**Adaptations**

**Summary**

Organisms are well adapted to survive in their normal environment. Population size depends on a variety of factors including competition, predation, disease and human influences. Changes in the environment may affect the distribution and behaviour of organisms (see ‘Environmental change’ topic)

**Survival**

* To survive, organisms require a supply of materials from their surroundings and from the other living organisms there.
* Organisms live, grow and reproduce in places where, and at times when, conditions are suitable.

**Competition** (see additional notes from Ambassadors session for more details)

Animals compete for:

* Mates
* Food
* Territory

Plants compete for:

* Space
* Light
* Water
* Nutrients from the soil

**Adaptation**

* Organisms have features (adaptations) which enable them to survive in the conditions in which they normally live
* The organisms that are best adapted to make use of their resources in a habitat are more likely to survive and increase in numbers
* Organisms might be adapted, for example:
	+ To be able to obtain a certain food better
	+ To make it more difficult for predators to catch them
	+ To survive in extreme climates, eg arctic and deserts

**Extreme adaptations**

* Extremophiles are organisms that live in extreme environments
* Some may be tolerant to high levels of salt (halophiles), high temperatures (thermophiles) or high pressures (barophiles)

**Extreme animals**

* Animals may be adapted for survival in dry and arctic environments by means of:
	+ Changes in surface area
	+ Thickness of insulating coat
	+ Amount of body fat
	+ Camouflage
* Examples:
	+ **Camel**
		- The camel can go without food and water for 3-4 days
		- Fat stored in their humps provides long-term food reserves, and a supply of metabolic water
		- The fat is not distributed around the body: this reduces insulation, allowing more heat loss
		- They are tall and thing, increasing their surface area:volume ratio, increasing loss of heat by radiation

 

* **Polar bear**
	+ Has thick fur and fat beneath its skin to insulate it
	+ Their large, furry feet help to distribute their weight as they walk on thin ice
	+ They are white which camouflages them against the snow. This helps them to hunt (remember, polar bears don’t have predators so they don’t need to change colour in the summer)
	+ They are compact in shape, reducing their surface area:volume ratio. This reduces heat loss by radiation

**Extreme plants**

* Plants may be adapted to survive in dry environments by means of:
	+ Changes in surface area, particularly of the leaves (eg, cacti)
	+ Water-storage tissues (succulents like cacti and moneyplants)
	+ Extensive root systems
* Desert plants
	+ Eg, the cactus, requires very little water to survive
	+ Leaves are spines
	+ Spines guard against most browsing herbivorous animals
	+ Spines also reduce the surface area, reducing water loss by evaporation
	+ A thick waxy cuticle surrounds the plant to reduce evaporation
	+ Fewer stomata reduces water loss
	+ Roots tend to spread sideways to catch rain water
* Arctic plants
	+ Many of the plants are small, growing close to the ground and very close together to avoid the wine and conserve heat
	+ Some possess a light, fuzzy covering to insulate the buds so they can grow
	+ Many are dark in colour (blues and purples) to absorb heat from the sun even in winter months
	+ Because of the cold and short growing seasons, arctic plants grow very slowly
	+ Some grow for 10 years before they produce any buds for reproduction

**Microorganisms**

* Slime capsule around some bacterial cells sticks them to surfaces and prevents them drying out
* Some have the ability to form spores to survive when conditions are harsh
* Some microorganisms have flagella which enable to them move around quickly
* Bacteria undergo rapid reproduction when conditions are favourable
* Some bacteria can survive extreme conditions (extremophiles are often bacteria)