Biology – Core Practical's

AQA Topics	AQA Chapter	Core Practical's	Year Taught	Exam Paper
Cell Structure and Transport	B1 Chapter 1	1 and 3	9	1
Cell Division	B1 Chapter 2		10	1
Organisation & the Digestive System	B1 Chapter 3		9	1
Organising plants and animals	B1 Chapter 4	3	10	1
Communicable Diseases	B2 Chapter 5	*2 Triple*	10	1
Preventing and treating disease	B2 Chapter 6		10	1
Non-communicable disease	B2 Chapter 7		10	1
Photosynthesis	B2 Chapter 8	6	9	1
Respiration	B2 Chapter 9		9	1
The Human Nervous system	B3 Chapter 10	7	10	2
Hormonal Coordination	B3 Chapter 11	*8 Triple*	11	2
Homeostasis in action (Triple only)	*B3 Chapter 12*		11	2
Reproduction	B4 Chapter 13		11	2
Variation and Evolution	B4 Chapter 14		11	2
Genetics and Evolution	B4 Chapter 15		11	2
Adaptations and Interdependence	B5 Chapter 16	9	9	2
Organising an Ecosystem	B5 Chapter 17	*10 Triple*	11	2
Biodiversity and Ecosystems	B5 Chapter 18		11	2

	Required practical	Topic
1	**Using a light microscope.** Use a light microscope to observe, draw, and label a selection of plant and animal cells and include a scaled magnification.	B1.2
2	**Investigating the effect of antiseptics or antibiotics on bacterial growth.** Use agar plates and measure the zones of inhibition produced around colonies.	B5.4
3	**Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.** Investigate osmosis by measuring how the mass of plant tissue changes in a range of concentrations of salt or sugar solutions.	B1.8
4	**Use standard food tests to identify food groups.** Detect sugars, starch, and proteins in food using Benedict's test, the iodine test, and Biuret reagent.	B3.3
5	**Investigate the effect of pH on the rate of reaction of amylase enzyme.** Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values.	B3.6
6	**Investigate the effect of light intensity on the rate of photosynthesis** Use an aquatic plant to observe the effect light intensity has on the rate of photosynthesis.	B8.2
7	**Investigate the effect of a factor on human reaction time.** Plan and carry out an investigation, choosing appropriate ways to measure reaction time and considering the risks and ethics of the investigation.	B10.2
8	**Investigate the effect of light or gravity on the growth of newly germinated seedlings.** Record results both as length measurements and as accurate, labelled biological drawings to show the effects.	B11.9
9	**Measure the population size of a common species in a habitat.** Use sampling techniques to investigate the effect of a factor on the distribution of this species.	B16.3
10	**Investigate the effect of temperature on the rate of decay of fresh milk.** Measure the pH change of milk to investigate how temperature affects its rate of decay.	B17.4

CP1- B1.2 Looking at cells

Aims

In this practical you will use a light microscope to observe plant and animal cells under the microscope. You will make your own drawings of the cells and calculate total magnification.

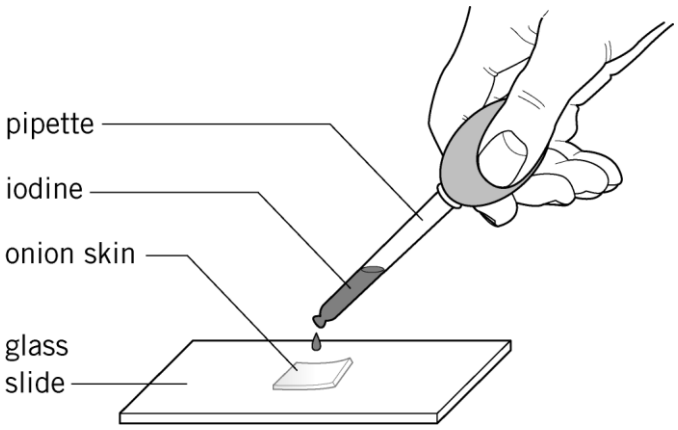
Equipment

- light microscope with low and high power objective lenses
- microscope slide and cover slip
- selection of samples: onion, *Elodea*, filamentous algae
- dilute iodine solution
- dropper pipette
- scalpel, scissors, forceps
- mounted needle
- blotting paper or filter paper
- range of prepared animal cells including cheek cells and red blood cells
- range of prepared plant cells including onion epidermal cells and leaf palisade cells

Method

Preparing your slide

1. Collect a sample of the cell you want to observe.
2. Remove the inner skin of a layer of onion using forceps, or a thin layer or *Elodea* or filamentous algae using the scalpel.
3. Place the thin slice onto a clean glass slide. Use your forceps to keep the onion skin flat on the glass slide.
4. Using a pipette, add one or two drops of dilute iodine solution on top of the onion skin or slice of algae or plant.
5. Hold the coverslip by its side and lay one edge of the cover slip onto the microscope slide near the specimen.
6. Lower the cover slip slowly so that the liquid spreads out.



CP2- B5.4 Analysing bacterial growth (Triple)

Aims

In this practical you will plan and carry out an experiment to investigate the effect of antiseptics or antibiotics on bacterial growth.

Equipment

- disinfectant solution/alcohol to sterilise benches
- Bunsen burner
- sterile Petri dish containing nutrient agar or sterile Petri dish and cooled molten nutrient agar
- inoculating loop
- sticky tape
- marker pen or chinagraph pencil
- culture of a bacterium (such as *Bacillus subtilis*) in a small capped bottle
- tweezers
- small pieces of filter paper
- ruler
- examples of antiseptics (e.g. antibacterial liquid soap, mouthwash, liquid toothpaste) or pre-soaked antibiotic discs
- distilled water

Method

1. Choose whether you wish to investigate the effectiveness of different antibiotics or antiseptics.
2. Write a detailed step-by-step method for this practical activity.

   Tip – Start by explaining how to produce an agar plate containing a bacterial culture. Then describe how you add your antiseptic/antiseptic discs. Remember to state the temperature and time to incubate your plate.
3. Complete a risk assessment.

   Tip – Go through each safety statement listed and explain why this is important.
4. Check your plan with your teacher and then carry it out.

CP3- B1.8 Investigating the effect of sugar or salt solutions on plant tissue

Aims

In this practical you will plan and carry out an experiment. In the experiment you will see how sugar and salt levels in water affect plant tissue.

Equipment and materials

- plant tissue e.g., potato, sweet potato, or beetroot
- range of concentrations of sugar or salt solutions
- distilled (pure) water
- apple corer
- sharp knife
- white tile
- filter paper
- tweezers
- boiling tubes
- measuring cylinder
- ruler
- balance
- stop-clock

Method

Your task is to find out how vegetable chips change when left in pure water compared to salty or sugary water (a solution).

7 The first thing you need to do is write a plan.

- Which vegetable (plant tissue) will you choose and how will you cut it up?
- Which solution will you choose? **See (a) in the table.**
- What will you measure to show how the chips have changed? **See (b) in the table.**
- How long will you leave the chips in the liquid?
- What control variables will you use (things that stay the same)?

8 Check your plan with your teacher and then carry it out.

CP4- B3.3 Food tests

Aims

In this practical you will test foods to investigate if they contain carbohydrates (simple sugars or starch), lipids (fats), or proteins.

Equipment and materials

- a range of small pieces of different foods (e.g. cheese, crisps, pasta, ham, bread, boiled sweets, nuts)
- test tubes
- test-tube rack
- spotting tile
- iodine solution
- Benedict's solution
- Biuret reagent or dilute sodium hydroxide solution and copper sulfate solution
- disposable pipettes
- filter paper
- water bath or beakers and a supply of hot water
- sticky labels or waterproof pen.

