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| Ideas for Mathematical investigations — Levels 5 and 6 |

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| Number: Number concepts | | | |
| Investigation | Overview | Links to other Mathematics strands and topics | Possible links to other key learning areas and learning outcomes |
| Will prices go up or down? | Students investigate how the Consumer Price Index is calculated and use this knowledge to create a price index for themselves and their classmates. They investigate changes to their personal price index over time and use their findings to estimate the cost of items on their index in the future.  This investigation provides students with opportunities to engage in an inquiry that requires an understanding of decimals and percentages, and may help to inform financial decisions.  (Note: The Consumer Price Index can be found on the Australian Bureau of Statistics’ website: http://www.abs.gov.au/) |  |  |
| What is the best way to be paid? | Students compare the rates of pay that apply to different methods of earning an income including hourly rates, piece rates, overtime and penalty rates, retainers and commission, and the direct and indirect taxes that they may be required to pay. The research could include part-time work undertaken now as well as the wage rates and tax brackets that apply to a job they anticipate having as an adult.  The investigation could be extended to include personal budgeting and the distribution of taxes by federal and state governments. |  |  |
| Plan an Australian getaway. | Students design an itinerary for a holiday tour of various places in Australia for a month. They develop a personal budget to finance the tour and have opportunities to invest money to increase their finances.  This investigation provides students with opportunities to make informed decisions about methods of payment, make financial decisions related to a budget, and calculate the compound growth of their money. | Space  * Location, direction and movement |  |
| What’s the weather like where you are? | Students investigate the Southern Oscillation Index (SOI), which is calculated from the monthly or seasonal fluctuations in the air-pressure difference between Tahiti and Darwin, and its relationship with the El Niño effect. They examine data from the Bureau of Meteorology to estimate the probability that eastern and northern Australia will be wetter than normal this year. | **Number**   * Addition and subtraction   **Chance and Data**   * Chance | Science EB 5.2  EB 6.2 |
| What makes a great business? | Students play the game, *The clever apprentice* to answer the questions:  *How do business operators make a profit?*  *How can you get a great discount for that computer game you’ve been saving for?*  *How is it possible for both buyers and sellers to be happy with the purchase and the sale respectively?*  Students are divided into two groups — buyers and sellers. The sellers form pairs, design a business to sell 10 selected items (given the cost price), devise and calculate sales prices, and formulate a business plan to ensure that the products are sold for the maximum profit. The buyers’ task is to buy 10 items from the sellers within a prescribed budget. They form pairs and negotiate with the sellers to get the best possible prices. Students who over-spend on their budgets will incur a penalty (a percentage of their budget), thereby reducing their buying power. |  |  |
| Which car would you recommend to a family that wants to buy a budget-friendly ‘green’ car? | Students research the purchase cost of a variety of makes and models of cars. They compare the rates of fuel consumption and emissions, present their conclusions about the ‘top 10 green cars’ in Australia and decide which ones are most affordable for the average Australian family.  To make judgments about the affordability of particular cars, students access existing sources of data about the average income, mortgage, debt and cost of living in Australia.  Useful websites include:  [www.GreenVehicleGuide.gov.au](http://www.GreenVehicleGuide.gov.au)  [www.greenhouse.gov.au](http://www.greenhouse.gov.au)  <http://www.greenercars.com/indexplus.html> | **Chance and Data**   * Data | **Science**  LL 5.3  LL 6.3  EC 5.3  EC 6.3  **SOSE** SRP 5.3 SRP 6.3 |
| Which rental firms give the best deals? | Students use rates, ratio and proportion to investigate the differences between deals offered by the major rental firms in their area in terms of daily rates, longer term rentals, insurance and limitations on use. | **Number**   * Multiplication and division |  |
| Home and away: How do the currencies compare? | Students construct a useful conversion table for people travelling overseas. They investigate conversion factors and rules for converting items that may be of interest to travellers. For example, gallons/litres; miles/kilometres; miles per gallon/kilometres per 100 litres; degrees centigrade/Fahrenheit; pounds/kilograms; and currencies. |  |  |
