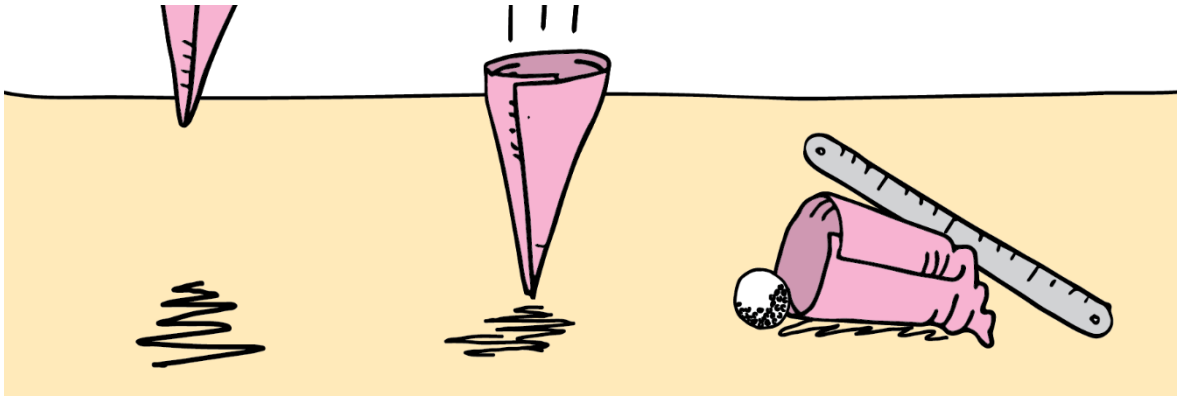
CRUMPLE ZONES

Science in motion | Design for safety | Activity C2



INVESTIGATION 1

The crumple zones are part of modern vehicle design, at the front and rear of a car, to protect occupants by absorbing crash energy and reducing the forces people are exposed to.

You're going to investigate the "crumple zone" of a paper cone.

- Make a paper cone by rolling the paper template to match both 'A's together and sellotaping the cone in place.
- Place a golf ball inside the cone so it rests in the cone securely.
- Drop the cone, straight down, from a height of 1m and record how much of the cone is squashed.

Do you notice the marks around the bottom? They are in centimetre increments to help with your recording of the results.

Repeat with a new cone.

Do this investigation 3 times in total and record each result in the results table.

Teacher support material

For further activities and curriculum support:

Science in motion (Waka Kotahi Education Portal)

Things you'll need
12 copies of the test cone template. *
Sellotape
Metre ruler
30cm ruler
Chair
2 golf balls

** It doesn't work to reuse a cone. Can you think why?*

INVESTIGATION 2

Using a higher dropping point simulates greater speed at the moment of impact. What happens to your cone if it is travelling faster?

Make another cone shape.

Place a golf ball inside the cone so it rests in the cone securely.

Drop the cone from a height of 1.5m (or 2m depending on how tall you are!) and record how much of the cone is squashed. Stand carefully on a chair if required.

Repeat with a new cone. Do this investigation 3 times in total.

INVESTIGATION 3

Using more golf balls simulates a heavier vehicle involved in the impact. What happens to your cone if you use two golf balls?

Make another cone shape.

Place two golf balls inside the cone so it rests in the cone securely.

Drop the cone from a height of 1m and record how much of the cone is squashed.

Repeat with a new cone. Do this investigation 3 times in total.

INVESTIGATION 4

Make another cone shape.

Place two golf balls inside the cone so it rests in the cone securely.

Drop the cone from a height of 1.5m (or 2m depending on how tall you are!) and record how much of the cone is squashed.

Repeat with a new cone. Do this investigation 3 times in total.

Think and discuss

Did you control all the variables each time?

What patterns have you seen in your investigations?

Look at the results from Investigations 1 and 2. What claim can you make about the relationship between speed and weight?

Look at the results from Investigations 1 and 3. What claim can you make about the relationship between weight and impact?

Have you seen these trends in your play or in life around you?

Based on these Investigations what advice might you give a truck driver?

Recording results

Distance the cone is deformed (cm)							
Investigation 1 1 metre high 1 golf ball		*Investigation 2* 1.5 metre high 1 golf ball		*Investigation 3* 1 metre high 2 golf balls		*Investigation 4* 1.5 metre high 2 golf balls	
Trial:	Distance deformed (cm)	Trial:	Distance deformed (cm)	Trial:	Distance deformed (cm)	Trial:	Distance deformed (cm)
Trial 1		Trial 1		Trial 1		Trial 1	
Trial 2		Trial 2		Trial 2		Trial 2	
Trial 3		Trial 3		Trial 3		Trial 3	
Average of 3 trials		**Average of 3 trials**		**Average of 3 trials**		**Average of 3 trials**	