The science behind staying safe on the road

Driver safety
The science behind staying safe on the road
INTRODUCTION TO THE GUIDE

The NRMA Early Driver Total Learning Resource is designed to assist high school teachers (Years 11–12) to engage and involve their students in the physics, health and essential maths of road safety.

The resource covers learner driver limits and the science behind the regulations for learner drivers, as well as driver behaviour psychology and teenage risk. It also covers the laws relevant to P1 and P2 drivers and the science behind them, and contains information for young drivers about car safety and the reasons for car crashes.

See the NRMA website for further details and information relevant to early driver safety.

HOW TO USE THE GUIDE

The notes in this study guide offer both variety and flexibility of use for the differentiated classroom. You and your students can choose to use all or any of the five sections — although it is recommended to use them in sequence, along with all or a few of the activities within each section.

THE ‘FIVE ES’ MODEL

This guide employs the ‘Five Es’ instructional model designed by Biological Sciences Curriculum Study, an educational research group in Colorado. It has been found to be extremely effective in engaging students in learning science and technology.

It follows a constructivist or inquiry-based approach to learning, in which students build new ideas on top of the information they have acquired through previous experience.

Its components are:

**Engage**
Students are asked to make connections between past and present learning experiences and become fully engaged in the topic to be learned.

**Explore**
Students actively explore the concept or topic being taught. It is an informal process where the students should have fun manipulating ideas or equipment and discovering things about the topic.

**Explain**
This is a more formal phase where the theory behind the concept is taught. Terms are defined and explanations are given about the models and theories.

**Elaborate**
Students have the opportunity to develop a deeper understanding of sections of the topic.

**Evaluate**
Both the teacher and the students evaluate what they have learned in each section.

MESSAGE FOR TEACHERS FROM NRMA

NRMA is working to create a wide range of free education resources for schools that will include teacher and student resources, Road Safety presentations in schools delivered by NRMA staff and school/student competitions.

All information on these resources can be viewed on [www.mynrma.com.au/youngdrivers](http://www.mynrma.com.au/youngdrivers). Your help and feedback in creating and refining these new programs will be greatly appreciated, so please keep in touch.

Motoring Education Team
National Roads & Motorists’ Association

Register for an email alert: [https://www.research.net/s/HSAlert](https://www.research.net/s/HSAlert)
Email: education@mynrma.com.au
REDDUCING THE RISKS FOR YOUNG DRIVERS

Your first car and the cars that you control as a young driver may be some of the riskiest cars you operate. This section looks at why crashes occur and what you can do to prevent them.

GETTING YOUR DRIVER’S licence and first car is exciting, but comes with the responsibility for a machine that in 2013 killed 1193 people on Australian roads.

Young drivers are more likely to be involved in a crash – in fact 17–25-year-olds accounted for nearly one in five road deaths in 2013. The extra risk stems from factors related to inexperience as well as behaviours and attitudes more common in young people than in other age groups.

Young drivers take more risks, overrate their skills and are more distractible. Inexperience with driving means that in some aspects of driving, they lack the skills of older drivers. In general, they are less able to handle tricky situations on the road and more likely to lose control.

Inexperience in both driving and drinking alcohol also means young people risk more if they drive under the influence of alcohol. This is one of the reasons why there is a zero blood alcohol limit for L and P plate drivers. Before the restrictions were implemented in 2004, one third of drunk drivers in fatal crashes were aged 17–24, though they made up just one seventh of the total number of drivers. To reduce driver distraction, it’s also illegal for learner and P1 drivers in NSW to use a mobile phone in a car – whether it’s hands-free or not.

How can young drivers stay safe?

• Don’t rush. Pay attention to what’s happening on the road. Don’t drive when tired or after drinking any alcohol – and don’t use your mobile phone.
• Make the most of opportunities to improve your driving, like the free keys2drive scheme and Safer Drivers courses.
• Comply with the law, including restrictions on your licence type.
• Get informed with reliable online resources like the NSW government’s GEARED site and the NRMA’s breakdown safety tips.
• Choose a safer car, by using the ANCAP safety ratings, researching crash test scores (and even watching the tests) on the NRMA website.

*see page 4 for web links

Buying a car? Do the maths.

Buying your first car will likely be the biggest and most complicated purchase of your life, and there are many costs to consider when working out what you can afford. New cars are appealing options: they are less likely to break down and have better fuel efficiency, as well as amazing safety ratings. But new cars also drop in value (depreciate) – in some cases by 50% of their sale price in three years – making a ‘young’ used car much better value.

Less able to handle tricky situations on the road, young drivers are more likely to lose control of their car.

It’s important to weigh this up against the ongoing costs: used cars require more repairs (and more money) to keep them roadworthy. There’s a few things you can keep in mind when buying a used car: buying a used Australian car can make getting replacement parts more affordable than getting parts from overseas, for instance. When choosing a car, it’s essential you consider fuel consumption in your weekly budget. A new 2.3 litre Ford Mondeo will burn $46.61 of fuel per week compared to only $29.93 for a new 1.6 litre Fiesta, assuming 15,000 km of driving in one year. Motor vehicle tax also climbs with car size – in NSW a 960 kg Nissan Micra costs $195 versus $277 for a 1260 kg Pulsar.

Explore the differences in costs for over 1800 new cars with the NRMA Car Operating Cost Calculator.


If you’re borrowing money to buy your first car, do plenty of research. Use the Loan calculator to estimate how much you can afford to borrow and how much your repayments will be.
**Understanding why car crashes happen**

Two key factors make cars lethal weapons: their human drivers and the laws of physics. Human error causes around 90% of crashes. Physics determines how these heavy, fast-moving objects move and collide.

Speed is the key ingredient in crashes. A speeding car is more likely to be involved in a crash and to be in a more extreme crash than a car that isn’t going as fast. Higher speeds leave drivers less time to respond to a hazard. Reaction times of drivers are longer when they are tired, distracted or after they’ve had an alcoholic drink.

As speed increases, kinetic energy increases as a function of speed squared. All of this energy is unleashed in an impact. Newton’s first law of motion tells us when a car stops suddenly, passengers not wearing seatbelts will be thrown forward at the same speed – making belting up crucial for safety.

When two cars travelling at the same speed crash head-on, Newton’s laws of motion tell us that the bigger car will fare better than the smaller car. This is because it has a bigger mass and the acceleration in the smaller car will be greater – imagine a Mini bouncing off a Hummer. Older cars are also off worse as their safety features are less effective than in a new car.

– Jude Dineley

**The car in front crashes.**

You are travelling at 70 km/h and have left a 30-metre gap.

**Q:** Can you avoid hitting them?

**A:** Probably not – it typically takes 1.5–3 seconds to react and hit the brakes, before you even slow down. By then, you will have travelled 29–58 metres.

**A TIMELINE OF VEHICLE SAFETY**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959</td>
<td>Crumple zones are first used, in a Mercedes Benz. Volvo is first to make three-point lap-sash belts standard in new cars.</td>
</tr>
<tr>
<td>1970</td>
<td>Victoria is the first state in the world to make seatbelts compulsory.</td>
</tr>
<tr>
<td>1993</td>
<td>Holden are first in Australia to install air bags in cars. ANCAP starts to crash test cars and publish the results for car buyers.</td>
</tr>
<tr>
<td>2012</td>
<td>Electronic Stability Control (ESC) technology becomes mandatory in new cars in Australia.</td>
</tr>
<tr>
<td>2013</td>
<td>There are 5.16 deaths per 100,000 on Australian roads, down from 30.4 in 1970.</td>
</tr>
</tbody>
</table>

**Links:**

WHAT TO DO WHEN THINGS GO WRONG

THE GREAT THING ABOUT Enzo’s job is being able to help people. Flat tyres or batteries and overheating engines are common types of problems. That’s why Enzo recommends you check your tyre pressure and have your car serviced regularly. But if things do go wrong, it’s important to know what to do.

“You’re driving, if you notice your car doing something strange, the first thing you should think about doing is turning your hazard lights on,” he says. “Move off the road and exit the car on the left-hand side. Get to the other side of the road barrier, if there is one,” he says.

