

Adaptations

Life exists in so many different environments because the organisms that live in them have adapted to them.

Adaptations Allow Organisms to Survive

Organisms, including microorganisms, are adapted to live in different environmental conditions. The features or characteristics that allow them to do this are called adaptations. Adaptations can be:

1) Structural

These are features of an organism's body structure — such as shape or colour. For example:

Arctic animals like the Arctic fox have white fur so they're camouflaged against the snow. This helps them avoid predators and sneak up on prey.



Animals that live in cold places (like whales) have a thick layer of blubber (fat) and a low surface area to volume ratio to help them retain heat.



Animals that live in hot places (like camels) have a thin layer of fat and a large surface area to volume ratio to help them lose heat.



2) Behavioural

These are ways that organisms behave. Many species (e.g. swallows) migrate to warmer climates during the winter to avoid the problems of living in cold conditions.

3) Functional

These are things that go on inside an organism's body that can be related to processes like reproduction and metabolism (all the chemical reactions happening in the body). For example:

Desert animals conserve water by producing very little sweat and small amounts of concentrated urine.

Brown bears hibernate over winter. They lower their metabolism which conserves energy, so they don't have to hunt when there's not much food about.



Microorganisms Have a Huge Variety of Adaptations...

...so that they can live in a wide range of environments:

Some microorganisms (e.g. bacteria) are known as extremophiles — they're adapted to live in very extreme conditions. For example, some can live at high temperatures (e.g. in super hot volcanic vents), and others can live in places with a high salt concentration (e.g. very salty lakes) or at high pressure (e.g. deep sea vents).



In a nutshell, it's horses for courses...

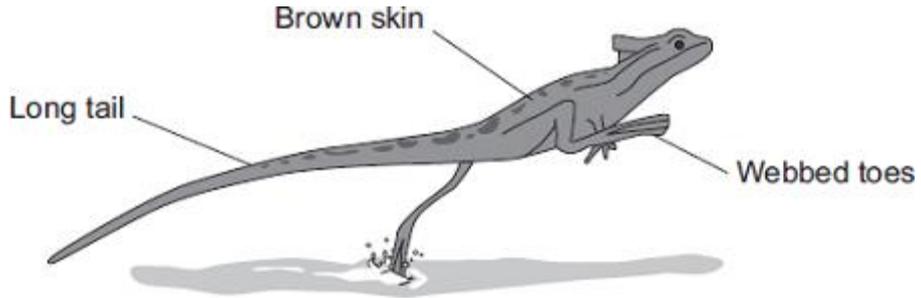
In the exam, you might have to say how an organism is adapted to its environment. Look at its characteristics (e.g. colour/shape) as well as the conditions it has to cope with (e.g. predation/temperature) and you'll be sorted.

Q1 The diagram on the right shows a penguin. Penguins live in the cold, icy environment of the Antarctic. They swim in the sea to hunt for fish to eat. Some penguins also huddle together in large groups to keep warm.

- a) What type of adaptation is being described when penguins 'huddle together'? [1 mark]
- b) Explain one structural adaptation a penguin has to its environment. [2 marks]



Q1.The picture shows a basilisk lizard. Some of the adaptations of the lizard are labelled.



Basilisk lizards are often found resting on branches of trees that grow next to water. Basilisk lizards can run across the surface of the water.

(a) Draw **one** line from each adaptation of the lizard to the advantage of the adaptation.

Adaptation	Advantage
Toes on the back feet are webbed	For camouflage on branches of trees
Long tail	Helps the lizard to balance when running
Brown skin	Warning colours to deter predators
	Increases surface area in contact with the water

(3)

(b) Suggest **one** advantage to the basilisk lizard of being able to run across the surface of the water.

.....

.....

(1)

(c) Animals, such as lizards, compete with each other.

Give **two** factors that animals compete for.