| What is the most economical way to travel around Australia? | Students investigate the different rates that rental companies charge for hire cars and, with this information, determine the most economical car-hire option for a self-drive holiday. They may choose to compare the cost of driving the total distance with the cost of flying between some destinations. If a one-way hire is involved, the potential extra cost should be investigated.  This investigation provides students with opportunities to develop a rule to illustrate costing, a table of values, and a graph to display the data. They analyse linear functions by determining the value of any term in a sequence by substituting into a rule, develop a rule in words for data given in tabular or graphical form, and represent linear functions in tabular or graphical form. | **Patterns and Algebra**   * Patterns and functions * Equivalence and equations |  |

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| Number: Addition and subtraction | | | |
| Investigation | Overview | Links to other Mathematics strands and topics | Possible links to other key learning areas and learning outcomes |
| What’s the weather like where you are? | Students investigate the Southern Oscillation Index (SOI), which is calculated from the monthly or seasonal fluctuations in the air-pressure difference between Tahiti and Darwin, and its relationship with the El Niño effect. They examine data from the Bureau of Meteorology to estimate the probability that eastern and northern Australia will be wetter than normal this year. | **Number**   * Number concepts   **Chance and Data**   * Chance | Science EB 5.2  EB 6.2 |
| Search for a cooler/warmer place to live in outer space. | Students take on the role of an outer-space weather forecaster. To make their weather predictions, they investigate the differences in temperatures on and between planets in our solar system, and determine which planets are going to be the hottest or coldest in the next holiday period and by how much. They could also recommend which planet or planets have temperatures that would support the establishment of a colony of Earth dwellers looking for a new home. |  |  |
| Need to find the quickest route to a planet of your choice? See me now. | Students take on the role of tour organiser for interplanetary travellers. They investigate the distances between the planets at various times during their orbits around the sun, and make recommendations about which year, or which time of year enables travellers to make the shortest trip possible between planets with stopovers along the way (e.g. Earth to Uranus with stopovers at Mars and Saturn). |  |  |
| Water, water everywhere but will there be enough to drink? | Students investigate their water consumption and that of their families. They identify ways to reduce consumption and calculate the savings (of water and money) that could be made. Students use the data gathered to promote water conservation in their community. They could also access data on water consumption from local government authorities, and make comparisons between their calculations and those of the authority. |  |  |
| Design a pool. | Students are required to design a pool and pool surrounds for a selected area of the school grounds. They investigate appropriate shapes for the pool and paving, the dimensions of the available area, the depth of the pool and its volume, and the length of the fence.  This investigation also lends itself to involving students in a study of water consumption in the school, the effects of installing a pool of the size they design, and the steps that can be taken to conserve water. Students could calculate the cost of materials for building a pool to their design and the rate of evaporation using standard meteorological measurements to see how quickly the water evaporates. | **Measurement**   * Length, mass, area and volume |  |
| How fair is the Duckworth-Lewis method? | Students investigate the application of the Duckworth-Lewis method of resetting targets in interrupted one-day cricket matches to comment on its fairness and applicability to school and community matches. As a result of the investigation, students could propose an alternative method of calculation. | Number  * Multiplication and division |  |

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| Title of investigation | Overview | Links to other Mathematics strands and topics | Possible links to other key learning areas and learning outcomes |
| Which rental firms give the best deals? | Students use rates, ratio and proportion to investigate the differences between deals offered by the major rental firms in their area in terms of daily rates, longer term rentals, insurance and limitations on use. | **Number**   * Number concepts |  |
| What ratios are there in the human body? | Students investigate ratios in the human body and calculate how long the arm of a statue would need to be if the index finger were 10 centimetres long, or how wide the arm span is in relation to height. They use chart paper, string, and measuring instruments to develop their own strategy for finding solutions.  The investigation could be extended to include, for example, the design of a larger-than-life model of a ‘big lizard’ for a reptile park or a human figure for a public space. |  |  |
