



# Congestion Conundrum

## Summary

In this lesson, students compare the space used by different modes of transport. They learn about how much space cars take up compared to pedestrians and bike riders. Students investigate, explore, propose, and implement opportunities to increase their physical activity levels at school and at home and begin to understand ways to reduce traffic congestion around their school. See also *Links to Western Australian Curriculum* on page 8.

Year level: Year 3 to Year 8  
Teaching and learning resource.

## Learning outcomes

Students will be able to:

- Actively participate and cooperate with group members during hands-on activities;
- Visualise the space taken up by different modes of transport;
- Recognise that cars take up more space than walkers and cyclists;
- Identify problems caused by traffic congestion, and;
- Identify ways to reduce traffic congestion around the school.

## Preparation

### Resources

- Bus, bike, car congestion photo displayed to class.
- Map of your school with local road network. To print out a map: go to Google Maps, type in your school's name, zoom into the school area with bordering roads, Save the screenshot (press *Ctrl + PrtScn* on MS Windows – press *Shift, Command and 3* on a Mac) and paste into a new document, then print on A3 paper).
- Three different coloured markers.
- Whiteboard or electronic screen
- Mobile device to take photos of the activities.



## Background notes

More than 2 million people call the Perth and Peel region home. This number is estimated to grow to more than 3.5 million by 2050.<sup>1</sup> What this could mean to the liveability of Perth in terms of traffic management and pollution control is hard to imagine. As we move towards this population milestone, we will need to make changes to the city's transport network to keep Perth and Peel moving.

We need to plan for a transport network that will drive urbanisation and more density around key transport infrastructure and provide easy access to work, education, and other activity centres. Part of the solution lies in educating young people who live in Perth and Western Australia. An appreciation of the values of walking, cycling and using public transport may preserve the liveability of Perth.

### Did you know?

- The journey to school comprises approximately 18.4 per cent of morning peak transport trips in the Perth metropolitan area <sup>2</sup>
- 80% of trips in the Perth metropolitan area are made by private vehicle, of which 10% are for distances less than one kilometre<sup>3</sup> (equivalent to a 10 minute walk).
- Average car travel times in peak periods to Perth schools over the next decade are predicted to increase by approximately 40 per cent<sup>2</sup>.
- A recent RAC survey suggests 85 per cent of parents/carers experience 'heavy congestion or traffic jams' outside their local school<sup>4</sup>
- In Perth, for regular peak hour drivers, 38 minutes was the average commuting time<sup>5</sup>.
- The annual economic cost of car travel to school in Perth is around \$186 million<sup>6</sup>, including \$90 million for travel time; \$65 million for vehicle operating costs; and \$30 million for crashes <sup>2</sup>.
- 11.87 million Australians aged 14+ (54.6%) used public transport at least once during the March quarter 2023. This is up over 2.9 million (+32.4%) from the March quarter 2022, and an increase of almost 5 million from the September quarter 2020<sup>7</sup>
- When comparing bike counts of 2018-19 (pre-COVID-19) and 2022-23, there has been a 10 per cent aggregate growth in bike riding, which indicates some of the growth recorded during the pandemic has been sustained<sup>8</sup>.
- Approximately 373,300 Western Australians were riding a bike weekly in 2023<sup>9</sup>.

<sup>1</sup> WA Department of Transport - Perth and Peel@3.5million: Transport Network <https://www.transport.wa.gov.au/projects/perth-and-peel-3-5million-transport-network.asp>

<sup>2</sup> WA Department of Transport, 2021, The declining rate of walking and cycling to school in Perth <https://www.transport.wa.gov.au/activetransport/active-travel-to-school.asp>

<sup>3</sup> Office of the Auditor General, Main Roads Projects to Address Traffic Congestion, 2015, [https://test.audit.wa.gov.au/wp-content/uploads/2015/03/report2015\\_02-TrafficCongestion.pdf](https://test.audit.wa.gov.au/wp-content/uploads/2015/03/report2015_02-TrafficCongestion.pdf)

<sup>4</sup> RACWA, RAC survey reveals dangers of school drop-offs, <https://rac.com.au/about-rac/media/media-releases/february-2020/rac-survey-reveals-dangers-of-school-drop-offs>, website accessed March 2020.