“If your vehicle just stops in the middle of the road, stay inside with the hazard lights on and, most importantly, leave your seatbelt on. There are lots of cars travelling at speed who may not realise you have stopped. Your seatbelt is essential as it stops you from being ejected from your car should someone run into you.”

Enzo also has tips to prevent being in a crash. “Be courteous to other drivers – wave if they let you merge, for instance, and keep a safe distance from the car in front of you. For safety, a three-second gap between you and the driver in front is essential. In the rain, I always leave a bit more.”

Drivng a newer car is a lot safer as they have many great safety features. Enzo recommends you research before you buy, so you know how safe the car is and how much it will cost to keep it on the road.

A professional vehicle inspection will make sure you don’t have any unexpected repairs in the future. “Sign up for NRMA Free2go and get one year of free roadside assistance if you are aged between 16 and 20-years-old – 16-year-olds get two years free,” says Enzo. (free2go.mynrma.com.au/default.htm) “You never know when you will need my help on the road.”

– Laura Boness

DISSECTING CRASH SCENES

CAR SAFETY RESEARCHER, Sam Doecke, explains how new technology and safety are closely tied.

SAM HAS EXAMINED MANY car crashes in his work. His advice to young drivers? “Buy the safest vehicle that you possibly can.”

One of the areas he has been researching is how much room people need when they lose control of their cars and skid off the road. Younger drivers are overrepresented in these ‘road departure crashes’. But safety technology, like electronic stability systems, can help prevent a loss of control in these circumstances, to a certain extent.

To get information about these kinds of crashes, Sam and the other researchers arrive early at crash scenes to collect evidence like the positions of the cars and tyre marks. They take photos and talk to witnesses before reconstructing the crash back in the lab. They also look at travel and impact speeds, and injury data.

Sam believes that purchasing decisions are important when it comes to safety, and that people need to consider safety features as well as design. Newer cars are “much safer in so many different ways,” he says. Even if you’re going for a second-hand car, he recommends finding one that’s only a few years old, as it will have most of the available safety features, like anti-lock braking systems. “We’re starting to see that consumers are demanding certain levels of safety, and that is really positive.”

– Laura Boness
1. Imagine that money and technology were not an issue. Think about the vehicle you would like to drive. What would it look like and what would it be capable of?

Draw and describe your dream vehicle here:

2. Now that you have described your dream vehicle, let’s have a go at giving it a safety check.
   • What safety features did you include to protect you as a driver?
   • What safety features did you include to protect your passengers?

3. If you did not include specific safety features, have a go at making your dream car also a safe car. Add and describe some safety features to the vehicle you drew in Question 1.
The aim of the Explore section is for students to investigate some of the dangers and safety issues around being a new driver, and for students to ponder the possible impacts of these issues on themselves and their passengers. It is intended that the students make their own discoveries as they work around the stations in the room in any order.

The table below lists the equipment and preparation required.

### Equipment and preparation table for the Explore circuit

<table>
<thead>
<tr>
<th>Station no. and activity</th>
<th>Materials list</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is your reaction time?</td>
<td>Computer for access to the website: <a href="http://www.humanbenchmark.com/tests/reactiontime">www.humanbenchmark.com/tests/reactiontime</a></td>
</tr>
<tr>
<td>2. Blood alcohol levels</td>
<td>Clean and empty bottles of alcohol including bottles (or cans) of beer, wine, alcopops, spirits</td>
</tr>
<tr>
<td>3. What causes crashes?</td>
<td>Reasons for crashes and Venn diagram – provided</td>
</tr>
<tr>
<td>4. Speeding penalties</td>
<td>Table of speeding penalties – provided</td>
</tr>
<tr>
<td>5. Mapping car speed</td>
<td>Toy cars, metre ruler, 1 m ramp with a gentle slope, stopwatch</td>
</tr>
<tr>
<td>6. Could poor perception be a problem when driving?</td>
<td>Ruler, collection of perception images – provided</td>
</tr>
<tr>
<td>7. Can you look away and still stay on task?</td>
<td>Piece of paper, pencil, stopwatch</td>
</tr>
</tbody>
</table>
**STATION 1**

**WHAT IS YOUR REACTION TIME?**

Table 1: Reaction time

<table>
<thead>
<tr>
<th>Trial number</th>
<th>Reaction time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Average:

**Table 2: Average reaction time of five classmates**

<table>
<thead>
<tr>
<th>Student name</th>
<th>Average reaction time (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Go to the website [www.humanbenchmark.com/tests/reactiontime](http://www.humanbenchmark.com/tests/reactiontime)

2. When you are ready, choose ‘Click to start’ in the blue area.

3. When the red screen turns green, click again as quickly as you can.

4. Record your reaction time in milliseconds (ms) in Table 1 at left.

5. Record all five reaction times, as well as your average, in Table 1.

6. Record the average reaction times for five other students in your class in Table 2.

7. Plot the data from Table 2 on the graph. The dependent variable (the one you are measuring) goes on the vertical axis. Label your axes (x) and (y).

**Graph title:** _______________________________
8. Why might a good reaction time be useful when driving a car? Give examples in your response.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

9. What sorts of things might affect the reaction time of a driver? Record a couple of ideas in each of the different categories in Table 3.

Table 3: Reasons that driver reaction time might be compromised

<table>
<thead>
<tr>
<th>Emotional</th>
<th>Vehicle-related</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Make a list of rules for a new driver about how to optimise their reaction time.
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
STATION 2
BLOOD ALCOHOL LEVELS

1. Watch the following video either from the New South Wales Government website or on YouTube.
   www.youtube.com/watch?v=RGA5vSaaibo

2. List reasons under the following table headings why you think drink driving is a bad idea.

<table>
<thead>
<tr>
<th>For the driver</th>
<th>For the passenger</th>
<th>For others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. What is your Plan B? Imagine you are a P plate driver, you have had an alcoholic drink and then you want to drive home. You know if you are caught by a random breath testing station, it will show you have been drinking and you will lose your licence. List your three preferred Plan B options and state why you would prefer each option.

Preference 1 Plan B option and why:
______________________________________________________________________________________
______________________________________________________________________________________
______________________________________________________________________________________
Preference 2 Plan B option and why:
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________

Preference 3 Plan B option and why:
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________

3. Imagine the designated person driving you home is a P plate driver. They have had an alcoholic drink and then they want to drive you home. Suggest how you could convince them of a Plan B instead. Write a short dialogue you could use to convince them that drinking and driving is not a good idea. Use ideas from the video in Question 1 in your response.
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
_______________________________________________________________________________________
STATION 3
WHAT CAUSES CRASHES?

1. Think about some of the reasons car crashes might happen and list them here.

_____________________________________________________________________________________
_____________________________________________________________________________________

2. The following reasons have all been identified as causes of crashes. Match the reasons (A–P) with the factors (1–3) on the three-way Venn diagram below. Write the letters in the appropriate place on the diagram.

A pet loose in the car
B driver not wearing prescription glasses
C rain
D impatient driver overtaking on a bend
E speeding
F arguing while driving
G dirty windows and mirrors
H running a red light
I tailgating on a freeway
J driver slept only two hours the previous night
K using a mobile phone on a winding road
L bald tyres on a wet day
M driving home after having several alcoholic drinks at a party and missing the roadworks sign to slow down
N driving with one hand on the wheel
O passengers daring driver to overtake a truck on a double line
P driving after breaking up with partner

Source: NRMA – ACT Road Safety Trust Annual Report 2011/2012
3. If a crash has multiple causes, what impact do you think that might have on both the severity of the crash and the chance that the crash occurred in the first place?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

4. Which reasons for having a crash can the driver take responsibility for in order to reduce the chance of having a crash in the future? Tick the reason from the list (A–P) in Question 2 if you think the driver could do something about it. List the letters here.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

5. Choose one of the reasons that was not in the ‘driver factors’ part of the Venn diagram in Question 2 and suggest what the driver could have done to reduce the risk of causing a crash.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
STATION 4
SPEEDING PENALTIES

1. Examine the following table, which shows examples of penalties imposed on Class C drivers caught speeding in a 60 km/h zone in NSW as of 1 July 2014.

<table>
<thead>
<tr>
<th>Speed driver was travelling (km/h)</th>
<th>Penalty for speeding</th>
</tr>
</thead>
</table>
| Less than 10 km/h over the speed limit | L or P plate driver: $327 fine and four demerit points  
                                        | Full licence driver: $327 fine and one demerit point |
| More than 10 km/h over the speed limit | L or P plate driver: $336 fine and four demerit points  
                                        | Full licence driver: $336 fine and three demerit points |
| More than 20 km/h over the speed limit | All drivers: $545 fine and four demerit points |
| More than 30 km/h over the speed limit | All drivers: $1,308 fine and five demerit points |
| More than 45 km/h over the speed limit | All drivers: $3,414 fine and six demerit points |


2. Do you think the penalties in table are appropriate? Do you think they are too harsh or too lenient? Why?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

3. Do you think that repeat offenders need more severe or ever increasing penalties? Why/Why not?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
4. Read the following media extracts of drivers not driving at the correct speed. Imaging you are a judge handing down their sentence. Use the information in the table on page 14 to deliver what you think is an appropriate sentence to the driver.

<table>
<thead>
<tr>
<th>Description of driver</th>
<th>Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last March, a 17-year-old took his mother’s car on a high-speed 20 km joy ride. The car was driven along a country road, some of the time on the wrong side of the road. The car’s speed was clocked at 75 km in a 60 km/h zone. Police turned up and gave chase after another motorist had reported erratic driving.</td>
<td></td>
</tr>
<tr>
<td>A man in his late 50s caused a commotion at a beachside resort last weekend by refusing to acknowledge he had been driving 62 km/h in a 60 km/h zone. He verbally abused police and said he wouldn’t be paying any fine imposed, as 2 km/h over the limit was insignificant.</td>
<td></td>
</tr>
<tr>
<td>A mother of three was rushing her youngest child to the hospital at 3 a.m. when she was caught by speed cameras driving 95 km/h in a 60 km/h zone. She was extremely apologetic to police but said that seeing as there were no other cars on the road at the time she didn’t see any harm in prioritising the needs of her sick child by getting him to hospital as quickly as she could. The police reported that the child was not in a life-threatening condition.</td>
<td></td>
</tr>
<tr>
<td>A driver was pulled over by police yesterday for driving her car at 30 km/h in a 60 km/h speed zone. The police followed the woman for a distance of more than 2 km before they stopped to question her.</td>
<td></td>
</tr>
</tbody>
</table>
STATION 5

AVERAGE SPEED TO SCHOOL

1. In preparation for this activity, you will need to record the exact distance from your home to school. If you travel by car, set the odometer to zero before you leave home, and note the time. When you arrive at school, write down the odometer number and the time, and calculate the number of kilometres (km) and the time it took (hr). Record your results in the table. If you travel to school by bus, use a free mileage app to calculate the distance. www.itunes.apple.com/us/app/triplog-gps-mileage-log-tracker/id585918522?ls=1&mt=8

2. Collect data from four other classmates and record it in the table. Calculate the average distance, time and speed.

<table>
<thead>
<tr>
<th>Student name</th>
<th>Distance (km)</th>
<th>Time (hr)</th>
<th>Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(speed = distance ÷ time)</td>
</tr>
</tbody>
</table>

Averages:

3. Who arrived to school in the shortest amount of time? ________________

4. Who travelled the fastest speed to school? ________________

5. Who travelled the greatest distance to school? ________________

6. Suggest reasons why a car’s speed might vary over the distance covered to school.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

7. Who do you think would spend the most money driving to school? Give reasons for your choice.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
STATION 6
COULD POOR PERCEPTION BE A PROBLEM WHILE DRIVING?

Image 1: What do you see?

1. What do you see in the image above?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

2. Can you see the two images at the same time? Why do you think this is possible?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
3. By simply looking at the lines, which one do you think is the longest, A or B?
_____________________________________________________________________________________
_____________________________________________________________________________________

4. Measure the two lines with a ruler. Which of the two lines is the longest?
_____________________________________________________________________________________
_____________________________________________________________________________________

5. Why do you think this perception trick works?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

6. What role do you think perception plays when driving? Can you think of an example where a driver’s perception of a situation might affect their safety? Explain your thinking.
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_____________________________________________________________________________________
_____________________________________________________________________________________
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_____________________________________________________________________________________

**STATION 7**

**CAN YOU LOOK AWAY AND STILL STAY ON TASK?**

All too often, drivers take their eyes off the road to attend to a task in the car, such as taking sunglasses out of a bag, selecting a song to play, or looking at a passenger. How easy is it to stay focused on the task of driving when you are not looking at what you are supposed to?

**What you need:**

- piece of A4 paper
- pen or pencil
- stopwatch

**What to do:**

1. Work in pairs.
2. Draw a single line track that zigzags and loops from one corner of the paper to the diagonally opposite corner.
3. Trace your finger along the line. Make sure the track is long enough that it takes about 20 seconds to complete at a slow pace.
4. Estimate how many seconds you can each look away from the line and keep your finger on it.
5. Person 1 traces their finger along the line and looks away for an increasing number of seconds – timed by Person 2.
6. Person 2 records the maximum number of seconds Person 1 can look away and keep their finger on the line.
7. Swap roles and repeat Steps 5 and 6.

**Results:**

<table>
<thead>
<tr>
<th>Person</th>
<th>Prediction</th>
<th>Experimental result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>How many seconds do you think you can look away from the line and still keep your finger on the line?</em></td>
<td><em>Actual number of seconds you can look away and keep your finger on the line.</em></td>
</tr>
</tbody>
</table>
DISCUSSION QUESTIONS

1. When might a driver be tempted to look away while driving a car? How many of these reasons are necessary?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

2. Is it ever safe to look away while driving, even when stopped at the traffic lights? Why/Why not?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

3. How can a driver reduce the amount of time they spend taking their eyes off the road when driving their car?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________


   Instructions:
   a) Click on the number to change lane.
   b) Try reading and responding to the text message on the phone while continuing to drive through the lanes.
1. Examine the following map. Imagine you have just earned your P plate driver’s licence and you have to drive from Point A (Bondi Beach) to Point B (Sydney Park).

2. On the map, draw two possible routes from Point A to Point B. Label the different routes ‘1’ and ‘2’.

3. Imagine that you have no time to waste so you need to take the shortest route (assuming that traffic is flowing well for both routes!). Estimate which route will be the shortest.

4. Use the ruler to measure the distance of each route and enter the information in Table 1.

### Table 1: Distances of each route from Bondi Beach to Sydney

<table>
<thead>
<tr>
<th>Route</th>
<th>Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
5. If both journeys took 37 minutes each, what would the average speed of each journey be? Use the headings in Table 2 to help you with the calculation.

Table 2: Calculating the speed for each route

<table>
<thead>
<tr>
<th>Route</th>
<th>Distance (km)</th>
<th>Time (min)</th>
<th>Speed (km/h) D/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>37</td>
<td></td>
</tr>
</tbody>
</table>

6. The average speed for each journey varies during the day depending on how heavy the traffic is. Look at the information already entered in Table 3 below and calculate the time it would take to drive from Bondi Beach to Sydney Park for each route travelling at different speeds at different times of the day.

Table 3: Calculating the time for each route at different times of the day

<table>
<thead>
<tr>
<th>Route</th>
<th>Time of day</th>
<th>Speed (km/h)</th>
<th>Distance (km)</th>
<th>T (minutes) = D/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8:30 a.m.</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1:30 p.m.</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5:30 p.m.</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8:30 a.m.</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1:30 p.m.</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>5:30 p.m.</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Which route took the longest time? _________________________
8. Use the information in Table 3 to calculate the average time it takes to drive from Point A (Bondi Beach) to Point B (Sydney Park) for each route.

