Croc!

LOST GIANTS TO LIVING LEGENDS

Teacher Resource

A companion guide to the secondary school self-guided worksheet

MUSEUM AUSTRALIAN NATIONAL MARITIME MUSEUM | Australian Government | QUEENSLAND MUSEUM | Queensland Government | MUSEUM AND ART GALLERY NORTHERN TERRITORY | NORTHERN TERRITORY GOVERNMENT

This exhibition is a collaboration between the Australian National Maritime Museum, Queensland Museum and Museum and Art Gallery of the Northern Territory.

How to use this guide

The teacher resource is a companion guide to the student worksheet. You can use this resource when guiding your students through the exhibition *Croc! Lost Giants to Living Legends*.

This teacher resource includes Australian Curriculum links, exhibition notes, fun facts, notes for teachers and answers to the student activities.

All activities are linked to the Australian Curriculum.

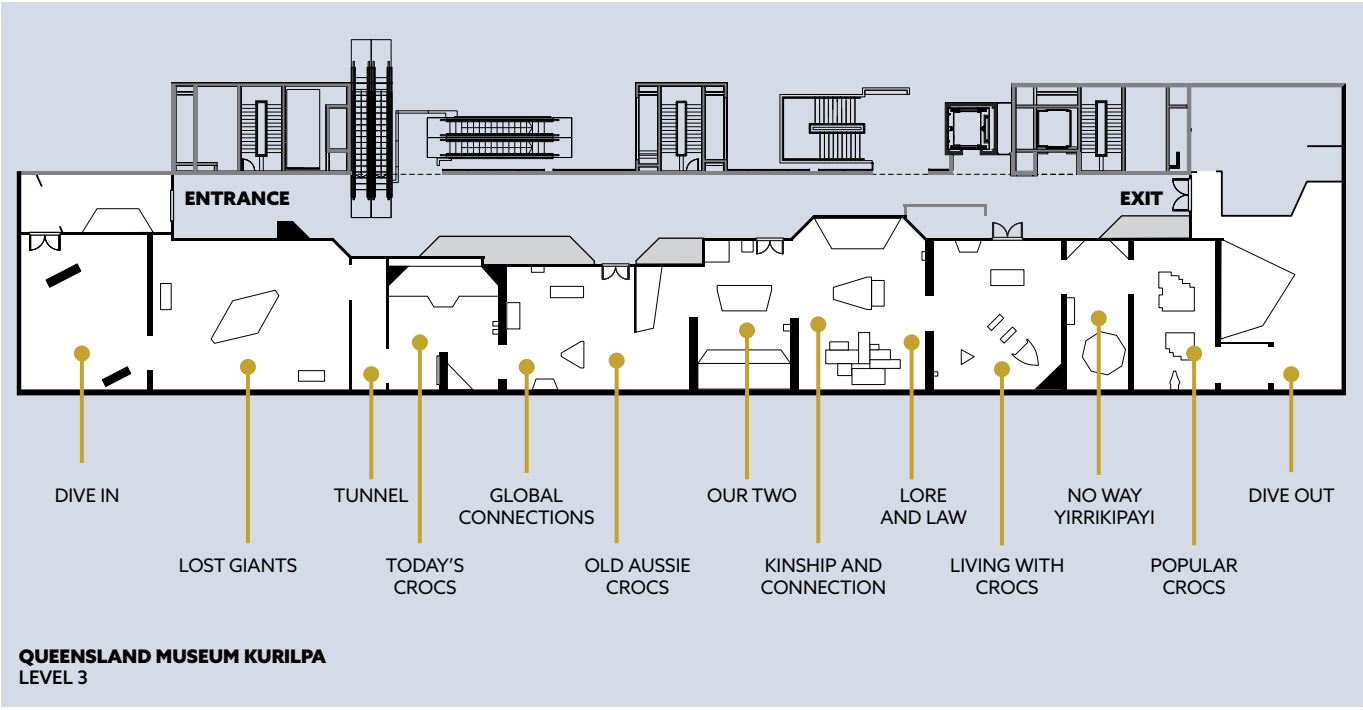
Activity	Curriculum links	Section of the exhibition
1	Science	***Lost giants*** ***Today's crocs***
2	HASS – History Intercultural Understanding	***Global connections***
3	Mathematics Numeracy	***Our two***
4	The Arts – Visual arts Aboriginal and Torres Strait Islander Histories and Cultures	***Kinship and connection*** ***Lore and law***
5	HASS – Geography Aboriginal and Torres Strait Islander Histories and Cultures Sustainability	***Living with crocs***
6	English Literacy	***Popular crocs***

Please note, you do not have to complete the activities in order. Each activity is self-contained and is not dependent on another activity to complete.

Recommended time to explore the exhibition: 90 minutes

Time to complete the activities: 60 minutes (approximately).

Estimated times for each activity are included throughout the teacher resource, as a guide.



List of symbols


Link to Australian Curriculum


Discussion questions


Answer questions: activities for students to complete individually or in small groups in the exhibition


Challenge yourself: extension tasks for older students or gifted and talented students


Support tasks: alternative activities for students with additional support needs


Approximate time it will take to complete an activity or visit a point of interest


Back at school: extra learning tasks to complete in the classroom, after the excursion.


