

Revision of Leaving Certificate Mandatory Practicals

1 Food tests

Conduct a qualitative test for:

- starch
- fat
- a reducing sugar
- a protein.

Food group	Reagents	Treatment	Positive result
Reducing sugar	Benedict's reagent	Boiling water bath	Brick red ppt
Starch	Iodine solution	N/A	Blue-black
Lipid	Brown paper	Left to dry	Translucent spot
Protein	Sodium hydroxide and copper sulphate (Biuret reagents)		Lilac

2009

1(e) Name a test or give the chemicals used to demonstrate the presence of a reducing sugar.....

(f) In relation to the test referred to in (e) which of the following is correct?

- (i) No heat needed.
- (ii) Heat but do not boil.
- (iii) Boil.

2008

1. (e) Name the test or give the chemicals used to detect the presence of protein in a food sample

.....

2006

7. (a) State a use of each of the following in the biology laboratory.

Biuret test (copper sulphate and sodium hydroxide solutions)

.....

Benedict's (or Fehling's) test

.....

2005

1. (d) When an iodine solution is added to a food sample and remains red-brown in colour, is absent.

2. Ecology

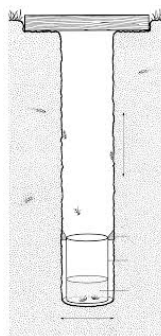
- Select and visit one ecosystem.
- Broad overview of the selected ecosystem.
- Identify any five fauna and any five flora using simple keys.
- Identify a variety of habitats within the selected ecosystem.
- Identify and use various apparatus required for collection methods in an ecological study.
- Conduct a quantitative study of plants and animals of a sample area of the selected ecosystem.
- Transfer results to tables, diagrams, graphs, histograms, or any other relevant mode.
- Identify possible sources of error in such a study.
- Investigate any three abiotic factors present in the selected ecosystem, as listed.
- Relate results to choice of habitat selected by each organism identified in this study.
- Note an adaptation feature by any organism in the selected ecosystem.
- From the information obtained in this study construct food chains, a food web, and a pyramid of numbers.
- Prepare a brief report of the results obtained.

Be able to make up a key for your 5 plants and 5 animals.

e.g.



Be able to draw and describe how to use pieces of equipment



Quantitative survey of plants:

- Counts the number of each plant species present.
- Use random quadrat throws to count the number in each quadrat
- Repeat a number of times
- Calculate the number in the whole habitat.
- The bigger the number of samples, the more accurate the count.

Quantitative survey of animal

- Counts the number of each animal species present
- Use randomly placed pitfall traps/ beating trays/etc.
- Collect, count, mark and release
- Collect and count again

$$N = \frac{n_1 \times n_2}{n_3}$$

n_3

n_1 = number caught and marked first time

n_2 = number caught second time

n_3 = number in second catch with marks

Abiotic factors:

Factor	How measured	How it affects named animal	How it affects named plant
Light intensity	Light intensity meter	Woodlouse found more in areas of lower light intensity	Brambles grew long shoots into higher light intensity area
Relative humidity	Wet and dry thermometer	Woodlouse found more in more humid area	Clover found more in less humid area
Soil temperature	Soil thermometer	Earthworm found more in cooler soil	Clover found in warmer soil

2009

11. (c) (i) In relation to ecological surveys, explain the meaning of the terms:

1. *Qualitative.*

2. *Quantitative.*

(ii) In the course of your ecological studies you investigated an ecosystem. Name this ecosystem

and describe how you conducted a **quantitative** survey of plants present in it.

(iii) How did you present the results of your survey?

(iv) Suggest a possible source of error in your survey. **(24)**

2008

7. (a) (i) What is a habitat?

(ii) What is an ecosystem?.....

(b) Answer the following questions by reference to a named ecosystem that you have investigated.

Name of ecosystem.....

(i) List **three** abiotic factors that you investigated.

1. 2. 3.

(ii) For each of the three abiotic factors that you have listed describe how you carried out the investigation.

Factor 1

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

Factor 2

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

Factor 3

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

(iii) In the case of a named organism give an adaptation feature that you noted.

Name of organism

Adaptation feature

.....

(iv) Briefly explain how the adaptation feature that you have given in (iii) is of benefit to the organism.

.....

2006

9. (a) (i) What is meant by the term 'fauna'?

(ii) In ecological studies what is a key?

(b) (i) Name **five** plants in the ecosystem that you have studied.

1.

2.

3.

4.

5.

(ii) In the space below draw up a simple key which could be used to identify each of these plants.

(iii) Name **five** animals in the ecosystem that you have studied.

1.

2.

3.

4.

5.

2006

10. (b) Describe how you carried out a quantitative survey of a **named** animal in the ecosystem that you have studied. (27)

2005

12. (c) (i) Give an account of how you carried out a quantitative survey of a named plant species in an ecosystem that you have studied. In your answer describe how you recorded the results of your survey.

(ii) As a result of a disease, a species of plant disappeared from an ecosystem.

Suggest **three** possible effects of the disappearance of this plant on the populations of other plants and animals in the ecosystem. **(24)**

2004

10. (a) Explain the following terms that are used in ecology: biosphere, habitat, niche. **(9)**

(b) In ecological studies it is found that the distribution of organisms is influenced by abiotic and biotic factors.

(i) Distinguish between the underlined terms.