Method

Test for starch:

1. Place a small amount of food on the spotting tile.
2. Add a few drops of iodine solution to the food on the spotting tile.
3. Yellow–red iodine solution turns blue–black if starch is present.
4. Record your result in the results table.
5. Repeat steps 1–4 for other types of food.

Test for sugar:

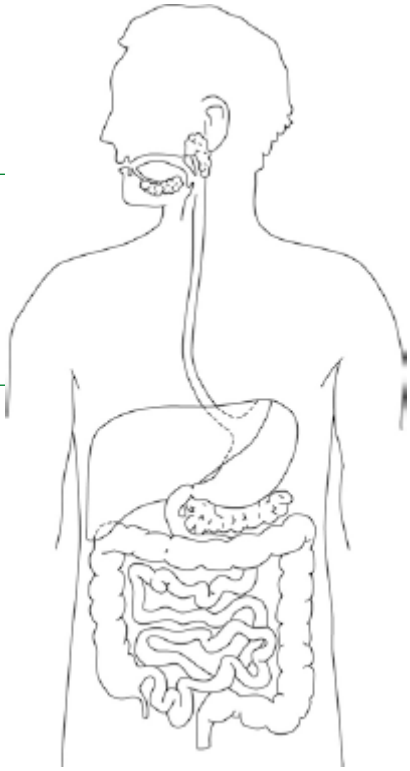
1. Place a small amount of food in a test tube.
2. Add enough Benedict's solution to cover the food.
3. Place the test tube in a warm water bath for 10 minutes.
4. Blue Benedict's solution turns brick red on heating if a sugar such as glucose is present.
5. Record your result in the results table.
6. Repeat steps 1–5 for other types of food.

Test for lipids (fat):

1. Place a small amount of food into a test tube.
2. Add a few drops of ethanol to the test tube.
3. Shake the test tube and leave for 1 minute.
4. Pour the solution into a test tube of water.
5. Ethanol added to a solution gives a cloudy white layer if a lipid is present.
6. Record your result in the results table.
7. Repeat steps 1–6 for other types of food.

Test for protein:

1. Place a small amount of food in a test tube.
2. Add 1 cm^3 of Biuret reagent. Alternatively add 1 cm^3 of sodium hydroxide solution and then add a few drops of copper sulfate solution.
3. Blue Biuret reagent turns purple if a protein is present.
4. Record your result in the results table.
5. Repeat steps 1–4 for other types of food.



CP5- B3.6 The effect of pH on the rate of reaction of amylase

Aims

In this practical you will use a continuous sampling technique to determine the time taken to completely digest a starch solution. You will repeat the experiment at different pH levels to investigate how pH affects the time taken for this enzyme controlled reaction to occur.

Equipment

- amylase solution (0.5%)
- starch solution (0.5%)
- iodine solution in a dropper bottle
- buffer solutions covering a range of pH values
- 5 cm^3 syringes
- pipette
- test-tube rack
- test tubes (one for each pH to be tested)
- spotting tile
- stop clock
- marker pen or chinagraph pencil
- water baths set at 30 °C

Method

1. Use the syringe to place 2 cm^3 of amylase solution into a test tube.
2. Use another syringe to add 1 cm^3 of pH buffer solution to the test tube.
3. Place the test tube into a water bath set at 30 °C and leave for 5 minutes.
4. Whilst waiting, add a drop of iodine solution into each dimple of a spotting tile.
5. After 5 minutes, use another syringe to add 2 cm^3 of starch to the amylase/buffer solution, start the stop clock and leave it on throughout the test. Mix using a plastic pipette.
6. Remove a drop of amylase/starch/buffer mixture after 30 seconds and add to the first drop of iodine on your spotting tile. (Hint – the iodine solution should turn blue–black.)

7. Wait another 30 seconds. Then remove a second drop of the mixture to add to the next drop of iodine.
8. Repeat step 6 until the iodine solution and the amylase/buffer/starch mixture remains orange. (Hint – this is the point at which the amylase has fully digested the starch.)
9. Record the time taken for the amylase to fully digest the starch. (Hint – count how many iodine drops you have used.) Multiply the number of drops by 30, as each drop equals 30 seconds of reaction time.
10. Repeat the whole procedure with a different pH buffer.