Point of interest

Curriculum areas


English


Maths


Science


History


Geography


Visual Arts

Cross-curriculum priorities


Aboriginal and Torres Strait Islander Histories and Cultures


Asia and Australia's Engagement with Asia


Sustainability

General capabilities


Critical and creative thinking


Digital literacy


Ethical understanding


Intercultural understanding


Literacy


Numeracy


Personal and social capability

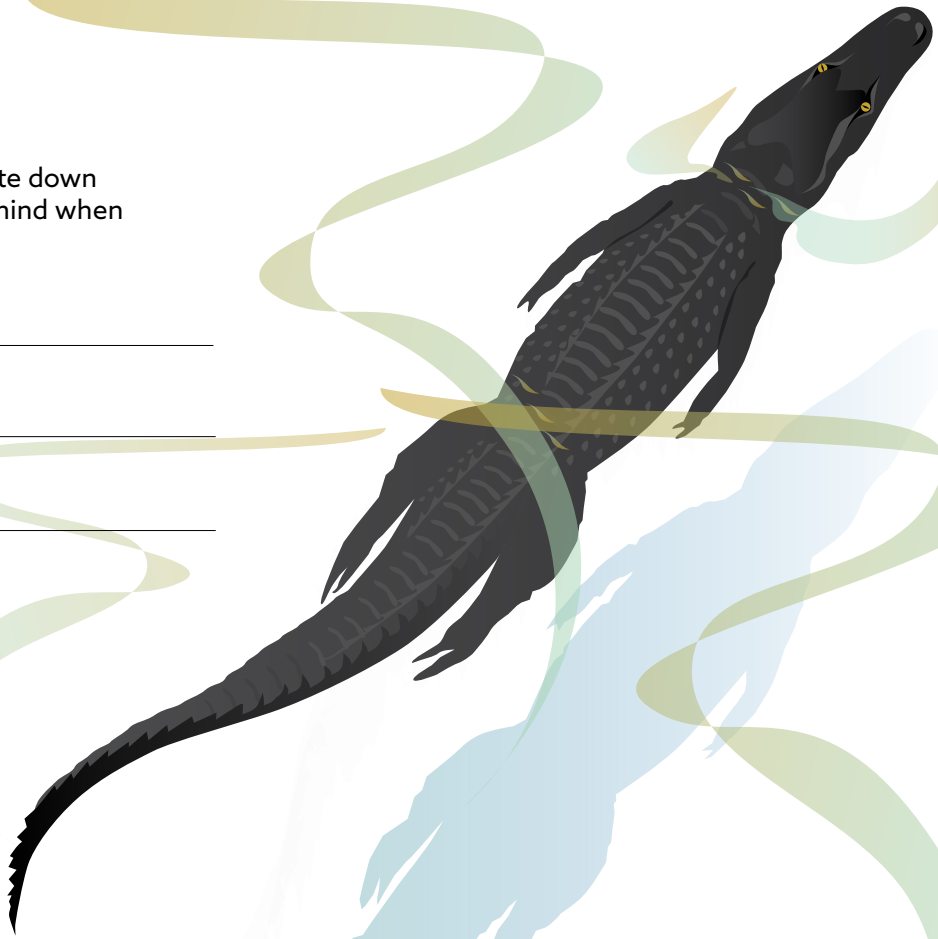
Dive in

Before you enter the exhibition, write down the first three words that come to mind when you think of crocodiles.

1. _____

2. _____

3. _____



Lost giants

Section information

What does this large creature remind you of?

Students might respond with 'dinosaur'. However, crocodiles are not living dinosaurs!

Dinosaurs and crocodilians share an ancient ancestor but evolved separately. The first crocodilians (ancestors of today's crocodiles, alligators, caimans and gharial) evolved about 200 million years ago in the Triassic period and lived alongside the dinosaurs.

113 million years ago, the 'Supercroc' appeared. 'Supercroc' was 10–12 metres long – twice as big as today's biggest crocs.

Fun fact

Crocodiles are the biggest reptiles on Earth.

10 minutes

Today's crocs

Biological sciences and the theory of evolution

Year 10: AC9S10U02

Use the theory of evolution by natural selection to explain past and present diversity and analyse the scientific evidence supporting the theory

Elaboration: analysing evidence for the theory of evolution by natural selection including the fossil record, chemical and anatomical similarities, and geographical distribution of species

Section information

This section explores the global distribution and unique characteristics of the 27 species of crocodilians around the world.

These 27 species are divided into three families of crocodilians: crocodiles, alligators and gharials.

Fun fact

Crocodiles are found on 5 of the 7 continents.

Teacher notes

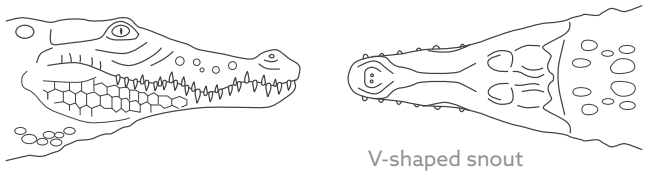
Students can find the answers to Activity 1 in these two adjoining sections of the exhibition: *Supercroc* and *Crocs today*.

Student responses to questions 2–4 in Activity 1 will vary. Some sample answers have been included below.

