

Reducing Road Accidents

Assessing the learning

Case Study description

Pupils examine ways of reducing road accidents using a real world simulation.

Suitability

National Curriculum levels 5 to 7.

Time

The assessment activities are part of the Case Study; they can be completed within the lesson and homework time for it.

Resources

All the resources are listed within the Case Study.



Opportunities to assess Key Processes

The lessons are inter-related hence evidence of any of the Key Processes may be seen at any time. The following reflects evidence gathered through trials.

- **Representing:** during lessons 2, 3 and 4
- **Analysing:** during lessons 1, 2, 3 and 4
- **Interpreting and evaluating:** during lessons 1, 2, 3 and 4
- **Communicating and reflecting:** during lessons 3 and 4.

In addition to assessment of the Key Processes, there are opportunities to assess Range and Content (detail is within the Case Study) and some of the other personal, learning and thinking skills, particularly for 'team working'.

Sample response: Pupil A

Comments

Pupil A explained why some photos and incidents match, but needed teacher support to complete the activity. It is not possible to work out the exact location of the accident from her incident report.

Probing questions and feedback

- You be the driver. I'll be the casualty. Please help me understand exactly where I was and how the incident happened?*

Pupil A would benefit from working on a range of practical activities to help develop her understanding of position.

Police Record 6							
Time	11.00am	Day	Tuesday	Date	12 th May	Year	3
Location of accident				Map Reference			
Church lane							
Name of casualty				Age of casualty			
Callum Fraiser				31			
Vehicle	Pedestrian	Cyclist	Car	Motorbike	Other vehicle		
Road Conditions	Dry		Wet	Snow	Frost/Ice		
Speed limit	10	20	30	40	50	60	70
Severity	Fatal		Serious		Slight		
Description of accident							
He turned right on to Church lane but a car pulling out of the church made Callum swerve out of the way, as it was frosty he collided with a lamp post and the motorbike exploded. Fatal							

Sample response: Pupil B

Comments

Pupil B created a mostly accurate solution which he checked and explained. However his map references lacked accuracy. His incident report was ambiguous since the infants' school is not due south from the bridge and his map reference confirmed a lack of understanding of scale.

Probing questions and feedback

- Please show me East 805 North 1150 on the map? Now move east in steps of 5. How does that help you to see that your map reference was not accurate? Can you improve it?*

Pupil B would benefit from working on a range of practical activities to help develop his understanding of scale.

Police Record 6							
Time	10.00 PM	Day	Sunday	Date	25/12/10	Year	1970
Location of accident				Map Reference			
Bridge near Infants school				805 1150			
Name of casualty				Age of casualty			
Gwenher Bevil				85			
Vehicle	Pedestrian	Cyclist	Car	Motorbike	Other vehicle		
Road Conditions	Dry		Wet	Snow	Frost/Ice		
Speed limit	10	20	30	40	50	60	70
Severity	Fatal		Serious		Slight		
Description of accident							
Mr Bevil was walking due South towards the infants school across the bridge on the main road. He was hit by a motor cyclist. The suspension of the motor bike became lodged in his stomach and he died instantly.							

Lesson 2: Formulating hypotheses

Pupils explore possible causes of accidents, developing hypotheses as they work.

Teacher guidance

Observe how well pupils:

- Use the data to make general statements
- Back up their statements with evidence



Questions to ask:

- *Does a (bar chart/pie chart) show the data effectively? Why/why not?*
- *Are there any other factors that you could consider?*
- *How confident are you that you have identified the most important patterns and the probable causes?*

Assessment guidance: Progression in Key Processes

	Representing	Analysing	Interpreting and evaluating
PROGRESSION 	Needs teacher support to help break down the task	Finds a relevant pattern in the data, eg most accidents happen to males	Gives evidence to support own relevant pattern
	Chooses a way to review the data	Finds more than one relevant pattern in the data	Gives convincing arguments to support own relevant patterns
	Uses diagrams and graphs to support the arguments	Finds a wide range of patterns within the data <i>Pupil pair C</i>	Uses graphs and/or diagrams effectively to support reasoned arguments
	Shows understanding of the most appropriate means of presenting reasoned arguments <i>Pupil pair C</i>	Works independently to structure the analysis in order to reach detailed arguments	Uses graphs and/or diagrams effectively and concisely to support reasoned arguments <i>Pupil pair C</i>

Sample response: Pupil pair C



Comments

Pupil pair C analysed the data, formulating simple hypotheses. Their work in the following lesson (some of which is shown below) confirmed they understood how evidence is used to support their claims.