| How to lose weight without giving up eating. | Students use ratio and proportion to work out the weight different objects would have in the moon’s gravity. They also investigate what their body would weigh on each of the other planets. |  |  |
| Players past and present: How do they compare? | Students investigate sporting statistics of past and present players to select a ‘team of the century’. For some sports, the ‘selectors’ will need to take rule changes into consideration (e.g. the number of balls per over in cricket, the introduction of the three-point line in basketball). |  |  |
| How fair is the Duckworth-Lewis method? | Students investigate the application of the Duckworth-Lewis method of resetting targets in interrupted one-day cricket matches to comment on its fairness and applicability to school and community matches. As a result of the investigation, students could propose an alternative method of calculation. | **Number**   * Addition and subtraction |  |
| Design a safety ramp for an adventure area. | Students investigate the design of an adventure park that includes a skateboard area and an extreme bike track. In the interests of safety, each downhill ramp must incorporate a safety ramp. The optimum dimensions of the safety ramps must be included in the design. Students refer to the Standards Australia requirements. | Patterns and Algebra   * Patterns and functions * Equivalence and equations | **Science**  EC 5.1  EC 6.1, 6.2 |
| Design an area for relaxation in the school grounds. | Students use a scale plan of the school grounds to identify a suitable area, sloping or flat, to locate a recreational or quiet place for student use. Students design the elements of the space to fit within the identified area. Designs must include seating for x people, a garden area (specify a percentage), and a water feature. A shade structure and paving could also be considered. They calculate the quantity and cost of materials required.  (Note: Seating and other elements must meet Australian standards and local council regulations. These will influence such things as the depth of the water feature.) | **Measurement**   * Length, mass, area and volume   **Space**   * Shape and line * Location, direction and movement |  |
| How many steps to health improvement? | Students research the number of steps recommended for daily exercise by health organisations and then investigate ways of measuring their weekly/monthly aggregates without counting their steps. They experiment to find how the recommendations are affected by varying speed or length of stride. They test their generalisations and those of other students to make recommendations to the student body about an exercise program based on daily walking. |  |  |
| How many times do you need to vote? | Students investigate the probability of contestants being voted for at different stages in an Australian reality television show. They calculate the effects on probability as the number of contestants changes and make recommendations about how the number of votes received can be fairly weighted based on the population size of the contestant’s home state. For example, in *My Restaurant Rules* how could a Western Australian restaurant compete fairly with a restaurant in New South Wales? | **Chance and Data**   * Chance |  |
| How do songs appear on the ARIA charts? | Students investigate the mathematics associated with a Number One selling record in Australia. Student select a variety of Number One hit singles from the previous 12 months, and investigate the number of sales made and the total amount spent on purchasing them in Australia/the world. They could compare the music investigated by all students in terms of the most popular or highest grossing. |  |  |
| Are you on the best phone plan? | Students investigate a variety of mobile phone plans with a view to choosing the most appropriate plan for themselves and/or another family member. They collect data about rates for making calls at different times of the day, sending text messages and retrieving messages. They compare data sets to make judgments about which plan is most appropriate for their needs. | **Chance and Data**   * Data |  |

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| Patterns and Algebra: Patterns and functions | | | |
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| Design a safety ramp for an adventure area. | Students investigate the design of an adventure park that includes a skateboard area and an extreme bike track. In the interests of safety, each downhill ramp must incorporate a safety ramp. The optimum dimensions of the safety ramps must be included in the design. Students refer to the Standards Australia requirements. | Number   * Multiplication and division   Patterns and Algebra   * Equivalence and equations | **Science**  EC 5.1  EC 6.1, 6.2 |
