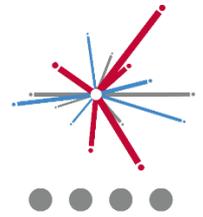# Ark Pioneer learning at Home

Core Curriculum

Science

Work to be completed

- ☐ Day 1- Knowledge organiser-based revision
- ☐ Day 2- Biotic and Abiotic Factors
- ☐ Day 3- Knowledge organiser-based revision
- ☐ Day 4- Adaptation
- ☐ Day 5- News article plus questions

Resources / links to help with work:

https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/1
https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/2
https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/3

https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/8
https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/9
https://www.bbc.co.uk/bitesize/guides/z9pd6yc/revision/10
https://www.youtube.com/watch?v=UA43xr2zR-A
https://www.youtube.com/watch?v=r17kLJxJcwM
https://www.youtube.com/watch?v=MY1d5Saqrc4

How will this work be checked?

Each week you will be given 'red pen work' to carry out corrections on the learning that you are doing at home. Please make sure this work is done and that you correct all work in your exercise book.

You must also complete the weekly quiz for your core curriculum subjects online and the link to those is on our school website in the 'quizzes' drop-down option from 'Home Learning'.

How much time should I be studying and what happens if I don't finish all my work?

For core curriculum subjects you are expected to do 30min each day as a minimum. Those subjects are English language, English literature, Maths, Science, History and Geography. These subjects all have a weekly quiz and will be checked in on by your form teacher when they call each week.

All other subjects are 'Extended Curriculum' and they should be done after you have finished the Core Curriculum tasks for the day. You should plan to do work in different subjects each day. We recommend that pupils do one hour per week in each of the 'extended curriculum' subjects.

We recognise that it is not possible for all pupils to complete all work given the exceptional circumstance. Please speak with your form tutor about the work if it is becoming unmanageable.

Aim high   *Have integrity*   *Be kind*   *Model determination*

1. Communities

- An ecosystem is the interaction of a community of living organisms with the non living parts of their environment.

Key words linked to Ecosystems:

Habitat	Place where an organism lives
Population	Number of organisms of one species in an ecosystem
Community	Group of interdependent living organisms in an ecosystem

- To survive and be able to reproduce organisms need a supply of materials from the environment and other living organisms that live there.
  A dung beetle would not be able to survive in an area where there was no animal dung.
- Plants often compete with each other for light and space, water and mineral ions.
- Plants need other organisms to aid pollination and seed dispersal to ensure the species continues to thrive.
- Animals often compete for territory, food and mates.
- Organisms that are better competitors will have a greater chance of surviving to reproduce and pass on their genes.

Key words linked to survival and reproduction:

Intraspecific Competition	Competition between individuals of the same species for the same resource e.g. food, mate, territory
Interspecific Competition	Competition between individuals of different species for the same resource e.g. food, territory
Behavioural Adaptations	A feature of how an organism acts to aid its chances of survival and chance of reproduction
Functional Adaptations	A feature of how a species body works which aids the chance of survival and reproduction.
Structural Adaptations	A feature of how a species is built which increases its chances of survival.
Extremophiles	Organisms which are adapted to live in places with extreme environments such as very cold or very hot, very acidic or alkaline, high salt or high pressure environments.

- Organisms in a community are so dependent on each other for resources that if one species is removed it can affect the whole community. This is known as **interdependence**.
- A stable community is one where the types of species and the environmental factors are in balance so the population numbers remain similar over time.

2. Abiotic Factors

- Abiotic factors are non living factors which can affect a community.

Abiotic factor	Possible effect on a community
Light intensity and air temperature	Too high can scorch plants. Too low can reduce the rate of photosynthesis and plant growth rate. Herbivores have less food to graze so increased competition. Increase in water temperatures reduces amount of dissolved gases present which affects aquatic life.
Moisture levels	Too high leads to water-logging of soil and reduce the root cells ability to respire. This can cause death and rotting of plants/crops. Too low can cause plants to wilt and so reduce the rate of photosynthesis. Water availability for animals is important too
Soil pH and mineral content	Extremes can affect plant growth. Minerals such as magnesium are needed for chlorophyll production. Lack reduces rate of photosynthesis in plants and growth and availability of food for animals.
Wind intensity and direction	Can affect shelter for organisms by bringing down trees etc. Can also bring in new pathogens, air pollution and affect seed dispersal. Also large waves in coastal communities.
Carbon dioxide levels	Too high (1% or more) can damage plant cells. Too low reduces rate of photosynthesis.
Oxygen levels in water	Aquatic organisms cannot get enough oxygen for aerobic respiration and suffocate.

