feedback based on the results for each game and the number of tries used to find the red balls
- opportunities for the student and teacher to reflect and comment on the student's learning progress.

Students:

- are given three games to play
- assess their problem solving strategies using a game scenario.

Red balls: assessment
L8865 – Years 7–8

Students select combinations of two covers at a time. They have six tries to identify the location of the balls.

HOTmaths: using relative frequency (Years 7–10)

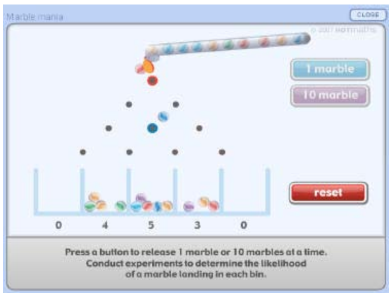
Students explore variation in short and long runs and investigate the reliability and variation in long runs.

Features include:

- a virtual fairground game of dropping marbles in bins
- 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 fairground 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)

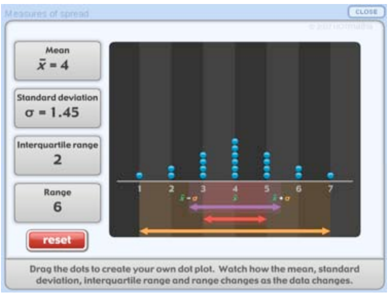
Students investigate measures of spread and the range of distribution by manipulating a dot plot.

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.



HOTmaths: exploring measures of spread
L10842 – Years 9–10

Students move points on a dot plot and observe what happens to various measures of spread and the mean of a distribution.

HOTmaths: exploring measures of spread: solution sheet
R11189

EagleCat: scatter (Years 11–12)

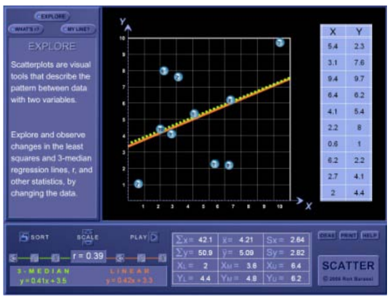
Students test their understanding of the correlation coefficient and lines of best fit on a scatter plot graph.

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.

Interacting with Mathematics (IWM) (Years 11–12)

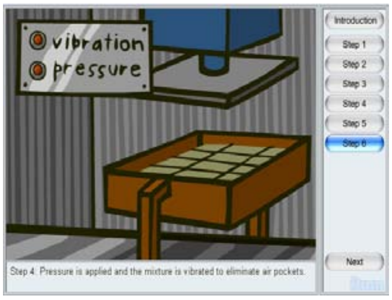
These digital curriculum resources, developed by the Department of Education and Children's Services (DECS), South Australia, provide mathematical learning experiences for students in years 11 and 12 that incorporate constructivist pedagogy and ICT technologies combined with a positive purpose for mathematical learning. A range of everyday problems and challenges are posed requiring students to solve them using mathematics.

Features include:

- a series of interactives (simulations) to visualise events and generate data
- prompts, helpful hints, and explanations of concept and techniques using interactive tools to aid student calculation and skill development
- assessment by a three-level check of concept reinforcement, skill refinement and application of knowledge of the concepts.

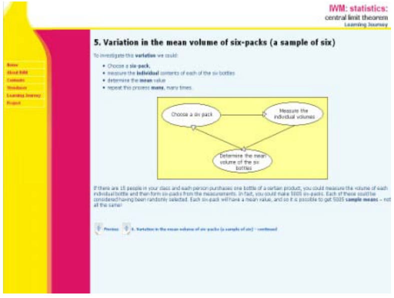
Students:

- attempt a Stenduser activity to promote interest and enthusiasm for the topic
- undertake the new learning tasks through a Learning Journey
- demonstrate their understanding of new concepts
- apply their new skills in simple situations
- apply their new knowledge to solve problems
- undertake a project or challenge to apply their new-found mathematical knowledge by exploring a problem(s) with little or no teacher direction.



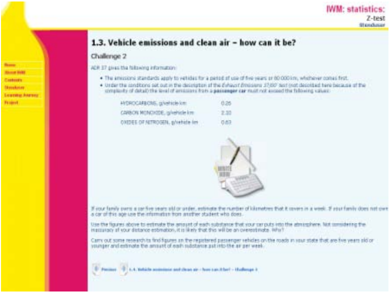
IWM: statistics: normal distributions
L10353 – Years 11–12

Students develop knowledge of normal distributions to solve real-world, statistical mathematical problems. They undertake a Learning Journey that investigates mathematical models used to determine if a consumer is getting a fair deal. (For example, 'Do companies provide a product that matches the label detail?'). They model a variety of populations using a normal density curve and use technology to make predictions using the algebraic model (equation) that defines the normal distribution.



