



# Road Smart Teacher Toolkit

Lesson Plan 3 – Saving lives through safety: Vehicle safety features reducing risk

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# Lesson 3 – Saving lives through safety: Vehicle safety features reducing risk

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## Student Outcomes

In this interactive lesson, students will deepen their understanding of the importance of safety features in cars, and learn how to pick a safer car.

By the end of this lesson, students will be able to:

- Describe vehicle safety features designed to protect people in a crash
- Describe the methods for assessing vehicle safety in Australia
- Identify sources of information about safer vehicles available in Australia
- Identify different types of road users
- Describe vehicle safety features designed to protect vehicle occupants and other road users in a crash and to prevent crashes
- Describe how different types of road users can manage their risk

## Suggested Timing

35 - 50 min

## Materials and Preparation

- A computer and projector, and/or digital whiteboard for the teacher to show the opening video.
- Print-outs, for each group, of *Resource 1: Safety Features Worksheet* and *Resource 4: Crash Analysis Worksheet* (noting that this resource runs over multiple pages and contains four images, total) from this document (and writing implements to complete them with).

## Lesson Description and Background

This lesson builds on the previous lesson (“Saving Lives Through Safety: Picking the Safest Car You Can”); however, it can also be delivered as a stand-alone lesson.

In this interactive and engaging lesson, students will be introduced to and explore how different types of safety features work in different ways to reduce crash risk, and what this means for them.

Students firstly watch a striking video which shows how older versus newer cars can have widely varying levels of crash risk. They then complete a group-based activity to classify and organise safety features of cars into different categories, and understand how each works differently to keep people safe.

Students use the knowledge gained through this activity to undertake an engaging, interactive, scenario-based learning activity where they analyse different crash situations and how certain safety features could lower their risk.

Students end the lesson by discussing and debating a provocative statement on road safety, and reflecting on the importance of the decisions they make every day about vehicle safety.

## Evidence Base

Research suggests that if everyone started driving a five-star safety rated vehicle, the road trauma could be reduced by up to half. Picking safe vehicles make a major difference to road safety.

## Coaching Tip

Remind students that just because a car is second hand it doesn't mean that it has to be dangerous or unsafe.

## Curriculum Mapping

Science

Content Description

- The values and needs of contemporary society can influence the focus of scientific research (VCSSU116)

Achievement Standard (excerpt only)

- By the end of year 10 students... predict how future applications of science and technology may affect people's lives.

## Lesson Part 1 – Introduction (5 minutes)

1. Show students the video *Crash test: old versus new cars*

You can find it [here](#), and we suggest you test it prior to delivering the lesson.

*Note: there is a version of this video with explanatory narration located on the news.com.au site. It may be preferable to play this video, however this website may not be compatible with all systems.*

*If the above link does not work there is a version without commentary found at the below link.*

<https://www.youtube.com/watch?v=azrpgvbOMq4>

2. Ask students to consider whether the pros of buying an old car outweigh the possible safety risks associated with it. Remind students that just because a car is second hand it doesn't mean that it has to be dangerous or unsafe.

## Lesson Part 2 – Group activity – “How does this feature work?” (10-15 minutes)

1. Divide students into groups of between two to four students.
2. Give students the Safety Features (Resource 1) worksheet and explain that safety features can be separated into two groups: (1) crash avoidance features, that help you avoid being in a crash; and (2) injury protection features, that provide greater levels of injury protection to drivers and passengers who are involved in car crashes.
3. Ask students in their groups to categorise the features listed on their worksheet into crash avoidance and injury protection features. It may be necessary for students to ask for help or to research certain features they do not understand. This is a good opportunity for discussion.
4. Ask students to rank the safety features from most important to least important, based on their opinion, and provide reasons for their answers.
5. Extension activity – Allow students to remain in their groups. Ask each group to discuss how cars could be made safer in the future. After the group discussion ask for one volunteer to share one of the safety features they want to see implemented in future vehicles.

