



Biology

Classification: Spots and stripes

Zebras have a distinctive pattern that makes them easily recognisable to most people, but they also display features common to other animals. So how can we easily compare animals? In this lesson you will investigate the following:

- What key features can be used to distinguish between one animal and another?
- How and why do we need to classify organisms?
- How are zebras similar and different to other animals?
- How does a dichotomous key work?
- How and why do we give organisms names?

Is the process of classification black and white? Let's find out!



This is a print version of an interactive online lesson. To sign up for the real thing or for curriculum details about the lesson go to www.cosmosforschools.com

Introduction: Classification (P1)

Why do zebras have stripes?

Why do zebras have stripes? It's a question that scientists have been asking for more than 100 years but now new research may finally have an answer. Most animal species have developed distinctive colour and patterns to help disguise them in their natural environment. Like a soldier's camouflage, the colouring and patterns look like the background, so it is hard to tell the difference between the animal and its surroundings. But the zebra lives on brown grassy plains and its stripes make it stand out, not disappear. The animal may as well have a sign for the lions saying, "come and eat me".

Now we may have the answer. By studying where most of the zebras live, scientists have found that the animals share their home with lots of nasty biting tsetse flies and horse flies. They also discovered that these flies don't like striped patterns and will stay away from them. So, it's likely that the zebras developed stripes to be an insect repellent. That may sound crazy – to make yourself a target for lions just to keep away the flies. But these aren't ordinary irritating flies. The tsetse flies carry diseases that can kill, while horse flies tear the animals' skins leaving them at risk of infections. Believe it or not, to a zebra, these two things are actually more dangerous than lions!

Read or listen to the full *Cosmos Magazine* article [here](#).



Credit: iStock.



Question 1

Observe: Cartoonists study animals to learn more about their behaviour and features so that they can draw images like the ones above. If you were asked to describe the similarities and differences between the two creatures above, what key features would you refer to?

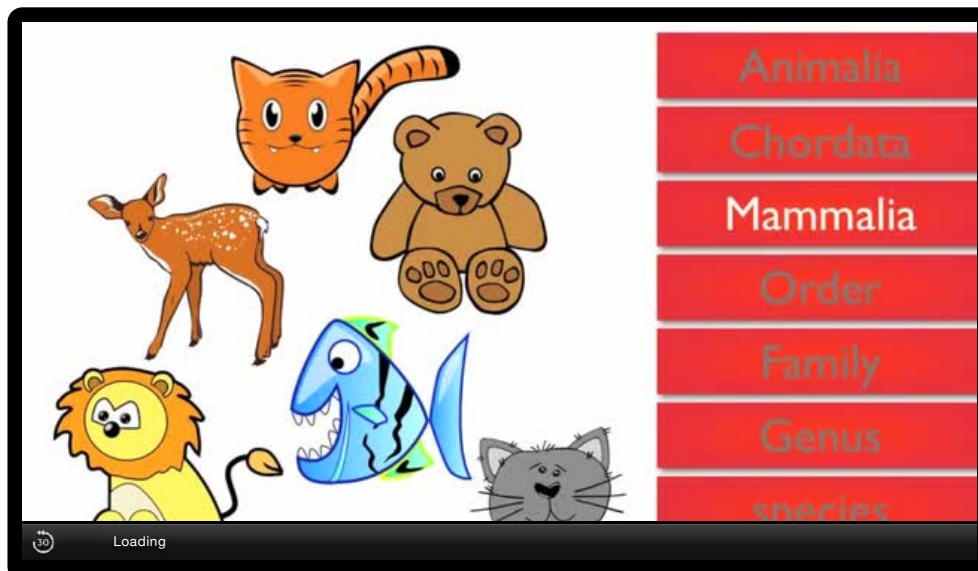
Gather: Classification (P1)



Spot the difference. A conspicuous looking zebra wanders grassy plains (left), while a white tiger looks majestic, the master of its territory (right). Credit: iStock.

You may already know that we can divide the things around us into two groups: *living* and *non-living*.

Among other things, living things can move, respire, grow, reproduce, excrete, eat and respond to the environment around them. But how can we distinguish one living thing from another and why is this important?



Credit: Mark Drollinger & YouTube.

Question 1

Recall: Greek or Latin words are used to classify living things because they are known all around the world.

