


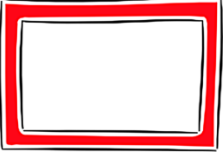







KEEPING SAFE AROUND TRUCKS Curriculum resources

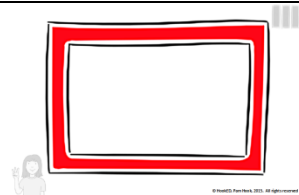
FACT – EXPLANATION – FUTURE THINKING CARDS

Trucks are larger and heavier than other vehicles using the road.

TRUCK SAFETY FACT 1.	
	<p>FACT: Large trucks do more damage in a collision than smaller and lighter vehicles travelling at similar speeds on the roads.</p>
	<p>EXPLANATION: In an inelastic collision the vehicle/s slow down, change direction and stop. The movement energy (kinetic energy) of the vehicle/s is transformed into heat energy, light energy, sound energy and deformation of the vehicles, driver and passengers. The vehicle with the greatest movement energy (kinetic energy) does the greatest damage.</p> <p>Speed also matters. The damage to a vehicle (and its driver) at impact in a crash situation increases at the square of speed. If you double the speed, the impact will create four times the damage. A pedestrian knocked down at 50km/h will suffer four times as much damage as one knocked down at 25km/h.</p>
	<p>FUTURE THINKING: When you share the road with large trucks, give them more space (time and distance) on the road.</p>

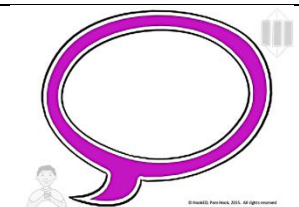
TRUCK SAFETY FACT 2.	
	<p>FACT: Large trucks take more time and distance to stop than smaller vehicles. Trucks cannot stop suddenly.</p>
	<p>EXPLANATION: Large trucks have a greater mass in motion (momentum = mass x velocity) than other vehicles on the road and require a greater braking distance than a lighter and/or slower vehicle. If a pedestrian or cyclist moves onto the road in front of a truck, the truck may not be able to slow down and stop in time to avoid a collision. If a car driver makes a tight lane change and slows down or stops suddenly in front of a truck, the truck driver cannot do the same and may collide with the car driver.</p>
	<p>FUTURE THINKING: Give large trucks more space (time and distance) on the road.</p>

TRUCK SAFETY FACT 3.	
	<p>FACT: Large trucks take more time to accelerate and more time to slow down than smaller vehicles.</p>
	<p>EXPLANATION: Cutting in on a truck may cause an accident if the truck has to manoeuvre or brake too suddenly. Trucks may not have time to swerve and accelerate out of the path of an incoming vehicle or runner. They need more time and distance to merge when entering a motorway or to exit when leaving a motorway.</p>
	<p>FUTURE THINKING: Before pulling in front of a truck, check that you can see the entire truck in your rear vision mirror. Do not change lanes if you cannot see the entire truck and cannot see the front tyres touching the road surface.</p>

TRUCK SAFETY FACT 4.

FACT: Large trucks have bigger blind spots than smaller vehicles. A blind spot is an area around the vehicle that the driver cannot see. Truck blind spots are found:

- **immediately in front of the truck** – the driver cannot see pedestrians crossing in front of the truck
- **beside the truck driver's door**
- **on the passenger side** – this is bigger than the driver's side blind spot, stretching the length of the truck and extending out the width of three lanes
- **directly behind the truck** – the cab has no rear vision mirror because the trailer behind a truck is so high, a rear vision mirror would only show the truck driver their own trailer.



EXPLANATION: Truck blind spots are dangerous places to ride in or drive in. Larger vehicles like trucks have larger blind spots because of the length and height of the vehicles. These blind spots limit a truck driver's view of pedestrians, cyclists and smaller vehicles. They are large enough to hide even another truck from the driver's view.

