# Sample Unit – Mathematics Life Skills – Year 11

***Sample for implementation for Year 11 from 2018***

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| **Unit title** | On the Move | **Duration** | 10 weeks |
| **Unit description** | This unit is based on the theme of travel and brings together and extends some of the learning from a number of topics – Statistics, Plans, Maps and Networks (Networks), Financial Mathematics and Measurement. Students use a range of mathematical skills related to travelling in their community including data use and analysis, measurement, using money, working with maps and networks, and reading and using timetables. This could also serve as a means of developing skills for independent travel through actual travel experiences. The relevance and suitability different topics and activities should be considered by teachers. |
| **Topic(s)** | Statistics and ProbabilityPlans, Maps and Networks (Networks)Financial MathematicsMeasurement  | **Subtopic(s)** | StatisticsUsing Plans, Maps and NetworksSpending MoneyEveryday Measurement |
| **Outcomes**MALS6-2 engages with mathematical symbols, diagrams, graphs and tables to represent information accurately MALS6-3 engages with appropriate tools, units and levels of accuracy in measurementMALS6-4 explores contexts of everyday measurementMALS6-5 demonstrates understanding of moneyMALS6-9 uses data in a range of contexts MALS6-11 explores plans, maps, networks and timetablesMALS6-12 engages with plans, maps, networks and timetables effectively in a range of everyday contexts and situations |
| **Assessment overview**Evidence of student learning could be gathered through:* teacher observations, both formal and informal, of student performance, involvement in class activities, communication of their understanding
* students’ survey results, data displays and analyses
* activities involving reading, using and making maps
* activities involving reading and using timetables
* students’ plans for travel using different methods and their solutions to travel problems
* presentations related to travel or car ownership that were developed and/or delivered by students
* quizzes, activities, group and individual tasks using a range of calculations related to time, money, measurement and financial mathematics
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| **Content** | **Teaching, learning and assessment** | **Resources** |
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| **S1.1: Gather data**Students:* pose a question that may be answered by a set of data
* identify a range of ways that data can be collected to answer a given question, for example:
	+ a verbal or written survey
	+ observations
	+ research on the internet Critical and creative thinking icon  Information and communication technology capability icon
* use digital technology to conduct surveys, for example:
	+ online survey tools  Information and communication technology capability icon
* select the best method to collect desired data Critical and creative thinking icon
* design an appropriate data collection tool for a given purpose Critical and creative thinking icon
* explain the need to avoid bias when collecting data and suggest ways to do so Ethical understanding icon Literacy icon

**S1.2: Organise and display data**Students:* record collected data using a variety of means, for example:
	+ tally marks
	+ concrete materials
	+ symbols
	+ digital technologies
* order and sort data into groups, categories or ranges
* complete pre-constructed data tables either on paper or digitally, for example:
	+ a spreadsheet
* construct frequency tables and make calculations related to these, for example:
	+ calculate total for the frequency column
* identify common features of graphs, including heading, scale, key, axes and labels, and locate these on graphs
* choose the most appropriate display for a data set, for example:
	+ picture graphs
	+ column graphs
	+ line graphs Critical and creative thinking icon
* construct a line, picture or column graph
* construct a line, picture or column graph with increasing accuracy, for example:
	+ use correct graphing techniques, eg equal (measured) spacing, ruling of lines
	+ include all relevant, commonly accepted features of graphs
	+ plot points or measure columns accurately as required
	+ use graph paper to assist with creating graphs
	+ use digital technologies to create a range of graphs  Information and communication technology capability icon

**S1.3: Analyse and interpret data**Students:* ask and answer questions about a set of data in general terms, for example:
	+ pose or answer questions based on the information displayed in a graph or table Critical and creative thinking icon
* recognise that the terms ‘mean’ and ‘average’ describe the same concept in everyday use Literacy icon
* calculate the range for a simple data set and discuss its meaning
* calculate mean, median and mode for a simple data set and discuss each concept
 | **How do we get to where we want to go?**Students brainstorm ways that people move about their community and the wider world, also drawing from their own experiences, including transport methods such as:* walking
* using wheelchairs
* riding a push bike or motor bike
* in a car as passenger or a driver
* in public transport such as train, bus, taxi, ferry, tram
* in a plane or helicopter

Students brainstorm less common methods, such as by horse or hot air balloon.Students discuss the pros and cons of various transport methods to help recognise that there are usually better and less desirable options for any given trip. For example, it might be better getting a bus to the city rather than driving due to traffic, parking and toll costs. Make a visual display of this information for the classroom. Options include: * students contributing to a collage by selecting appropriate pictures from a supplied set, or finding pictures themselves in magazines or online
* students contributing to a class or individual mind map (written or created using a program such as *bubbl.us*)
* students contributing to a poster using words that they come up with or words that they select from a set of words.

