

**Data for Sydney Region shows that 28 %  
of crashes are from a REAR END.**



**More than half of  
these result in  
injury – 54%.**

Most of these crashes could  
Have been avoided had the  
3 SECOND GAP  
been maintained !

To avoid Rear End crashes, please take a couple of minutes to read this important road safety information:

# **STOPPING DISTANCE**

...you see the brake lights of the car in front of you just came on...  
You will hit the brake to slow down your car...  
BUT, there is a small time delay before you really do that – **your  
reaction time.**

During that period of time, your car is still moving  
at the same speed out of your control.

**the faster you are going,  
the further you will travel during this time**

The total stopping distance is made up of four components:

**STOPPING DISTANCE** = HUMAN PERCEPTION + HUMAN REACTION + VEHICLE REACTION + BRAKING

= REACTION TIME + BRAKING TIME

During these periods of time the vehicle will pass through...

= REACTION DISTANCE + BRAKING DISTANCE

# REACTION TIME

## HUMAN PERCEPTION TIME

How long the driver takes to see the hazard, and the brain takes to recognise it is a hazard requiring an immediate reaction

Can be as long as 0.25 - 0.5 seconds

## HUMAN REACTION TIME

How long the body takes to move the foot from the accelerator to the brake pedal

Can vary from 0.25 – 0.75 seconds

## VEHICLE REACTION TIME

After the driver has acted time is needed for vehicle to react. This depends on the brake pedal free play, hydraulic properties of the brake fluid and working order of the braking system

Approximate value is 0.2 seconds

Total reaction time can be as little as 0.75 seconds, but more realistically, the reaction time that is used in calculations is 1 – 1.5 seconds. It is important to note that reaction time is a very complicated topic affected by a large number of variables.

Human factors can be affected by tiredness, alcohol, fatigue, concentration levels etc. A perception and reaction time of 3 – 4 seconds is possible.

Note that 4 seconds at 100 km/h means the car travels 110 meters before the brakes are applied.

# The biggest factor in stopping distances is the speed at which a driver reacts to seeing a hazard – DRIVER REACTION TIME

Response speed depends on several factors thus there is no single , universal reaction time value. Factors that affect reaction time are:

**EXPECTATION** – greatly affected by whether the driver is alert to the need to brake

**URGENCY** – people brake faster when there is great urgency

**MENTAL LOAD** – the brake time becomes longer when there are number of factors that compete for the driver's attention (eg. in car displays, mobile phones, pear...)

**PSYCHOLOGICAL REFRACTORY PERIOD** – new responses are made more slowly than if there had been no previous behaviour

**AGE** – older people respond more slower than younger people. However, older drivers generally compensate for slower reaction times with reduced speeds

**NATURE OF THE SIGNAL** – brake light, obstacle in the path, motion...It's much more difficult to judge motion towards or away from you than something which cuts across your path

**VISIBILITY** – Reaction time increases in as visibility decreases

**RESPONSE COMPLEXITY** – more complex muscular responses take longer

**TIME OF THE DAY** – light level has little effect on reaction time, rather it is contrast that matters

# BRAKING TIME & DISTANCE

Depends on factors such as:

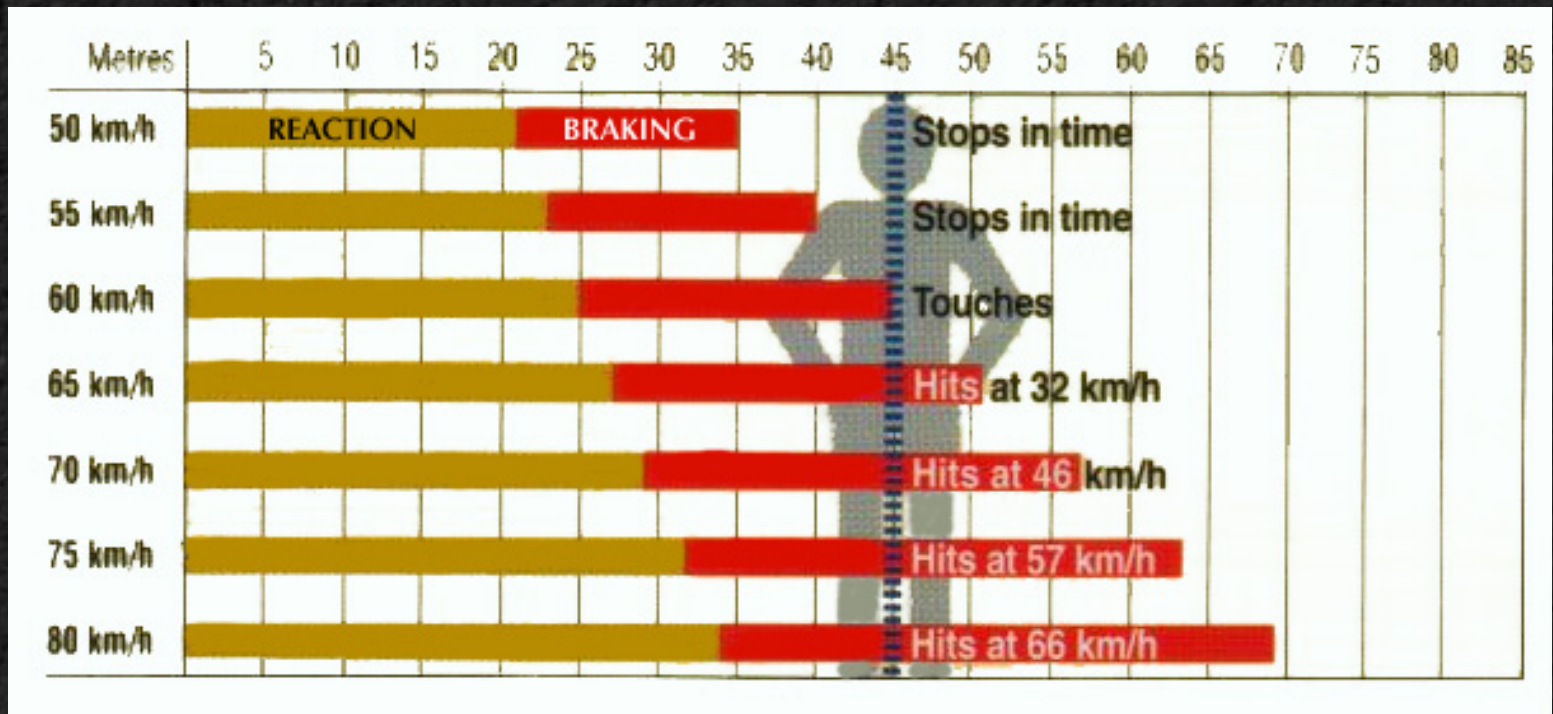
- The type of braking system,
- Brake pad material,
- Brake alignment,
- Tyre pressure, tread and grip,
- Vehicle weight,
- Suspension system,
- The coefficient of friction of the road surface,
- Wind speed,
- Slope of road,
- Surface smoothness,
- The braking technique applied by the driver
- Weather conditions

NOTE:        **LAWS OF PHYSICS, SHOW THAT DOUBLING THE SPEED OF A CAR  
INCREASES BRAKING DISTANCE BY FOUR TIMES**



The following tables and graphs are for guidance only, as there are a lot of variables in real life situations.

