Year 7 Science
Ark Globe Academy
Remote Learning Pack
Phase IV
Monday 8 June – Friday 19 June
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Session 1 – Animal Cells (answers for all questions found on slides)

Do Now:

1. What are all living things made of?
2. What are the 7 life processes?

Stretch: What acronym do we use to remember the life processes?

Cells

All living things are made up of cells.

Instead of saying living things in science we use the word organism. Because all living things are made of cells, we can say they are the building blocks of life.

We cannot see cells with just our eyes because they are so small, so we use microscopes to see them.

Animal cells are found in animals (like humans, dogs, birds etc.)

Task: Have a go and see if you can remember how to label the parts of an animal cell using these words: Cell Membrane, Mitochondria, Cytoplasm, Nucleus -

Task: Now, from memory, match these descriptions to each part of your cell

- A jelly-like substance where chemical reactions happen
- This contains DNA, and controls the activity of the cell
- This is a barrier around the cell and controls what goes in and out of the cell
- Structures where respiration takes place and energy is released
CFU

Which part of the cell...
(a) Controls the activities of the cell?
1. Cell Membrane
2. Mitochondria
3. Nucleus

(b) Surrounds the cell?
1. Mitochondria
2. Cytoplasm
3. Cell membrane

CFU

Which part of the cell...
(c) Releases energy?
1. Cell Membrane
2. Mitochondria
3. Nucleus

(d) Contains DNA?
1. Mitochondria
2. Cytoplasm
3. Nucleus

(e) Is where most chemical reactions take place?
1. Cell Membrane
2. Cytoplasm
3. Nucleus
Session 2 – Plant cells

Do Now:

1. What is the scientific word for a ‘living thing’
2. Name the four structures of an animal cell
3. Which structure controls the activity of the cell?

Extension: Write down everything you know about plants

Plants and plant cells

Plants, just like animals, are also organisms. This means that they are also made of cells. Plants cells have exactly the same parts as animal cells, along with some different parts.

Task: See if you can remember what the missing labels are and add them to the diagram below of a plant cell.

There are different functions for these parts of the cell, so, using these descriptions, and match the label with the correct description.

1. A layer outside the cell membrane that strengthens the cell and is made of cellulose –
2. Contains a green pigment called chlorophyll to absorb sunlight for photosynthesis –
3. A large space inside the cell which contains liquid and stores nutrients for the cell –
Task: Complete the Venn diagram to summarise the parts found in animal cells only or plant cells only or both. What do you notice about your Venn diagram?

Task: Use your knowledge and the Venn diagram to complete the check for understanding below

**Check for understanding**

**True or false? Copy down any true sentences, correct any false ones**

1. Both animal and plant cells have a cell wall
2. Both animal and plant cells have nucleus
3. The job of the mitochondria is to release energy for the cells to use
4. Plants have chloroplasts to absorb sunlight for use in respiration
Apply Task: Compare and contrast plant and animal cells using what you have learnt from the past two sessions.

Include:

- Which parts are in an animal cell
- Which parts are in a plant cell
- Which parts are in both animal and plant cells
- What the job of at least two parts is for each one.

When comparing use the words but, whereas, or both

Start with this sentence:

Plant cells and animal cells have many differences and similarities, for example...
Session 3 – Microscopes

Do Now:

1. Name the three structures of a plant cell
2. Which part of the cell controls what goes in and out of the cell?
3. Which part of a plant cell stores nutrients?

Stretch: In what ways is a mirror similar to a microscope? How is it different?

The Microscope

Cells are the basic building blocks of all animals and plants. They are so small, you need to use a light microscope to see them. ‘Micro’ means small, and ‘Scope’ means to look at, so it’s a piece of equipment we use to look at small objects.

All microscopes magnify objects i.e. make them look bigger. When you look through a microscope you are looking at the magnified image of an object.

Task: See if you can remember all the parts of a microscope. Add labels to your microscope using the words below

- Eyepiece Lens
- Stage
- Light
- Stage
- Focusing Knob
- Objective Lens
Task: Quick quiz.

Which part of the microscope...

(a) passes light through the specimen?

1. Light bulb  
2. Stage  
3. Eye piece lens

(b) holds a microscope slide?

1. Light  
2. Stage  
3. Objective lenses

c) is the lens that you put your eye to?

1. Objective lens  
2. Eye piece lens  
3. Eye lens

(d) is the part that you hold to carry the microscope?

1. Handle  
2. Stage  
3. Objective lens

(e) is the lens closest to the object?

1. Light  
2. Stage  
3. Objective lens

(f) brings the image into focus?