Refer to: Drive – Understanding Blind Spots

<https://youtu.be/dR1dbB2Tps8>

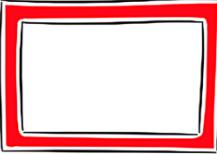







FUTURE THINKING: It is a good idea to position your vehicle far enough back so you can see it in a truck driver's side mirrors. This will let the truck driver know you are there.

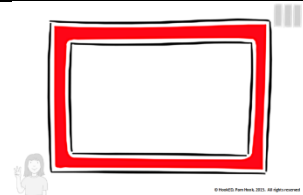
Refer to: <https://drive.govt.nz/learn-to-drive/simple-driving/blind-spots/>

FUTURE THINKING: Never move (walk, cycle, skate or drive) behind, beside or directly in front of a truck as it is preparing to back up or is backing up. Avoid the blind spots where the driver cannot see you.

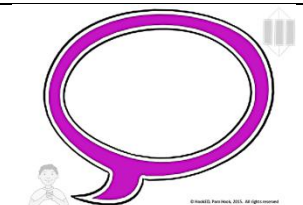
FUTURE THINKING: If you are in a car travelling behind a truck, make sure you keep well back out of the blind spot – drive far enough back to see both mirrors. If you are in a car travelling beside a truck, move past steadily. Do not hang around in the blind spot.

TRUCK SAFETY FACT 5.	
	<p>FACT: Large trucks need more room to turn than smaller vehicles.</p>
	<p>EXPLANATION: Cutting in on a truck may cause an accident if the truck has to manoeuvre or brake too suddenly. Trucks may not have time to swerve and accelerate out of the path of an incoming vehicle or runner. They need more time and distance to merge when entering a motorway or to exit when leaving a motorway.</p>
	<p>FUTURE THINKING: When trucks are turning, keep clear of their blind spots. Avoid cutting in on their left when trucks swing wide right to make the left turn.</p>

TRUCK SAFETY FACT 6.	
	<p>FACT: Large trucks take longer to pass than smaller vehicles.</p>
	<p>EXPLANATION: It takes more time to pass a large truck than it does to pass a small vehicle because a truck is longer so someone passing it needs to travel extra distance. It can take several seconds longer to pass a truck than it does to pass a car.</p>
	<p>FUTURE THINKING: Make sure you have plenty of clear road space ahead so that you can safely pass the truck and change back into your lane without going over the speed limit.</p> <p>FUTURE THINKING: Make sure there is enough space between your car and the truck when you change back into your lane so the truck does not have to manoeuvre or brake too quickly.</p> <p>FUTURE THINKING: When following a truck, leave enough space between your vehicle and the truck ahead so vehicles behind can pass you without having to also pass the truck in front of you.</p>

TRUCK SAFETY FACT 7.

FACT: Large trucks throw out more water during wet weather than smaller vehicles.

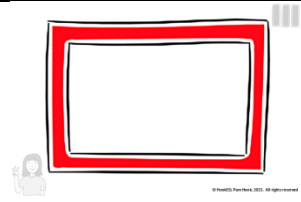


EXPLANATION: Water splash results when the truck body and the truck tyres force water out of their way. Water spray results when the water is atomised and suspended in the air. Both splash and spray represent a hazard for truck drivers and other vehicles sharing the road. For example, a sudden shower of water falling on a car windscreen may cause the driver to temporarily lose control of their vehicle – swerving or braking suddenly. Splash and water spray can also reduce the visibility of other road vehicles, hazards, road signs and markings.



FUTURE THINKING: It is a good idea to position your vehicle far enough away from the truck so it avoids any unexpected spray.

FUTURE THINKING: Keep away from the roadside edge of pavements to avoid unexpected spray that might cause you to lose your balance and fall or stumble into the road.

TRUCK SAFETY FACT 8.

FACT: Large trucks create more air turbulence than smaller vehicles, which can affect oncoming vehicles.