Alligator

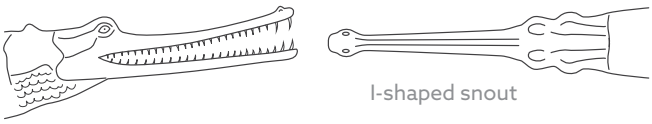
U-shaped snout

Crocodile



V-shaped snout

Gharial



I-shaped snout

Activity 1

The theory of evolution by natural selection explains how species change over time. Individual organisms with characteristics that are most suited to their environment, are more likely to survive and reproduce. Over time, this leads to the species changing or evolving.

When a group of organisms is separated from the rest of their species, they may develop different traits which help survival. This is called isolation. Over time, this group of organisms may evolve into a new species (a process called speciation).

1. Using the displays in *Lost giants* and *Today's crocs*, complete the table below.

	Section: *Lost giants*	Section: *Today's crocs*	
	Isisfordia duncani	**Saltie**	**Dwarf Caiman**
Size	1 – 1.5m	Males: 4.5 – 5.2m. Females: 2.5 to 3m. Biggest measured: 6.2m	1.2 – 1.6m
Location	Australia	Australia and the Indo-Pacific	Americas (central and south)
Diet	Insects to small animals	Fish and large game	Mostly fish

2. Using the display and the information in your table above, compare *Isisfordia duncani* (an ancient croc) with a modern species of croc (either a Saltie OR a Dwarf Caiman).
How are they similar? How are they different?

Modern croc species Dwarf Caiman

Similarities

- Both species are carnivorous.
- Both live(d) in warm climates.
- Both live(d) in equatorial areas.
- Both are a similar size (~1 – 1.5m)
- Isisfordia duncani and Dwarf Caiman both have U-shaped snouts.

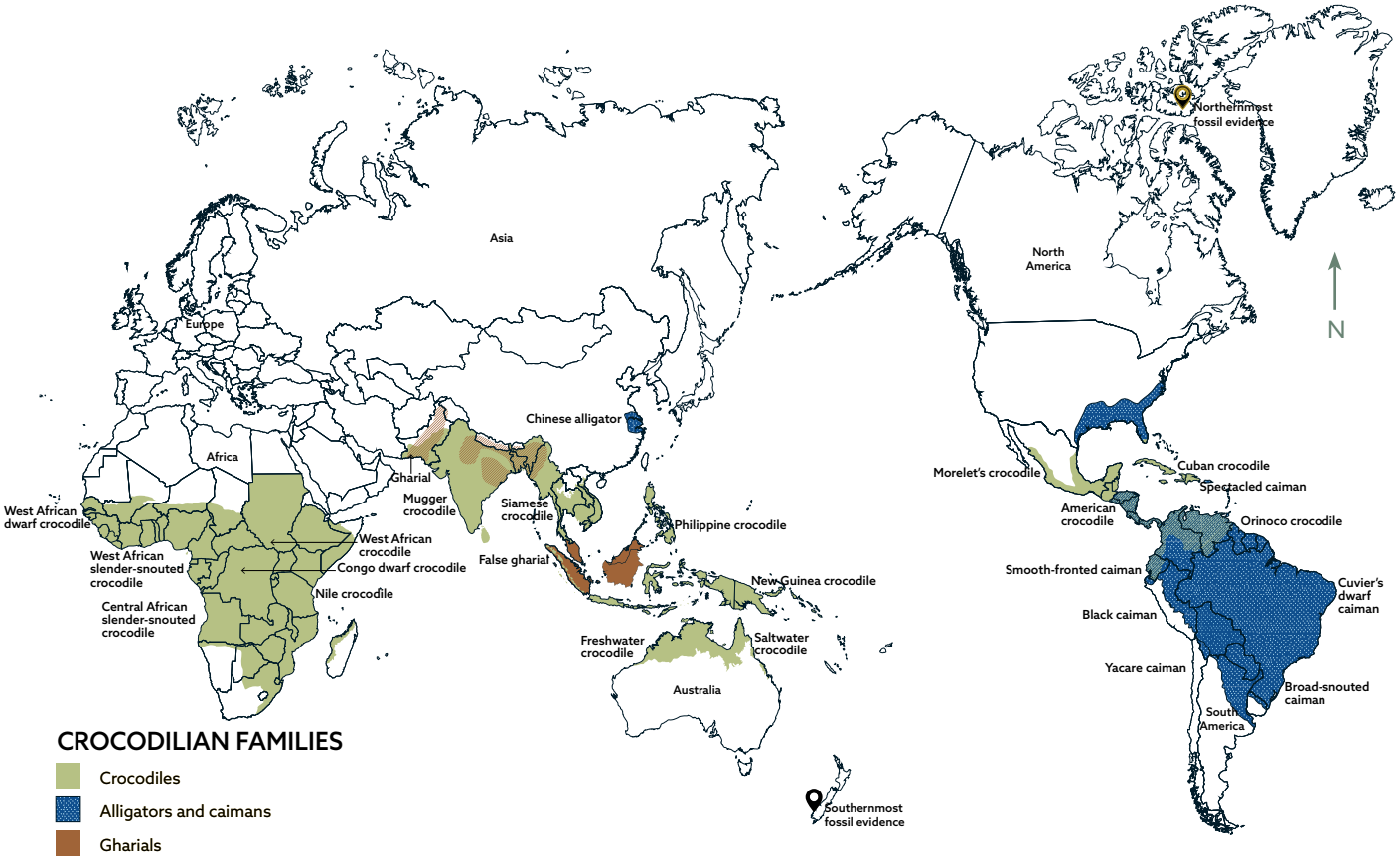
Differences

- Isisfordia duncani ate insects and small animals. Dwarf Caimans mostly eat fish.
- Isisfordia duncani lived in Australia. Dwarf Caimans live in Central and South America.