## Lesson Part 3 – Scenario-based learning – “Avoid that crash!” (15-20 minutes)

6. Distribute the Crash Analysis (Resource 3) worksheet to the groups, noting this resource runs over multiple pages, and includes four images, total. **Note: it is important to remember that some students may have been personally affected by road trauma and as such, this can be a sensitive topic. For this reason, we have selected examples in which no fatality occurred. This can be mentioned to students.**
7. Give students around 10 minutes to complete the worksheet, by identifying how crash avoidance or crash prevention features may have either prevented this crash, or reduced the likelihood of injury for those involved.
8. When students have completed the exercise, ask groups to share their answers with the class. It is not necessary for every group to share every answer.
9. At the conclusion of the discussion, ask students to consider each crash, and identify things that the driver(s) (including other road users and passengers) could have done to avoid the crash. Make the point that safer drivers and safer cars together make the road a safer place.

## Lesson Part 4 – Conclusion (5-10 minutes)

10. Write the following statement on the board:  
**“Young drivers could use the family vehicle and parents use the “learner” vehicle”**  
Highlight to students that young drivers are the most likely category of driver to be involved in a serious crash. Traditionally we have seen parents buy a cheaper vehicle for the learner. The advice from road safety experts is that the family vehicle will have more safety features that could be of benefit for the learner. While it is natural for students to want a vehicle as soon as possible, it is more important to get the right vehicle. Remind students that they have coped without a personal vehicle and they may have to wait a little longer to get the right (safe) one.
11. Ask students to discuss this statement in the context of what they have learned in this lesson.

## Resource 1A: Safety features

Directions: Correctly categorise each safety feature in the below list of 13 features as either a **crash avoidance feature** (which makes a crash less likely) or an **injury protection feature** (which reduces injury in a crash). Write the feature in the appropriate column of the table below.

Anti-lock Brake System (ABS)      Seat Belts      Airbags      Electronic Stability Control (ESC)      Head Rests  
 Lane-Keep Assist      Active Cruise Control      Side-Impact Protection System      Crumple Zones      Blind Spot Warnings  
 Pedestrian Friendly Bonnet Design      Driver Fatigue Monitoring      Auto Emergency Braking (AEB)      Intelligent Speed Adaptation (ISA)

Crash Avoidance Features (Features that make a crash less likely)	Injury Protection Features (Features that reduce injury to road users in a crash)

## Resource 1B: Safety features explained

Safety Feature	Description
Anti-lock brake System (ABS)	Detects panic braking when sudden and forceful movement is applied to the brake pedal. When the system recognises sudden braking, it will add additional pressure to the brake. This allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding.
Seatbelts	For drivers and front-seat passengers, using a lap and shoulder belt reduces the risk of fatal injury by 60 percent in an SUV, van or ute and by 45 percent in a car.
Airbags	Airbags provide crucial cushioning for people during a crash.
Electronic Stability Control (ESC)	ESC is an extension of antilock brake technology that helps drivers maintain control of their vehicles on curves and slippery roads, and hence prevent skidding. ESC becomes active when a driver loses control of their car.
Head Rests	Attached to the top of a seat this safety feature reduces whiplash or serious neck and spinal injury.
Lane-Keep Assist	Technology that detects if a car is drifting in its lane. It provides alerts and warnings to help avoid or mitigate a crash.
Active Cruise Control	Improved cruise control that include warnings or assistance such as automatic braking to adjust the vehicle speed by detecting the distance and speed of the preceding vehicle and maintains an appropriate following distance.
Side-Impact Protection System	By having a reinforced energy absorbing honeycomb materials inside the doors, force is widely distributed across the vehicle. Resulting in less directional force being applied to a specific area.
Crumple Zones	Crumple zones are designed to absorb the energy from the impact of a crash. By absorbing the energy the crumpling prevents the energy traveling through the car.
Pedestrian Friendly Bonnet Design	These features reduce injury to the pedestrians whilst maintaining structural integrity.
Blind Spot Warnings	Alarm that alerts the driver if there is something in their blind spot.
Driver Fatigue Monitoring	Technology that provides warnings when it detects a driver falling asleep. This may help avoid or mitigate a crash.