- ☐ True
- ☐ False
- ☐ I'm not sure
- ☐ I don't understand the question

Question 2

Recall: The bear was eliminated from the group of animals at the level:

- ☐ Mammalia
- ☐ Chordata
- ☐ Felidae
- ☐ Carnivora
- ☐ Animalia

Living things are divided into *kingdoms*. There are six in all: *animals, plants, bacteria, archaea, fungi and protists*.

This lesson will focus on the animal kingdom, or ***Animalia***.

The animal kingdom is divided into two *phyla* - *vertebrates* and *invertebrates*. Vertebrates are animals that have a *backbone*, while invertebrates are animals *without a backbone*.

The vertebrates are divided into *classes* - *mammals, fish, birds, reptiles and amphibians*.

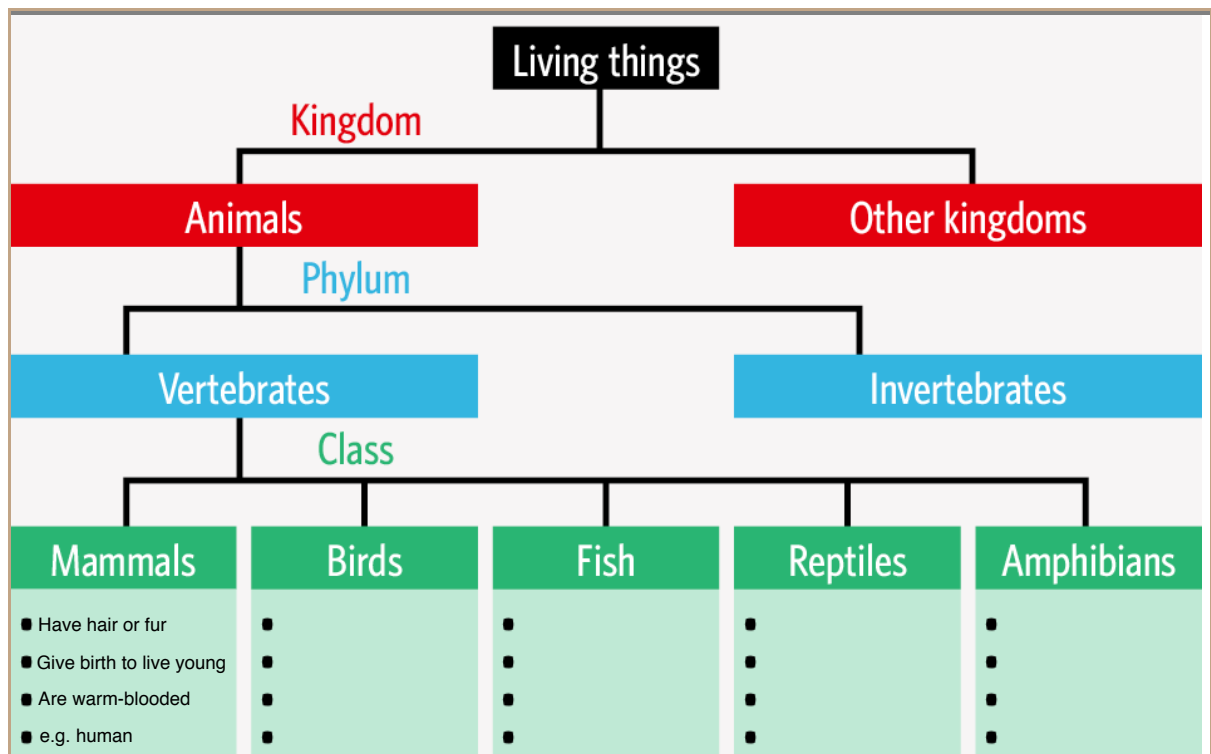
Question 3

Think: Why do we classify organisms?

Question 4

Describe: Complete the diagram below by adding some behavioural or physical *features* and an *example* to each animal class. The first class has been completed for you.

Hint: You may need to perform an internet search to help with some of the features.



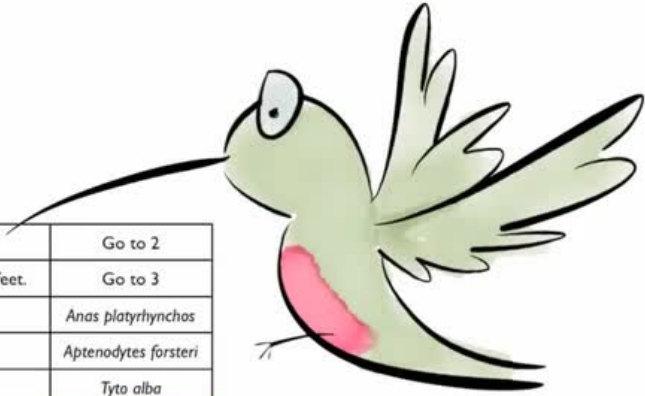
Question 5

Select: Which *class* do you think the zebra and white tiger best fit into? Justify your choice.