The similarities suggest that *Isisfordia duncani* (an ancient croc) and modern crocs share a common ancestor. A common ancestor is the ancestral organism, from which two or more species (or lineages) have descended and evolved.

3. Find the croc distribution map on display. Fill in the location of the different crocodilian families below.

Geographical distribution of crocodilian families



4. Using the map, displays and your knowledge of the theory of evolution, explain the environmental factors which contributed to this distribution and species diversity.

- Isolation: Three crocodilian families and 27 species have evolved over time due to geographic isolation. These species have developed different physical and behavioural
- Continental drift: The separation and movement of continents resulted in the separate evolution of crocodiles into different species.

5. The geographical distribution of crocodilians is predominantly around the equator (ie the middle of the world). Why do you think crocodilians are mostly found around in this area?
Consider climate in your answer.

Crocodilians are mostly found in equatorial areas because they need a warm, tropical climate to survive.

Crocodilians are ectothermic. This means that they depend on their environment to maintain their body temperature. Crocodilians cannot generate their own body heat (like mammals).

Crocodilians also require water for swimming and hunting. This means that they need to live in areas that are near waterways, such as the sea, rivers and estuaries.

10 minutes

Global connections

The ancient world

Year 7: AC9HH7K11

Key beliefs, values and practices of an ancient society, with a particular emphasis on one of the following areas: everyday life, warfare, or death and funerary customs.

Year 7: AC9HH7S06

Identify perspectives, attitudes and values of the past in sources.

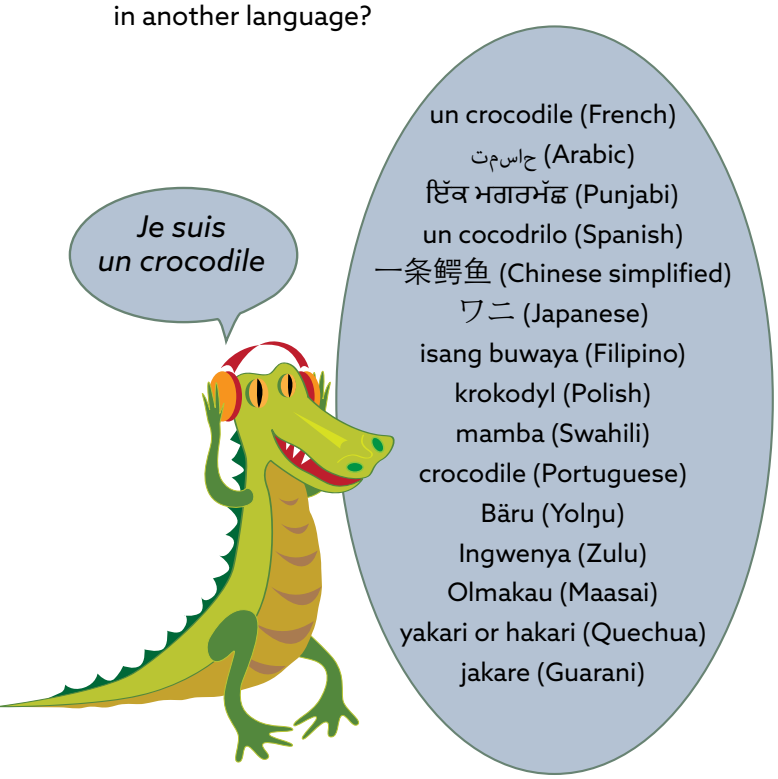
Section information

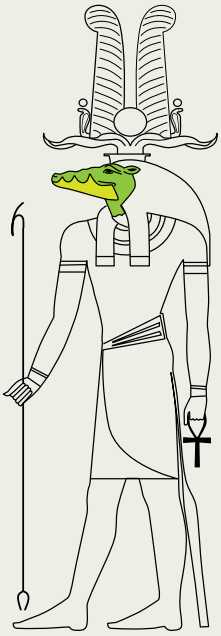
This section of the exhibition explores the connections between humans and crocodiles across time and cultures.

Fun fact

The word 'crocodile' means pebble worm! It comes from the Greek word *krokodilos*, from *krokē* 'pebble' and *drilos* 'worm'. Why do you think crocodiles are called pebble worms?

Do you know the word for crocodile in another language?





Activity 2

Explore the connections between humans and crocodiles across time and cultures. Find the displays about each culture to answer the questions.

Egypt **1.** Who is Sobek?

The ancient Egyptian god of crocodiles, the Nile, the army and fertility.

2. Why did the Egyptians mummify crocodiles and bury them in their tombs?

So Sobek would protect their loved ones in the afterlife.

Roman **3.** What has this crocodile skin been made into? Where was it found?

This crocodile skin has been made into armour. It was found in Egypt.

4. Why did Roman soldiers wear this?

For ceremonies (not during battle).

5. Using your previous responses, what do you think crocodiles represented in ancient Roman society?

Power and dominion over Egypt.

China **6.** Why are crocodiles important in feng shui? What do crocodiles symbolise?