3. Biotic Factors

- Biotic factors are living factors which can affect a community.

  Examples of biotic factors are:

- Food availability
- New predators arriving
- New pathogens arriving
- One species outcompeting another so the numbers are no longer sufficient to breed.

 The dodo became extinct when Dutch sailors introduced new animals to its habitat. The dodo's eggs were eaten by new predators (rats) so the population numbers fell. It was also outcompeted for food.

4. Adaptations

- Organisms have features that enable them to survive in their normal habitats. These features are called adaptations.

- Organisms which are more suited to their environment are able to breed and survive. Those which are not well adapted may not survive.

- Adaptations can be _structural, behavioural or functional._

- **Structural adaptations** are how the organism is built. They are the physical features you can usually see.

- Porcupines have hairless soles on their feet to help it climb trees better.
  A porcupine may have as many as 30000 quills. These are hairs with barbed tips. When a predator approaches it turns round and lashes out with its quills. If the quills become embedded in the predator they expand and become stuck in the animal's skin.

- Polar bear fur is made of a dense, insulating under fur. The fur prevents heat loss so well that polar bears can quickly overheat when they run.
- Black footpads on the bottom of their feet are covered by small bumps which help grip the ice.
- Their forepaws act as large paddles and the hind legs serve as rudders to aid swimming.

- Cacti have needles as leaves to reduce the surface area for water loss. The needles also deter herbivores from eating them.

- **Behavioural adaptation**s are how the organism acts to aid its chances of survival and reproduction.

- Emperor penguins huddle together to reduce heat loss to the environment.
- They breed during the autumn so that offspring are ready to become independent in the summer when more food is available.

- **Functional adaptations** assist the organism's body to work better in its environment.

- A penguin's heart rate can fall from 130 bpm to 80bpm when diving to conserve oxygen and stay underwater for longer.
- Male penguins do not eat for around 100 days so they can survive the winter and incubate the eggs. They rely totally on body fat laid down during the summer.

Day One

Test yourself on the week's questions by:

1. Study the knowledge organiser for your set topic.

2. Write the answer to each question in Copy column (you can do this in your workbook).

3. Check your answers using the knowledge organiser. Tick if correct, and add any missing information in red pen.

4. Cover the answers in Copy column and answer the question <u>from memory</u> in the Cover, Check column.

5. Uncover the answers and mark the Cover, Check column with a red pen. Tick if correct, and add any missing information.

	Question	Copy, Cover	Check
	1. What is a habitat?		
	2. What is a population?		
	3. What is a community?		
	4. What does intraspecific competition mean?		
	5. What does interspecific competition mean?		
	6. What is a biotic factor?		
	7. What is an abiotic factor?		
	8. What does the term interdependence mean?		

Day Two- Biotic and Abiotic Factors

1. Place each of these factors under the correct column heading:
   food availability   light intensity   environmental temperature   pathogens   soil pH
   oxygen availability   carbon dioxide levels   predators competition acid rain

Biotic factor	Abiotic factor

2. The loss of one species can affect the whole community in an ecosystem. This dependence of a species on others for survival is called interdependence.

   Elephants often eat or destroy acacia plants. If these plants are not grazed they quickly become trees and eventually a grassland savannah can become a forest.

   Suggest how the loss of elephants from an area due to poaching or disease could be devastating to other species such as lions, hyenas, zebras and grasses.

3. **Intraspecific** competition occurs between organisms of the same species in a habitat.
   Interspecific competition occurs between different species in a habitat.

   Research an example of each type of competition with named organisms. Try to include a plant **and an** animal example where possible. Use the links on the first page to help you.

4. Giant Pandas are described as vulnerable on the IUCN threat scale.
   https://www.iucnredlist.org/species/712/121745669
   Identify the possible abiotic and biotic factors which are affecting the population numbers.

Day Three

Test yourself on the week's questions by:

6. Study the knowledge organiser for your set topic.

7. Write the answer to each question in Copy column (you can do this in your workbook).

8. Check your answers using the knowledge organiser. Tick if correct, and add any missing information in red pen.

9. Cover the answers in Copy column and answer the question <u>from memory</u> in the Cover, Check column.

10. Uncover the answers and mark the Cover, Check column with a red pen. Tick if correct, and add any missing information.

Question	Copy, Cover	Check
1. What is a behavioural adaptation?		
2. What is a functional adaptation?		
3. What is a structural adaptation?		
4. What does the word breed mean?		
5. What does MRS GREN mean?		
6. What makes up an animal cell?		
7. What makes up a plant cell?.		