<sup>5</sup> RACWA, How much of your life do you spend in a car?, <https://rac.com.au/car-motoring/info/commuting-times-perth> 2021

<sup>6</sup> From Strategic Transport Economic Model (STEM), base model 2016.

<sup>7</sup> Roy Morgan, Public transport use increases in March quarter 2023, Article 9281, June 2023 <https://www.roymorgan.com/findings/9281-public-transport-patronage-rises-post-pandemic-july-2023>

<sup>8</sup> WA Department of Transport, Western Australian Bicycle Network Plan - Annual Progress Report 2022-23 <https://www.transport.wa.gov.au/projects/wa-bicycle-network-plan.asp>

<sup>9</sup> Department of Transport 2023, People's Pulse Report. Active Travel Community Insights 2022-23

## Teaching and learning ideas

Teachers are encouraged to use a range of the teaching and learning ideas provided. The teaching and learning ideas provide opportunities to address multiple learning areas. Teachers can modify and extend ideas for different year levels and phases of schooling. Teaching ideas have been aligned to the Western Australian curriculum including identification of learning area, strand and sub-strand.

### Activity 1 - Space used by different transport modes

1. Using the congestion photo below, compare the space taken up by people standing, people on a bike, people in a bus, and in cars. These photographs show 76 pedestrians, 76 cyclists and 70 cars (ratio = 1.06 passengers per car).
2. Rank the pictures below from the largest to the smallest space used to transport the same amount of people.



Rank the pictures from largest to smallest space.

### Extension Activity – How many walkers fit in a car bay?

Take the class outside to an empty car-parking bay. Explain that the car bay will fit one car. Ask students to predict how many walkers will fit inside the same space. Then ask students to stand in the space to find out. Take a photo and post it on [www.yourmove.org.au](http://www.yourmove.org.au) to earn points.

- Choose appropriate units of measurement for length, area, volume, capacity and mass to compare the objects. What other objects could be used in the comparison?
- Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units.
- Compare objects using familiar metric units of area and volume -eg bus, car, bike, adult.
- Solve problems involving the comparison of lengths and areas using appropriate units -eg How many students could fit into the space of 5,10?

- Recognise, represent and order numbers to at least tens of thousands- If one car bay can fit \_\_\_\_\_ students in that space. How many car bays would be used for
- 100 students?
- 200 students?
- 500 students?
- The number of students at your school?
- 1000 students?
- Solve problems involving addition and subtraction of fractions with the same denominator.

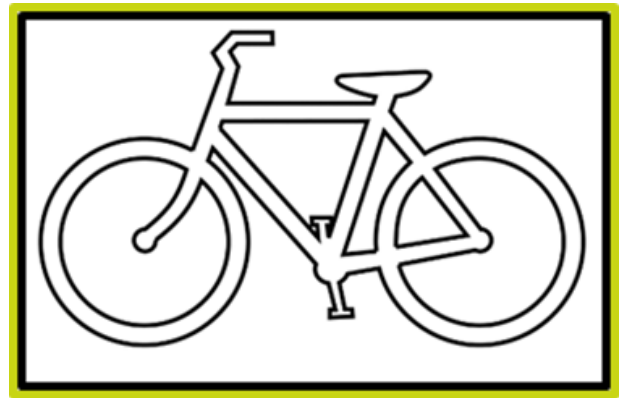
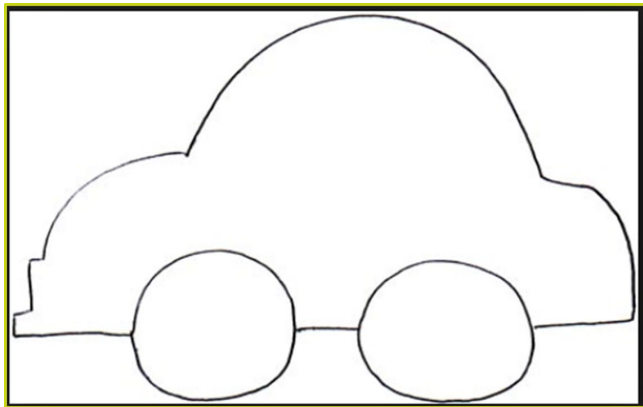
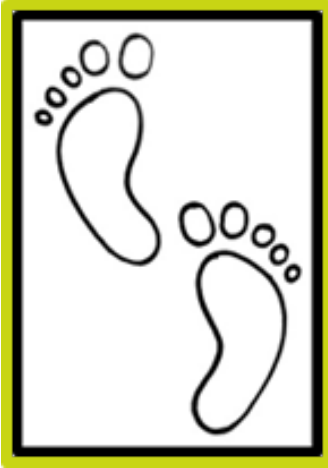
## **This part of the activity is suitable for primary and secondary students**