Probing questions and feedback

- *Why did you choose to use a pie chart to show the incidents? What other options did you consider?*

The pupils may benefit from working without structured support, such as that provided by the worksheet, when they analyse data and write a report.

S7: Making notes on your ideas (optional)

Each time you think you have found a possible cause of accidents, note down your thoughts in this table:

What is a possible main cause of accidents? <i>Pedestrian people being hit by cars on busy roads</i>	
Where do they occur? <i>By busy roads and schools, especially on corners and roundabouts</i>	What is my evidence? <i>Most of the ^{cluster of} accidents are by the main roads and outside schools</i>
When do they happen? <i>Most of them happen at 8am-9am and 3pm-4pm. On the 4th year, Friday, and in February</i>	What is my evidence? <i>On the graph it proves it because in Feb it's cold and icy and on Fridays children are in a rush to get home for the weekend</i>
Who do they happen to? <i>School students between 5-16</i>	What is my evidence? <i>Because they are young of age and are outside the school</i>
What might be done to reduce the number of accidents? <i>Put more zebra crossings and traffic lights up and reduce speed limit</i>	

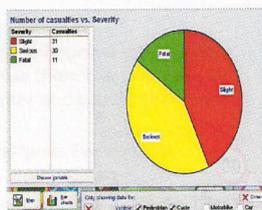
Our criteria

We have concentrated on fatal and serious accidents. The areas where the most occurring dots, show we need to take action on particular incidents.



Pie chart of serious and fatal incidents.

The pie chart, as you can tell shows us that 72 cyclists and Pedestrians were involved in many serious and fatal accidents. That's 58%



Infant School

All of the red dots are all in a specific area. They all have 3 things in common:

- ★ All were pedestrians
- ★ All were attending the school
- ★ All incidents occurred just before or after the end of school



Lessons 3 and 4: Making and presenting a case

Pupils decide how to allocate money to reduce accidents. They present arguments to support their decisions and consider arguments offered by others.

Teacher guidance

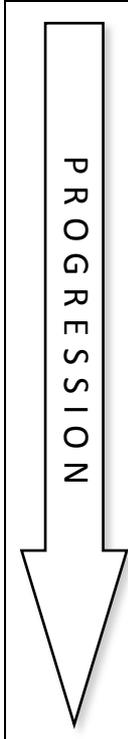
Observe how well pupils:

- Choose what to present and how to present it
- Create a detailed but concise report that includes reasoned arguments and clear conclusions
- Reflect on their own approach and those of others

Questions to ask:

- *Have you considered any other possible causes? Or solutions?*
- *How confident are you that your solution is likely to save the most lives? Why?*
- *How will you convince others about your proposal? Would it convince 'Dragon's Den'?*

Assessment guidance: Progression in Key Processes

	Representing	Analysing	Interpreting and evaluating	Communicating and reflecting
 PROGRESSION	Needs teacher support to help break down the task	Draws simple conclusions Pupil trio D	Presents evidence to support simple conclusions Pupil trio D	Creates a simple report; gives simple feedback to others Pupil trio D
	Chooses which information to use, selects simple tools Pupil trio D, Pupil pair E	Draws conclusions, processing data correctly Pupil pair E	Presents evidence to support conclusions Pupil pair E	Creates a report that includes major issues; gives feedback to others
	Chooses which information to use, selects effective tools	Draws effective conclusions, using simple statistics	Uses graphs and/or diagrams effectively to support convincing arguments	Communicates effectively; gives effective feedback and reflects on own approach Pupil pair E
	Uses a wide range of appropriate tools, eg symbols, diagrams, tables and graphs Pupil pair F	Draws effective conclusions, using appropriate and effective statistics Pupil pair F	Uses a range of forms effectively to support concise, reasoned arguments Pupil pair F	Communicates effectively using a range of forms; gives insightful feedback and reflects on a range of approaches Pupil pair F

Sample response: Pupil trio D

How to reduce the road accidents

These are our ideas

Measures	Cost	North	East
Road narrowings	£10,000 per road	390	1400
Traffic lights	£30,000 per light	1300	1000
School crossing patrol	£5,000 per year	700	270
Budget £100,000	Money spent £5,000	1250	600
		250	1450
		Money left £195,000	

road narrowing's

We are going to narrow the road near the bridge so the cars will see pedestrians coming



We hopefully stop these accidents

School crossing patrol

we are putting a school crossing patrol at the secondary school because a lot of people are run over at the secondary school it will prevent six accidents a year and one death



This is the secondary school and all the accidents involve pedestrians

Traffic lights

We are putting two traffic lights in the area surrounding the primary and junior school because there are many incidents around that area and most involve pedestrians so the traffic lights will reduce those accidents



Comments

The pupils drew some correct conclusions, but made an error in their total cost. The amount of evidence is limited as was their oral feedback to others. However, their reflection showed an awareness of how they might improve.