Collect and display data related to getting about. This can be done in order to answer a relevant question such as ‘How do students in our class travel to school?’Other potential survey topics could include:* who has used a specific transport method such as a plane
* the number of vehicles owned by each student's household
* transport methods most commonly used by students to get to school, or for weekend outings.

Conduct a class survey, collecting data in a variety of ways such as gesture, oral, digital or written methods. As appropriate, students could be asked to design the data collection tool (eg create a survey on *SurveyMonkey*). Discuss potential sources of bias and the need to avoid this in a fair survey.Organise and display collected data into an appropriate table and/or graph. As appropriate, students could use or design a checklist for a ‘good graph’, defining the key features they should include (for example labelled axes, heading, suitable scale). Students can construct graphs using pen and paper methods, a spreadsheet, or by putting the pieces of a graph together. Analyse the data, answering the original question and using the information obtained to draw any other relevant conclusions. Students publish their findings, for example make a classroom display, put their graphs and information in the school newsletter/website.  | A range of visual prompts, such as pictures of transport methodsMagazines, colour printer [bubbl.us](https://bubbl.us/) [wordle.net](http://www.wordle.net/)[www.surveymonkey.com](http://www.surveymonkey.com) Grid paperDigital or online spreadsheetsParts of a graph to put togetherGraph checklistA possible extension activity is the activity [CaSMa03 - Are Students Being Taken For A Ride?](http://www.abs.gov.au/websitedbs/CaSHome.nsf/home/downloadable%2Bfiles.es/%24FILE/CaSMa03%2BAre%2BStudents%2BBeing%2Btaken%2Bfor%2Ba%2BRide%2BWorksheet.rtf) that can be found on *Scootle*  |
| **P1.2: Maps**Students:* recognise and respond to the language of maps, for example:
	+ scale
	+ direction
	+ north Literacy icon
* recognise the purpose and functions of maps
* recognise that maps represent real things, for example:
	+ regions
* use maps to locate positions or gather information, for example:
	+ in their local area
* use the language of maps Literacy icon
* recognise a variety of maps, for example:
	+ historical maps
	+ topological maps
	+ maps from different cultural traditions
	+ maps that use digital technology Aboriginal and Torres Strait Islander histories and cultures icon Asia and Australia’s engagement with Asia icon  Information and communication technology capability icon Intercultural understanding icon
* identify typical features of a map, for example:
	+ key, scale, grid, compass rose Literacy icon
* identify directions on a map in a variety of ways, for example:
	+ using compass directions and their abbreviations
	+ using common terms eg left and right Literacy icon
* develop skills in using maps, for example:
	+ locate something or describe the location of something on a map using grid references
	+ read and use a map key (legend) Literacy icon
	+ read distances directly from the map or from a related table of distances
	+ use scale to determine distances between places
	+ give and follow directions using a map Literacy icon
* recognise that the shortest or fastest route is not always the best route and discuss why
* create simple maps, for example:
	+ sketch a map showing the way from one place in the school to another Critical and creative thinking icon Personal and social capability icon
* solve problems involving maps, for example:
	+ identify or calculate distances and travel times between two places and determine if they can get to a given place within a time frame Critical and creative thinking icon