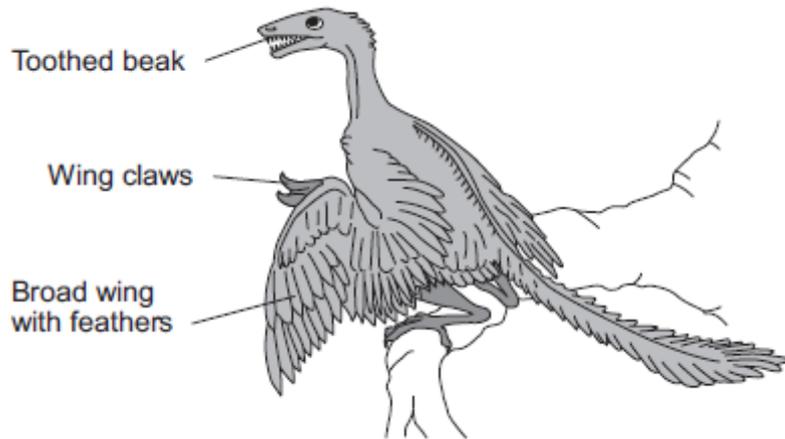
Tick (✓) **two** boxes.

Oxygen	<input type="checkbox"/>
Food	<input type="checkbox"/>
Territory	<input type="checkbox"/>
Light	<input type="checkbox"/>

(2)
(Total 6 marks)

Q2. The drawing shows what a prehistoric bird called the *Archaeopteryx* might have looked like when it was alive.

Scientists think that *Archaeopteryx* was a predator.



(i) Look at the drawing.

Write down **three** adaptations that might have helped *Archaeopteryx* to catch prey.

How would **each** adaptation have helped *Archaeopteryx* to catch prey?

Adaptation 1

How it helps

.....

Adaptation 2

How it helps

.....

Adaptation 3

How it helps

.....

(3)

(Total 3 marks)

Q3. Penguins live mainly in the Antarctic. Penguins eat mainly fish.
Photograph 1 shows a penguin swimming underwater.

Photograph 1



© raywoo/iStock

(a) Use information from **Photograph 1** to suggest **three** ways the penguin is adapted for catching fish.

1

.....

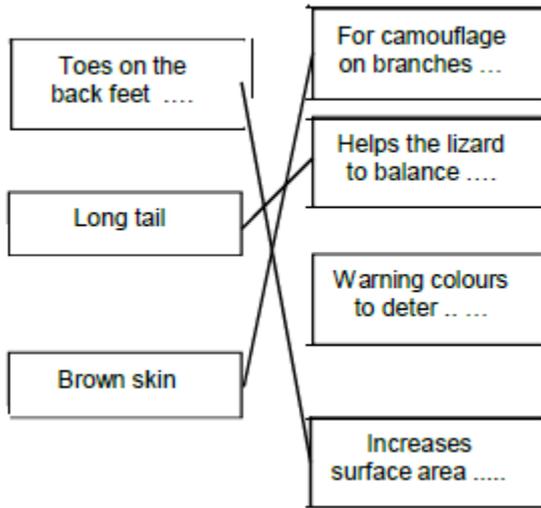
2

.....

3

.....

(3)



M1.(a)

one mark for each line

do **not** award mark for an adaptation if lines are drawn from it to more than one advantage

3

(b) escape (predators)

accept faster than swimming

allow chase prey

allow it stops them from drowning

1

(c) food

1

territory

1

deduct **one** mark for each tick in excess of two

[6]

M2.(b) (i) teeth for biting (prey)

must give structure + explanation

1

claws to grip (prey)
accept sensible uses

1

wing / tail for flight to find (prey)

1

M3.(a) any **three** from:

- streamlined shape enables it to swim quickly (to catch fish)
- wings (provide power) to move quickly (to catch fish)
allow 'flippers'
- wings used for steering
- white underside / dark top acts as camouflage (so prey less likely to see it)
- long / sharp beak to catch fish

3

(b) any **three** from:

- reduces (total) surface area of penguins exposed to wind / cold atmosphere
- reduced number of penguins exposed (to wind / cold)
accept reference to movement in or out of the huddle
accept outer ones insulate / act as barrier
- reducing heat loss
allow reduced cooling
- 'share' body warmth / heat

3