Process: Classification (P1)

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1	The bird has webbed feet.	Go to 2
	The bird does not have webbed feet.	Go to 3
2	The bird has three toes.	<i>Anas platyrhynchos</i>
	The bird has four toes.	<i>Aptenodytes forsteri</i>
3	The bird has tufts	<i>Tyto alba</i>
	The bird has no tufts	<i>Threnetes rukeri</i>



Loading

Credit: Mark Drollinger & YouTube.



Image credit: iStock.

Question 1

Classify: From the images above, select the animal that best suits each blank space to complete the dichotomous key.

	Behavioural or physical feature	Action or species
1	flying	go to 2
	not flying	go to 6
2	feathered	go to 3
	not feathered	Little brown rat
3	web-footed, water dwelling	Mallard duck
	not web-footed, not water dwelling	go to 4
4	hovering flight, very small	Ruby-throated hummingbird
	not hovering flight	go to 5
5	mouse eater, nocturnal	Great horned owl
	insect eater, diurnal	American robin
6	hairy or furred, mammalian	go to 8
	not hairy, not furred, not mammalian	go to 7
7	legs present	
	legs absent	
8	aquatic animal	Harbour seal
	land animal	go to 9
9	hopping or jumping locomotion	go to 10
	not hopping or jumping locomotion	go to 11
10	large with tail used for balance	
	small with small bobbed tail	
11	large flat leathery tail	Beaver
	tail neither flat nor leathery	go to 12
12	hoofed, herbivorous	go to 13
	not hoofed, omnivorous or carnivorous	
13	spotted or striped coat	go to 14
	no spots or stripes on coat	
14	spots on coat	
	stripes on coat	

Question 2

Determine: Do you think that two animals' coat colour and pattern is sufficient to determine whether or not they belong to the same species? Support your answer with an example.

Question 3

Think: New species are discovered every year. What difficulties do you think researchers might have in determining whether or not an organism belongs to a new or existing species?

Question 4

Research: The classification of the plains zebra is:

Kingdom: *Animalia*

Phylum: *Chordata*

Class: *Mammalia*

Order: *Perissodactyla*

Family: *Equidae*

Genus: *Equus*

Species: *quagga*

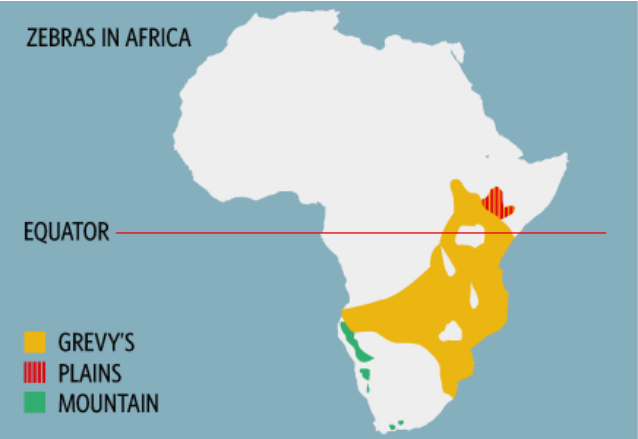
Use the internet to find out the genus and species of each of the animals shown below. The first one has been done for you.

Note: the genus always begins with a capital letter and the species is always written in lower case. Both are to either be written in italics or underlined.

 ZEBRA <u>Equus quagga</u>	 HORSE _____
 MULE _____	 DONKEY _____

 Question 5

Recall: The *Cosmos* Magazine article stated four theories for why zebras have stripes. What were they?



Credit: Getty images.

 Question 6

Calculate: The approximate location distribution of the three species of zebra can be seen in the image above. If the continent of Africa is approximately 30,244,049 km², calculate the approximate area (in square kilometres) that each species occupies.

Species of zebra	Approximate fraction of Africa occupied	Area (square kilometres)
Grevy's (<i>Equus grevyi</i>)	$\frac{1}{100}$	
Plains (<i>Equus quagga</i>)	$\frac{1}{5}$	
Mountain (<i>Equus zebra</i>)	$\frac{1}{80}$	

Apply: Classification (P2)

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Activity: Classifying striped animals



Credits: iStock, David Wrobel / Getty Images, Rolf Kopfle / Getty Images, Charles V Angelo / Getty Images.