**P1.3: Networks**Students:* recognise and respond to the language of networks, for example:
	+ via
	+ detour
	+ connect Literacy icon
* recognise the purpose and functions of networks
* recognise that networks represent real things, for example:
	+ transport systems
* use networks to gather information, for example:
	+ the journey the bus takes between its first and last stop
* use the language of networks Literacy icon
* recognise what is represented by a diagram of a network, for example:
	+ recognise that a diagram of a bus network is showing how the bus routes are linked
* recognise a range of types of networks, for example:
	+ train or bus networks, road networks, social networks
* recognise the differences between a network diagram and a map
* identify how different parts of a network are linked, either directly or indirectly, for example:
	+ identify a road between two towns from a road network, or describe the relationship between two people from a social network Literacy icon Personal and social capability icon
* identify a number of possible paths to get from one place in a network to another, for example:
	+ identify possible travel routes between two places  Information and communication technology capability icon
* use personal networks to solve simple problems, for example:
	+ using a network diagram of undercover routes between buildings
	+ plot a route to walk from one place to another without getting wet on a rainy day Critical and creative thinking icon Personal and social capability icon
* investigate and solve problems in given networks, for example:
	+ how to visit each point in a network without retracing any paths (eg the Königsberg Bridge Problem)
	+ finding the most efficient route around a paper delivery run Critical and creative thinking icon
* construct a simple network, for example:
	+ represent their family network using photos or draw a road network given a map of their area Personal and social capability icon Civics and citizenship icon
* solve problems involving networks, for example:
	+ plan the route for a walking tour to visit the major landmarks in a city without retracing paths
	+ use airline, train, bus or road network diagrams to identify the best route, eg ‘Which train line should I take if I want to get from A to B?’ Critical and creative thinking icon Personal and social capability icon
 | **How do we know where we are going?**Students consider different types of maps and their uses. For example topological maps may be useful for bushwalking, GPS maps are better for driving, public transport network maps are required to plan travel by train.Consider the features of maps such as the key, scale, grid references, compass rose and use these. Students undertake a range of activities in reading maps:* relate a local area map to their real life, for example recognise that a particular intersection on a map is where the petrol station is (*Google Maps* is useful for this)
* locate places on a map using grid references or the key of the map
* read the map to plan a route to/from a place
* give/follow directions on a map, using suitable language such as left/right or compass directions
* read maps using relevant technology such as *Google Maps*, GPS
* read public transport networks, recognising that these are not usually scale maps but rather a simplified representation of a transport system
* use a scale to determine distances on a map.

Students can also construct maps or plot journeys on given maps, for example:* colour the route they take to get to school on a map
* take a class outing and map their journey on a local area map as they go along
* construct network diagrams to show public transport routes in their area
* draw a ‘mud map’ to show how to get around the local area or the school.

Students solve more complex travel problems as appropriate for their ability and needs, for example:* identify a range of possible travel routes between two places (and perhaps via somewhere else) using a range of maps, networks or technology. Students can use online resources such as the *Transport NSW* website or *Google Maps* to see alternate transport methods, or online game and activities.
* compare journeys/routes based on aspects such as distance, time, traffic, terrain, disability access. This could involve use of the *RTA Live Traffic* website to determine traffic issues, or websites to determine disability access to public transport
* interpret airline, train, bus or road network diagrams and use these to answer questions about the network, for example ‘Which train line should I take if I want to get from A to B?’, ‘Can I fly direct from Sydney to Broome?’
* plan an efficient travel route, for example plan a walking tour to visit the major landmarks in a city without retracing paths, or plot a route to get from their classroom to the Library without getting wet on a rainy day
* use the route map on a timetable to determine where they should begin or end a journey to make the easiest or most efficient travel method
* recognise that bus timetables rarely list all stops, then interpolate to estimate the time they need to be at a bus stop that is not listed.