Crocodiles are revered for their ability to survive and thrive in diverse environments. Crocodiles embody the feng shui principles associated with water, including the flow of wealth and opportunities. Crocodiles symbolise resilience and tenacity.

India **7.** Who is Ganga in Hindu mythology?

The river goddess.

8. What is the name of the part-crocodile beast Ganga is riding?

Makara.

Historical analysis

Using the displays and your responses to the previous questions, select one of the historical objects.

What value did crocodiles have in this society?

How does the object demonstrate this society's attitude towards crocodiles?

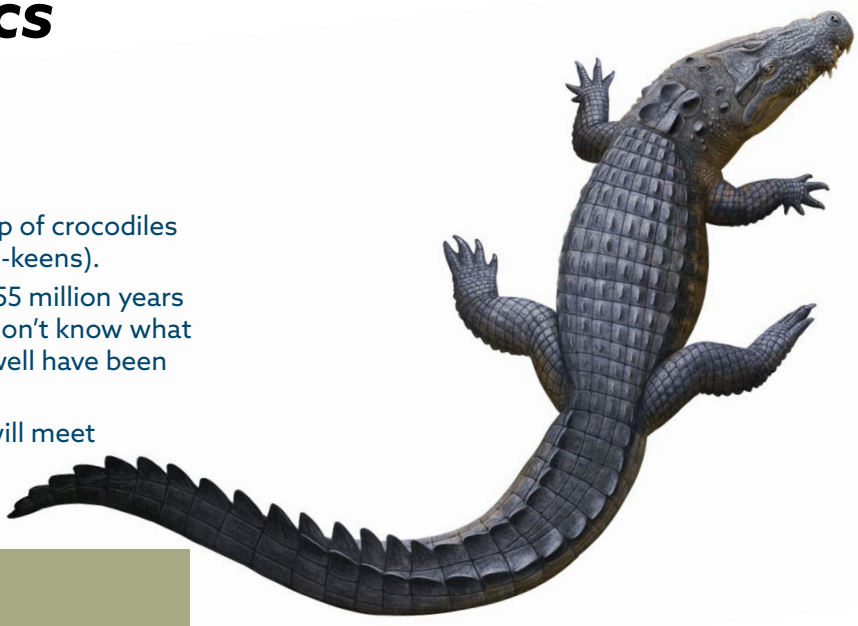
Old Aussie crocs

Section information

Ancient Australia was home to a group of crocodiles called the Mekosuchines (mee-co-sue-keens).

Mekosuchines lived in Australia from 55 million years ago until only 40,000 years ago. We don't know what drove them to extinction, but it may well have been the drying climate.

In this section of the exhibition, you will meet the crocs that used to live in Australia (and two that still do!).



Paludirex
Image credit: Andrey Atuchin

Fun fact

Not all ancient crocs lived in the water; many lived on land. Explore this section of the exhibition and discover where they lived in Australia.

Quinkana
Image credit: Andrey Atuchin

Do the mekos look like crocodiles today? What do you notice about the shape of their bodies and their external features?

Modern-day crocodile
Photo credit: Queensland Museum, Gary Cranitch

5 minutes

Our two

Number, percentages, conditional probability, algebra

Year 7, AC9M7N06

Use the 4 operations with positive rational numbers including fractions, decimals and percentages to solve problems using efficient calculation strategies

Year 10, AC9M10P01

Use the language of "if ... then", "given", "of", "knowing that" to describe and interpret situations involving conditional probability

Section information

There are two kinds of crocodiles in Australia: saltwater crocodiles (salties) and freshwater crocodiles (freshies). Freshies are only found in Australia. This section of the exhibition explores the unique physical features and adaptations of Aussie crocs.

Fun fact

Crocodiles cannot chew their food. They use their teeth to tear chunks off their prey. Crocs have 60–80 teeth and replace them as they break. They may go through 50 sets in their lifetime.

Photo credit: Queensland Museum, Gary Cranitch

Activity 3

Find the 'bite force' interactive to complete the questions below.

1. The bite force of a saltie is 16,460 Newtons and the bite force of a human is 890 Newtons.

What is the human bite force as a percentage of a saltie's bite force? Answer to one decimal place and remember to show your working.

(890 ÷ 16460) x 100 = 5.4%

2. If the bite force of a saltie is 16,460 Newtons, how many freshies would you need to equal the bite force of a saltie? Round up to the nearest whole number.

(16460 ÷ 1850) = 8.897

Therefore, you would need nine freshies to equal the bite force of a saltie.

3. A group of 5 creatures has a combined bite force of 22,900. There is one saltie (*S*) in the group. *F* is freshie. How many freshies are in this group? What creature is *X*?

Remember to show your working.

$S + 3F + X = 22{,}900$

16,460 + 3(1850) + X = 22,900

(3 x 1850) + X = 6,440

5550 + X = 6,440

X = 890

Therefore X is one human.
There are three freshies in this group.

10 minutes

Kinship and connection & Lore and law

Presenting and performing

Years 7 and 8: AC9AVA8P01

Curate and present examples of their visual arts practice to accompany exhibits of their artworks to communicate ideas, perspectives and/or meaning to audiences.

Elaboration: creating visual art labels for an exhibition/showcase; for example, researching a variety of art gallery labels and using findings to plan and write a label with the artist's name, materials, year, and information about how the task was approached and what the artwork is about.

