**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)