

TORTOISE SHAPES AND SIZE...

? Not all tortoises look the same. What can you learn about a tortoise from looking at the shape of its shell?



Some Galapagos tortoises have **domed shells** like this



Some Galapagos tortoises have **saddleback shells** like this

TASK 1

How would you define the term 'adaptation'? Share your definition with a friend and give an example.

An adaptation is a feature which helps an animal survive, e.g. canine teeth for a carnivore. Some adaptations may be internal and not be visible. Some adaptations may be behavioural.

TASK 2

In the space below, draw one of our Galapagos giant tortoises. Make notes describing the different adaptations of the tortoise and how those features might help the tortoise survive in the wild.

Encourage students to annotate their drawings, thinking about shell size and shape, length of legs and neck, claws, mouth, eyes - how do all of these features help tortoises survive?

? Not all the Galapagos Islands have the same habitat. What can you tell about the habitat of a tortoise by looking at the shape of its shell?



Some of the Galapagos Islands are **smaller and dryer**, where tall cacti plants grow.



Some of the Galapagos Islands are **larger and wetter**, where many plants grow close to the ground.

TASK 3

Which of the two tortoise shell shapes is better adapted for reaching tall cacti plants? Why?

The saddleback allows the tortoise's neck to reach up higher to eat tall plants such as cacti.

Which of these island types is likely to provide enough food for tortoises to grow to larger sizes? Why?

The larger, wetter islands have more vegetation which would support animals to grow to larger sizes.

Which island type do you think our tortoises are likely to have come from? Why?

ZSL tortoises probably come from larger, wetter islands as they don't have the adaptation of a saddleback shell which they would need to eat tall cacti on smaller dryer islands.

Why have scientists noticed that cacti plants are bigger on the Galapagos Islands than they used to be?

They have been undergoing an "evolutionary arms race" - as tortoises evolve to have a more saddleback and can therefore reach higher, cacti plants continue to grow higher to avoid being eaten.

ISLAND GIANTS!

? Why are Galapagos giant tortoises so large?

It is thought tortoises first arrived on the Galapagos Islands a long time ago by being swept into the ocean and floating there all the way from South America!

DID YOU KNOW THAT GIANT TORTOISES ARE KNOWN AS 'HABITAT ENGINEERS'?



They change the spread of native vegetation by transporting their seeds over long distances.

DID YOU KNOW?

TASK 4

Do you think a large tortoise or small tortoise is likely to survive a long journey like that with no food or water? Why?

Larger tortoises because they have more energy reserves.

This is known as the "founder effect" - the first tortoises on the Galapagos may have already been large, but once on the Islands was it an advantage or disadvantage for these animals to be large?

TASK 5

List the possible different reasons below:

Advantages to being big on an island

- Can outcompete smaller individuals for food
- Can outcompete smaller individuals for mates

Disadvantages to being big on an island

- Need more food to survive
- Harder to hide from predators

TASK 6

In your own words, describe the process of evolution via natural selection that Galapagos tortoises have gone through to make them the island giants we know today:

- Few natural predators on the Islands allowed tortoises to remain large (giant tortoises used to be found on all continents apart from Australia and Antarctica).
- Larger tortoises survived well due to outcompeting smaller tortoises for food and mates.

Some animals living on islands actually adapt to be smaller over time rather than bigger. This is known as Island Dwarfism.

TASK 7

Explain a reason why you think this could happen:

Look for the sign near the tortoises that might help students. With limited food, big animals who eat a lot may die out, or adapt to become smaller.

CLIMATE CHANGE—LOOKING TO THE FUTURE

With current climate change trends, the Galapagos Islands could see a decrease in overall rainfall.

TASK 8

Predict what short term effects this could have on tortoises living there:

Less rainfall would make the Islands become dryer with less food for tortoises. There would be more competition for food. Some tortoises might die resulting in an overall reduction in tortoise number.

Predict what long term effects this could have on tortoises living there:

Over a longer period of time (thousands to millions of years) the tortoise population might adapt and evolve. They might become smaller as less food will be available as islands become drier to support large tortoises. The Islands might have more cacti on them because they will be dryer, so there might be more tortoises with saddleback shells instead of domed shells as they adapt over time.

? What other animals do we have at ZSL London Zoo that might be island giants?

See if you can find out about other animals that are island giants by visiting the world's largest lizard, the Komodo Dragons of the Indonesian Islands. Also, in our reptile house, what can you find out about one of the world's largest frogs, the Mountain Chicken Frog, of the Islands of Montserrat and Dominica (www.mountainchicken.org)?

Be a scientist and record your observations in the space below: