LESSON PLAN

# Crashes, Survival & Evolution

STAGE
**Years 9 - 10**

DURATION
**45 minutes**

SUBJECT
**Science**

## RESOURCE OVERVIEW

The human body is vulnerable. We're not designed to survive road crashes. 'Graham', a life-like sculpture created by the TAC and Monash University Accident Research Centre, shows how humans would need to evolve if we were to survive.

In this lesson, students use the Meet Graham digital experience to explore risks to different body parts of a road crash, and how these body parts would need to evolve to survive a crash. They then discuss the advantages and disadvantages, as well as the likelihood, of these evolutionary changes.

Some students who have been impacted by road trauma may find the activity confronting. Please ensure suitable support is available for them

ROAD SAFETY EDUCATION VICTORIA

# Resource Details

## CURRICULUM ALIGNMENT

This activity supports:

- The theory of evolution by natural selection includes the processes of variation, isolation and adaptation and is supported by evidence including the fossil record, biogeography and comparative embryology; the theory explains past and present biodiversity and demonstrates how all organisms have some degree of relatedness to each other (VC2S10U05)

## RESOURCE REQUIREMENTS

In this lesson, teacher/s will need:

- A computer and projector, and/or digital whiteboard with internet access to show the opening video
- Devices with internet access for each group of students
- Access to the Meet Graham website - www.meetgraham.com.au
- A copy for each group of Resource 1: Meet Graham worksheet.
    - Sample answers - Resource 1: Meet Graham worksheet answers provides sample answers to the first two questions on the worksheet.

## LEARNING INTENTION

In this lesson, students will:

- Understand how environmental factors could impact the evolution of the human body.

## SUCCESS CRITERIA

By the end of this lesson, students should be able to:

- Describe the effect of a road crash on the human body.
- Describe the changes the human body may need to survive a road crash.
- Explain why it's unlikely the human body will evolve to survive a road crash.

# Lesson Plan

## Tuning in

APPROX. 10 MINUTES

Explain that the lesson is about what adaptations a human would need to survive a road crash.

Play the 2-minute Meet Graham video http://www.meetgraham.com.au/ Click on the 'Tell me more' button to play the video.)

Explain that Graham is the human of the future who has evolved to be able to survive a road crash by being able to better withstand the forces involved.

If natural selection hasn't previously been covered, facilitate a discussion about natural selection or link the topic to how Graham has evolved.

Ask students how they think the human body would need to evolve to survive a road crash.

## Main activity: Evolution of the human body

APPROX. 30 MINUTES

Split the class up into small groups or pairs.

Distribute a copy of Resource 1: Meet Graham worksheet to each group.

Assign each group at least two body parts from the following list:

- Brain
- Skull
- Face
- Neck
- Rib Cage
- Skin
- Knees
- Legs & Feet

Ensure that all body parts are covered and, if possible, assign the same body part to more than one group to generate discussion later.

Go through the worksheet questions to make sure students understand what is required.

Students should use the Meet Graham website and explore the 'View Graham' section (www.meetgraham.com.au/view-graham) to find the answers to the first two questions on their worksheet, focusing on their assigned body parts.

Give students approximately 15 minutes to complete the worksheet for their allotted body parts.

Bring the groups back together and, working through the body parts, have each groups present their answers or add to the answers of a group with the same body part. Presentations could be oral, digital or graphic.

## Reflecting activity

APPROX. 5 MINUTES

Ask students:

- If they think humans could evolve to look like Graham.
- How long it could take for these evolutionary changes to occur.
- Why such evolutionary changes aren't likely to occur in humans.

Finally, ask students what we need to do to stay safe on the road.

# Resource Worksheets & Answers

## Resource 1: Meet Graham worksheet

| BODY PART | What is the risk associated with this body part? Why is it particularly vulnerable in a crash? | What changes are made to the body part that make Graham less vulnerable in a crash? |
|---|---|---|
| BRAIN | | |
| SKULL | | |
| FACE | | |
| NECK | | |
| RIBCAGE | | |
| SKIN | | |
| KNEES | | |

| BODY PART | What are the advantages and disadvantages to this evolutionary change to the body part? | Could the body part have evolved in any other way to make it less vulnerable in a crash? How? |
|---|---|---|
| BRAIN | | |
| SKULL | | |
| FACE | | |
| NECK | | |
| RIBCAGE | | |
| SKIN | | |
| KNEES | | |

# Resource Worksheets & Answers

## Sample answers - Resource 1: Meet Graham worksheet

| BODY PART | What is the risk associated with this body part? Why is it particularly vulnerable in a crash? | What changes are made to the body part that make Graham less vulnerable in a crash? |
|---|---|---|
| BRAIN | The brain is one of the major organs in the body. It doesn't have much internal support to help cushion it from forces that could damage neural connections and deform the structure of the brain. | His skull is a lot bigger, with more cerebrospinal fluid and ligaments to brace the brain when a collision occurs. |
| SKULL | The skull protects the brain. Depending on the amount of force, the skull can fracture. | Graham's skull absorbs more of the impact. The structure of his skull is larger with inbuilt crumple zones to absorb any impact forces. The crumple zones aid in slowing down the momentum of his head as it moves forward on impact and increases his skull's ability to stop the force from continuing through to damage his brain. |
| FACE | Injuries to the face are commonly caused by impact with the steering wheel, dashboard, windshield and even shattered glass. These can range from minor scrapes to serious cuts and fractures. | His nose is reduced and his ears are protected by the larger structure of his skull and neck. Fatty tissue has been added around protruding areas like his cheekbones to help further absorb the energy on impact. |
| NECK | There is not enough strength in the neck to stop the head from jolting forward in a crash. The neck is placed under more pressure than its structure can manage. | Removing the neck has sacrificed his mobility to make his head more resilient to injury in a crash. The ribs, a form of protection, have been extended upwards to reach his skull. |
| RIBCAGE | Car seatbelts are designed to use the strength of the ribs. The seatbelt rests across your ribs and sternum and across your pelvis. It loads the centre of your chest, spreading the force over the ribcage until the ribs break when the force becomes too great. | Stronger ribs to give him better protection. Large barrel-like ribs to withstand greater impacts. Airbag like sacks placed between each of Graham's ribs. The airbags provide an inbuilt added layer of protection for the heart and other vital organs. |

| BODY PART | What is the risk associated with this body part? Why is it particularly vulnerable in a crash? | What changes are made to the body part that make Graham less vulnerable in a crash? |
|---|---|---|
| SKIN | Lacerations are lasting reminders for people injured in car crashes. Skin can be stripped down to the flesh, causing nerve damage and pain. | Graham has thicker and tougher skin to shield and reduce abrasions and road rash. |
| KNEES | The knee is built to bend in one direction, and can break if forced into unintended positions. | His knee joints are fortified with extra tendons that give added flexibility and allow his knees to bend in other ways |
| LEGS & FEET | Injuries to the legs, feet and ankles can cause long-term debilitation because we are so reliant on them for everyday movement. | Strong, hoof-like legs with added joints allow him to jump out of the way quickly in a “spring-loaded” fashion. The extra joints in Graham’s legs give his lower limbs added flexibility to reduce the impact force placed on the tibia in a crash |

www.roadsafetyeducation.vic.gov.au