CP6- B8.2 Light intensity and rate of photosynthesis

Aims

In this practical you will plan and carry out an experiment to find out how the rate of photosynthesis changes as you change the light intensity.

Equipment and materials

- pondweed
- scissors
- boiling tube of water
- test tube rack
- large beaker of water
- lamp
- metre rule
- stopwatch
- thermometer

Method

1. Cut a piece of pondweed 8–10 cm long. Place it in a boiling tube of water with the cut end uppermost.
2. Use the thermometer to measure the temperature of the water in the boiling tube.
3. Place the lamp 15 cm from the boiling tube. Place the large beaker of water between the lamp and the boiling tube.
4. Wait until there is a steady flow of bubbles from the cut end of the pondweed. Count the number of bubbles in 2 minutes. Record this in the first blank column of the results table.
5. Measure the temperature of the water in the boiling tube again to make sure it has not changed.
6. Repeat steps 1–5 four more times but **in step 3** increase the distance between the lamp and boiling tube by 2 cm each time.
7. Repeat the **whole investigation** (steps 1–6) two more times and record the results in the second and third blank columns of the table.
8. Calculate the **mean** number of bubbles for each distance, leaving out any anomalous values from your calculations. Record it in the fourth blank column, giving your answer to the nearest whole number.

CP7- B10.2 Measuring reaction time

Aims

In this practical you will plan and carry out an experiment to investigate how one factor affects human reaction time.

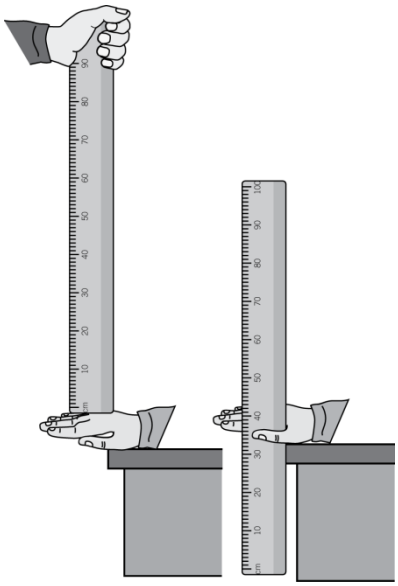
Equipment and materials

- metre ruler
- cola drink
- cups

Method

1 Work in pairs.

2 One student holds a ruler vertically so the zero end points downwards. The other student puts their thumb and fingers in a C shape around the ruler, level with the zero marking.



3 Without warning, the first student drops the ruler and the second student has to catch it as quickly as they can.

4 Write down the number just above the second student's thumb. The lower the number, the faster the reaction time. Write the number in the results table.

5 Repeat steps 2 to 4 four more times.

6 The second student has a drink of cola and waits a few minutes.

7 Repeat steps 2 to 4 five more times and record the results in the table.

8 Calculate the mean number on the ruler for before drinking cola, and the mean number for after drinking cola. Record these in the last blank column, giving your answers to the nearest whole number.

9 Plot your mean results in a bar chart.

CP8- B11.9 Investigating newly germinated shoots (Triple)

Aims

In this practical you will plan and carry out an experiment to investigate how light affects the growth of newly germinated seedlings.

Equipment and materials

- newly germinated seedlings, such as cress, rapid-cycling *Brassica rapa* (fast plants), *Sinapis alba* (white mustard), *Raphanus sativus* (radish)
- two Petri dishes
- cotton wool or compost
- water and pipette
- small cardboard box (e.g. shoebox)
- scissors
- lamp or a light bank
- ruler
- string