## DRY SURFACE

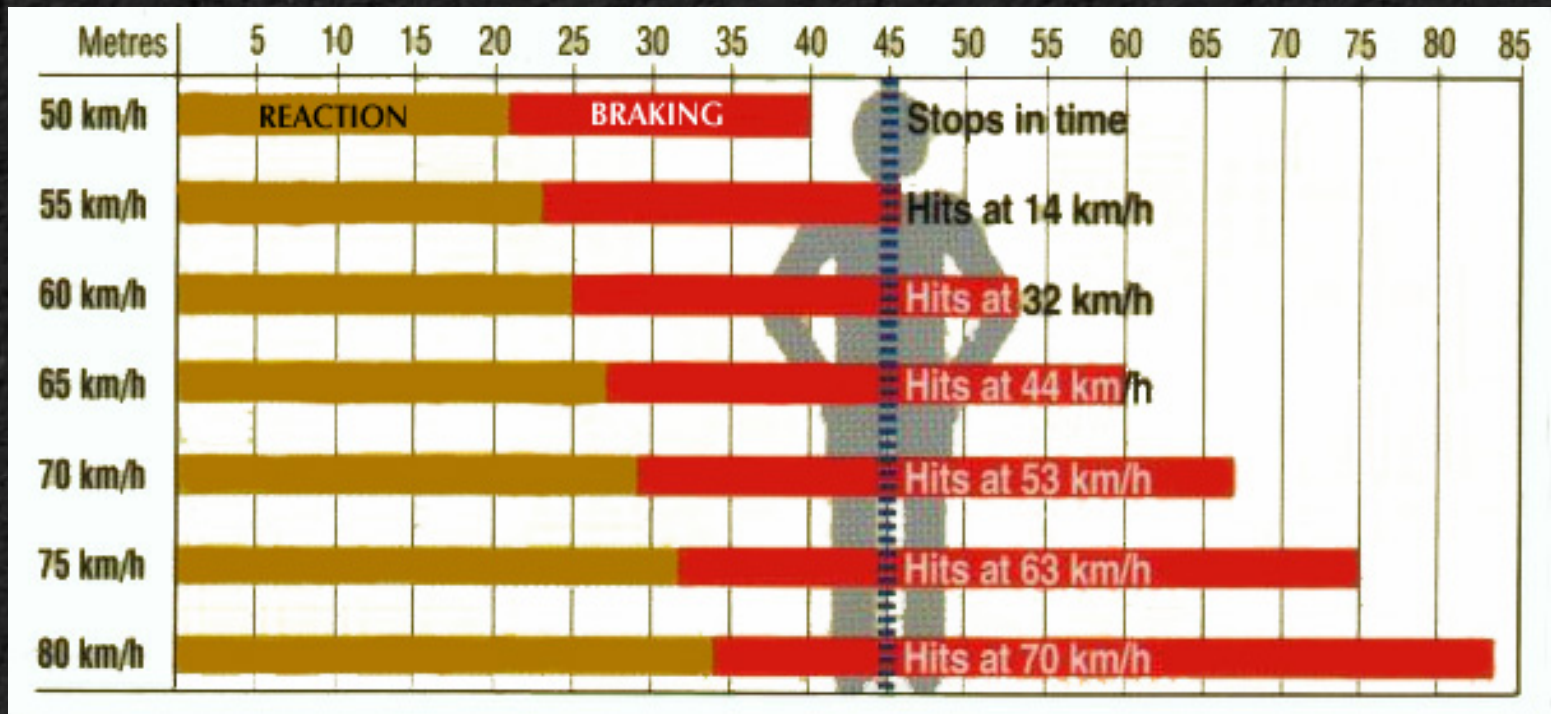


A child runs onto the road 45 m ahead of you while you are travelling in 60 km/h zone. You brake hard.

WILL YOU STOP IN TIME ?

NOTE: Road is dry, you have a modern vehicle with good brakes and tyres. Reaction time used in calculations is 1.5 seconds.