Probing questions and feedback

- Now that you have heard presentations from other groups, what would you change about your presentation and why?*

The pupils would benefit from undertaking other tasks that required them to present their solutions. A 'dummy run' of their draft presentation would enable the teacher to use probing questions to help move forward their understanding.

What was good about what we did?
It was clear and we thought outside the box. We linked it to other problems as well. We used print screens to back up our answers.

How could our own reasoning have been improved?
If we had had more evidence to back up our reasoning. If we had used more graphs as evidence and used more persuasive vocabulary. more graphs.

What did we forget? What did we do wrong?
We maybe had a bit too much information. We should have had more graphs. Maybe our vocab needed to be more persuasive.

After reflection...What have you learned from this activity?
Presentation is a big part of maths. That how you present something is a big part of a successful idea, also how much maths is a big ~~part~~ part of it. Not to read off the board. Say it in your own words.

Was there knowledge or a skill you learnt from someone else in the group?
Sarah linked different ideas, she was very creative. That you shouldn't read directly off a powerpoint.

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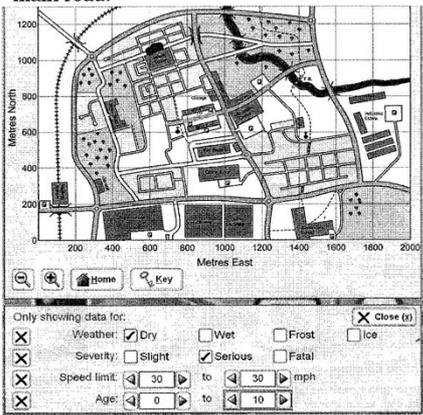
Sample response: Pupil pair E

Our solution

Most accidents take place in dry weather with serious impacts. Statistics show that the vehicle, would usually be travelling at 30 mph and the accidents would commonly involve pedestrians and cars.

To help solve these accidents we have come up with a few ideas which we believe will benefit this town in a great way, resulting in the number of accidents being reduced providing you with a safer town.

Firstly our number one priority would be the infant school. Children are being injured by cars speeding along the schools main road.

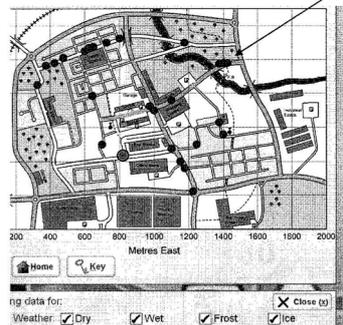


One possible solution would be to employ a lollipop lady to prevent vehicles colliding with the children. We would place her roughly at 1,125 North and 600 East.

The time of all these accidents were either before or after school, employing a lollipop lady is good because she doesn't need to stay the night only a few hours when school starts and school finishes. This would cost only £5,000 a year and much better than a pelican crossing because it is almost three times cheaper and just as effective.

Only showing data for: Dry Wet Frost Ice
 Slight Serious Fatal
 Speed limit: to mph
 Age: to

Our second most common accident would be by the bridge. Cars are going over the bridge while at the same time pedestrians are crossing the unsafe footpath. Cars can't see the pedestrians crossing and the pedestrians are unaware of the cars. This is a very dangerous situation. The weather does not cause these accidents as it is shown on the map; these accidents are caused by pedestrians and cars not being aware of each other. To solve this dangerous situation we would place a pelican crossing where the bridge and the footpath meet. The coordinates for this would be; 980 North and 1380 East.



This would cost 18,000 and is better than traffic lights because it is cheaper and includes traffic lights anyway. This would be increasing the safety for almost 1/3 of the cost of traffic lights.

Only showing data for: Dry Wet Frost Ice
 Slight Serious Fatal
 Speed limit: to mph
 Pedestrian Cycle Motorbike Car

Comments

The pupils gave a clear account of their proposed actions but used limited statistics in support of their approach. They were effective in giving supportive but critical comment on presentations by other groups.