<table>
<thead>
<tr>
<th>Route</th>
<th>Average time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

9. Write a summarising sentence or two to explain why it is a good idea to plan your journey before you start. Give examples related to how a person’s driving might be affected if they are running late due to underestimating the time or distance to their destination, or if they get lost along the way.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
TEACHER’S NOTES

In this section, we discuss and analyse the statistics behind L and P plate driving, and consider what new drivers need to do to improve their safety on the road.

Three articles are provided for students to read. Each article is accompanied by a range of literacy activities including:

- Brainstorming
- Glossary
- Comprehension and summary
- Questioning toolkit

The three articles are:

Article 1 – Car crashes: lowering your risk
An article highlighting the many ways that new drivers can maximise their safety, and the safety of others, on the road.

Article 2 – Letter to a younger me
A letter from an experienced driver to their inexperienced younger self, highlighting some of the mistakes they made along the way to becoming an experienced driver.

Article 3 – Licence restrictions
An article about some of the special conditions for P and L plate drivers, as well as hints and tips with informative links for guidance on topics such as speed, vehicle types and mobile phone use.
You can reduce your risk of collision by following these top tips. Sarah Keenihan reports

YOU’VE GOT YOUR DRIVER’S licence – congratulations! Let’s keep the momentum going and talk through some simple ways to ensure you remain safe on the road.

Risks and rewards
For all the benefits that driving a car can bring to our lives – freedom, flexibility and fun – the truth is that driving a car is dangerous. In Australia, every day an average of four people are killed and 90 are seriously injured in vehicle collisions (around three classrooms full of people). Drivers aged 17–25 years have a particularly high car crash death rate. This is due to a number of factors, including the kinds of cars young people drive, inexperiene on the road, poor situational judgment and distractions.

Your first car purchase – prepare
Research shows that the kinds of cars most young people drive are older and/or smaller than average and don’t protect in a crash situation as well as new cars. Older vehicles have been shown from crash records to be less safe on average than newer vehicles, due to fewer safety features and less sophisticated design.

If you want to buy a car, you need to do some research. All cars sold in Australia are given a safety rating between one and five, as shown in the Australasian New Car Assessment Program (ANCAP) www.ancap.com.au/results?Search=1 and the Used Car Safety Ratings (UCSR) report www.mynrma.com.au/motoring-services/reviews/safety.htm. You can use these lists to check the model and year of cars you’re interested in to compare their safety ratings. Always choose a vehicle with one or more of these safety features fitted: Autonomous Emergency Braking (AEB), Lane departure warning, Blind spot warning, Electronic stability control (ESC), Traction Control, Anti-lock Brake System (ABS), Brake Assist. These are effective in avoiding collisions and in making vehicles more resistant to the forces of impact during a crash.

Safety is about behaviour
Being a safe driver is strongly influenced by attitude and behaviour. It involves thinking about how to best apply your body and brain to the task of driving. This is because driving successfully is not just a matter of travelling in a straight line. You must be able to control the speed and direction of your car. You also need to be aware and monitor the positions of stationary and moving objects around you, and be able to judge and react safely to sudden changes in your environment. The safest way to drive is to have an alert mind so your senses can constantly assess what is going on around you. Driving when tired, or under the influence of drugs or alcohol, will reduce your ability to remain in control, to be aware, to make good judgments and react to sudden changes. Distractions such as texting and talking on mobile phones, and use of other technology such as GPS, increase your risk of having a crash. Chatting to passengers or eating can also interrupt your concentration.

Experience matters
You already know that when you play sport or hammer out tunes on a piano, the more you practise, the better you get. This is also true when it comes to driving. More experience – that is, the total amount of time you’ve actually been on the road, managing your way through traffic – will make you a safer driver. Right now, your limited experience as a younger driver places you at higher risk of having a collision. Driving with this fact in mind will help you manage crash risk.

Review the road rules
You may have recently passed an L or P plate driver test, but a little revision every now and again is a good idea. Go here for a list of the top ten most misunderstood road rules: www.mynrma.com.au/media/Top_10_misunderstood_road_rules.pdf. Included are tips on roundabouts, U-turns and safe following distances. – Sarah Keenihan
ACTIVITY 1
BRAINSTORMING

1. Do you drive? YES / NO
2. Are you ever a passenger of a young driver? YES / NO

If you answered YES to either of the questions above, it’s worth knowing that statistically, drivers aged 21 and under are three times as likely to be involved in a crash than drivers over age 21.

3. The following factors listed in the table are specifically related to why young people are over-represented in injury and fatal crashes. Next to each reason, from your life experience, share your ideas about how these factors could create a less than safe driving experience.

<table>
<thead>
<tr>
<th></th>
<th>Reason</th>
<th>Why this increases the risk on the road</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Kinds of cars</em> (e.g. smaller/older cars)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Speed</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td><em>Alcohol or drugs</em></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><em>Failure to wear a seatbelt</em></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><em>Distractions</em></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td><em>Fatigue</em></td>
<td></td>
</tr>
</tbody>
</table>

4. Are any of the reasons you listed preventable? Compare your list to another student’s and discuss your ideas for preventing crashes.
ACTIVITY 2
GLOSSARY

Create a glossary. Use the table to define any science words that are related to this article.

Glossary of terms

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>momentum</td>
<td></td>
</tr>
<tr>
<td>ANCAP</td>
<td></td>
</tr>
<tr>
<td>safety rating</td>
<td></td>
</tr>
<tr>
<td>UCSR</td>
<td></td>
</tr>
<tr>
<td>AEB</td>
<td></td>
</tr>
<tr>
<td>ESC</td>
<td></td>
</tr>
<tr>
<td>ABS</td>
<td></td>
</tr>
<tr>
<td>behaviour</td>
<td></td>
</tr>
<tr>
<td>influence</td>
<td></td>
</tr>
<tr>
<td>concentration</td>
<td></td>
</tr>
<tr>
<td>distraction</td>
<td></td>
</tr>
<tr>
<td>senses</td>
<td></td>
</tr>
<tr>
<td>drug</td>
<td></td>
</tr>
<tr>
<td>alcohol</td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 3
SUMMARISING

Summarise the information in Article 1 by responding to the following questions:

1. In Australia, on average how many people are killed or seriously injured each day in vehicle collisions? __________

2. What can drivers do to ascertain the safety of a car they are buying or borrowing?
____________________________________________________________________________________
____________________________________________________________________________________

3. Being alert is the safest way to drive. What influences can physically reduce a driver’s ability to be alert?
____________________________________________________________________________________
____________________________________________________________________________________

4. List the distractions that interrupt concentration and increase the risk of having a crash.
____________________________________________________________________________________
____________________________________________________________________________________

5. According to the article, what will make you a safer driver?
____________________________________________________________________________________
____________________________________________________________________________________

6. What type of car do you, your siblings, cousins or parents drive? List two models of car in the table below.
____________________________________________________________________________________
____________________________________________________________________________________


<table>
<thead>
<tr>
<th>Model</th>
<th>Safety rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Activity 4

## Questioning Toolkit

We have provided a series of discussion questions in the form of a Questioning Toolkit. Choose some or all of the questions, or ask some of your own. Write your ideas and opinions relating to each of the different types of questions.

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Your ideas and opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Essential questions</strong></td>
<td></td>
</tr>
<tr>
<td>These are the most important and central questions. They probe the deepest issues that confront us and can be difficult to answer.</td>
<td></td>
</tr>
<tr>
<td><strong>Question:</strong></td>
<td></td>
</tr>
<tr>
<td>Why is a younger drivers more at risk of having a car crash than an older, more experienced driver?</td>
<td></td>
</tr>
<tr>
<td><strong>Sorting and sifting questions</strong></td>
<td></td>
</tr>
<tr>
<td>These questions help us to manage our information by finding the most relevant details.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Which risks are specific to young drivers?</td>
<td></td>
</tr>
<tr>
<td>Which risks can be avoided?</td>
<td></td>
</tr>
<tr>
<td>How might it be possible to reduce the number of car crashes young drivers have?</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothetical questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions designed to explore the possibilities, the ‘what ifs?’ They are useful when we want to test our hunches.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>What if there was only one approved car for drivers aged under 25 that has a high safety rating, one seat and is speed restricted to 80 km/h?</td>
<td></td>
</tr>
<tr>
<td>What if it was a legal requirement for young drivers to be continuously filmed and monitored while driving?</td>
<td></td>
</tr>
<tr>
<td><strong>Provocative questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions to challenge convention.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Should L and P plate drivers only be allowed to drive cars with the highest safety rating?</td>
<td></td>
</tr>
<tr>
<td>Do you think that drivers in ‘safer’ vehicles take more risks, such as braking later?</td>
<td></td>
</tr>
<tr>
<td>Do you think young drivers realise that they are more at risk of a car crash than other drivers?</td>
<td></td>
</tr>
</tbody>
</table>

Imagine you were a much older and more experienced driver. What advice would you want to give to your 16-year-old self as you start out on your driving journey? Jane Lewis tells her younger self her story.