## WET SURFACE

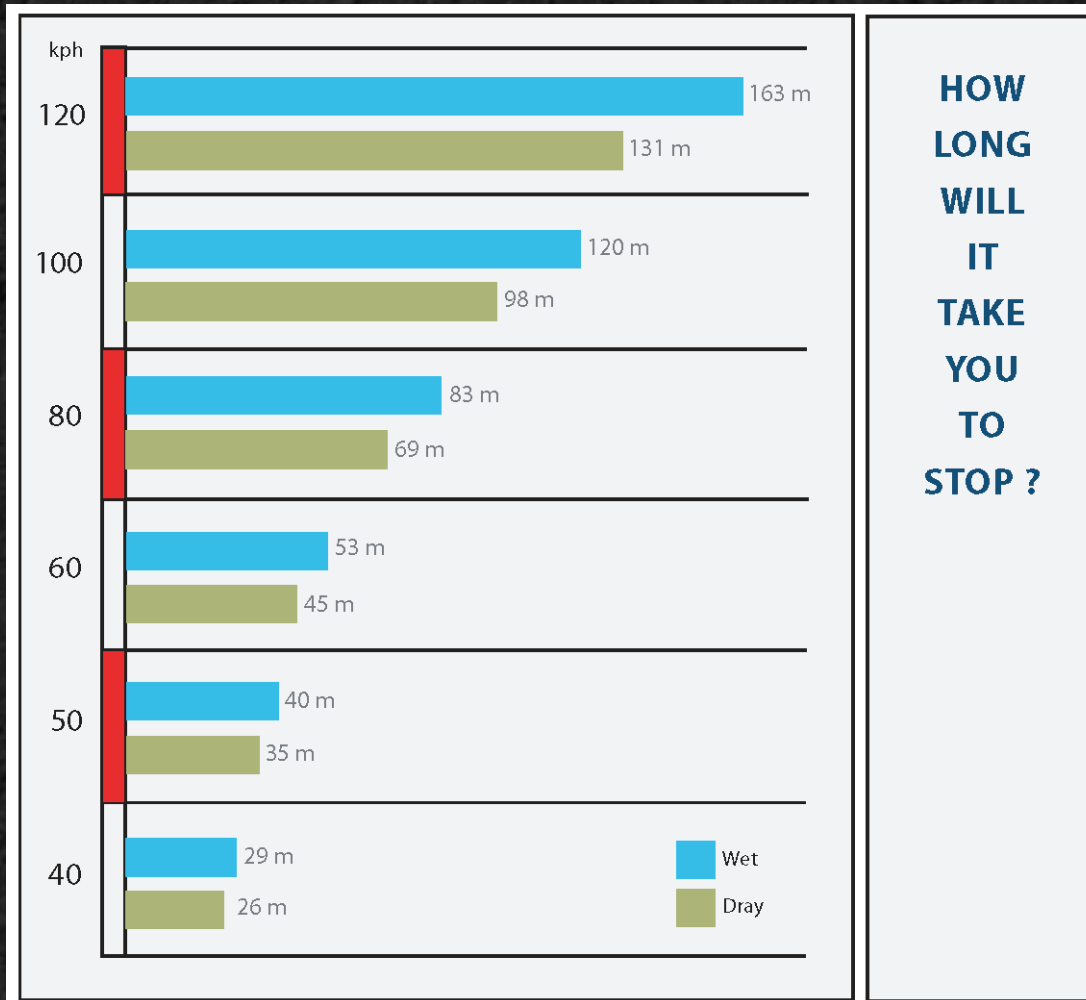


A child runs onto the road 45 m ahead of you while you are travelling in 60 km/h zone. You brake hard.

WILL YOU STOP IN TIME ?

NOTE: Road is wet, you have a modern vehicle with good brakes and tyres. Reaction time used in calculations is 1.5 seconds.

## Comparison wet and dry surface



## WHAT ELSE CAN HAPPEN ON A WET ROAD THAT AFFECTS STOPPING DISTANCE?

### FIRST RAIN

The car needs traction to move or to stop. Your tyres will achieve the best traction on clean and dry road. But road surface can be contaminated by dirt and spilled fluids from vehicles. The first rain, especially after a long dry period, can be very dangerous as dirt and water form very slippery film and tyres lose traction, as on icy surfaces.

After reasonable time of rain the dirt and slippery film will be washed off road surface.

The other danger on the wet road is:

### AQUAPLANING

This is a phenomenon in which the tyres progressively lose direct contact with the road surface due to the layer of water that is wedged between the wheel and road owing to the vehicle's speed.

The function of the tyre's tread is to remove water between the tyre and the road surface to ensure better traction. Increasing speed on a wet surface, water will be dragged by the tyre as a wedge between the tyre and road surface. That pressure builds up on tyre until the moment when the pressure is high enough to separate the tyre from the road.

Example of high demand on tyres: At a speed of 80km/h tyre must displace up to 25 litres of water per second.

To avoid aquaplaning, slow down in rain.

Allow longer stopping distances and drive as smoothly as possible.