EXPLANATION: When vehicles push through the surrounding air, they create air turbulence. Large, taller vehicles push through more air than smaller vehicles and so create more turbulence. At high speeds this turbulence creates a suction effect as the air close to each side of the vehicle moves forward with the vehicle. The suction can produce sudden changes in the path of motorcyclists, cyclists and pedestrians, causing them to lose their balance.

The large truck may temporarily block strong winds from smaller vehicles and pedestrians as it passes them and then expose them to strong winds again once it has passed. This can affect the steering and balance of the smaller vehicle or pedestrian, causing them to change their path or stumble.



FUTURE THINKING: Be prepared for turbulence when approaching an oncoming truck. If you are driving or riding, grip the steering wheel or handlebars firmly so you can correct any turbulence-induced changes to your path.

FUTURE THINKING: As a pedestrian, keep away from the roadside edge of pavements to avoid unexpected turbulence or suction that might cause you to jerk or stumble into the road.

TRUCK SAFETY FACT 9.

FACT: Large trucks have a high centre of gravity (a point around which an object is balanced in all directions). A high centre of gravity makes trucks more susceptible to rollovers when cornering or in high wind gusts.



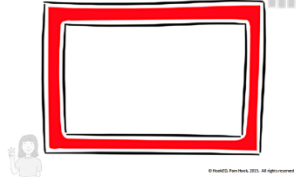


EXPLANATION: The higher the centre of gravity, the more unstable the vehicle. The closer to the ground, the more stable the vehicle.

If the load in a truck is not centred across its width, the truck will have even less stability when cornering and be more likely to roll over.

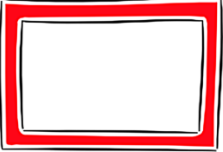


Trucks have movement energy (kinetic energy), which affects the forces on the truck when cornering or braking or the impact in a crash. If a truck enters a corner at 60km/h, there will be four times more overturning (side) force on the vehicle than if it had entered the corner at 30km/h.






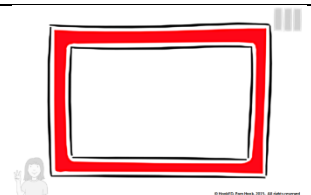
FUTURE THINKING: If you are in a car travelling beside a truck in gusty conditions, move past steadily. Do not hang around in the blind spot alongside the truck.

TRUCK SAFETY FACT 10.	
	<p>FACT: Long distance truck drivers' work conditions can make them vulnerable to driver fatigue.</p>
	<p>EXPLANATION: Driver fatigue leads to drowsiness, loss of awareness and falling asleep at the wheel. Early symptoms include not recognising your own level of tiredness, poor judgement, slower reaction time and poorer driving skills.</p> <p>Long distance truck drivers commonly start very early and work long hours, clocking up working weeks of 70 hours. They often work late into the night. Their work hours can disrupt eating and sleeping patterns, leaving them with limited opportunities for a restful night of deep sleep. Over time these factors put drivers into sleep debt, leading to driver fatigue that increases crash risks. Regulations¹ control the numbers of hours truck drivers can work to help manage driver fatigue.</p>
	<p>FUTURE THINKING: Technology can already let drivers know when they start to lose alertness by monitoring eye movements, blink rates and small steering wheel movements. Now researchers are investigating if using blue LEDs in truck cabs and in light showers at truck stops will help reset truck drivers' body clocks to high levels of alertness. Preventing driver fatigue will reduce accidents caused by drivers falling asleep at the wheel.</p> <p>Refer to: https://www.newscientist.com/article/dn13491-blue-lds-to-reset-tired-truckers-body-clocks/</p>

¹ The maximum number of hours that a driver can work in any cumulative work day is 13 hours. A driver must have at least 10 hours' continuous rest between cumulative work days (as well as the standard half hour breaks every five-and-a-half hours). The maximum time that a driver can work in any cumulative work period is 70 hours (after which they must take a minimum 24-hour rest break). (Source: New Zealand Transport Agency. March 2015. Health and Fatigue: An introduction programme for drivers of heavy motor vehicles.)