Probing questions and feedback

- *Did you consider including graphs, diagrams or percentages to illustrate the scale of the problem? How might that help the audience?*
- *A summary of recommendations is usually given in a report. What key facts would you need in your summary and why?*

The third problem would be car and pedestrian accidents around the entrance and exits of car parks. Cars are speeding into and out of the shopping centre car park knocking over pedestrians in the way. This happens mostly in dry weather however it increases when it is raining or wet. The cars are travelling at approximately 30mph.

Our solution would be to have barriers when you come in and go out of the car park and have to pay for a ticket because that would slow people down a great deal. We would put them just before the entrance and just outside the entrance. This is also a good idea because it gives you a good daily income because so many people use the shopping facilities. This would cost approximately £30-40,000. This may look expensive but with your daily income of the cost of parking it would cost as much as you think.

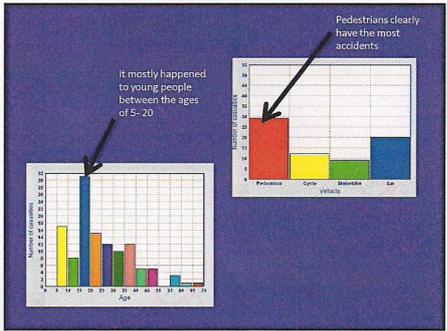
Another solution would be to put speed bumps in the car park and outside the car park which would cost £1,000 a bump but both these solutions would really cut down on the amount of accidents.

Pupil pair E would benefit from engaging with further problems in which they are challenged to use quantitative/statistical arguments to support, justify and then rank recommendations.

Sample response: Pupil pair F

How to reduce road accidents

Who is it happening to?

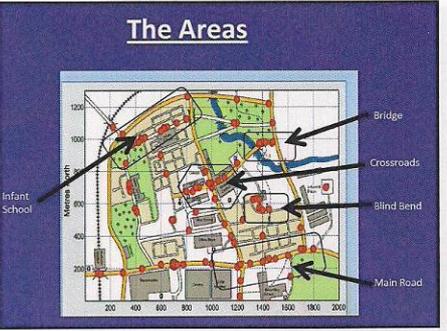


- From this information we have decided to focus on cyclists and pedestrians, between the ages of 5-20. The accidents we are concerned about are the serious and fatal ones.



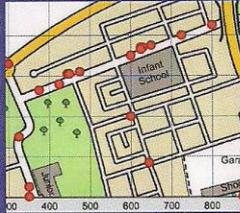
- As you may already know, global warming is currently a world wide problem that needs to be addressed. While addressing to this big problem of road accidents why not try and improve the global warming situation.
- By making walking or cycling safer we can encourage people to use these methods of transport.
- Not only is this ethically good, it will also reduce car and motorbike accidents as instead of driving people will cycle and walk.

Where are the accidents happening?



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The Infant School



We noticed that many serious accidents were happening outside and near the infant school to pedestrian children aged around 5 years to 10.

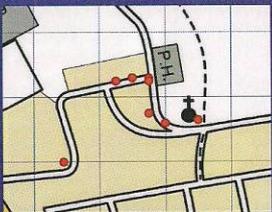
Lollipop lady

- Although there are lots of accidents further down the road the children can all safely cross in one place so they wont need to cross further down the road.
- We intend to trail the lollipop lady for 3 years, the cost of this is 15 000 pounds.



We propose a lollipop lady placed here.

The Blind Bend



On the blind bend there have been serious and some fatal injuries due to cars not being able to see round the bend.

Mini Roundabout

- This will insure the cars can see both pedestrians, cyclists and other vehicles turning or about to turn around the corner.
- We would want to place 2 signs before the roundabout, one stating that it is 100 meters to mini roundabout and one saying 50 meters to mini roundabout.



We propose a mini roundabout here.

Costs

- The costs of all these safety precautions is 97 000 pounds.
- Infant school- 15 000
- Main Road- 24 000
- Footpath- 48 000
- Blind Bend 10 000
- We would save 10 lives and stop 24 serious accidents.

THANK YOU FOR WATCHING

We hope you feel we have spent our budget wisely and agree with all our methods to reduce the accidents.

Comments

The pupils structured their report effectively. They used statistics to justify their choices, and produced details of most, but not all of their proposals. .

Probing questions and feedback

- Do all your recommendations have the necessary information alongside?*
- Is it certain you would save 10 lives and stop 24 serious accidents? Why not? How do you think decisions made about the likely costs of saving lives in the real world?*

Pupil pair E would benefit from tackling further challenging activities that take them out of their comfort zone.