Modern vehicle with good brakes and tyres, on a dry road doing 50 km/h, reaction time is 1.5 sec:



With the advent of better brakes, vehicle stopping distances have been reduced somewhat over the years but it should be remembered that, no matter how good the brakes and tyres are, the laws of physics don't change.

**REMEMBER,**

**DOUBLING YOUR SPEED INCREASES BRAKING DISTANCE BY FOUR TIMES**

Most frighteningly, Australian research has shown that the very people we expect to have the fastest reactions - **young drivers** - are particularly prone to effectively 'freeze up', at the sight of an unexpected hazard ahead, and their reaction time can therefore exceed two seconds.

so, stopping distances vary according to  
driver conditions, road and weather conditions  
and vehicle conditions...

**But drivers need to recognise that :**

No matter how good a driver you think you are  
and how ever good your car is,  
the difference between driving at the speed limit  
and a few km/h over the limit  
will result in a much longer stopping distance.

That could **result** in fatal consequences.



To avoid rear end crashes you should whenever possible maintain a

# 3 SECONDS GAP

between your vehicle and the vehicle in front of you.

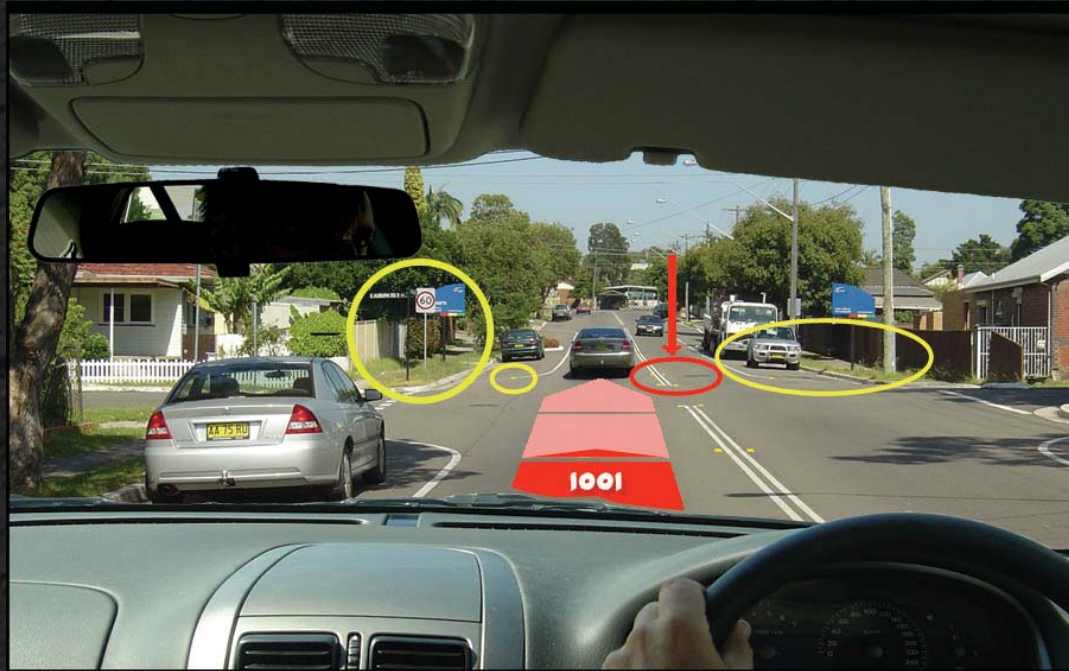
## WHY a "3 second gap"

Distances should be adjusted to the speed you are driving – shorter for lower speed and longer for a higher speed.

An old safety recommendation that suggested counting car lengths between vehicles at certain speeds was very inaccurate due to the inability to judge car lengths accurately enough .