1. Photosynthesis  
2. Objective lens  
3. Focusing knob

Magnification

On a microscope, each lens has its own magnification. Usually, the eyepiece lens has a magnification of 10x but this doesn’t always have to be the case. The objective lenses will also have their own magnifications. The magnification of each lens is shown next to the lens, and we can work out the total magnification by using this equation.

\[
\text{total magnification} = \text{eyepiece lens magnification} \times \text{objective lens magnification}
\]
For example, if the eyepiece lens magnification is \( \times 10 \) and the objective lens magnification is \( \times 40 \) then the total magnification = \( 10 \times 40 = \times 400 \) (400 times)

**Apply Task**

**Work out total magnifications for the following**

1. Eyepiece Lens 10x, Objective Lens 10x
2. Eyepiece Lens 10x, Objective Lens 40x
3. Eyepiece Lens 1x, Objective Lens 10x
4. Eyepiece Lens 1x, Objective Lens 4x
5. Eyepiece Lens 1x, Objective Lens 40x
6. Eyepiece Lens 4x, Objective Lens 10x
Session 4 – Observing Cells

Do Now: Label this diagram of a plant cell without looking back!

![Plant cell diagram]

Stretch: Scientists are trying to view a cell but it can only be seen at 200x magnification. Will a microscope with an eyepiece lens of 10x and objective lens of 10x be enough to see the cell? If not, what should the scientists do?

Hazards, Risks, and Precautions

So, we use microscopes to magnify things. Scientists often want to look at cells so we do this through the microscope. But we need to know how we do this properly otherwise you won’t see what you want to see! To view cells for proper viewing, we must prepare them on slides, which are pieces of glass that we can place on the stage. Before we do anything, we need to always remember how to manage the risks from any hazards by taking precautions.

A hazard is anything that could cause harm.

A risk is the likelihood/chance of a hazard causing harm.

A precaution are the steps we take to minimise the risk of a hazard.

Task: Copy any sentence that is true. Copy and correct any sentence that is false.

1. Hazards are something that could cause harm
2. Reducing the chance of a hazard happening is called a risk.
3. A risk is the chance or likelihood that the hazard does actually cause harm

Preparing a slide with onion!

Now that we know how to be safe. We can start preparing our slides for viewing. Onion cells are easy to see using a light microscope. Here is a typical method for preparing a slide of onion cells:
These are the steps:

1. cut open an onion
2. use forceps to peel a thin layer from the inside
3. spread out the layer on a microscope slide
4. add a drop of iodine solution to the layer
5. carefully place a cover slip over the layer
6. Observe using a microscope by placing slide on the stage

Task: Sort the following statements into two groups. Decide whether they are describing a hazard or a precaution.

- Iodine splashing in your eyes
- Wearing goggles
- Tucking bags and coats underneath desks
- Tripping over a bag whilst holding a glass slide and cutting yourself
- Iodine splashing on your skin
- Clearing the bench of all equipment
Session 5 – Cells Summary

Do Now:

1. What solution do we add when we prepare slides for viewing
2. Where do we place our slide on the microscope when we want to view it
3. What is the total magnification of a microscope with eyepiece lens 10x and objective lens 40x

Self Assessment – Check that you know how to do all of these. If you aren’t confident go back to the previous sessions.

✓ Knowing what all living things are made of
✓ Knowing the basic parts of an animal and plant cell and what their functions are
✓ Knowing what microscopes are, the different parts of a microscope and why we use them in science.
✓ Knowing what magnification is and how to work out total magnification of a microscope
✓ Knowing how to prepare a simple slide to view a plant cell and the risks, hazards, and precautions involved in this

What could go wrong?

There are a few things that we need to be careful of or consider when we are trying to look at slides in the lab.

• We use iodine so we can actually see the cell through the microscope
• We need to use a very thin layer of onion so light can pass through easily
• We need a source of power for our microscope
• We use a cover slip so that our objective lens doesn’t touch our object
• Multiple health and safety precautions with equipment (including the microscope!)

Apply Task: Explain in full sentences the consequence of the following mistakes:

1. A student forgot to put their goggles on
2. The onion layer was too thick
3. They carried the microscope using the eyepiece lens instead of the handle.
4. They forgot to stain the cells with iodine.
5. They forgot to turn the microscope on.
Apply Task: Answer the following exam questions.

Q1.

The diagram shows a cell.

(a) (i) Use words from the box to name the structures labelled A and B.

<table>
<thead>
<tr>
<th>cell membrane</th>
<th>chloroplast</th>
<th>cytoplasm</th>
<th>nucleus</th>
</tr>
</thead>
</table>

A .......................................................  

B .......................................................  

(ii) The cell in the diagram is an animal cell.

How can you tell it is an animal cell and not a plant cell?

Give two reasons.

1 ............................................................................................................
............................................................................................................