Dear me,

I could save you so much money and so much stress if only I could go back in time and tell you about the worst mistakes I ever made as a driver.

First, there was that time I drove up the back of that Mercedes. It was raining and I was frustrated my travel was taking so long. I got bored and started checking phone messages. (Bad I know.) I guess we were going so slowly, I thought I could take my eyes of the road for a second. That’s when it happened – the Merc stopped and I kept going. It wouldn’t have been so bad, except I hadn’t renewed my car insurance. Ouch. That was an expensive mistake. Mercedes bumper bars are not cheap.

The second thing was the cat. If I hadn’t been speeding, it probably would have made it across the road. But I was running late to meet a friend. It was also raining and dark. I floored it to get down the hill, and this white cat appeared out of nowhere! I slammed on the brakes but it was too late. It was dead. I carried it to the nearest house and laid it on the lawn. I felt terrible. It was a beautiful cat.

The last one is the very worst of all – I hit an old man. A pedestrian. He was trying to cross three lanes of traffic. I was in the furthest lane, and he started shuffling across, head down. I didn’t think he was going to keep going all the way, but he did. By the time I realised, I couldn’t stop. I swerved, but I hit him with my side mirror. I found him lying on the road with his hand bleeding. He insisted he was all right but I helped him to a cafe anyway. The owner said she’d look after him, so I went to work. Later, I found out I’d been reported for a ‘hit and run’. Turns out I was supposed to have gone straight to the police. OMG, that was a stressful day.

I could also tell you about my first car and what a death trap it was (I bought it because it looked great!), but I’m out of time!

Good luck with your driving.
Me x

PS: Everything I’ve told you here is true.
**ACTIVITY 1**  
**BRAINSTORMING**

Brainstorm some common mistakes that drivers make that cause problems on the road. Write five mistakes in the table below. Then complete the table with possible consequences and what could be done to avoid each mistake. An example is given to help you get started.

<table>
<thead>
<tr>
<th>Mistake</th>
<th>Possible consequences</th>
<th>Ways to avoid this mistake</th>
</tr>
</thead>
<tbody>
<tr>
<td>racing a red light</td>
<td>hitting a pedestrian, cyclist or another driver</td>
<td>Slow down at the lights and stop if they turn orange.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 2
SUMMARISING

Answer the following questions relating to Article 2.

1. The writer talks about three incidents in her letter. For each incident, identify all the things the driver did that contributed to causing the incident. (These may include driver’s attitude as well as behaviours.)

Incident 1: ____________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

Incident 2: ____________________________________________________________________________
_____________________________________________________________________________________

Incident 3: ____________________________________________________________________________

2. By law all cars must be registered.
   a) What is the difference between car registration and car insurance?

_____________________________________________________________________________________
_____________________________________________________________________________________

b) What does CTP stand for in ‘CTP green slip’, and what does this insurance cover?

_____________________________________________________________________________________
_____________________________________________________________________________________

   c) What happens if you don’t have car registration and you have a crash?

_____________________________________________________________________________________
_____________________________________________________________________________________

3. There are certain times when a driver needs to pay particular close attention to the road in front of them.
   a) Which such conditions are mentioned in the letter?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________
b) Are there any other conditions you can think of when a driver needs to pay particularly close attention to the road in front of them?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

c) Are there any situations you can think of that might make it difficult for a driver to concentrate fully on the road, even when they know they should?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

5. Road crashes can have a range of impacts on the people involved. Take the example of a driver hitting a pedestrian.

a) What are all the ways that the driver at fault might be affected by such an accident? (Think about possible legal, financial, physical, emotional and other implications.)

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

b) What are all the ways that the pedestrian might be affected?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

c) Who else might be impacted by such an accident, and how might it affect them?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

# Activity 3

## Questioning Toolkit

We have provided a series of discussion questions in the form of a Questioning Toolkit. Choose some or all of the questions, or ask some of your own. Write your ideas and opinions relating to each of the different types of questions.

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<td></td>
</tr>
<tr>
<td><strong>Question:</strong></td>
<td></td>
</tr>
<tr>
<td>What sort of mistakes do drivers make when they are driving? What factors are commonly involved in crashes?</td>
<td></td>
</tr>
<tr>
<td><strong>Sorting and sifting questions</strong></td>
<td></td>
</tr>
<tr>
<td>These questions help us to manage our information by finding the most relevant details.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Why do drivers make mistakes? What can help a driver make fewer mistakes, or less serious ones?</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothetical questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions designed to explore the possibilities, the ‘what ifs?’ They are useful when we want to test our hunches.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>What if drivers had to be older to get a licence? What if drivers had to get more driving experience before being allowed to drive on their own?</td>
<td></td>
</tr>
<tr>
<td><strong>Provocative questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions to challenge convention.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Once a driver has made a mistake, should they be allowed to keep driving, or should they have their licence taken away?</td>
<td></td>
</tr>
</tbody>
</table>

LICENCE RESTRICTIONS

Special licence conditions apply for learner drivers within NSW. The conditions and restrictions that apply to learner or provisional licence holders do not change when they travel outside NSW. Here are some hints and tips to get you started.

**IT IS IMPORTANT THAT YOU ARE AWARE OF YOUR DRIVING RESTRICTIONS SO YOU DON’T GET FINED OR LOSE YOUR LICENCE.**

**Watch your speed**
- Learner and provisional P1 and P2 drivers must not drive faster than 90 km/h
- A driver doing 65 km/h in a 60 km/h zone doubles their risk of crashing; doing 75 km/h in a 60 km/h zone increases the risk of crashing by 11 times
- Learner and P1 and P2 drivers penalised for speeding (four demerit points) will lose their licence for at least three months

**Avoid mobile phones**
Learner and P1 licence holders must not use any function of a mobile phone while driving or while the vehicle’s ignition is switched on. This includes phones in the hands-free mode, with the loud speaker operating or sending text messages. The law encourages young drivers to concentrate on developing their vehicle control and hazard-perception skills. Studies have found that using a mobile phone while driving is dangerous as it slows reaction times and interferes with a driver’s perception skills and increases the chance of having a crash.

Once you have a full licence, you will need to understand mobile phone laws. For more information visit: roadsafty.transport.nsw.gov.au/stayingsafe/mobilephones/index.html

**Zero blood alcohol**
NSW has three blood alcohol concentration (BAC) limits: zero, under 0.02 and under 0.05. Your BAC measures the amount of alcohol you have in your system in grams of alcohol per 100 millilitres of blood. All learner and provisional drivers must have a zero blood alcohol limit – completely alcohol-free while driving. This doesn’t stop you from having fun, it just means you can’t drive or ride after drinking any alcohol. And remember – If you drink alcohol on a big night out, you may still be over the zero limit the next day. Also remember to check product labels for alcohol content. Some medicines, mouthwashes and food may contain alcohol. You should check labels for alcohol content (sometimes called ethanol). All products containing alcohol can affect your BAC so if you are going to drive, avoid these products.