| Design a pyramid. | Students take on the role of pyramid designer to produce a design and scale model of a pyramid. The design must state the number of blocks that will be required in the building of the pyramid. Students use Pythagoras’s theorem to write an explanation of how the overseers of the construction of the pyramid can guarantee that the base is square and level and that every block has a perfectly rectangular face. | **Space**   * Shape and line   **Patterns and Algebra**   * Equivalence and equations | **SOSE**  TCC 5.1  TCC 6.1  **Technology**  TP 5.1, 5.2, 5.3, 5.4  TP 6.1, 6.2, 6.3, 6.4  MAT 5.1, 5.2  MAT 6.1, 6.2 |
| How do secret codes work? | Julius Caesar has sent a coded message to his generals at the front line. You intercept the message and try to find out what it is. Crack the code and decipher the message. Create a new message to change the course of history. Students use numerical equivalents of the letters of the alphabet to create and interpret representations of a linear equation. | **Patterns and Algebra**   * Equivalence and equations |  |
| What is the most economical way to travel around Australia? | Students investigate the different rates that rental companies charge for hire cars and, with this information, determine the most economical car-hire option for a self-drive holiday. They may choose to compare the cost of driving the total distance with the cost of flying between some destinations. If a one-way hire is involved, the potential extra cost should be investigated.  This investigation provides students with opportunities to develop a rule to illustrate costing, a table of values, and a graph to display the data. They analyse linear functions by determining the value of any term in a sequence by substituting into a rule, develop a rule in words for data given in tabular or graphical form, and represent linear functions in tabular or graphical form. | **Number**   * Number concepts   **Patterns and Algebra**   * Equivalence and equations |  |
| Choose a venue for a special event. Stay within the budget. | Students investigate the different ways in which function centres quote for their services when hosting a party. They use this information to determine the cheapest venue for a function.  This investigation provides students with opportunities to develop a rule to illustrate costing, a table of values, and a graph to display the data. They analyse linear functions by determining the value of any term in a sequence by substituting into a rule, develop a rule in words for data given in tabular or graphical form, and represent linear functions in tabular or graphical form. | **Patterns and Algebra**   * Equivalence and equations   Chance and Data   * Data |  |
| How much could you raise from a car wash at school? | To reduce the cost to students for the year-level camp, students have decided to conduct a car wash to raise funds. Students investigate the cost of materials and advertising, and the price to be charged for one car to be washed. They produce tabular and graphical representations of the number of cars washed and the money raised. They analyse these data to determine how many cars need to be washed to reduce the cost per student for the camp by a given amount and represent the data as a linear equation. | **Patterns and Algebra**   * Equivalence and equations |  |
| What should you aim for on a dartboard? | Students investigate the score they are most likely to achieve by throwing three darts at a dartboard. Before they begin the investigation, students make decisions about the rules that will apply to the game (e.g. misses score zero, trebles and doubles count/do not count, you need to throw a 1 to start). | **Patterns and Algebra**   * Equivalence and equations |  |
| Which system will be employing the most teachers in the future? | Students investigate patterns of enrolment in state and private schools over the previous 10 years to make predictions about the number of teachers likely to be needed in various sectors of schooling in the next five years. | **Patterns and Algebra**   * Equivalence and equations |  |
| Who profits from short message services? | Students collect data to estimate how many text messages the students in their school send per day. They use their findings to calculate how much money the provider makes.  This investigation provides students with opportunities to interpret and solve linear equations using algebraic and graphical methods. | **Patterns and Algebra**  Equivalence and equations |  |

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| Design a pyramid. | Students take on the role of pyramid designer to produce a design and scale model of a pyramid. The design must state the number of blocks that will be required in the building of the pyramid. Students use Pythagoras’s theorem to write an explanation of how the overseers of the construction of the pyramid can guarantee that the base is square and level and that every block has a perfectly rectangular face. | **Space**   * Shape and line   **Patterns and Algebra**   * Patterns and functions | **SOSE**  TCC 5.1  TCC 6.1  **Technology**  TP 5.1, 5.2, 5.3, 5.4  TP 6.1, 6.2, 6.3, 6.4  MAT 5.1, 5.2  MAT 6.1, 6.2 |