- Display the “Did you know facts?”
- In groups choose one of the facts and propose/create a solution to improve this outcome.
- Include how you would promote and evaluate the success of this plan.
- How would you create an active neighbourhood?
- How walkable is your neighbourhood?

## **Activity 2 - Space used by our class**

1. Give each student one copy of the sheet below (pictures of car, feet, bike and scooter).
2. Compare the space taken up by one car, one walker, one bike and one scooter. One car-parking bay will comfortably fit 12 bikes or 20 walkers.
3. Ask students to cut out the picture that describes how they travelled to school that day. If they came by public transport, they used the same space as walkers. They can decorate their picture. This activity can be modified to allow students to create images of how they travelled you school using ICT or designs from The Arts.
4. This can also be completed as a mathematics activity where students describe and draw two-dimensional shapes, with and without digital technologies or make models of three-dimensional objects and describe key features.
5. Ask students to place their travel mode picture on a central desk, grouping all the car pictures together, all feet pictures together, all bike pictures together, and all scooter pictures together.
6. Compare the space taken up by the different modes or travel. Which takes up most space?
7. Discuss ways to reduce the road space taken up by the class (eg. more students walk to school).
8. Take photos of this activity and during an ICT class, post them on [www.yourmove.org.au](http://www.yourmove.org.au) to earn points.

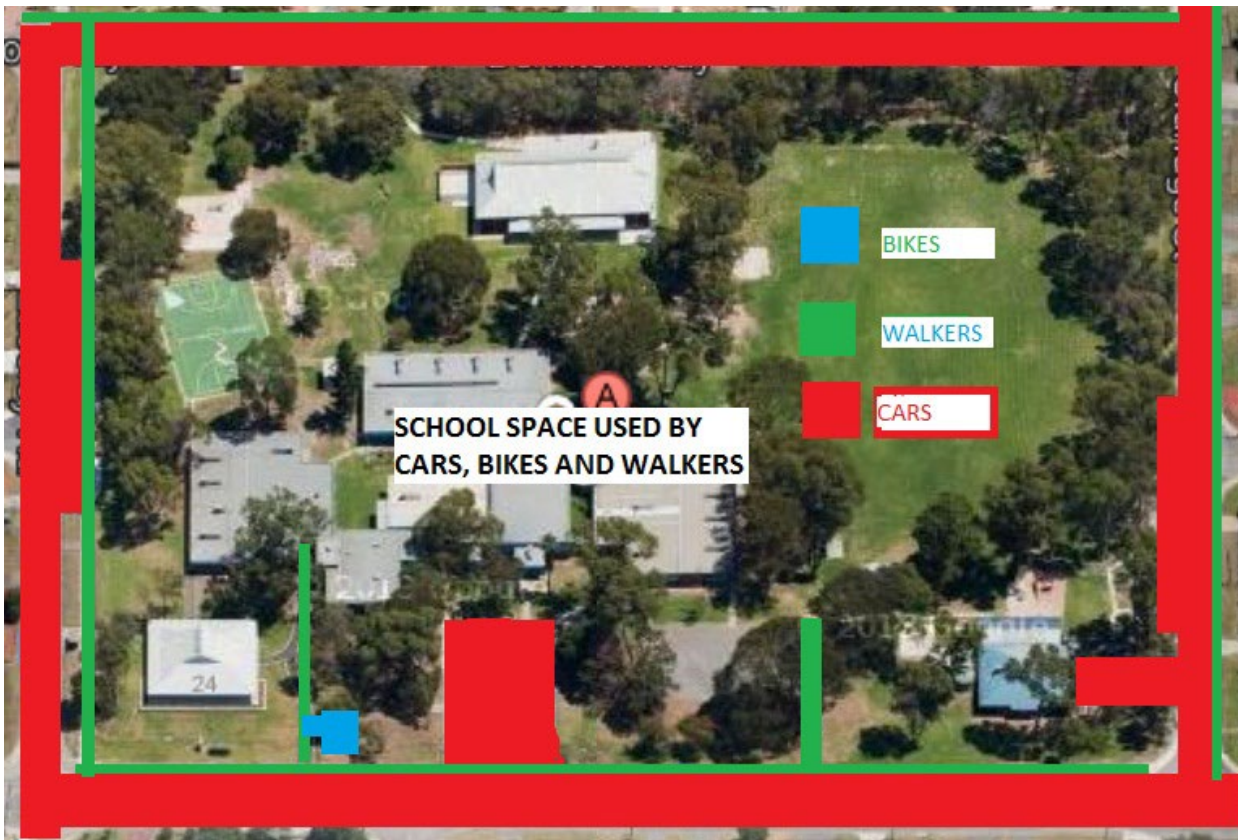
**Cut out the picture below that describes how you travelled to school today:**