**Fatigue**
Being awake for 17 hours has a similar effect on performance as a blood alcohol content of 0.05 – drivers in these conditions are twice as likely to have a crash. For more information on driver fatigue visit: www.rms.nsw.gov.au/geared/your_driving_skills/staying_safe/test_your_tired_eyes.html

**Seatbelts**
Learner, P1 and P2 drivers can only drive a vehicle that has a seatbelt fitted to the driver’s seat. You cannot carry more passengers than there are passenger seatbelts fitted to the vehicle, and all occupants must wear the seatbelts correctly when travelling.

**Vehicle types**
There are restrictions on the types of vehicles you are permitted to drive. For more information about banned cars and approved vehicles visit: www.rms.nsw.gov.au/geared/your_car/buying/p1_p2_prohibited_vehicles.html.

For more information on licence conditions, including information on passenger limits, towing and automatic vehicles, visit: www.roadsafety.transport.nsw.gov.au/stayingsafe/drivers/youngdrivers/licenceconditions.html

For more information and a summary of the major restrictions for each licence type visit: www.nrmasaferdriving.com.au/licence-restrictions.htm

**Sources:**
www.drinkwise.org.au/drinking-and-you/is-there-such-a-thing-as-safe-drink-driving/#
ACTIVITY 1
BRAINSTORMING

Before reading the article, find out what you already know and think about the road rules of Australia by taking this quick quiz. Some of the statements about the law are true, and some have been made up. For each question answer True (T) or False (F), then give your thoughts on the statement. Should it be a law? Does it improve driver safety? Can you think of an improved or alternative law?

1. NSW P1 licenced drivers are restricted to driving under 90 km/h.  
   T / F
   Thoughts: _____________________________________________________________
   ______________________________________________________________________

2. Someone from NSW on a P1 licence can drive a porsche.  
   T / F
   Thoughts: _____________________________________________________________
   ______________________________________________________________________

3. In NSW, young drivers cannot drive if they have had only one alcoholic drink and have a blood alcohol level under 0.02.  
   T / F
   Thoughts: _____________________________________________________________
   ______________________________________________________________________

4. Restrictions to drivers in NSW do not apply once they have crossed a state border into another state or territory of Australia.  
   T / F
   Thoughts: _____________________________________________________________
   ______________________________________________________________________

5. Provisional licence holders in the NSW can use a mobile phone as long as it is secured in a fixed mounting.  
   T / F
   Thoughts: _____________________________________________________________
   _____________________________________________________________________
**ACTIVITY 2**

**GLOSSARY**

Create a glossary. Use the table to define any science words that are related to this article.

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAC</td>
<td></td>
</tr>
<tr>
<td>ethanol</td>
<td></td>
</tr>
<tr>
<td>fatigue</td>
<td></td>
</tr>
</tbody>
</table>
ACTIVITY 3
SUMMARISING

Summarise the key points in Article 3 by responding to the following questions.

1. Write a couple of sentences or make a drawing to summarise the information in the article.

2. Use the information in the article and/or the information from this website to explain the difference in restrictions for L and P plate and full licence drivers: [www.nrmasaferdriving.com.au/licence-restrictions.html](http://www.nrmasaferdriving.com.au/licence-restrictions.html)

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
3. What cars are you allowed to drive as a P or L plate driver? Go to the following website and type in different models of cars that you know. Identify two models of cars that P and L plate drivers are banned from driving: www.roadsafety.transport.nsw.gov.au/stayingsafe/drivers/youngdrivers/vehicle-restrictions.html

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

4. Why are P and L plate drivers banned from driving the cars mentioned in Question 3?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

5. Identify two other restrictions mentioned in the website that are not mentioned in Article 3, e.g. restrictions on the number of passengers or to the use of trailers.

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
**ACTIVITY 4**

**QUESTIONING TOOLKIT**

We have provided a series of discussion questions in the form of a Questioning Toolkit. Choose some or all of the questions, or ask some of your own. Write your ideas and opinions relating to each of the different types of questions.

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Your ideas and opinions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Essential questions</strong></td>
<td></td>
</tr>
<tr>
<td>These are the most important and central questions. They probe the deepest issues that confront us and can be difficult to answer.</td>
<td></td>
</tr>
<tr>
<td><strong>Question:</strong></td>
<td></td>
</tr>
<tr>
<td>Why do we have road rules?</td>
<td></td>
</tr>
<tr>
<td>Why do we have different driver restrictions based on age and experience?</td>
<td></td>
</tr>
<tr>
<td>Why do young inexperienced drivers have more restrictions than other drivers?</td>
<td></td>
</tr>
<tr>
<td><strong>Sorting and sifting questions</strong></td>
<td></td>
</tr>
<tr>
<td>These questions help us to manage our information by finding the most relevant details.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Is it important to have exemptions or should all young drivers be subject to the same restrictions?</td>
<td></td>
</tr>
<tr>
<td>Should road rules be the same across the whole of Australia?</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothetical questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions designed to explore the possibilities, the ‘what ifs?’ They are useful when we want to test our hunches.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>What if there were no road rules, would you want to use the road?</td>
<td></td>
</tr>
<tr>
<td>What if there were no punishments for breaking road rules, would people still obey them?</td>
<td></td>
</tr>
<tr>
<td><strong>Provocative questions</strong></td>
<td></td>
</tr>
<tr>
<td>Questions to challenge convention.</td>
<td></td>
</tr>
<tr>
<td><strong>Questions:</strong></td>
<td></td>
</tr>
<tr>
<td>Is it really an age thing? Should older P plate drivers be subject to the same restrictions as younger P plate drivers?</td>
<td></td>
</tr>
<tr>
<td>Is it the role of the police to enforce road rules?</td>
<td></td>
</tr>
<tr>
<td>Why do the road rules and driver restrictions keep changing?</td>
<td></td>
</tr>
</tbody>
</table>

ABOUT THE REFRACTION SCIENCE MATRIX

What is the Refraction Science Matrix?
A learning matrix, such as the Refraction Science Matrix, is a flexible classroom tool designed to meet the needs of a variety of different learning styles across different levels of capabilities. Students learn in many different ways – some are suited to hands-on activities, others are strong visual learners, some enjoy intellectually challenging, independent, hands-off activities, while others need more guidance. The matrix provides a smorgasbord of science learning activities from which teachers and/or students can choose.

Can I use the Matrix for 1 or 2 lessons, or for a whole unit of study?
Either! The Matrix is designed to be time flexible as well educationally flexible. A time frame for each activity is suggested on the Matrix. Choose to complete one activity, or as many as you like.

Is there room for student negotiation?
Yes! Students can be given a copy of the Matrix and choose their own activities, or design their own activities in consultation with their teacher.

Can I use the Matrix for a class assessment?
Yes! You can set up a points system – perhaps one lesson equals 1 point. Students can be given a number of points to complete. If they choose less demanding activities, they will have to complete more of them.

What do the row headings mean?

<table>
<thead>
<tr>
<th>Row heading</th>
<th>Description of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific procedure</td>
<td>Hands-on activities that follow scientific method. Includes experiments and surveys. Great for kinaesthetic and logical learners, as well as budding scientists.</td>
</tr>
<tr>
<td>Science philosophy</td>
<td>Thinking about science and its role in society. Includes discussion of ethical issues, debates and hypothetical situations. An important part of science in the 21st century.</td>
</tr>
<tr>
<td>Being creative with science</td>
<td>For all those imaginative students with a creative flair. Great for visual and musical learners and those who like to be innovative with the written word.</td>
</tr>
<tr>
<td>Science time travel</td>
<td>Here we consider scientific and technological development as a linear process by looking back in time or travelling creatively into the future.</td>
</tr>
<tr>
<td>‘Me’ the scientist</td>
<td>Personalising the science experience in order to engage students more deeply.</td>
</tr>
<tr>
<td>Communicating with graphics</td>
<td>Using images to communicate complex science ideas.</td>
</tr>
<tr>
<td>ICT</td>
<td>Exploring the topic using computers and the Internet.</td>
</tr>
</tbody>
</table>

What do the column headings mean?