Students should recognise that the shortest or fastest route is not always the best route and discuss why.  | A range of maps to view, discuss and use, including access to technology and the internetA range of online interactive activities are available. For example:Treasure Hunt (*Scootle*)<https://www.scootle.edu.au/ec/viewing/L8866/index.html> Position (*Maths Builder*)<http://worksheets.mathsbuilder.com.au/esa/4/ES041917#Position__Direction_and_Coordinates_+4_01> *Transport NSW*[www.transportnsw.info](http://www.transportnsw.info/en/index.page) *Scootle* activities, for example:Journey Planner <http://www.scootle.edu.au/ec/viewing/L1111/index.html> *Live Traffic NSW*[livetraffic.rta.nsw.gov.au](http://m.livetraffic.rta.nsw.gov.au/Search.aspx) Network diagrams, such as the NSW train system or an airline’s network map, for example:SpatialGenie – My Transportation Network[www.spatialgenie.edu.au/teacher\_resources/M009132\_My\_transportation\_network.doc](http://www.spatialgenie.edu.au/teacher_resources/M009132_My_transportation_network.doc) Digital or print timetables |
| **M1.1: Time*** use units of time and their abbreviations, for example:
	+ hr, min
* calculate elapsed time, for example:
	+ getting on the train at 3.00 pm and disembarking at 3.45 pm
* recognise 24-hour time using four digits (eg 0900, 2315)
* relate 24-hour time to their equivalent am or pm times
* explore conversions between 12-hour and 24-hour times
* explore simple rates related to time, for example:
	+ speeds measured in kilometres per hour
* investigate travel times using digital technology, for example:
	+ public transport planning websites or apps  Information and communication technology capability icon
* use and interpret time to plan travel, for example:
	+ use calendars to consider travel dates Critical and creative thinking icon Personal and social capability icon
	+ identify the typical features of each season and use this to make decisions about clothing required for travel Asia and Australia’s engagement with Asia icon Difference and diversity icon
* read and interpret timetables in a range of formats and contexts, including timetables that use 24-hour time, for example:
	+ travel timetables, eg bus, train, ferry, connecting services Personal and social capability icon
* recognise how days of the week (including weekends and public holidays) affect timetables
* solve everyday problems involving time, for example:
	+ is there enough time to get to the shops and buy the groceries before they close? Critical and creative thinking icon Literacy icon Personal and social capability icon
	+ identify what time to leave home to arrive somewhere by a given time if using public transport, or calculate how long a bus trip will take Critical and creative thinking icon Personal and social capability icon
 | **When are we going and how long will it take to get there?**Students start by reviewing time-telling skills, time units and their abbreviations, and the language of time such as am, pm, morning, afternoon. Students can take practical measurements of time, for example using a stopwatch to determine how long it takes them to get to the closest bus stop.Students can practise using time units in calculations, such as determining the number of minutes between two times.Students read and interpret timetables in a range of different formats (including those that use 24-hour times if required). Consider both print timetables and digital timetables, and explore apps for their phones that are useful when travelling. They should develop an understanding of and use relevant travel terminology such as route number, interchange (train) line and so on. Students can answer a range of practical questions, for example: * how can I get from A to B using public transport?
* at what places does the 780 bus stop?
* which train stations near me have good wheelchair access?
* which ferry goes directly from Manly to Darling Harbour?
* what time does the bus leave Blacktown?
* what time does the train arrive at Sutherland?
* how long does the coach take to travel from Wauchope to Port Macquarie?
* if I have to be at an appointment at Shoalhaven District Hospital at 9.00 am, by what time will I need to leave home?
* what difference does it make if I am travelling on a public holiday?
* how will I know if there are going to be interruptions to services on the day I am travelling?

Ideally, students will use timetables for routes and areas they are likely to use (independently or with others) and use this to apply the answers to their personal situation.  | Clocks (digital and analog)CalendarsStopwatches or other timing devicesA range of timetables; print and digital. *Transport NSW*[www.transportnsw.info](http://www.transportnsw.info) Access to useful apps; see <http://www.transportnsw.info/apps> for ideas |
| **M1.1: Time*** explore simple rates related to time, for example:
	+ speeds measured in kilometres per hour
* investigate travel times using digital technology, for example:
	+ public transport planning websites or apps  Information and communication technology capability icon

**M1.5: Energy**Students:* identify units of energy commonly used in relation to human or household energy and their abbreviations, for example:
	+ kilojoules, calories, kilowatts Literacy icon
* recognise that kilojoules are used to describe the amount of energy gained when consuming food or drink Literacy icon Personal and social capability icon
* recognise that energy is expended during physical activity Literacy icon Personal and social capability icon

**P1.2: Maps*** develop skills in using maps, for example:
	+ read distances directly from the map or from a related table of distances
	+ use scale to determine distances between places
	+ give and follow directions using a map Literacy icon
 | **How far are we going?**Students can calculate distances and/or times in relation to walking/cycling, for example: * calculate distances between two places by measuring (with a trundle wheel for example), using a scale on a map or reading distances from a map or network diagram and adding them up
* calculate walking or cycling speeds, either by being given or by measuring time and distance and then using speed = distance divided by time. If appropriate, students could be introduced to the formula $S =\frac{D}{T}$
* identify that walking and cycling burn kilojoules and then calculate kilojoules burned for a particular journey (students could access freely accessible apps, websites or tables to determine journey data)
* read maps and/or scales to calculate if it is too far to walk or ride to a given place, or to estimate how long it might take.

