5. Place the agar plate upside down into an incubator – this stops moisture from dripping down onto the bacteria and disrupting the colonies – temperature used is 25°C – this reduces the chances that harmful bacteria will grow.

How the practical is carried out - method:

1. Clean bench with disinfectant solution to kill microorganisms that could contaminate the culture.
2. Sterilise an inoculating loop by passing it through a Bunsen burner flame.
3. Open a sterile agar gel plate (previously sterilised using an autoclave) near a Bunsen flame – the flame kills bacteria in the air.
4. Use loop to spread the bacteria evenly over the plate.
5. Place sterile filter paper discs containing antibiotic onto the plate.
6. Seal the plate using adhesive tape to prevent unwanted microorganisms from contaminating the culture.
7. Incubate the plate at 25°C
8. Leave for a few days.
9. After this, a layer of bacteria should be observed with a zone of inhibition (a circle gap) around most of the antibiotics – they have prevented bacteria from growing in these zones.
10. Effectiveness of antibiotic can be measured by measuring the area of the zone of inhibition, measure the radius then pi r squared. Larger areas = more effective at killing bacteria.

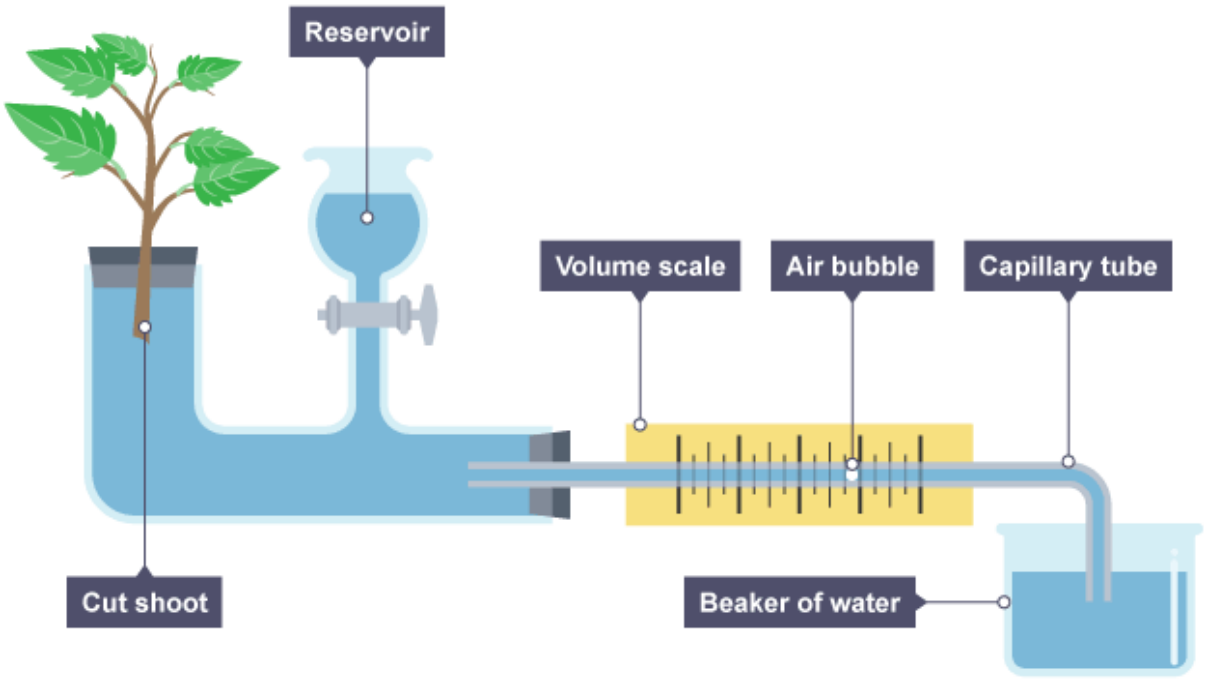
Photosynthesis:

Investigate how light intensity affects the rate of photosynthesis.

Explain how the results of this are affected by inverse square law.

1. Place a boiling tube in a clamp 10cm away from an LED light source, measuring the distance using a ruler. LED used because they do not release much heat – higher temperatures may affect the experiment.
2. Pour 45cm^3 of sodium hydrogen carbonate solution (1%) into the tube – this substance releases carbon dioxide which is required for photosynthesis.
3. Put an 8cm long piece of pondweed, Cabomba into the boiling tube with a cut end at the top – do this carefully using forceps, make sure pondweed not damaged/liquid overflow.
4. Leave for five minutes to allow the pondweed to acclimatise to the conditions.
5. Bubbles of gas should be seen being produced from the cut end of the pondweed – oxygen being produced by photosynthesis.
6. Start a stopwatch and count the no. of bubbles produced in one minute using a handheld counting device.
7. Repeat five more times and calculate the mean number of bubbles produced in one minute.
8. Repeat whole experiment for distances of 20cm, 30cm and then 40cm.

Independent = distance from light source in cm



Source: BBC Bitesize GCSE Eduqas Biology

2. Make sure components are sealed as air-tight as possible using petroleum jelly.
3. A single air bubble is introduced to the capillary tubing.
4. Tap on reservoir opened to add water, allowing the air bubble to be pushed back to zero on the volume scale (ensures accuracy)
5. Timer is started, and a set time (e.g. 30s) is measured.
6. The distance the air bubble has travelled along the scale is recorded
7. Experiment can be repeated with different environmental conditions for the plant e.g. temperature raised

Interpreting results

- Measuring an assumed rate of transpiration – as we cannot measure transpiration directly; some of the water will be used by the plant for processes such as photosynthesis
- The faster the air bubble travels, indicated by greater volume reading over set time, the greater the rate of water uptake by the plant and therefore the greater rate of assumed transpiration

Factors affecting transpiration:

- Temperature (increased) – evaporation and diffusion are faster at higher temperatures as particles have more kinetic energy so water is more likely to leave stomata
- Humidity (decreased) – humidity decreases the concentration gradient between the inside and outside of the leaf, reducing transpiration
- Wind speed (increased) – moving air masses removes water vapour from stomata, increasing the rate of diffusion of water from the leaf
- Light intensity (increased) – stomata open wider to allow more carbon dioxide into the leaf for photosynthesis