<table>
<thead>
<tr>
<th>1. Read and revise</th>
<th>2. Read and relate</th>
<th>3. Read and review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designed to enhance student comprehension of information.</td>
<td>Gives the student the opportunity to apply or transfer their learning into a unique format.</td>
<td>Requires the more challenging tasks of analysing and/or assessing information to create and express new ideas and opinions.</td>
</tr>
<tr>
<td>Activity</td>
<td>1. Read and revise</td>
<td>2. Read and relate</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Scientific procedure – PDHPE, Maths and Physics</strong></td>
<td>How good are you at judging distance? To find out, see Activity 1.</td>
<td>Collect some data on driver distraction by carrying out Activity 2.</td>
</tr>
<tr>
<td><strong>Science philosophy</strong></td>
<td>Should the most inexperienced drivers be driving the least safe cars? Write down your thoughts on this question before sharing your ideas with the rest of the class.</td>
<td>Do you think all of the new driving and road rules for L and P plater drivers are necessary? Choose a rule that you read about in the articles and discuss why you think it has been put in place and whether you think it is necessary. What effect do you think the rule will have on overall road safety?</td>
</tr>
<tr>
<td><strong>Being creative with science</strong></td>
<td>Create a pamphlet, website or skit to communicate to new drivers how they can improve their safety on the road.</td>
<td>Choose an old car and a new car and design an individual advert for each using the safety features as the main selling points.</td>
</tr>
<tr>
<td><strong>Science time travel</strong></td>
<td>Interview an older relative, such a parent or grandparent, about their experience as a young driver. Are there mistakes they made and regretted? How did they manage to avoid crashes? Write their stories up so they can be added to a class poster about what new drivers can learn from experienced drivers to keep themselves safe on the roads.</td>
<td>Choose a couple of safety features of a family car, such as seatbelts, airbags, tyres, or others of your choice, and use secondary research sources to create a timeline of the development and addition of these features into cars.</td>
</tr>
<tr>
<td><strong>‘Me’ the scientist</strong></td>
<td>You are a psychologist working with young drivers to help them resist the negative influence of peer pressure when they are at the wheel. Brainstorm responses to the following comments: “I dare you to overtake that truck on the double white line!” and “Can you drive me home? I know you are drunk, but I can’t get home any other way.”</td>
<td>You are a chemist studying the effects of alcohol on young drivers and need to design a workshop to teach them how to calculate their own blood alcohol content (BAC) using their body weight, number of standard drinks and time over which the alcohol is consumed. See Activity 3.</td>
</tr>
<tr>
<td><strong>Communicating with graphics</strong></td>
<td>Use NRMA data to graph and interpret crash statistics. See Activity 5.</td>
<td>Draw a series of graphics of a car on a road that could be used on a poster to show how the speed of a car changes under the following conditions: 1) The driver is using the accelerator. 2) The driver is using the brake. 3) The car is driving uphill. 4) The car is driving downhill. 5) The car is moving over a large patch of ice on the road.</td>
</tr>
</tbody>
</table>
ACTIVITY 1
JUDGING DISTANCES

Background Information:
Not everyone can judge distances with the same degree of accuracy. When driving a car it is important to know how good you are at judging distances so that you can compensate to avoid crashes if you need to, such as by timing distances and being aware of safe distances from other cars.

Aim:
To identify how accurate humans are when judging distances.

Materials:
- Measuring tape
- Masking tape
- Small cut out square of coloured paper 2cm²
- Participants
- Mirror

Method:
1. Work in small groups. One or two people from each group are the ‘experimenter(s)’ and the other people in the group are the ‘test subjects’.
2. The experimenter(s) make a clear space across the classroom floor of at least 10 m.
3. The experimenter(s) place a ‘starting’ line of masking tape on the floor at one end of the room.
4. The test subjects stand on the masking tape starting line and turn their back to the experimenter(s).
5. The experimenter(s) places a coloured square of paper several metres away from the starting line.
6. The experimenter(s) record the distances of the coloured square of paper from the starting line in the data table below at ‘Trial A’ in Table 1.
7. The test subjects turn around and estimates the distance the coloured square is away from them. Their estimations are recorded in the data table below.
8. Repeat steps 4–7 three more times in order to complete Trial B, Trial C and Trial D.
9. Repeat the whole experiment, this time estimating the distance of the coloured square of paper backwards through a rear vision mirror. Record all your results in Table 2.
Results:

Table 1 – Different distance estimates of various test subjects facing forward

<table>
<thead>
<tr>
<th>Actual distance to be estimated</th>
<th>Test subjects (names)</th>
<th>Estimated distance (cm)</th>
<th>Difference between actual and estimated distance (cm)</th>
<th>Average in difference between actual distance and distance estimation (cm)</th>
<th>Closest estimate provided (name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial A</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial B</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial C</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial D</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 – Different distance estimates of various test subjects facing backwards through a rear vision mirror

<table>
<thead>
<tr>
<th>Actual distance to be estimated</th>
<th>Test subjects (names)</th>
<th>Estimated distance (cm)</th>
<th>Difference between actual and estimated distance (cm)</th>
<th>Average in difference between actual distance and distance estimation (cm)</th>
<th>Closest estimate provided (name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial A</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial B</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial C</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trial D</td>
<td>1.</td>
<td>1.</td>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>2.</td>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>3.</td>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion:

1. Who was the most accurate person at judging distances? How do you think they managed to judge the distance the best and did they have a technique?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

2. Was there any evidence to support the theory that it is easier to estimate the closer distance more accurately than the ones further away? Give reasons using your data.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

3. In general, were the test subjects more accurate at judging distance when facing forward, or looking backwards through a rear vision mirror? Suggest why this might be the case.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

4. Do you think this activity is a valid model to help predict whether someone is going to be a good judge of distances when they are driving a car? Identify the limitations and strengths of activity as a model to test peoples ability to judge distances.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
5. What are the consequences of not being able to estimate distance well when driving on the road?
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________

6. How might a driver change their behaviour if they know they were not good at estimating distances?
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________

Conclusion:
Write a conclusion that responds to your aim and summarises your results.
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
___________________________________________________________________________________
ACTIVITY 2
DRIVER DISTRACTION

Background Information:
NRMA research shows drivers are continuing to take risks by using their mobile phone while driving, with:
- 88% making phone calls
- 68% texting and reading emails
- 40% using application, e.g. checking the weather forecast and news headlines
- 38% taking photos
- 25% updating their status or tweeting

Aim:
To investigate the effect of mobile phone use on completion of the virtual driving game ‘Car park challenge’.

Materials:
- Mobile phone

Method:
1. Participant 1 practises the Car Park Challenge to get familiar with the controls.

2. With Participant 2 recording game scores in the results table, Participant 1 completes the Car Park Challenge with each of the following mobile phone distractions:
   (a) without any distractions
   (b) while making a phone call
   (c) while sending a text message or email
   (d) while reading an app
   (e) while taking a selfie
   (f) while writing a status update or tweet

3. Participant 1 plays the Car Park Challenge another 2 times for each distraction, with Participant 2 recording the scores in the results table.

4. Participant 2 repeats steps 1–3 with Participant 1 recording the scores in the results table.

5. Calculate each participant’s average score for each distraction.
## Results:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Participant 1</th>
<th>Participant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attempt 1</td>
<td>Attempt 2</td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Making a call</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texting or emailing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using an app</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taking a selfie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Updating status or tweeting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Class results:

Design a data table to record the mean average results for your class.

### Discussion:

Break up into groups to role-play the effects of driving with and without using a mobile phone.

### Conclusion:

Write a conclusion that responds to your aim and summarises your results and the class results.
ACTIVITY 3
CALCULATING BAC

Background information:
Blood Alcohol Concentration (BAC) is the measurement of the amount of alcohol in a person’s blood. It is measured in grams per 100 millilitres (ml) of blood. Therefore, a BAC of 0.05 means you have 0.05 grams (g) or 50 milligrams (mg) of alcohol in every 100 ml of blood. A standard drink is a unit of measurement. One standard drink is equivalent of 10 g of alcohol in a drink regardless of the actual size or volume of the drink or the type of alcohol, for example: wine, beer or spirits. After one standard drink the BAC for people of different body weights will be different. Generally, the greater the body weight the lower the BAC after the same amount of alcohol. Males and females will have a different BAC after consuming the same amount of alcohol.