  | Measuring devices including trundle wheelsConsider websites like *8700 Find Your Ideal Figure*<http://www.8700.com.au/balance-and-burn/kj-activity-comparison/> . This website could be used to set up personalised tables that students can then use to calculate for themselvesA range of maps, print and digital |
| **F1.1: Decimals and money**Students:* add and subtract decimals correct to two decimal places using a variety of strategies, including mental, written and calculator techniques as appropriate  Information and communication technology capability icon
* estimate costs and change on purchases, for example:
* select appropriate coins and notes to tender after estimating costs
* use rounding to estimate the amount of change due, eg to the whole dollar or 50c
* recognise whether they have been given the correct change during a purchase Personal and social capability icon
* calculate change due on purchases using a range of strategies, including concrete materials, mental, written and calculator techniques as appropriate Critical and creative thinking icon Information and communication technology capability icon Work and enterprise icon
* interpret calculator displays involving decimal answers in the context of money, for example:
* understand that 0.5 means $0.50 or that a calculator answer of 4.567 cannot be recorded as $4.567  Information and communication technology capability icon

**M2.5: Measuring capacity**Students:* recognise metric units of capacity, their abbreviations and conversions between them Literacy icon
* recognise appropriate units and devices to measure capacity Critical and creative thinking icon
* recognise the concept of capacity and how it relates to volume Literacy icon
* estimate and compare capacities, for example:
* choose which of a set of 3D shapes would have the greatest capacity Critical and creative thinking icon
 | **How much will it cost to get there?**Students can calculate costs in relation to public transport, for example: * calculate fare costs from given information for a bus, train, taxi, tram or ferry
* use the *Transport NSW* website to calculate Opal card fares and calculate to determine/check the new balance of their Opal card after a journey or a top-up
* estimate and calculate costs for multi-stage journeys by adding a number of fares together
* calculate change due from a transaction paying for a fare.

Students can calculate car-related costs in relation to travelling in a car, for example: * calculate distances between two places by reading and adding/subtracting distances from a map or table
* calculate distances between two places by using the scale on a map
* calculate distance travelled by a car using before and after odometer readings
* calculate speed of travel given distance travelled and time taken using speed = distance divided by time
* calculate speed of travel by calculating distances and times from given data. If appropriate, students could be introduced to the formula $S =\frac{D}{T}$
* calculate fuel consumption given relevant data
* calculate parking fees, for example using the table of parking fees as displayed in public carparks
* calculate the sum of tolls for a given journey
* as appropriate, consider making calculations involving other car-related information such as fuel tank capacity, engine capacity, mass of vehicle. This could include activities such as ranking cars in order of increasing mass or engine capacity, or calculating how much fuel is needed to fill a petrol tank.
 | Fare information[www.opal.com.au](http://www.opal.com.au) A range of maps, print and digitalAccess to a car to see an odometer*Australian Government Green Vehicle Guide*[www.greenvehicleguide.gov.au](http://www.greenvehicleguide.gov.au)  |
|  | **Travel problem solving**Students draw together all of the skills learnt in the unit to solve travel problems, for example:* working out whether they can get to a certain place within a given time frame and budget
* determining the route and transport method that best fits a given set of criteria
* comparing costs of different journey options, for example finding the cheapest airfare. Students should also identify reasons why the cheapest option may not be the best one, for example when taking a plane the times of cheaper flights may be less desirable, or paying for desired extras, such as checked baggage or carbon offsets may cost more
* comparing the costs and benefits of different journey options, for example deciding whether it is best for them to use a car, train, coach or plane to make a longer journey between two cities by considering times, costs and convenience
* creating a travel plan for a journey taking into account a range of relevant factors, for example times and dates, costs, distances
* making a visual representation of a travel plan using a variety of methods, such as symbols, descriptions or network diagrams
* preparing and delivering a presentation on a trip they have planned. This can range from simply explaining or showing how they can get to a weekend activity, through to presenting a detailed slideshow on an interstate trip they have planned.

Students should use a range of sources, including print and digital, to investigate, plan or book trips if appropriate. There are opportunities for class outings in this unit, so that students may be able to practice skills in relation to travel in authentic contexts. By catching a bus together, for example, they could rehearse planning a journey, reading times and timetables, using money to pay a fare, timing journeys, locating landmarks on a map, mapping a journey and solving travel issues. This topic may also be useful to determine, plan or address individual travel goals for students. |  |

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| Reflection and Evaluation |