| How do secret codes work? | Julius Caesar has sent a coded message to his generals at the front line. You intercept the message and try to find out what it is. Crack the code and decipher the message. Create a new message to change the course of history. Students use numerical equivalents of the letters of the alphabet to create and interpret representations of a linear equation. | **Patterns and Algebra**   * Patterns and functions |  |
| What is the most economical way to travel around Australia? | Students investigate the different rates that rental companies charge for hire cars and, with this information, determine the most economical car-hire option for a self-drive holiday. They may choose to compare the cost of driving the total distance with the cost of flying between some destinations. If a one-way hire is involved, the potential extra cost should be investigated.  This investigation provides students with opportunities to develop a rule to illustrate costing, a table of values, and a graph to display the data. They analyse linear functions by determining the value of any term in a sequence by substituting into a rule, develop a rule in words for data given in tabular or graphical form, and represent linear functions in tabular or graphical form. | **Number**   * Number concepts   **Patterns and Algebra**   * Patterns and functions |  |
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| What would you put in your survival backpack? | Students going on a survival camp investigate the recommended weight of a backpack in relation to their body weight. They choose food and clothing that fit within the recommended limits.  (Note: Water is not included in the calculations.) | **Measurement**   * Length, mass, area and volume | **HPE**  PHIC 5.2  PHIC 6.2 |
| Who profits from short message services? | Students collect data to estimate how many text messages the students in their school send per day. They use their findings to calculate how much money the provider makes.  This investigation provides students with opportunities to interpret and solve linear equations using algebraic and graphical methods. | **Patterns and Algebra**   * Patterns and functions |  |
| Which system will be employing the most teachers in the future? | Students investigate patterns of enrolment in state and private schools over the previous 10 years to make predictions about the number of teachers likely to be needed in various sectors of schooling in the next five years. | **Patterns and Algebra**   * Patterns and functions |  |

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| Measurement: Length, mass, area and volume | | | |
| Investigation | Overview | Links to other mathematics strands and topics | Possible links to other key learning areas and learning outcomes |
| Design a pool. | Students are required to design a pool and pool surrounds for a selected area of the school grounds. They investigate appropriate shapes for the pool and paving, the dimensions of the available area, the depth of the pool and its volume, and the length of the fence.  This investigation also lends itself to involving students in a study of water consumption in the school, the effects of installing a pool of the size they design, and the steps that can be taken to conserve water. Students could calculate the cost of materials for building a pool to their design and the rate of evaporation using standard meteorological measurements to see how quickly the water evaporates. | **Number**   * Addition and subtraction |  |
| Design a permaculture environment | Students investigate a variety of designs for permaculture environments. They create a design for a permaculture environment in the school grounds that allows the greatest number of plants to be grown in the smallest space. They calculate the quantities of materials required to construct their design. Materials should include those required for fencing the area. |  |  |
| Design a wheelchair ramp for a school building. | Students investigate regulations that apply to the installation of wheelchair ramps to make a building accessible to disabled students. They design a ramp and calculate the quantities and costs of materials required to construct it. They check the Disability Access Standards available from Disability Services Queensland.  This investigation provides opportunities for students to apply Pythagoras’s theorem and develop an understanding of tangent ratios. |  |  |
| What would you put in your survival backpack? | Students going on a survival camp investigate the recommended weight of a backpack in relation to their body weight. They choose food and clothing that fit within the recommended limits.  (Note: Water is not included in the calculations.) | **Patterns and Algebra**   * Equivalence and equations | **HPE**  PHIC 5.2  PHIC 6.2 |
| Prepare a submission for the construction of a sporting facility. | As members of the school council, students submit a proposal for the establishment of a sporting facility such as a beach volleyball court or long jump pit in the school grounds. The proposal must contain a plan of the court, a recommended site within the school grounds for locating the court, materials required for a standard court, and a budget. The proposal must indicate how safety requirements have been considered. |  |  |