Background

In this task, you are asked to use the images above to demonstrate your understanding of classification. Are you ready for this stripy challenge?

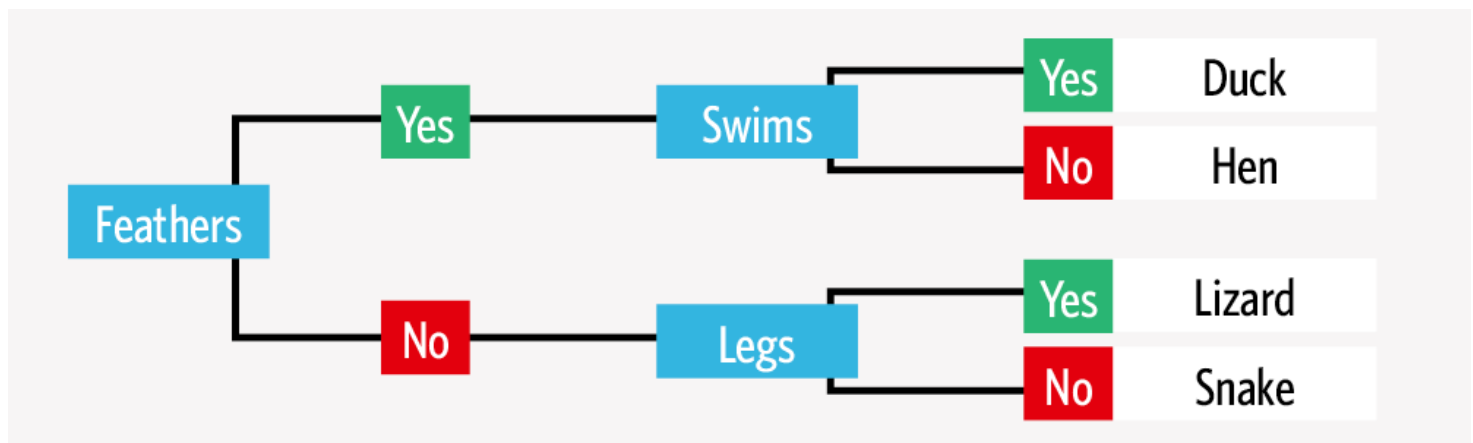
Question 1

Complete: Use the table below to describe each of the animals featured in the images.

Hint: You may perform an internet search to help you. Make sure to describe each animal as specifically as you can as you will soon be asked to design a dichotomous key.

Image	Common name of animal	Distinguishing features	Genus and species
1 (top left)			
2			
3			
4			
5			
6			
7			
8 (bottom right)			

Recall that a *dichotomous key* uses specific features to characterise and separate species. In this lesson we have seen an example of a step by step tabular dichotomous key, but you can also construct a dichotomous key in graphical form, seen below.



Question 2

Design: Construct a dichotomous key that can be used to distinguish between each of the eight animals pictured at the top of this page. Use the project space provided to create your key in either tabular or graphical form. Supplement your dichotomous key with your own images of each animal (sourced from the internet) along with their formal names (genus and species). You may wish to add additional animals to your key, however you *must* include all of the animals pictured above.

Good luck!

Career: Classification (P2)



Brought to you by the University of Adelaide

Tim Caro was only three years old when his mother gave him a book about birds. Captivated by the beautiful and colourful birds he saw within its pages, young Tim knew then that he wanted to become a zoologist.

Tim isn't satisfied with just admiring beautiful animals. He wants to know exactly why animals look the way they do. Although we learn about what animals look like as children, he says that few people really understand the reasons behind the striking geometrical patterns of a giraffe's coat, or why a panda is black and white.

At home in sunny California, Tim divides his time between teaching biology at the University of California and writing books and papers about his research. It's a very different life from the two months a year he spends doing fieldwork on the open plains of Tanzania. It's this time that he relishes the most because he gets to watch his beloved animals in the wild. Tim cares deeply about animals - a large part of his research is dedicated to help protect and conserve the wildlife in Africa.

Through his research, Tim hopes to excite young people about the wonders of nature. Although he works hard (he wakes up at 5.30 am everyday!), Tim always makes time to play squash every evening.



Question 1

Propose: If you could ask Tim one question about his work, what would you ask him and why?

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