Auto emergency braking (AEB)	<p>AEB is a feature that alerts a driver to an imminent crash and helps them use the maximum braking capacity of the vehicle. AEB will independently brake if the situation becomes critical and no human response is made. AEB comes in three categories:</p> <ol style="list-style-type: none"><li>1. low speed system – works on city streets to detect other vehicles in front of the driver’s car to prevent crashes and non-life threatening injuries such as whiplash</li><li>2. higher speed system – scans up to 200 metres ahead using long range radar at higher speeds</li><li>3. pedestrian system – detects pedestrian movement in relation to the path of the vehicle to determine the risk of collision.</li></ol>
Lane-Keep Assist	<p>Technology that detects if a car is drifting in its lane or out of the lane. It provides alerts and warnings when this occurs which helps to avoid or mitigate a crash. Some versions will proactively steer the car back into the lane.</p>



## Resource 2: Answers for safety features

Directions: Correctly identify each safety feature in the below list of 11 features as either a **crash avoidance feature** (which makes a crash less likely) or an **injury protection feature** (which reduces injury in a crash). Write the feature in the appropriate column of the table below.

Anti-lock Brake System (ABS)      Seatbelts      Airbags      Electronic Stability Control (ESC)      Head Rests  
 Lane-Keep Assist      Active Cruise Control      Side-Impact Protection System      Crumple Zones      Blind Spot Warnings  
 Pedestrian Friendly Bonnet Design      Driver Fatigue Monitoring      Auto Emergency Braking      Intelligent Speed Adaptation (ISA)

### Crash Avoidance Features (Features that make a crash less likely)


- Anti-lock Brake System (ABS)
- Electronic Stability Control (ESC)
- Lane-Keep Assist
- Active Cruise Control
- Blind Spot Warnings
- Driver Fatigue Monitoring
- Auto Emergency Braking
- Intelligent Speed Adaptation (ISA)

### Injury Protection Features (Features that reduce injury to road users in a crash)

- Seatbelts
- Airbags
- Head Rests
- Side-Impact Protection Systems
- Crumple Zones
- Pedestrian Friendly Bonnet Design

## Resource 3: Crash analysis worksheet

*Directions: Look at the following four images of crashes and read the accompanying descriptions. For each image, based on the picture and description, record **what crash avoidance features** may have stopped the crash, and **what injury protection features** may have reduced injury for those involved.*

Crash Image	Description of Crash	Safety Features
	<p>This is a rear-end crash, and one of the most common types of crashes for young drivers.</p> <p>In this case, the black 4WD was forced to stop suddenly, and the silver car travelling behind it failed to stop in time.</p> <p>As you can see, the silver car ran into the back of the 4WD and has significant damage.</p>	<p><b>What crash avoidance features may have stopped this crash?</b></p>          <p><b>What injury protection features may have reduced injury to those involved?</b></p>



This image shows a car about to merge into the lane that the truck is in.

In this case, the driver of the silver car attempted to merge without checking their mirrors, and seconds later collided with a truck because they did not leave adequate room for the truck (which struck the rear of the silver vehicle).

**What crash avoidance features may have stopped this crash?**

**What injury protection features may have reduced injury to those involved?**



In this image, a driver skids in foggy/wet conditions and slides into oncoming lanes of traffic.

The driver was travelling too fast for the conditions and this contributed to losing control of their car.

**What crash avoidance features may have stopped this crash?**

**What injury protection features may have reduced injury to those involved?**



This image shows a cyclist moments before a driver opens their car door and causes them to crash.

It also shows that even when you're stationary, or travelling as a passenger (not a driver), you can still cause a crash and need to take care.

It also demonstrates additional risks for other types of road users.

#### **Note**

Look at the direction that the driver is looking. If the driver had used the "Dutch reach" when opening the door their eyes could be drawn to the potential hazards around them.

**What crash avoidance features may have stopped this crash?**

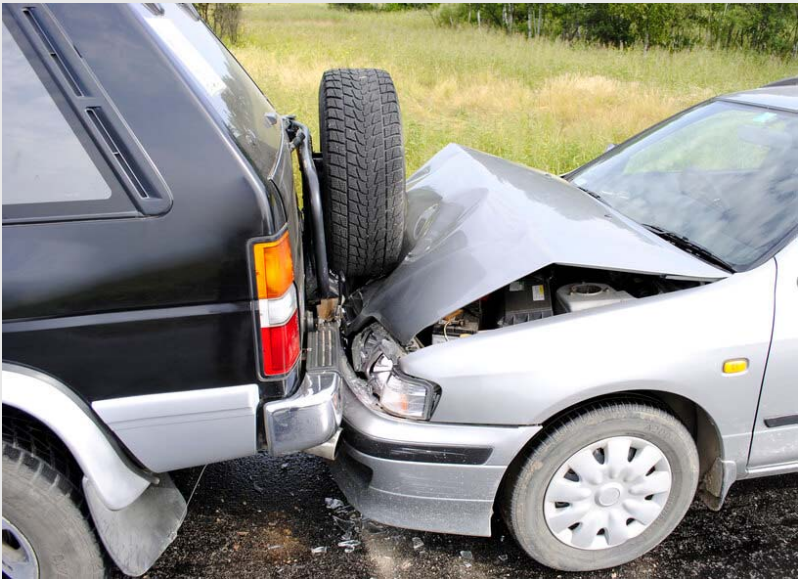
**What injury protection features may have reduced injury to those involved?**