TRUCK SAFETY FACT 11.	
	<p>FACT: When they are stopped on an upgrade, large trucks can roll backward for a length of between 4m and 5m before the forward gears engage.</p>
	<p>EXPLANATION: Truck rollback can occur when a driver is on an incline and trying to ease off the brake and engage the clutch. Any delay in engaging the clutch can result in rollback.</p>
	<p>FUTURE THINKING: When you are in a vehicle stopped behind a truck on an uphill incline, leave drift space between your vehicle and the truck in front.</p> <p>FUTURE THINKING: As a pedestrian, do not stand behind a truck on an incline when crossing the road.</p>

TRUCK SAFETY FACT 12.	
	<p>FACT: Large trucks can gain speed when travelling on a downgrade, especially if they are fully loaded.</p>
	<p>EXPLANATION: The truck can gain speed on the incline as a result of acceleration due to gravity on the incline.</p>
	<p>FUTURE THINKING: Leave extra space when merging in front of a truck or when trying to cross in front of a truck on a downward incline.</p>

TRUCK SAFETY FACT 13.

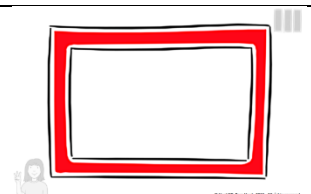
FACT: Large trucks with separate trailer units can jack-knife when braking.



EXPLANATION: When a truck brakes suddenly, the trailer unit can move faster than the cab, causing the truck to jack-knife.



FUTURE THINKING: Leave extra space when vehicles are merging in front of a truck on a downward incline.

TRUCK SAFETY FACT 14.

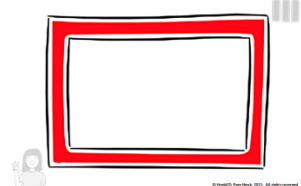
FACT: Large trucks can damage pavements, bridges and road surfaces and at a greater rate than other modes of transport.



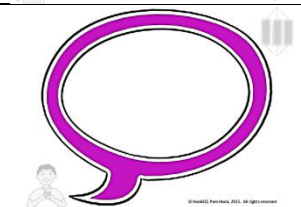
EXPLANATION: With more truck traffic, the stress and damage to the roads increases due to the weight force of large trucks travelling over different surfaces and structures. When road surfaces break up, they can be a hazard to other vehicles and cyclists. Other vehicles are smaller (have less mass) and do not exert the same weight force.



FUTURE THINKING: Be extra alert to pot holes in road surfaces with heavy truck traffic.

TRUCK SAFETY FACT 15.

FACT: Large trucks need lots of space.

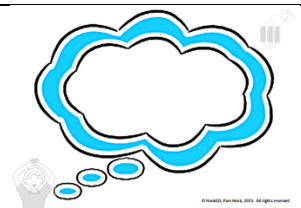


EXPLANATION: Trucks take up large amounts of space and large areas are needed for freight-related uses, such as terminals, warehousing and parking. Finding the land for these uses can create tensions and competition with existing uses and/or anticipated future land use. Land that was set aside in the past for terminals or warehousing at some time in the future may now be in demand for housing or recreation.

Delays and excess truck traffic at freight terminals or rail-truck, air-truck, water-truck, and truck-truck transfer points can spill onto the road system. A shortage of parking spaces can lead to illegal parking of large trucks alongside entrances and exits of depots or on residential streets. The large trucks obstruct visibility and create braking hazards that cause accidents.

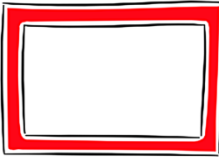


Residents complain that when trucks and truck and trailer units are parked on narrow residential streets overnight, they create a traffic hazard for other drivers using the road. In addition, stock trucks bring unwanted smells to the suburbs and the noise of diesel motors warming up very early in the morning wakes residents.