2 ............................................................................................................
............................................................................................................
Q2.

(a) The diagrams show the structures of a yeast cell and a bacterial cell.

(i) Both the yeast cell and the bacterial cell have structures A and B.

Name structures A and B.

A .......................................................

B .......................................................

(ii) The yeast cell and the bacterial cell have different shapes and sizes.

Give one other way in which the structure of the bacterial cell is different from the structure of the yeast cell.

...............................................................................................................

...............................................................................................................

Q3.

The diagram below shows a cell from the inside of a human cheek.

(a) On the diagram, label parts A, B and C.
3 marks

(b) Plant cells have some parts which animal cells do not have. Name two of these parts.

1. ............................................................

2. .....................................................................

2 marks

Maximum 5 marks
Session 6 – States of matter

Do Now:
List what the stuff in your room made of?

Everything is made up of matter. The properties of a substance depend on what its particles are like, how they move, and how they are arranged.

Most substances can exist in three states: solid, liquid and gas. The particles of a substance are the same in each state, but their arrangement and movement change. This explains the different behaviour of a substance in its three states.

Explaining properties

Solids:
- have a fixed volume and a fixed shape
- cannot flow, because their particles cannot move from place to place
- cannot be easily compressed, because their particles are close together with no space to move into

Liquids:
- have a fixed volume but no fixed shape
- can flow and take the shape of their container, because their particles can move around each other
- cannot be easily compressed, because their particles are close together with no space to move into

Gases:
- have no shape or volume
- can flow and completely fill their container, because their particles move quickly in all directions
- can be compressed, because their particles are far apart with space to move into

Are these different types of matter solids, liquids or gases?
- Gold
• Milk
• Water
• Wood
• Toothpaste
• Melted chocolate
• Air
• Sand

Complete the table

Write yes or no in each box

<table>
<thead>
<tr>
<th>Property</th>
<th>Solid</th>
<th>Liquid</th>
<th>Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed volume?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed shape?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easily compressed?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can flow?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Apply

(HINT: Use the table of the properties of each state of matter to help you)

a) Write down all the reasons why you think sand is a solid.

b) Why might we also think that sand is a liquid?
Do Now:
Sort these into solids liquids and gases

- Orange juice
- Steam
- Air
- Rock
- Cola drink
- Spoon
- Chocolate bar
- Water
- Helium in a balloon

All matter is made of tiny particles that are so small we cannot see them!

Every solid, liquid and gas is made of particles.

There are 8,400,000,000,000,000,000,000,000 particles of water in a glass of water!

---

**Solid**

The particles are very close together and touch their neighbours.

Particles do not move around. They vibrate on the spot.

---

**Liquid**

The particles are close together.

Particles move around, sliding over each other.
Draw particle diagrams for:

1. Solid
2. Liquid
3. Gas

Mr Abosoglu's rules

1. Always draw 9 particles for each state of matter
2. Particles must be the same shape and size
3. Always use a pencil

Apply

• Complete the following sentences that explain the properties of solids, liquids and gases.
• Remember to explain the property using the words ‘because the particles...’.
• The first one has been done for you.

1. Solids and liquids cannot be compressed because the particles are very close together.
2. Solids have a fixed shape and cannot flow...
3. Gases can be compressed...
4. Gases flow and completely fill their container...
5. Liquids flow and take the shape of their container...
Session 8 – Melting and freezing

Do Now: Match up the question to the answer

<table>
<thead>
<tr>
<th>Why can you not compress a solid?</th>
<th>Because the particles can move from place to place, sliding over each other.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why can liquids flow?</td>
<td>Because the particles are touching</td>
</tr>
<tr>
<td>Why do gases flow?</td>
<td>Because the particles move throughout the whole container</td>
</tr>
</tbody>
</table>

Explain why you can compress a gas, but not a liquid or a solid.

**Melting** – the change of state from a solid to a liquid

**Freezing** – the change of state from a liquid to a solid

When ice melts the ice gains energy from the surroundings, so its particles begin to vibrate faster.

Particles move away from their places in the pattern and continue to move around.

When a liquid starts to freeze, its particles move more slowly as they transfer energy to the surroundings.

Particles get into a pattern and vibrate on the spot away from their places in the pattern and continue to move around.

Write melting or freezing next to each statement:
Melting point - the temperature at which a solid changes state into a liquid.

Freezing point - the temperature at which a liquid changes state into a solid.

List the substances below in order of increasing melting point

<table>
<thead>
<tr>
<th>Substance</th>
<th>Melting point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallium</td>
<td>30</td>
</tr>
<tr>
<td>Gold</td>
<td>1063</td>
</tr>
<tr>
<td>Oxygen</td>
<td>-218</td>
</tr>
<tr>
<td>water</td>
<td>0</td>
</tr>
</tbody>
</table>

This type of graph is called a cooling curve. It shows us where there is a state change because the temperature stays the same instead of gradually going down.