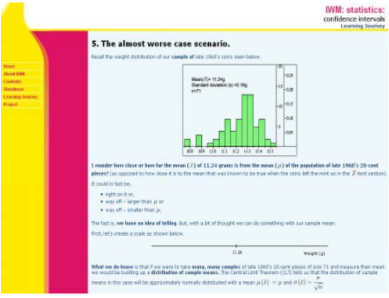
IWM: statistics: central limit theorem
L10354 – Year 12

Students develop knowledge of the central limit theorem to solve real-world, statistical mathematical problems. They undertake a Learning Journey to investigate whether a drink bottle actually contains the volume on the label and investigate how a weights and measures inspector uses samples of products to check their contents. They use simulations to discover the connection between the distribution of the sample means and the population distribution and determine the defining factors for the central limit theorem. Students are advised to first complete the resource titled: 'IWM: statistics: normal distributions'.



IWM: statistics: Z-test
L10355 – Year 12

Students develop knowledge of the Z-test to solve real-world, statistical mathematical problems. They undertake a Learning Journey to discover the similarities that exist between Z-tests and normal distributions and generalise this knowledge to formulate the conditions for a Z-test. They investigate odd events in relation to card and dice games and formulate a null hypothesis. They analyse data about vehicle emissions, or study the wear on coins in circulation. Students are advised to first complete the resource titled: 'IWM: statistics: central limit theorem'.

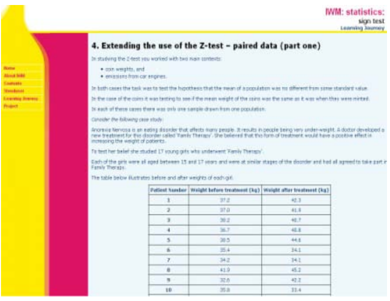


IWM: statistics: confidence intervals
L10356 – Year 12

Students develop knowledge of confidence intervals to solve real-world, statistical mathematical problems. They undertake a Learning Journey to discover the theory underpinning confidence intervals. They use real data from the *SeniorSchoolCensusOnline* website to practise skills with 95% confidence intervals and predict with confidence a range of values that the mean weight of coins in circulation lies within. They determine the effect of sampling bias on a confidence interval. Students are advised to first complete the resources titled: 'IWM: statistics: central limit theorem' and 'IWM: statistics: Z-test'.

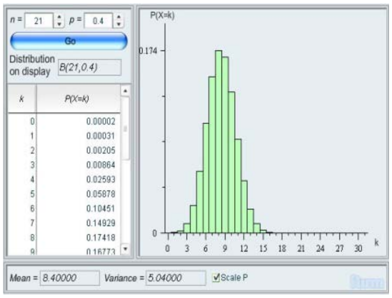
IWM: statistics: binomial distributions
L10357 – Year 12

Students develop knowledge of binomial distributions to solve real-world, statistical mathematical problems. They undertake a Learning Journey interacting with two downloadable spreadsheets relating to drug testing. They examine the concept of a false positive, find out why this result might occur and how to calculate its probability. They meet factorial notation and combinations being used to calculate the probability of particular outcomes in situations where there are only two possible outcomes – success or failure.



IWM: statistics: sign test
L10358 – Year 12

Students develop knowledge of sign tests to solve real-world, statistical mathematical problems. They undertake a Learning Journey and compare individual data with the median for things like product preferences, manufactured items and house prices. They use the *SeniorSchoolCensusOnline* website to examine the coolest fashion accessories for students in different year levels. Students are advised to first complete the resources titled: 'IWM: statistics: Z-test' and 'IWM: statistics: binomial distributions'.



IWM: statistics: confidence intervals: proportions
L10359 – Year 12

Students develop knowledge of confidence intervals and sample proportions to solve real-world statistical mathematical problems. They undertake a Learning Journey that examines the testing for cannabis use and investigate the effect of varying the sample size, or the probability, of a false positive in a binomial distribution of means. They complete a series of questions that describes the normal approximation to a binomial distribution, work out 95% confidence intervals for a sample of a population and explore the process of rating Australian television shows. Students are advised to first complete the resource titled: 'IWM: statistics: binomial distributions'.