

Road safety

A group of road safety campaigners want to advise people about what factors affect the distance it takes a car to stop. You are going to use your physics knowledge and skills to help them. You will need to use your Working Scientifically, maths, and literacy skills.

Project overview

There are four parts to this project.

Part 1

You are going to read an article about road safety. You will be given some questions to answer. In pairs or groups, you can then discuss ideas about the science involved. You might want to think about what you have learned about forces. You can work together to think about some scientific questions. You need to turn one of your ideas into a question that you can investigate.

Part 2

You are going to plan your investigation. There are some questions to help you. Your answers will be assessed.

You will then carry out your investigation.

Part 3

You will answer some questions about your investigation. Your answers will be assessed.

Part 4

You will summarise what you have done in a Big Write. You will write a newspaper article using what you learned in your investigation.

Part 1

Read the article. Then answer the questions on the next page to show you have understood.

The **Activate** Herald

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45p

STOP!*By Michael Michelson*

ACTIVATE town council are worried about the increase in road traffic accidents in the winter. Accidents happen when cars cannot stop safely in an emergency. The council have monitored the traffic accidents during the year and noticed that there is a big increase in winter.

Town councillor David Davidson explained the problem.

‘Modern cars have lots of safety features to stop you getting injured. They have air bags. The air bags inflate when the car stops suddenly.



This stops the driver or passenger hitting their head on the steering wheel or dashboard.

Cars also have crumple zones at the front so that the car takes longer to stop if it hits something. This means that the passengers are less likely to be hurt.

We are concerned that drivers are not thinking about what happens when the road conditions change. Lots of accidents happen when it is raining. The friction between the road and the car tyres affects the distance that it takes the car to stop. When the road conditions change, the friction changes too.’

Councillor Davidson also explained that there are lots of different factors that affect the distance that it takes a car to stop.

Questions

1 Describe **three** different forces that may act to slow down a moving object.

- 1 _____

- 2 _____

- 3 _____

(6 marks)

2 Explain how **two** safety features of cars help prevent passengers being injured in an accident.

- 1 _____

- 2 _____

(2 marks)

3 Suggest **one** factor that could increase stopping distance and explain why it does this.

- _____

(2 marks)

Group discussion and research

In your groups, discuss the science behind the article. You can use Topic 9.3 in your book as a start, but you can also do some research into road safety. You may want to divide up the research between group members.

Here is a selection of websites that you can use:

- www.stoppingdistances.org.uk/
- www.physics4kids.com/files/motion_friction.html
- lgfl.skool.co.uk/content/keystage3/Physics/pc/learningSimulations/STDSC/launch.html

While you are doing the research, think about how you can design an investigation.

Deciding on a question

In your group, write down a list of ideas or questions that you could investigate. You need to decide on the question that you will investigate. Remember, it must be:

- a scientific question
- a question that you can answer by collecting data.

Part 2

Questions

1 a Think about your research. Name two sources that you used.

1 _____

2 _____ (2 marks)

b Which one of the sources helped you most to choose your question? Circle 1 or 2.

1

2

Explain your answer.

(1 mark)

2 Write down the question that your group has decided to investigate.

(1 mark)

3 Explain why your group has decided to investigate this question.

(2 marks)

This is a QWC question. You will get marks for:

- (6 marks)

- a prediction
- the variables that you will change, measure, and control
- what equipment you plan to use
- what you plan to do
- how you will do the investigation safely
- how you will collect data that is precise and accurate
- a table for your results

Investigation plan

[illegible]

[illegible]

Part 3

You have now completed your investigation.

In this part you will be **working independently** to:

- answer some questions about your investigation
- answer some questions about a similar investigation.

Questions

1 Name the variables in your investigation.

The independent variable was _____

The dependent variable was _____

The control variables were _____

(3 marks)

2 Look at your results.

a Did you repeat any results? Circle your answer.

Yes

No

b Explain why you did or did not repeat your results.

(2 marks)

3 a What was the range of the independent variable? Give the units.

From _____ to _____ units _____

(2 marks)

b Draw a graph of your results. You should use graph paper.

(3 marks)

c Look at your graph. Does it show a trend? Circle your answer.

Yes

No

Not sure

Describe what your results show.

(3 marks)

d Write down your prediction from part 2.

My prediction _____

Do your results support your prediction? Circle your answer.

Yes

No

Not sure

Explain your answer. You should use examples from your results.

(3 marks)

4 A tyre company has conducted some tests with model cars on different surfaces to see how well their tyres work. Here are their results.

	Stopping distance of model car (cm)		
Surface	Measurement 1	Measurement 2	Mean
sandpaper	45.0	48.0	46.5
ice	80.0	75.0	77.5
wet table	74.0	49.0	61.5

a Write a conclusion based on these results.

(1 mark)

b Suggest an explanation for your conclusion.

(1 mark)

5 Explain how these results link to the article about road safety.

(1 mark)

Part 4

The task

You are going to write a newspaper article. Your newspaper article will be for the Activate Herald. It will tell the story of what you have done.

There are three steps in this task.

- 1 Planning:** You should always do some planning before you start a Big Write. Choose all of the information you want to put in your article. You can use the planning grid on the next page.
- 2 Big Write:** Now you are ready to write your article. Make sure you look at your plan as you write. You should check what you have written afterwards. You could also ask someone else to read it for you.
- 3 Optional group work:** Work in groups to look at some newspaper articles about science. Make a list of the things you think are important for a good article.

Brief from the Editor

Hi,

Thanks for agreeing to write this article for the paper. Please include:

- *a summary of the key points from the original article about concerns over road safety*
- *a description of what you did*
- *any important results you have that will help people understand.*

Remember, people will want to know who was involved and if it affects them. Make sure you explain all the science clearly. Most people reading the article will not be scientists.

Yours sincerely,

Angela Ashby (Editor)

Planning grid for newspaper article

Key points from original article
Who was involved in the investigation?
Summary of method
Important data
Summary of conclusions
Ideas for a headline for the article