Apply

a Lena plots her results on a graph.
i Tick one box to describe what is happening at point A on the graph.

<table>
<thead>
<tr>
<th>The substance is melting.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The substance is boiling.</td>
<td></td>
</tr>
<tr>
<td>The temperature of the substance is increasing.</td>
<td></td>
</tr>
<tr>
<td>The temperature of the substance is decreasing.</td>
<td></td>
</tr>
</tbody>
</table>

ii Use the graph to give the melting point of Lena’s liquid.

b Tom says that the substance is a liquid at 200°C. Ben says it could be a liquid or a gas. Explain who is correct. Use evidence to support your answer.
Session 9 – Boiling

Do Now: True or false? Copy the true and correct the false.

1. The melting point is when a liquid turns into a gas.
2. When heated, solid particles have more energy to move more, then a liquid is formed.
3. Liquid and solid particles have the same amount of energy.

Boiling – the change of state from a liquid to a gas

When water starts to boil, steam bubbles rise to the surface of the liquid. They escape into the air.

In these steam bubbles the water particles are much further apart.

Boiling happens if enough energy is transferred to the particles.

The mass of water at the start is the same as the total mass of steam and water. We say mass is conserved in boiling.

Mass of water before and after boiling

Water → Water + Steam
3000g → 2000g + 1000g

Boiling point - the temperature at which a liquid changes state into a gas.

Quick quiz

Choose the correct answer
(a) Jack boiled 4000g of water. After 10 minutes there was 3000g of water left in the pan. What mass of steam had been produced?
1. 7000g
2. 1000g
3. 3000g

(b) What is the definition of ‘boiling point’?
1. When water boils into a gas
2. The temperature at which a liquid changes state into a gas.
3. The temperature at which a liquid changes state into a solid
If the temperature is below the melting point, it is a solid
If the temperature is between the melting point and the boiling point, it is a liquid
If the temperature is above the boiling point, it is a gas

What state is it in at 25°C for each of the elements?

<table>
<thead>
<tr>
<th>Element</th>
<th>m.p./°C</th>
<th>b.p./°C</th>
<th>State at 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>-101</td>
<td>-34</td>
<td></td>
</tr>
<tr>
<td>Iodine</td>
<td>114</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>Fluorine</td>
<td>-220</td>
<td>-188</td>
<td></td>
</tr>
<tr>
<td>Bromine</td>
<td>-7</td>
<td>59</td>
<td></td>
</tr>
</tbody>
</table>
Apply

(HINT: Think about the different temperatures each substance would boil at)

How can we determine the boiling point of a substance (think back to the cooling curves we looked at last lesson)?

Lucy has a colourless liquid and some boiling point data for water, ethanol and propanol.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Boiling point (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>100</td>
</tr>
<tr>
<td>ethanol</td>
<td>78</td>
</tr>
<tr>
<td>propanol</td>
<td>97</td>
</tr>
</tbody>
</table>

Describe a method she could use to identify the liquid and how she would know what liquid it is.
Session 10 – More changes of state

Do Now: Is the sentence describing melting, boiling or freezing?

1. A change in state from solid to liquid.
2. Particles lose energy and begin to move more slowly. Particles move into a pattern and vibrate on the spot.
3. A change in state from liquid to solid
4. Particles gain energy and move further apart in bubbles. These bubbles rise to the surface and escape into the air.
5. A change in state from liquid to gas
6. Particles gain energy and vibrate faster. They move away from their regular arrangement.

Sublimation - the change of state from a solid to a gas.

What is the difference between boiling and evaporating?
Both are changes of state from a liquid to a gas!

Boiling
This only happens at the boiling point.
Bubbles of the substance rise up to the surface and escape into the air.

Evaporation
Particles with the most energy leave the liquid surface and move away from the liquid.
**Why do you sweat?**

Sweating cools you down by evaporation!

The water particles that move away from your body need energy. They take this energy from your skin and this cools you down.

**Why do you dry your hair with a hairdryer?**

The hairdryer speeds up evaporation.

It transfers energy to help liquid particles have enough energy to leave the liquid surface.

It also moves water particles that have evaporated away from your hair.

**Condensation** - The change of state from a gas to a liquid.
Apply: Complete exam questions

The picture shows a person taking a hot shower.

(a) When a person uses the shower the mirror gets misty. Why? (3 marks)

(b) The homeowner installs an electrically heated mirror into the shower room. When a person has a shower, the heated mirror does not become misty but stays clear. Why does the mirror stay clear? (2 marks)