Section information

The crocodile is an important part of Aboriginal and Torres Strait Islander cultures. This section of the exhibition showcases just a few examples of the deep connection between crocodiles and First Nations people.

Fun fact

***Bäru* means crocodile in the Indigenous Yolŋu Language of Northeast Arnhem Land.**

Teacher notes

Students can select an artwork of their choosing to complete this activity. A sample answer is included above right.

Activity 4

Imagine you are curating an art exhibition on First Nations' cultural connections to crocodiles. Explore this section of the exhibition, then select one artwork in the First Nations gallery and write the object label for this work.

Name of the artwork: Baniyala Bäru at Yathikpa

Artist: Donald Nuwandjali Marawili

What Country, language group or place is this work connected to? Bäru is the ancestral crocodile of Yathikpa in East Arnhem Land. This is an important creation story for the Madarrpa people of the Baniyala homeland.

Date: 1998

Materials: Bark painting, natural pigments

How does this artwork depict First Nations connection to Country?

Baniyala Bäru at Yathikpa is a creation story. It shows how Bäru brought fire during the creation time. This artwork also shows miny'tji, which are sacred clan designs and represent ancestral knowledge and a continuing connection to Country.

Find the Sea Rights flag.

The colours and symbols of this flag represent the Yolgnu people's deep connection to their ancestral waters and territories.

Use the Sea Rights flag as inspiration to draw a flag for your school.

Make sure the flag represents your school. Consider First Nations Country, the local geography, your community and what makes your school unique.

Use colours, shapes, patterns and symbols to represent your school community.

Image credit: Australian National Maritime Museum

15 minutes

Living with crocs

Environmental change and management

Year 10: AC9HG10K01

The human-induced changes that challenge the sustainability of places and environments.

Elaboration: identifying tensions between the conflicting perspectives of individuals, communities and governments on the use of sustainable practices.

Elaboration: discussing the concept of sustainability in relation to environmental functions and identifying tensions between the conflicting perspectives of communities, businesses and government.

Year 10: AC9HG10K02

The environmental world views of people and their implications for environmental management

Elaboration: comparing differences in peoples' views about the causes of an environmental issue of personal, national and global importance.

Year 10: AC9HG10K03

First Nations Australians' approaches to custodial responsibility and environmental management in different regions of Australia.

Section information

Australians and crocodiles have lived side by side for thousands of years. Our relationship with crocodiles has varied over time. This relationship encompasses tourism, totems, hunting, conservation, farming, research and much more. This section of the exhibition unpacks the complex and evolving relationship between Australians and crocs.

Fun fact

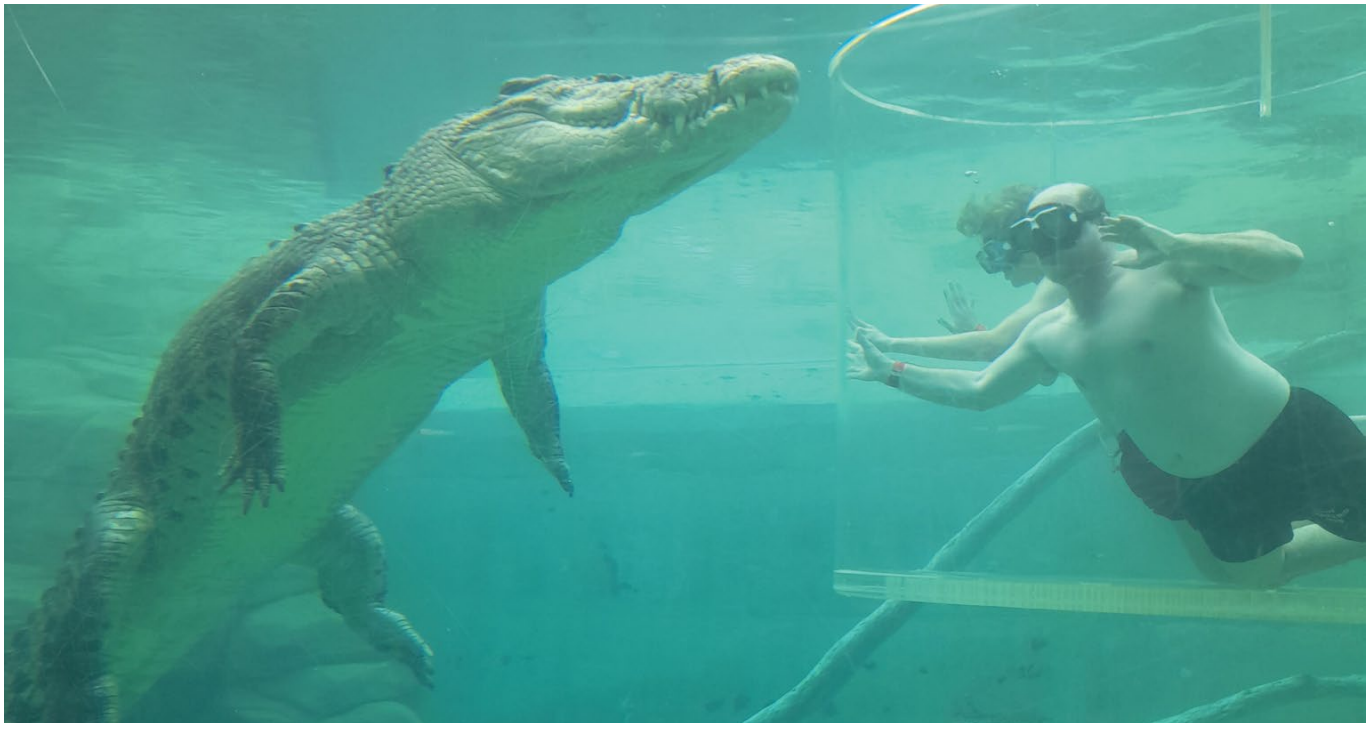
In Australia, humans are the only predators of adult crocs.