Day Four- Adaptation

1. Choose one animal and one plant that you have studied or researched.
    Explain how the species is adapted to live in their natural environment.

2. The following list includes examples of adaptations shown by a variety of species.
   Categorise them as behavioural, functional or structural adaptations and explain why they are of benefit to the species in terms of survival.

Feature	Type of adaptation	Benefit to species
Migration of geese		
Hibernation of a polar bear		
Duck's webbed feet		
Desert mice produce concentrated urine		
Camels have large feet		
Needle like leaves in a cactus		
Thin wide leaves		
Excellent nocturnal eyesight in owls.		
Gills in fish		
Camels do not sweat		
Four chambered heart		
No feathers on a vultures head		
Water lilies have floating leaves and flowers		
Dandelion seeds are light and fluffy		

3. Some species live in environments which are very extreme.

   a.   Suggest where an acidophile would be found living?

   b.   Why might it be an advantage to be an extremophile?

   c.   Give three other conditions which might make living in the deep sea vents extremely challenging.

Day Five – Read the news article and answer the questions at the end.

Grizzly Bears' Diet Improves with Gray Wolf Re-appearance
Return of one predator helps another find more food.

Image credits: NPS Photo/Jacob W. Frank via Flickr

Friday, August 2, 2013   Author: Ranjini Raghunath

Photographs of an Elk and a Gray Wolf.

Efforts to reintroduce wolves to Yellowstone National Park have curbed a teeming elk **population**, but have also had an unexpected benefactor: the grizzly bear.

In the early 1900s, gray wolves and grizzly bears were **abundant** in the park, as were a variety of berry-producing shrubs. The **ecosystem** and **communities** were **stable.**

During summer, the grizzly bears stocked up on the fat from the berries for energy needed during hibernation. Unfortunately, elk also grazed on the shrubs the berries grow on, **competing** directly with the grizzly bears.

Gray wolves, for their part, **prey**ed on the elk, keeping their numbers in check, and indirectly helping the grizzly bears get more fruit in their diet. Grizzlies aren't fast enough to hunt mature elk.

But after hunters nabbed the last Yellowstone gray wolf in the 1920s and park biologists ended **elk-culling** efforts, elk numbers started rising, growing by six times in 26 years, Oregon and Washington State University **ecologists** report in the *Journal of Animal Ecology*.

More elk meant fewer berries for the bears, which started scrambling for alternate sources of food, including garbage in the park. After open garbage was also banned in 1971, the number of grizzly bears started decreasing. In 1975, they were labelled as a "**threatened species**" by the US government, the paper reported.

The elk boom also brought down the number of woody trees such as willow, aspen and cottonwood, the researchers found. These trees are also important to the grizzly bear: their dense **canopy** provides a hiding place for the bear to rest and eat.

In the mid-1990s, gray wolves were brought down from Alberta, Canada to Yellowstone, as part of the Northern Rocky Mountain Wolf Recovery Plan, by the US government.

Since the wolves' return, elk populations have dropped by ten percent and the grizzly bears have started eating more berries, indicated by the almost doubling of the fruit content in the bears' droppings in August -- when they need the berries most -- the researchers reported.

Earlier studies have linked elk populations to the grizzly bear's diet, but few have drawn the connection from wolf to bear, noted William Ripple, an ecologist at Oregon State University in Corvallis, and lead author of the study.

The grizzly bears were also found to "capitalize" on the wolves' return by scavenging on the elk carcasses the wolves left behind, he said, referring to an earlier study.

However, it remains to be seen if the recent drop in elk population will affect the bear's **dependence** on their carcasses, he acknowledged.

"Science is still fairly ignorant about the complexities of nature and how changes in one species might affect other species in the ecosystem," he said. "It is important that we understand how these **top predators** function, and their effects on the **food web**."

As the Yellowstone grizzly bear's other food sources such as white bark pine nuts and cutthroat trout also dwindle with climate change, their dependence on berries may grow, Ripple said.

Name –

Answer the following questions in full sentences:

    1.   What is this news story about?

    2.   What two events upset the stable community in Yellowstone National Park?

    3.   Give two reasons why berries so critical to the Grizzly bear population?

    4.   Apart from the competition between the elk and the bears for the berries – how else did the elk cause problems for the bear population?

    5.   How did reintroducing wolves impact on the bears- and how do scientists know this?

  6. Draw a food web for all the species involved in this article.

    7.   Write down the meanings of any words **in bold** in the article.