## Activity 3 - Space used by our school

Use the map of your school area.

1. Ask students to identify the areas on the map used by cars and have a student colour those in 1 colour (eg. roads, staff car-park, parent car-park, entry points for cars).
2. Ask students to identify the areas used by bikes and scooters and use a different colour to highlight them (eg. shared paths, footpaths, bike racks, scooter racks).
3. Ask students to identify the areas used by walkers and public transport users and use the third and final colour to highlight them (eg. footpaths, shared paths, bus stop).
4. Compare the space at school dedicated to cars, to walkers and to cyclists.
5. Older students could use their maths skills to calculate the areas and percentages, and present the information in a pie chart.



## Activity 4 – Let’s get creative!

1. Use the school map from Activity 3 above.
2. Identify those areas around the school that are used by cars.
3. Ask students to imagine other uses for these spaces. What would you like to see there instead of a road or car park? Some ideas could include a playground, vegetable garden, biodiversity garden, basketball court or bicycle parking.
4. Propose and implement opportunities to increase their physical activity levels at school and at home.
5. Ask students to draw a picture of their ideas.
6. Present findings and conclusions in a range of communication forms (e.g. written, oral, visual, digital, tabular, graphic), appropriate to audience and purpose, using relevant terms.
7. Post some of the pictures of the students work on the [Your Move website](#) to earn points.

## Activity 5 - Class discussion on congestion (suitable for years 4-8)

In the classroom, ask students “What is traffic congestion?” A simple definition is when roads and car parks become overcrowded and clogged up with vehicles.

1. Ask students “Is there a congestion problem at this school? Do the streets and car parks get overcrowded before and after school?”

2. Ask students “What’s the problem with congestion?” Get them to brainstorm their ideas with a partner and then write some class ideas on the board. Ideas include:
3. Increased travel time which may result in delays and late arrival for school.
4. Reduced safety on roads and in carparks. There is a higher chance of collision due to tight spacing and constant stopping and going.
5. Stressed and frustrated motorists, encouraging road rage and reduced health of drivers.
6. Increased burden on our health system with a less physically active community from people sitting for longer periods in their cars.
7. More “rat running” on our residential streets as motorists look for short cuts.
8. Increased idling, acceleration and braking which wastes fuel, increases air pollution, increases carbon emissions, and leads to more wear and tear on vehicles.
9. Reduced quality of life for those who have no choice but to drive (eg. long trips that have no public transport service) and
10. Blocked traffic may interfere with the passage of emergency vehicles travelling to their destinations where they are urgently needed.
11. Use the whiteboard to draw a table with headings like those in Appendix A: Solutions, Pros and Cons.
12. Ask students “What are possible solutions to congestion around our school?” Write their ideas under the first “Solutions” column. You may need to prompt using the ideas in the table below.
13. Ask students “What are the pros and cons of each solution”. Ask them to consider the environmental, social and economic impacts of each solution. Add their ideas to the table. You may need to prompt using the ideas in the table below.
14. Ask students to rank the solutions from least to most popular.
15. Post some of the pictures of the students work on the [Your Move website](#) to earn points.