Teacher notes

Encourage students to explore this section of the exhibition to learn about the different relationships people have with crocodiles.

Students can complete this task individually or in small groups. If completing this activity in small groups, each student can fill in one perspective and then share the information with their group members.

Student responses to this activity will vary. Sample answers are included on the next page.



An up-close croc tourism experience.
Photo credit: Em Blamey

Activity 5

Australians and crocodiles have lived side by side for thousands of years.

Yet, crocodiles are very contentious. Different stakeholder groups have vastly different relationships with crocodiles.

Use the displays to answer the question:

	How does this stakeholder group value crocodiles?
Farming	Saltwater crocodiles are valued for their skins which are used to create luxury, high-end fashion products.
Tourism	Tourists pay to see crocs (eg cage of death and croc jumping). Croc tourism brings money into the area (e.g. accommodation, food, souvenirs etc)
First Nations Arafura Swamp Rangers Aboriginal Corporation (ASRAC)	Crocodiles have a song line and ceremony. ASRAC collect and hatch saltwater crocodile eggs, and rear the hatchlings, as a sustainable business.
Conservation: Toad training	Cane toads are poisonous to crocs – especially freshies. Crocs are top predators. Without crocs, the whole ecosystem is threatened. Scientists catch cane toads, remove their toxins and inject them with lithium chloride. When a croc eats a Condition Taste Aversion (CTA) toad, they will feel sick but recover quickly. After eating a few CTA toads, the crocs will stop eating toads.
Safety: 'Be Crocwise'	'Be Crocwise' is a public education campaign to keep the public safe and reduce the risk of croc attack.
CITES and illegal trade	CITES is an international agreement that aims to protect wild, threatened animal and plant populations. All crocodile species are listed by CITES.

	Select two stakeholder groups from the mind map activity. Do the viewpoints of these two groups support or contradict one another?
Farming	There are welfare concerns around croc farms. Croc farms can help conservation efforts by preventing illegal hunting.
Tourism	Tourism can teach people about crocodiles, so they respect and value them (conservation).
First Nations Arafura Swamp Rangers Aboriginal Corporation (ASRAC)	ASRAC raise the crocodiles until they are 1m, then they are sold to croc farms. Croc egg survival in the wild is low. Removing croc eggs does not impact wild croc populations.
Conservation: Toad training	Toad training protects freshies – which are significant to the Traditional Owners.
Safety: 'Be Crocwise'	This campaign helps to protect crocs (conservation) by encouraging people to be aware and keep away from croc areas.
CITES and illegal trade	CITES is trying to protect crocs (similar to the environmental toad training perspective).

Task 1: Research and develop a crocodile management strategy for living alongside crocs in a safe, sustainable and culturally respectful way.

Task 2: Organise a class debate and discuss this topic: **When a croc attack occurs, who is at fault?**

When a crocodile attacks a human, it can be considered a threat to public safety and killed. However, a crocodile attack generally occurs within a crocodile's natural habitat.

Photo credit: Queensland Museum, Gary Cranitch

10 minutes

Popular crocs

Engaging with and responding to literature

Year 7: AC9E7LE03

Explain the ways that literary devices and language features such as dialogue, and images are used to create character, and to influence emotions and opinions in different types of texts.

Elaboration: comparing the representation of a character's appearance in a novel and film version of the same text.

Elaboration: explaining the impact and significance of language features in a text.

Year 8: AC9E8LE03

Explain how language and/or images in texts position readers to respond and form viewpoints.

Elaboration: sharing opinions about how a film positions the viewer to respond to a character.

Year 9: AC9E9LE03

Analyse how features of literary texts influence readers' preference for texts.

Elaboration: reflecting on and discussing responses to literature including characterisation, setting details, plot events, themes and literary devices used to achieve particular effects, and collaboratively formulating a list of factors that distinguish value.

Year 10: AC9E10LE03

Analyse how the aesthetic qualities associated with text structures, language features, literary devices and visual features, and the context in which these texts are experienced, influence audience response.

Elaboration: examining a range of texts and evaluating the effect of text structures and language features; for example, determining whether the narrative position of a child evokes reader sympathy towards an event or issue.

Section information

From exotic reptiles to deadly hunters or cuddly toys, crocodiles are represented in a variety of ways in popular culture. This section of the exhibition includes depictions of crocodiles in films, literature, art, fashion and toys.

Teacher notes

Encourage your students to explore this section of the exhibition before completing the activity. If you are short on time, divide the class into groups. Each group can complete one column. Students can complete the remaining columns back at school.

Student responses to this activity will vary. Sample answers are included on the next page.