BAC is calculated using the following formulas:

**Males**
\[
\text{Number of standard drinks} \times 10 - \text{hours of drinking} \times 7.5 \div \text{Weight in kg} \times 6.8
\]

**Females**
\[
\text{Number of standard drinks} \times 10 - \text{hours of drinking} \times 7.5 \div \text{Weight in kg} \times 5.5
\]

1. How does alcohol affect driving?

2. Imagine you have had one standard drink in an hour. Calculate your BAC in the space provided.

3. Imagine you have had two standard drinks in half an hour. Calculate your BAC in the space provided.
4. Do you think it would be easy or difficult to manage your BAC? Give reasons to support your answer.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

5. What problems might someone face when trying to monitor their BAC during an evening out drinking with friends?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

6. Suggest some ways that people could use to help monitor the amount of alcohol they consume in an evening.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
ACTIVITY 4
THE COST OF SAFETY

Background Information:
Understanding how well a car can protect you and your friends in a crash is an important first step when looking to buy a car. With the correct information, you can find a safe car at whatever price you can afford. There are plenty of myths out there about cars and their safety, so make it easy and look for a five-star new or used car. In this activity you will use car and crash safety websites (such as www.mynrma.com.au/motoring-services/reviews/safety.htm) to find answers to the following important questions.

What to do:
1. Describe the purpose of used car safety ratings (UCSR).
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

2. Describe how UCSR are calculated.
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

   i. Identify a car with a five-star (‘Excellent’) safety rating. ________________________________
   ii. What additional safety elements are promised by cars designated as ‘Safe Picks’?
_____________________________________________________________________________________
_____________________________________________________________________________________

4. ESC and ABS are two safety features that help reduce a driver’s risk of crashing. Unlike many new and expensive technologies they can be easily found in cars at the cheaper end of the market.
   i. What are ESC and ABS?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
ii. How do ESC and ABS work?
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

5. What is ANCAP?
_____________________________________________________________________________________

6. Research shows that drivers of three-star ANCAP cars have twice the chance of being killed or seriously injured compared to drivers of five-star ANCAP cars. Search the ANCAP Commercial vehicles and find the following.

i. One-star vehicle: ______________________________________________________________________

ii. Five-star vehicle: ______________________________________________________________________

7. Follow the links to the crash test videos below. Describe the differences you observe between the one-star and five-star cars’ ability to keep the driver and passenger safe.

One-star car:
Five-star car:

<table>
<thead>
<tr>
<th>One-star car driver/ passenger safety</th>
<th>Five-star car driver/ passenger safety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. Design a graphic, such as a sticker or badge, which could help make people aware of the fact(s) behind one common myth about car safety. Draw your design here.
Airbags, parking sensors, USB/iPod connectivity, alloy wheels, computer consoles, ABS, electronic stability programs, Bluetooth, sat nav, etc. – the technology in our cars has changed a lot over the past 25 years. While many technological advances have improved car safety, others have been linked to an increase in driver distractions. So how has this impacted on the NSW car crash fatality rate?

In this activity, we look at the NSW car crash fatality data over a 25-year period. For each year, the following table shows the number of fatalities, the population of NSW and the number of fatalities per 100,000 people in the population.

### NSW car crash fatality data 1989–2013:

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities</th>
<th>Population</th>
<th>Fatalities per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>960</td>
<td>5,776</td>
<td>16.6</td>
</tr>
<tr>
<td>1990</td>
<td>797</td>
<td>5,834</td>
<td>13.7</td>
</tr>
<tr>
<td>1991</td>
<td>663</td>
<td>5,899</td>
<td>11.2</td>
</tr>
<tr>
<td>1992</td>
<td>649</td>
<td>5,958</td>
<td>10.9</td>
</tr>
<tr>
<td>1993</td>
<td>581</td>
<td>5,995</td>
<td>9.7</td>
</tr>
<tr>
<td>1994</td>
<td>647</td>
<td>6,045</td>
<td>10.7</td>
</tr>
<tr>
<td>1995</td>
<td>620</td>
<td>6,106</td>
<td>10.2</td>
</tr>
<tr>
<td>1996</td>
<td>581</td>
<td>6,176</td>
<td>9.4</td>
</tr>
<tr>
<td>1997</td>
<td>576</td>
<td>6,246</td>
<td>9.2</td>
</tr>
<tr>
<td>1998</td>
<td>556</td>
<td>6,306</td>
<td>8.8</td>
</tr>
<tr>
<td>1999</td>
<td>577</td>
<td>6,375</td>
<td>9.1</td>
</tr>
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<tr>
<td>2013</td>
<td>339</td>
<td>7,408</td>
<td>4.6</td>
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</table>

1. Draw a line graph to show how the number of fatalities per 100,000 in the population has changed over time from 1975 to 2013. Label the graph and axes.

2. How has the number of fatalities per 100,000 population changed during the 38-year period you have graphed? Describe the trend.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

3. Why do you think there has been a decrease in the number of fatalities on NSW roads? Suggest as many possible reasons as you can.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

4. Why is it better to use per 100,000 of population to compare data than the actual number of fatalities?

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
5. In 1982, the fatalities per 100,000 population was 23.6 yet in the following year it dropped 30% to 18.0 and has been following steadily since. What do you think contributed to this dramatic decline?*

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

6. Data is available from 1908 when there were 7.6 fatalities per 100,000 population. In 1970, the year with the highest fatality rate there were 28.9 fatalities per 100,000 population. What do you think the trend will be over the next 25 years? What do you think will have the greatest impact on this trend? Describe your ideas here and extrapolate the trend with a dotted line on your graph in Question 1.

_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

*NSW introduced Random Breath Testing in December 1982 when the state road toll was over 1,200
SECTION 1
CREATE A DRIVING DISTRACTION QUIZ

(a) Ask each student to call out a word related to the activities you have carried out and what you have learnt during this unit on driver safety. Record these words on the board.

(b) Each student must pick 10 words from the board and write a definition for each word.

(c) Students then pick four more words from the board and write a paragraph describing them. They should highlight their chosen words in the paragraph.

(d) Students create a concept map showing all they have learnt about driver safety, using at least half the words from the board. They should show links between words and write along lines connecting words to show how the terms are related.

SECTION 2
CROSSWORD ANSWERS

\[
\begin{array}{cccc}
\text{A} & \text{D} & \text{I} & \text{N} \\
\text{F} & \text{A} & \text{T} & \text{I} \\
\text{G} & \text{U} & \text{E} & \text{R} \\
\text{A} & \text{N} & \text{A} & \text{R} \\
\text{E} & \text{X} & \text{P} & \text{E} \\
\text{R} & \text{E} & \text{N} & \text{C} \\
\text{E} & \text{E} & \text{E} & \text{E} \\
\end{array}
\]
SECTION 2
CROSSWORD

Across
4. Drivers should stop and rest when they have this.
7. One of the reasons that young drivers have more car collisions than any other age group.
9. Driving too close to the car in front.
10. Never do this while driving.
11. Another word for a car accident.

Down
1. A policy to help protect you financially after an accident.
2. Blood alcohol content.
3. Points that can be lost if you are caught speeding.
5. Number of passengers a P plate driver can have in their car at night.
6. Bald tyres are most dangerous when the road is
8. All cars need this in order to be driven on the roads.
12. Distance covered in a set time.
13. Speed limit for P plate drivers.
## SECTION 4
### INDIVIDUAL UNIT REVIEW

<table>
<thead>
<tr>
<th>What about you?</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe your favourite activity during this unit of study.</td>
<td>Create an image that summarises this unit of work for you.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning summary</th>
<th>Your philosophy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write two dotpoints of things that you learnt about the psychology of driving safely. Write another two dot points about the physics of driving safely.</td>
<td>How has this unit of work changed your thinking about driving?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More questions?</th>
<th>Metacognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write three questions that you have about driving safely, or anything else related to this unit of study.</td>
<td>Which activities did you find helped you learn the best? Why?</td>
</tr>
</tbody>
</table>