## Activity 6 Primary and Secondary

1. What strategies do you use to make informed choices to promote health, safety and wellbeing?
2. In groups collate all the strategies that could be used to make informed choices to promote health, safety and wellbeing.
3. Define a problem, and a set of sequenced steps, with users making decisions to create a solution for a given task.
4. Make predictions, provide evidence for their predictions and compare them with results.
5. Discuss and compare results to form common understandings.

## Extension activity: how long does it take to walk or cycle to school?

- Ask students to predict how long it takes to walk or cycle to school from their home. For those students who live too far away to walk, ask them to walk the last kilometre to school.
- Ask students to time their walk or cycle to school using a watch or timer.

- Discuss their results. Were their predictions correct? Did they enjoy the walk/cycle? What and who did they see along the way?

## Assessment Ideas

Ask students to write a letter home to their parents that explains what they learnt in class during the above activities. The contents of the letter can be used to assess student understanding and identify misconceptions.

- Did the student actively participate and cooperate with group members during hands-on activities?
- Was the student able to visualise the space taken up by different transport modes?
- For years 4-7, did the student identify ways to reduce traffic congestion, or offer an opinion about the pros and cons of one solution?

## Links to the Australian Curriculum

Table 1: English

Strand	Sub-strand
Language	<ul style="list-style-type: none"> <li>• Expressing and developing ideas</li> <li>• Vocabulary</li> </ul>
Literacy	<ul style="list-style-type: none"> <li>• Interacting with others</li> <li>• Listening and speaking interactions</li> <li>• Interpreting, analysing, evaluating</li> <li>• Analysing and evaluating texts</li> <li>• Creating texts</li> </ul>

Table 2: Maths

Strand	Sub-strand
Measurement and Geometry	<ul style="list-style-type: none"> <li>• Shape</li> <li>• Location and transformation</li> <li>• Using units of measurement</li> <li>• Data representation and interpretation</li> </ul>
Number and algebra	<ul style="list-style-type: none"> <li>• Number and place value</li> <li>• Fractions and decimals</li> </ul>

Table 3: Humanities and Social Sciences

Strand	Sub-strand
Geographical Knowledge and Understanding	<ul style="list-style-type: none"> <li>• Places have distinct features (Year 1)</li> </ul>



	<ul style="list-style-type: none"> <li>• The Earth’s environment sustains all life (Year 4)</li> <li>• Factors that shape the human and environmental characteristics of places (Year 5)</li> </ul>
Humanities and Social Sciences skills	<ul style="list-style-type: none"> <li>• Questioning and Researching</li> <li>• Evaluating</li> <li>• Analysing</li> <li>• Communicating and Reflecting</li> </ul>
Civics and citizenship skills Knowledge and Understanding	<ul style="list-style-type: none"> <li>• Communities</li> </ul>

**Table 4: Health and Physical Education**

Strand	Sub-strand
Personal, social and community health	<ul style="list-style-type: none"> <li>• Being healthy, safe and active</li> <li>• Contributing to healthy and active communities</li> </ul>
Movement and physical activity	<ul style="list-style-type: none"> <li>• Moving our body</li> <li>• Learning through movement</li> </ul>

**Table 5: Technologies - Design and Technologies**

Strand	Sub-strand
Creating solutions by	<ul style="list-style-type: none"> <li>• Investigating and defining</li> </ul>

### Cross Curriculum Links:

Health and physical education, English, Science.

### Cross Curriculum Priorities:

Sustainability.

### General Capabilities:

Literacy, Numeracy, Critical and creative thinking, Personal and social capability, Ethical understanding.