#### **Dutch reach explained:**

- When opening a car door use the hand which is furthest away from the car handle
- By doing this the passenger/driver are forced to turn their body towards the door
- This allows the passenger/driver to easily look over their shoulder to check for other road users

## Resource 4: Crash analysis worksheet answers

The following table contains sample answers (in the far-right column) to the crash analysis worksheet. They are sample answers, only.

Crash Image	Description of Crash	Safety Features
	<p>This is a rear-end crash, and one of the most common types of crashes for young drivers.</p> <p>In this case, the black 4WD was forced to stop suddenly, and the silver car travelling behind it failed to stop in time.</p> <p>As you can see, the silver car ran into the back of the 4WD and has significant damage.</p>	<p><b>What crash avoidance features may have stopped this crash?</b></p> <ul style="list-style-type: none"><li>• ABS (to increase stopping distance)</li><li>• Active cruise control (which if activated could have automatically slowed the silver car)</li><li>• Automatic Emergency Braking (AEB) (which could have notified the driver of an impending collision)</li><li>• Driver-attention detection in case of distraction or fatigue</li><li>• Active braking (which could have automatically slowed the silver car)</li><li>• Intelligent Speed Adaptation (ISA) (ensures the car doesn't exceed the speed limit)</li></ul> <p><b>What injury protection features may have reduced injury to those involved?</b></p> <ul style="list-style-type: none"><li>• Seat belts (to prevent the driver being thrown forwards)</li><li>• Airbag (to protect the driver's head)</li><li>• Crumple zones (to absorb the force of a serious crash)</li><li>• Head rests (reduce whiplash injuries)</li></ul>





This image shows a car about to merge into the lane that the truck is in.

In this case, the driver of the silver car attempted to merge without checking their mirrors, and seconds later collided with a truck because they did not leave adequate room for the truck (which struck the rear of the silver vehicle).

#### **What crash avoidance features may have stopped this crash?**

- Lane-Keep Assist (to help keep the silver car in the correct lane)
- Blind spot indicators (to remind the driver of the silver car that there was something in their blind spot)
- Indicator (to signal to the truck that they were changing lanes)

#### **What injury protection features may have reduced injury to those involved?**

- Seat belts
- Airbags (to prevent injury to the drivers' head and side of body)
- Side impact protection system (to avoid the driver's body coming in contact with the side of the car)



In this image, a driver skids in icy conditions and slides into oncoming lanes of traffic.

The driver was travelling too fast for the conditions and this contributed to losing control of their car.

**What crash avoidance features may have stopped this crash?**

- Electronic Stability Control (ESC) (to help the driver keep control of the car and avoid skidding)
- ABS (so if the driver tried to slow down the car wouldn't skid)
- Active suspension (to help keep the car stable and in-control)
- Good tyres (to help maintain grip and decrease the likelihood of losing control)

**What injury protection features may have reduced injury to those involved?**

- Seat belts (to ensure the driver is not thrown around the inside of the car)
- Airbags (to protect the driver's head and body)





This image shows a bicycle moments before a driver opens their car door and causes them to crash.

It also shows that even when you're stationary, or travelling as a passenger (not a driver), you can still cause a crash and need to take care.

It also demonstrates additional risks for other types of road users.

#### **What crash avoidance features may have stopped this crash?**

- Side mirrors (to help the passenger see what is coming behind them)
- Using the "Dutch reach" method of opening the door. This allows the passenger/driver to check for other road users before opening the door
- Blind spot indicator (to remind both passenger and driver that things are coming from behind)
- Bell (for the cyclist)
- High visibility clothing (for the cyclist)

#### **What injury protection features may have reduced injury to those involved?**

- Helmet (for the cyclist)