Method

1. You will be given two Petri dishes each containing five newly geminated seedlings growing in a layer of cotton wool or compost.
2. Measure the length of each shoot. Measure from the base of the shoot to the tip. Write your measurements in your results table.
3. Make careful drawings of the seedlings in your results table.
4. Using scissors cut out one of the sides of the box. Make sure the box has the lid closed so light can only enter through the side.
5. Place one of the Petri dishes inside the box. Put the other one near to it, but outside the box.
6. Put a lamp or light bank above the box and Petri dishes, making sure that some light is going inside the box.
7. Leave the experiment for about a week until the seedlings have clearly grown. You will need to add water during this time to make sure that the cotton wool or compost stays moist but not waterlogged.
8. After about a week, measure the length of each shoot. Measure from the base of the shoot to the tip. If a shoot is curved, straighten it before you measure it, or use a piece of string to mark off its length and then measure the string. Write your measurements in your results table.
9. Make careful drawings of the seedlings in your results table.

CP9- B16.3 Investigating population size

Aims

In this practical you will plan and carry out an experiment to measure the population size of a common species in a habitat. You will also use sampling techniques to investigate the effect of a factor on the distribution of this species.

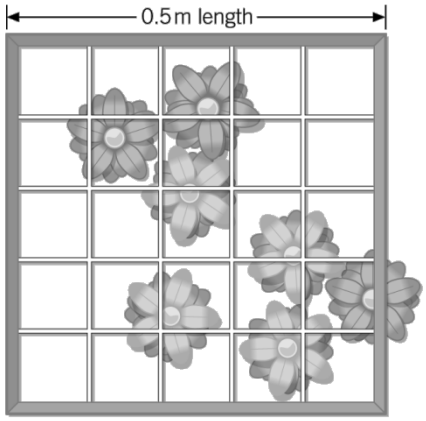
Equipment

- two 20 m measuring tapes
- table of random numbers or other generator of random numbers
- 50 × 50 cm gridded quadrat frame
- notebook and pencil
- identification sheet
- optional equipment to measure abiotic factors such as light meter, pH meter/ universal indicator paper, anemometer

Method

The area you will be studying is 20 × 20 m and it will be marked off using a tape measure. To carry out a random sample of this area you need to use a random number generator to determine the co-ordinates of where to place your quadrat.

At each sample site you need to count the number of plants of your species present.



To carry out a transect spread a tape measure through the area you are studying. At regular intervals (for example, every metre) place your quadrat and count the number of species present. At each site you must also take a measurement of the abiotic factor you have chosen to study.

1. Choose which species of plant you wish to study – check that you can recognise this species easily by referring to an identification key.
2. Chose which abiotic factor you wish to study.
3. Write a detailed step-by-step method for this practical activity.

   Hint – you may wish to write two separate plans, one for each part of the practical.
4. Check your plan with your teacher before carrying it out.

CP10- B17.4 Decay of Fresh Milk (Triple)

Aims

In this practical you will plan and carry out an experiment to find out how the rate of decay of fresh milk changes as you change the temperature.

Safety

Do not drink the milk

Wash hands afterwards

The oven must not be warmer than 25 °C

The beakers of milk should remain covered during the experiment

Waste should be disposed of in an appropriate manner

Equipment and materials

- sample of fresh milk
- measuring cylinders (10 cm^3)
- small beakers
- thermometers
- waterproof pens or sticky labels
- aluminium foil
- pH meter
- fridge and oven

Method

1. Use a measuring cylinder to put 10 cm^3 of fresh milk in each of three small beakers. Label these as fridge, room, oven.
2. Use a pH meter to measure the pH of the milk in each beaker. Record these in your results table.
3. Place one beaker in a fridge, place one in an oven/incubator and leave one out at room temperature. Cover each beaker in aluminium foil.
4. Use a thermometer to measure the temperature in each place. Record these results in your results table.
5. Measure the pH of each beaker at the same time each day over the next 5 days. Record all your results in the results table.

Results table

	Place where milk was left		
	Fridge	**Room**	**Oven**
Temperature in °C			
pH after 0 days (start)			
pH after 1 day			
pH after 2 days			
pH after 3 days			
pH after 4 days			
pH after 5 days			