| How can water storage be increased? | Students investigate design, location and construction of different ‘tanks’ for collecting and storing rainwater in their school or home. They consider roof areas of different building structures, the storage capacity and shape of different containers including bladders, the design and cost of constructing a stand, and the length and size of pipes required.  This investigation provides opportunities for students to calculate length, mass, area and volume, and to access council regulations that govern the installation of water storage devices. |  | **SOSE**  PS 5.2, 5.3  PS 6.2, 6.3 |
| Design an area for relaxation in the school grounds. | Students use a scale plan of the school grounds to identify a suitable area, sloping or flat, to locate a recreational or quiet place for student use. Students design the elements of the space to fit within the identified area. Designs must include seating for x people, a garden area (specify a percentage), and a water feature. A shade structure and paving could also be considered. They calculate the quantity and cost of materials required.  (Note: Seating and other elements must meet Australian standards and local council regulations. These will influence such things as the depth of the water feature.) | **Number**   * Multiplication and division   **Space**   * Shape and line * Location, direction and movement |  |

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| Measurement: Time | | | |
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| Plan an itinerary so you can travel with the Pacific Rugby Tour. | Students investigate arrival and departure times, travel times and the effects of travelling across time zones for a Pacific Rugby Tour. Destinations include New Zealand, Fiji, Samoa, Tonga and Argentina. | **Space**   * Location, direction and movement |  |
| How long can a day last? | Students investigate time zones and flight schedules to answer the questions: ‘How far can you fly in 24 hours?’ and ‘How many time zones can you cross?’ Each leg of the flight must end in a different time zone. | **Space**   * Location, direction and movement |  |
| What are the impacts of natural disasters? | Students investigate the duration and impact of natural disasters. For example, students could investigate how long it took for the 2004 Boxing Day Tsunami to reach Ethiopia from its source, the rate at which it travelled, and the effects of the different time zones. Other disasters that could be investigated include Chernobyl, Exxon Valdez oil spill, volcanic eruptions and other earthquakes. | **Space**   * Location, direction and movement | **SOSE**  PS 5.3  PS 6.4 |
| What is involved in organising a large sporting event? | Students plan an international sporting tournament — such as World Cup Soccer or Olympic Games — that is being held in more than one Australian city. For example, soccer matches could be held in each state that has a team in the national competition. Games need to be programmed to cater for international audiences who wish to view the games live.  (Note: Competitions could occur during months that observe daylight saving.) | **Space**   * Location, direction and movement |  |
| Where in the world is the hero? | Using a novel such as *The Da Vinci Code* or a movie such as *The Great Race* or *Around the World in 80 Days*, students track the travel on a map of the world, record times on a timeline and investigate other interesting aspects or mathematical ideas in the story. Students could form judgments about whether the story is fact or fiction based on the information collected. | **Space**   * Location, direction and movement |  |

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| Chance and Data: Chance | | | |
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| Are all dice fair? | Students conduct experiments on a variety of dice and use the data to make a judgment about which dice are fair.  This investigation provides students with opportunities to make quantitative judgments about the theoretical and experimental probability of single and compound events. | Chance and Data  * Data | **Science**  SS 5.2  SS 6.2 |
| How can you make board games more exciting? | Students investigate how they could modify the rules of a game to make it fairer or more exciting. For example, they could investigate modifying the rules of Monopoly so they had a 50-50 chance of getting out of jail when they roll the dice.  This investigation provides students with opportunities to model events in different ways, explain theoretical and experimental probabilities, calculate numerical values of the probabilities, and justify statements and decisions using theoretical and experimental probabilities. | Chance and Data  * Data |  |
| Can you predict what your lifespan will be? | Students take on the role of a life insurance salesperson or actuary who has to identify the probability of students living to a ripe old age. They collect, record and display data about causes of death in different age brackets and in different countries, and use the numerical probability to make a prediction about their own lifespan.  This investigation provides students with opportunities to investigate data over time as well as cross-sectional data and to display the data in histograms and two-way tables. | **Chance and Data**   * Data |  |