## Web links

A short film of the making of the congestion images from Fremantle:

<http://www.youtube.com/watch?v=3PqcLoDEKq0>

<http://healthyactivebydesign.com.au>

<https://www.transport.wa.gov.au/projects/perth-and-peel-3-5million-transport-network.asp>

<https://www.transport.wa.gov.au/activetransport/active-travel-to-school.asp>

[https://test.audit.wa.gov.au/wp-content/uploads/2015/03/report2015\\_02-TrafficCongestion.pdf](https://test.audit.wa.gov.au/wp-content/uploads/2015/03/report2015_02-TrafficCongestion.pdf)

<https://rac.com.au/about-rac/media/media-releases/february-2020/rac-survey-reveals-dangers-of-school-drop-offs>

<https://rac.com.au/car-motoring/info/commuting-times-perth>

<https://www.transport.wa.gov.au/projects/wa-bicycle-network-plan.asp>

<https://www.transport.wa.gov.au/activetransport/evaluation-monitoring-and-reporting.asp>

## Appendix A – Congestion Solutions

Congestion Solutions		
Solutions	Pros	Cons
<b>Build more roads and car parks</b>	Provides access for people who cannot walk, cycle or catch public transport.	<p>Expensive – it costs Perth’s local governments approximately \$600,000 to build one linear kilometre of suburban street near a Perth primary school<sup>10</sup>.</p> <p>Destroys natural environment, generates heat, impermeable.</p> <p>Takes up space that could be used for other things (one car-parking space will fit 1 car, or 12 bikes, or 20 walkers).</p> <p>Reduces road safety for walkers and cyclists as there are more cars to avoid and roads to cross.</p> <p>New roads and car parks are not in themselves a solution to congestion as they create more demand<sup>11</sup>.</p>

<sup>10</sup> Based on advice from Main Roads WA and Local Government Authorities. These costs exclude planning, design, drainage, utilities, removal of unsuitable material, tipping costs, line marking and treatment costs, etc. Costs vary greatly, depending on location and treatments used.

<sup>11</sup> Australian Government, 2010, *Our Cities – Building a Productive, Sustainable and Liveable Future*.

<b>Toll roads and parking fees</b>	<p>May deter some people from driving and parking as it becomes more expensive.</p>	<p>Expensive system to set up and maintain. Disadvantages those on low incomes. Those who can afford it will still drive and park, so may not ease congestion.</p>
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<b>Catch buses and trains</b>	<p>Can be faster than driving during peak periods, particularly with trains and bus lanes.</p> <p>Cheaper than driving and maintaining a car.</p> <p>Safer than driving.</p> <p>Takes up less space than same number of drivers. Perth buses can carry a maximum of 82 passengers<sup>12</sup>. The 3 car-set B-series trains in Perth carry approximately 560 passengers<sup>13</sup>. The 2-car set A-series trains carry approximately 380 passengers<sup>14</sup>.</p> <p>Builds community as people meet at bus stops, train stations and commute together.</p>	
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<b>Walk and cycle</b>	<p>Takes up less space. 20 walkers or 12 bikes can fit into the same space as 1 car bay.</p> <p>Cheapest form of transport infrastructure.</p> <p>Inexpensive to build bike paths &amp; footpaths. It costs Perth's local governments approximately \$55 to build one square metre (or \$110,000 per linear kilometre) of shared concrete path around a Perth primary school<sup>15</sup>.</p> <p>Promotes healthy, active lifestyles.</p> <p>Less car traffic and 'more eyes on the street' lead to safer streets.</p> <p>Reduces air and noise pollution.</p> <p>Builds community as neighbours meet when walking and cycling.</p> <p>Most of us live within walking or cycling distance from school (10 minutes walk).</p>	
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<sup>12</sup> Office of the Auditor General, 2017, *Planning and Management of Bus Services*.

<sup>13</sup> Wikipedia, Transperth B Series Trains, 2023, [https://en.wikipedia.org/wiki/Transperth\\_B-series\\_train](https://en.wikipedia.org/wiki/Transperth_B-series_train)

<sup>14</sup> Wikipedia, Transperth A Series Trains, 2023, [https://en.wikipedia.org/wiki/Transperth\\_A-series\\_train](https://en.wikipedia.org/wiki/Transperth_A-series_train)

<sup>15</sup> Based on expert advice from Main Roads WA and Local Government Authorities. These estimated costs exclude planning, design, drainage, utilities, removal of unsuitable material, tipping costs, line marking and treatment costs. Costs of paths vary greatly, depending on location and treatments used.