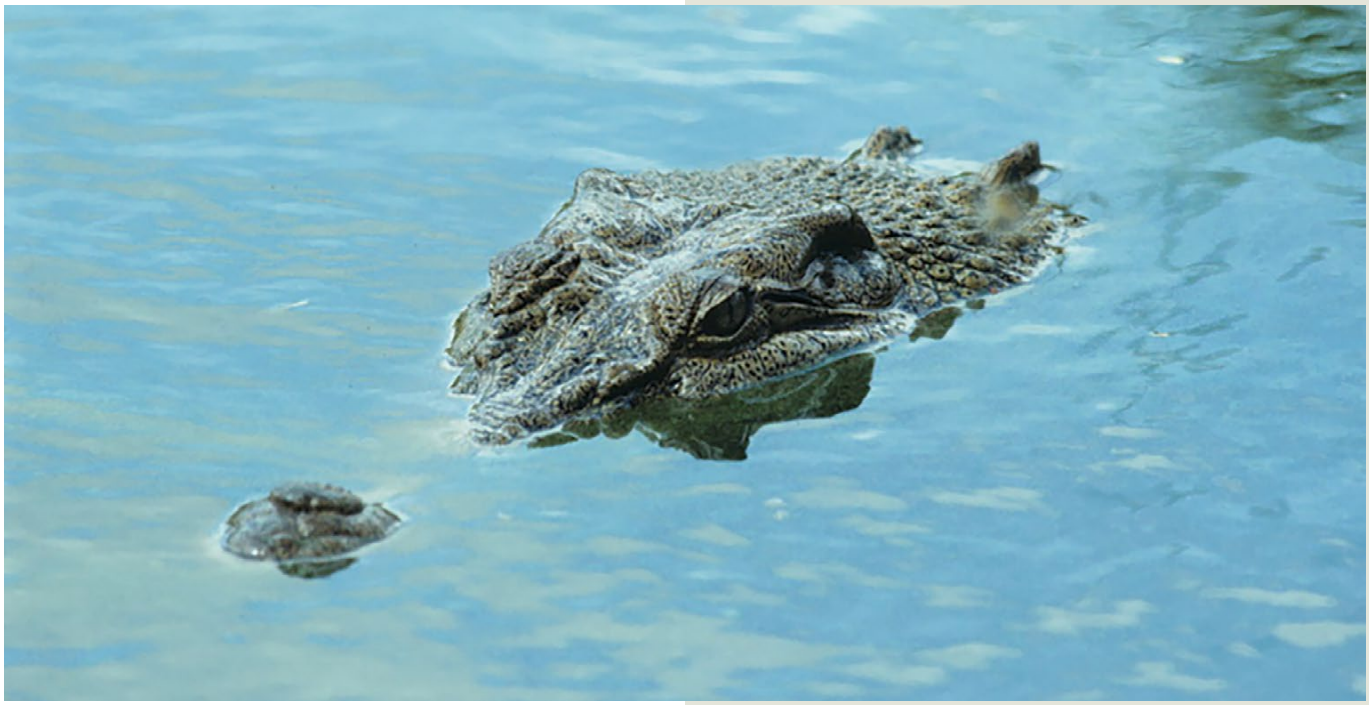


Photo credit: Queensland Museum, Gary Cranitch

Activity 6

Crocodiles are captivating. Pop culture is riddled with crocs! They have been represented as heroes and villains across film, literature, news, art, fashion and more.

Compare and contrast the representations of crocodiles in pop culture. Explore this section of the exhibition and select one example of crocs in art, film and fashion to complete the table.

	Art	Film	Fashion
How are crocodiles represented? Record three adjectives (describing words)	Boxing Croc by Franck Gohier: Imposing, ferocious, fierce, predatory, dinosaurian	Crocodile Dundee: Scary, scaly, large, powerful, strong	Lacoste: Cute, small, cartoonish, simplistic, green
What techniques have been used to depict crocodiles in this way? Consider camera angles, colours, shots, symbolism, facial expressions, costumes, etc.	Low angle view of the crocodile makes the croc seem large and threatening. The boxing gloves are a symbol of combat and strength. The red colour of the boxing gloves symbolises power and aggression.	Crocodile's eye is yellow and contrasts with the red background to make the crocodile look fierce. The crocodile tail hanging off the Crocodile Hunter's shoulder accentuates the muscle and strength of the crocodile's tail.	Bright green is a very soothing, natural colour. Lacoste is a sporting brand. Therefore, this logo symbolises power and physical prowess.

How are these representations of crocodiles similar? How are they different?

In Boxing Croc, Crocodile Dundee and the Lacoste logo, crocodiles are represented as powerful animals. However, in the Lacoste logo this power is associated with sports and athletic skill.

In Boxing Croc and Crocodile Dundee, this power is associated with savage and wild behaviour.

Dive out

Now that you have explored the exhibition, write down three words you would use to describe crocodiles.

1. _____
2. _____
3. _____

Has your perception of crocodiles changed? How?

_____

What is one thing that surprised you about crocodiles?

_____

Thank you for visiting

Croc! Lost Giants to Living Legends

For more information, please email education@qm.qld.gov.au

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MUSEUM AND ART GALLERY NORTHERN TERRITORY

NORTHERN TERRITORY GOVERNMENT

This exhibition is a collaboration between the Australian National Maritime Museum, Queensland Museum and Museum and Art Gallery of the Northern Territory.