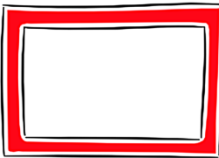


When spill-over truck traffic is diverted through narrow residential streets, it can increase the traffic hazards and noise in local communities to levels that annoy residents.



FUTURE THINKING: Amazon has a patent for “aerial fulfilment centres” that could change the way we think about the land area needed for freight. These massive blimp warehouses permanently floating at 45,000 feet in the sky would use drones to deliver products from the sky.

Refer to: <https://www.inverse.com/article/25761-amazon-aerial-fulfillment-centers-blimp-drone-warehouses>

TRUCK ENERGY USE FACT 1.	
	<p>FACT: Large trucks consume energy resources and, in doing so, contribute to greenhouse gas emissions (climate change).</p>
	<p>EXPLANATION: Freight vehicles help drive the demand for imported petroleum fuels. They consume over 40% of the energy that the whole transport sector uses.</p> <p>The gasoline, diesel, jet fuel, kerosene and fuel oil used to transport goods and services contribute a significant proportion of our greenhouse gas emissions. Diesel-powered truck engines produce more nitrogen oxides, hydrocarbons and particulate matter than car engines over the same distance travelled. Particulate matter irritates the eyes, nose, throat and lungs, and leads to respiratory and cardiovascular disease. The nitrogen oxides and hydrocarbons cause coughing, choking and respiratory problems. The International Agency for Research on Cancer has classified whole diesel engine exhaust as a Group 2A carcinogen (meaning it is probably carcinogenic to humans).</p>
	<p>FUTURE THINKING: Autonomous trucks cut fuel use by using computer control to manage acceleration and deceleration.</p> <p>Refer to: https://www.newscientist.com/article/dn27485-autonomous-truck-cleared-to-drive-on-us-roads-for-the-first-time/</p> <p>FUTURE THINKING: Platooning – automated and semi-automated trucks – save on fuel costs and lower carbon dioxide emissions by driving close together at a constant speed. The trucks in a platoon are in constant communication, accelerating and braking at the same time. Platooning can also improve vehicle safety by eliminating human reaction time when braking. It can reduce congestion as trucks in a platoon travel much closer together. With platooning, driver fatigue is not an issue.</p> <p>Refer to: https://www.eutruckplatooning.com/About/default.aspx</p>

ENERGY USE FACT 2.	
	<p>FACT: Large trucks create more air resistance than smaller vehicles, which can increase fuel use.</p>
	<p>EXPLANATION: When vehicles push through the surrounding air, they create air resistance. Large, taller vehicles push through more air than smaller vehicles and so create more drag forces, increasing fuel use.</p>
	<p>FUTURE THINKING: Currently, trucks designers fit spoilers and fairings (side skirts and rear tail fairings) to reduce air resistance. However, these are heavy, can interfere with loading the truck and in some circumstances contribute to rather than reduce drag and increased fuel use.</p> <p>Researchers are replacing spoilers and fairings with controllable plasma actuators for trucks in the future. When switched on, the actuators produce glowing purple clouds of charged plasma that delays the moment when airflow over the truck separates from the vehicle and acts as drag.</p> <p>Refer to: https://www.newscientist.com/article/mg22730314-600-plasma-makes-lorries-hit-purple-patch-of-fuel-efficiency/</p> <p>FUTURE THINKING: Autonomous trucks are programmed to run in convoys, slowing down and speeding up together. The first truck reduces the air resistance for the trucks travelling close behind, thus reducing fuel use. The trucks communicate with each other about when to speed up and when to slow down so that they can follow closely behind each other.</p> <p>Refer to: https://www.newscientist.com/article/dn27485-autonomous-truck-cleared-to-drive-on-us-roads-for-the-first-time/</p>