| What are the chances of winning the lottery? | Students investigate the probability of winning various lotteries. They calculate the theoretical probability and use computer simulations to calculate experimental probability values to make a judgment about which lotteries offer the best and least chances of winning. Students could present their findings to others to promote understandings about gambling. |  |  |
| Can you predict which genetic traits your children will inherit? | Students investigate the likelihood of inheriting genetic traits, such as eye or hair colour from their parents. They collect data from a representative sample (e.g. parents and siblings of students participating in the investigation) and analyse and interpret the data to make judgments about the probability of having a child who has particular characteristics such as blonde hair and blue eyes. | **Chance and Data**   * Data | Science SS 6.1, 6.2  LL 5.1, 5.2  LL 6.2 |
| What’s the weather like where you are? | Students investigate the Southern Oscillation Index (SOI), which is calculated from the monthly or seasonal fluctuations in the air-pressure difference between Tahiti and Darwin, and its relationship with the El Niño effect. They examine data from the Bureau of Meteorology to estimate the probability that eastern and northern Australia will be wetter than normal this year. | **Number**  Number concepts  Addition and subtraction  **Chance and Data**  Chance | ScienceEB 5.2EB 6.2 |
| How many times do you need to vote? | Students investigate the likelihood of contestants being voted for at different stages in an Australian reality TV show. They calculate the effects on the probability as the number of contestants changes and make recommendations about how the number of votes received can be fairly weighted based on the population size of the contestant’s home state. For example, in *My Restaurant Rules,* how could a Western Australian restaurant compete fairly with a restaurant in New South Wales? | **Number**  Multiplication and division |  |

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| Can you predict what your lifespan will be? | Students take on the role of a life insurance salesperson or actuary who has to identify the probability of students living to a ripe old age. They collect, record and display data about causes of death in different age brackets and in different countries, and use the numerical probability to make a prediction about their own lifespan.  This investigation provides students with opportunities to investigate data over time as well as cross-sectional data and to display the data in histograms and two-way tables. | **Chance and Data**   * Chance |  |
| Are you on the best phone plan? | Students investigate a variety of mobile phone plans with a view to choosing the most appropriate plan for themselves and/or another family member. They collect data about rates for making calls at different times of the day, sending text messages and retrieving messages. They compare data sets to make judgments about which plan is most appropriate for their needs. | **Number**   * Multiplication and division |  |
| Are ethnic groups catered for in your school? | Students take on the role of census collectors in the school with the responsibility of collecting information about the different ethnic groups represented in the school and their food preferences. Information collected will be used to make recommendations about which languages should be offered for study and foods that should be available in the school tuckshop. Students produce and compare data displays and use measures of location to help them make judgments. |  |  |
| What are the physical attributes of athletes? | Students investigate the physical attributes of athletes who perform at a high level in an attempt to establish a relationshipbetween physical characteristics and performances in sport. They display and interpret the cross-sectional data they have collected. |  |  |
| Which car would you recommend to a family that wants to buy a budget-friendly ‘green’ car? | Students research the purchase cost of a variety of makes and models of cars. They compare the rates of fuel consumption and emissions, present their conclusions about the ‘top 10 green cars’ in Australia and decide which ones are most affordable for the average Australian family.  To make judgments about the affordability of particular cars, students access existing sources of data about the average income, mortgage, debt and cost of living in Australia.  Useful websites include:  [www.GreenVehicleGuide.gov.au](http://www.GreenVehicleGuide.gov.au)  [www.greenhouse.gov.au](http://www.greenhouse.gov.au)  <http://www.greenercars.com/indexplus.html> | **Number**   * Number concepts | **Science**  LL 5.3  LL 6.3  EC 5.3  EC 6.3  **SOSE** SRP 5.3 SRP 6.3 |