# 3 SECOND GAP

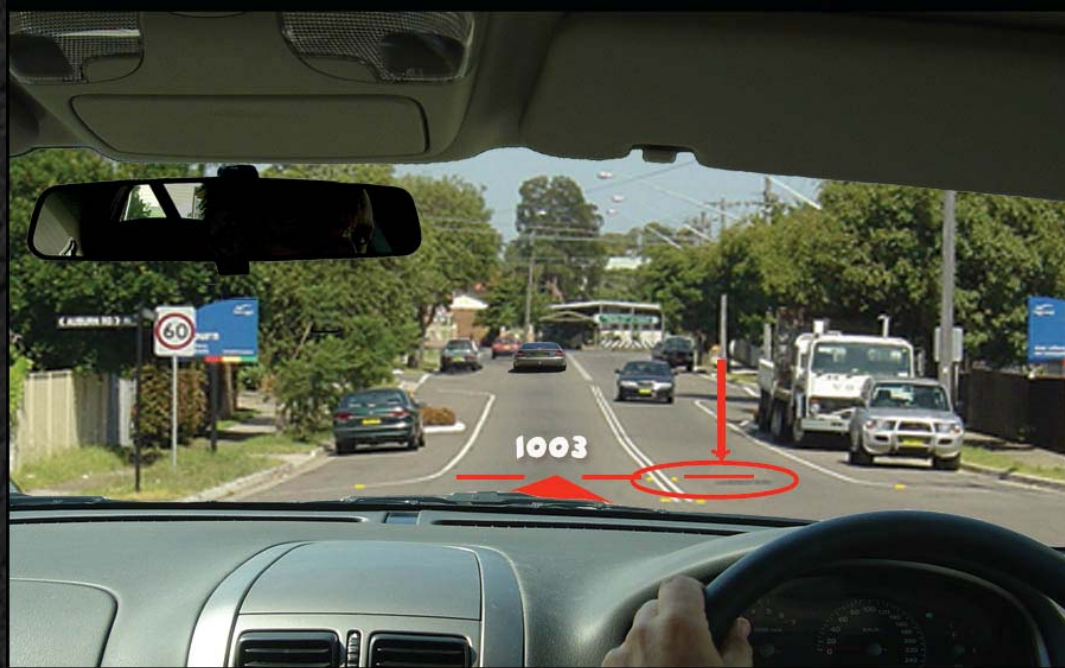
Simply select stationary point ,  
when the vehicle in front of you passes that point start counting  
“one thousand and one, one thousand and two...”



Guiding via stationary object (never a moving one) can be any thing on or near the road such as sign posts, light poles, painted markings, reflective lights, pot holes or patches, shadows, parked cars etc

“... one thousand and three”.

If you reach the stationary point before you count 'one thousand and three' you are too close (on a dry road). Slow down and drop further back.



As soon as the surface gets wet, or even just damp, three seconds becomes inadequate !  
Use at least a **4-second gap** on a **wet road** and **10 seconds** on **icy roads**.

When the road is icy, covered with compacted snow, or fuel has been spilled the 'braking distance' for your vehicle can be as much as ten times further than for dry roads.  
Remember that the 'first rain' is as dangerous as ice on the road !

If other driver cuts in front of you,  
restart your count on their vehicle and drop back once more.

It may test your patience, but it's better than being injured  
because you were simply driving too close and couldn't stop.

A US experiment has shown that driving from Philadelphia to New  
York City, a 100 mile trip, using a 2-second rule added a total of  
two minutes to the drive time.

If the 3-second rule is used, accident avoidance is increased  
by 70 percent over the 2 - second rule.

**"The driver ahead stopped suddenly"...**

Hitting the car in front simply means  
you weren't paying enough attention to the weather  
or the road surface conditions  
and either you didn't leave a big enough gap between the vehicles  
or you were driving too fast for those conditions.

**BE PREPARED FOR THESE THINGS.**

## What if you have been tailgated?

Keep in mind that when someone is tailgating you ,  
you have to add their following distance to yours,  
so if you have to react you've got the extra time and space  
to slow or stop without the tailgater hitting you.  
just get them " off your back" , pull over and let them pass !

**DRIVE SMART !**

# SAFE DRIVING TIPS

Watch a couple of cars ahead of you ,  
not just the one right in front

Scan the road for possible hazards

Anticipate others reaction and be ready to react

Maintain at least a 3 sec gap (appropriate for the conditions)

AUBURN & PARRAMATTA  
CITY COUNCILS  
ENCOURAGE SAFE DRIVING !

An initiative of the Local Government Road Safety Program  
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