| Choose a venue for a special event. Stay within the budget. | Students investigate the different ways in which function centres quote for their services when hosting a party. They use this information to determine the cheapest venue for a function.  This investigation provides students with opportunities to develop a rule to illustrate costing, a table of values, and a graph to display the data. They analyse linear functions by determining the value of any term in a sequence by substituting into a rule, develop a rule in words for data given in tabular or graphical form, and represent linear functions in tabular or graphical form. | **Patterns and Algebra**   * Patterns and functions   Chance and Data   * Data |  |
| Youth issues | Students survey a cross-section of the school population to determine whether the national findings on issues considered important by Australian youths are reflected in their school populations. Data could be collected on education, relationships, employment, alcohol and drug usage, and bullying. Alternatively, the survey could establish what issues are of most importance to particular age groups and make recommendations to the school to investigate these issues. For further information on issues of importance to Australian Youth go to: http://www.youthfacts.com.au/. Click on ‘Attitudes & opinions’. |  |  |
| Can you predict which genetic traits your children will inherit? | Students investigate the likelihood of inheriting genetic traits, such as eye or hair colour from their parents. They collect data from a representative sample (e.g. parents and siblings of students participating in the investigation) and analyse and interpret the data to make judgments about the probability of having a child who has particular characteristics such as blonde hair and blue eyes. | **Chance and Data**   * Data | Science SS 6.1, 6.2  LL 5.1, 5.2,  LL 6.2 |
| What paths do migrating animals take? | Students investigate the migratory paths of a variety of animals (e.g. whales, turtles, lobsters, birds, butterflies, caterpillars, salmon, reindeer, wildebeest), plot the path on maps, compare the distances travelled and the time taken, and then draw conclusions about which animals spend the greatest part of their life travelling. They construct graphs and make generalisations based on graphs about the size of the animals in relation to the distance travelled.  Students may wish to investigate how the animals navigate and compare to tools or techniques used  by humans. | **Chance and Data**   * Data |  |

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| Space: Shape and line | | | |
| Investigation | Overview | Links to other Mathematics strands and topics | Possible links to other key learning areas and learning outcomes |
| Design a pyramid. | Students take on the role of pyramid designer to produce a design and scale model of a pyramid. Their design must state the number of blocks that will be required in the building of their pyramid. Students use Pythagoras’s theorem to write an explanation of how the overseers of the construction of the pyramid can guarantee that the base is square and level and that every block has a perfectly rectangular face. | **Patterns and Algebra**   * Patterns and functions * Equivalence and equations | **SOSE**  TCC 5.1  TCC 6.1  **Technology**  TP 5.1, 5.2, 5.3, 5.4  TP 6.1, 6.2, 6.3, 6.4  MAT 5.1, 5.2  MAT 6.1, 6.2 |
| Design an area for relaxation in the school grounds. | Students use a scale plan of the school grounds to identify a suitable area, sloping or flat, to locate a recreational or quiet place for student use. Students design the elements of the space to fit within the identified area. Designs must include seating for x people, a garden area (specify a percentage), and a water feature. A shade structure and paving could also be considered. They calculate the quantity and cost of materials required.  (Note: Seating and other elements must meet Australian standards and local council regulations. These will influence such things as the depth of the water feature.) | **Number**   * Multiplication and division   **Measurement**   * Length, mass, area and volume   **Space**   * Location, direction and movement |  |
| Design a building that would improve your community. | Students design a building relevant to their community, such as a place of worship, shopping outlet, community centre, community housing, restaurant, sporting facility or their own creation. Students construct a model of their building.  This investigation provides students with opportunities to apply understandings of scale plans and elevations, compound shapes, sections and cross-sections, angles and lines. |  | **Technology**  TP 5.1, 5.2, 5.3, 5.4  TP 6.1, 6.2, 6.3, 6.4  MAT 5.1, 5.2  MAT 6.1, 6.2 |
| What improvements would you make to a sporting venue? | Students take on the role of an architect with the task of redesigning a sporting venue (e.g. football stadium, the school oval, local tennis courts). They consider improving the orientation of the playing field or building, use compass points to create pathways around the venue, and position objects in relation to points of the compass and the sun. Students develop plans and advertising brochures to communicate their design ideas. |  |  |