(ii) Name an ecosystem that you have investigated and give an example of an abiotic factor

that influences the distribution of a named plant in the ecosystem.

(iii) In the case of your named ecosystem give an example of a biotic factor that influences the distribution of a named animal.

(iv) What is meant by a pyramid of numbers? Construct a pyramid of numbers from organisms

in the ecosystem that you have studied.

(v) What term is used by ecologists to describe the organisms that form the base of the pyramid? **(24)**

3. Using the microscope

Be familiar with and use the light microscope.

Prepare and examine one animal cell and one plant cell (e.g. own cheek cells, onion cells, *Elodea* leaf, potato tissue and moss) unstained and stained using the light microscope (x100, x400).



Cell	Dye	Colour	Structures stained
Cheek cell (epithelium) (animal)	Methylene blue	blue	Nucleus is dark blue Ctytoplasm is pale blue
Onion cell (epidermis) (plant)	Iodine solution	yellow	Nucleus is dark yellow Cell wall is yellow

2006

8. (a) State a function of each of the following components of a cell.

(i) Ribosome.....

(ii) Cell membrane.....

(b) Answer the following questions in relation to the preparation, staining and microscopic observation of a slide of an animal cell.

(i) What type of animal cell did you use?.....

How did you obtain the cell?

.....

(ii) Name the stain that you used

Describe how you applied the stain

.....

(iii) After staining, a cover slip is placed on the slide. Give a reason for this

.....

(iv) How did you apply the cover slip?.....

.....

Why did you apply it in this way?

.....

(v) Describe the difference in colour or depth of colour, if any, between the nucleus and cytoplasm when the stained cell was viewed under the microscope.

.....

4. Enzymes

- Investigate the effect of pH on the rate of one of the following:
 - amylase, pepsin or catalase activity.
- Investigate the effect of temperature on the rate of one of the following:
 - amylase, pepsin or catalase activity.
- Prepare one enzyme immobilisation and examine its application.
- Investigate the effect of heat denaturation on the activity of one enzyme.

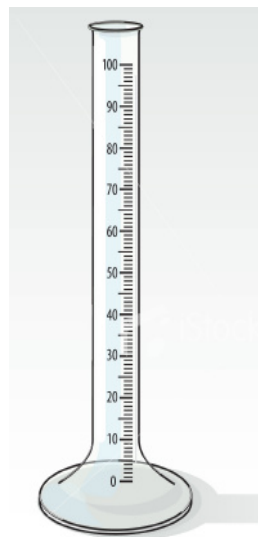
Enzyme: Catalase
Source: potato cubes / soaked peas/ celery etc.
Substrate: hydrogen peroxide
Reaction: hydrogen peroxide \longrightarrow water + oxygen
Measurement: trap evolved oxygen in washing up liquid and measure the height of froth produced

pH

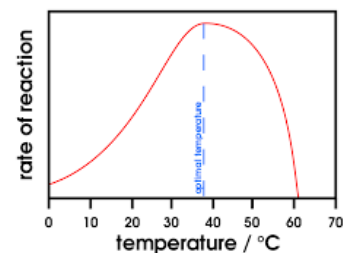
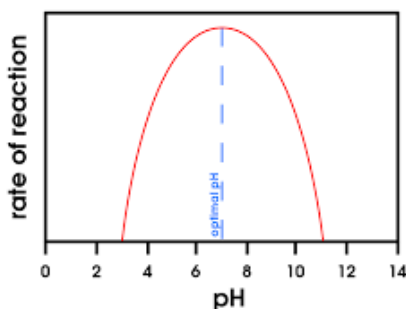
Keep the temperature constant
 Use a water bath at 25°C
 Repeat at different pH using pH buffer tablets
 Use same volume and conc. H₂O₂ each time
 Use the same volume of washing up liquid each time
 Use the same amount of enzyme each time

Temperature

Keep the pH constant
 Use a buffer tablet pH7
 Repeat at different temperatures using water baths
 Use same volume and conc. H₂O₂ each time
 Use the same volume of washing up liquid each time
 Use the same amount of enzyme each time



Graduated cylinder with H₂O₂, washing up liquid and enzyme

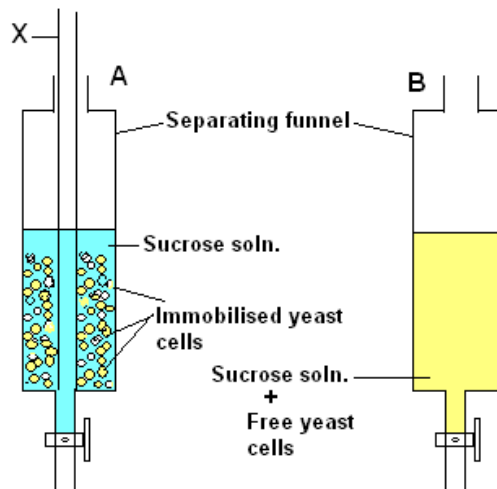


Enzyme immobilisation

Enzyme: sucrose
Source: yeast
Substrate: sucrose
Products: glucose and fructose (reducing sugars)
Immobilising agent: sodium alginate

Preparation of yeast beads:

- (i) Mix yeast suspension with sodium alginate.
- (ii) Add drops of the mixture from a height to calcium chloride solution.



2009

9. (a) (i) To which group of biomolecules do enzymes belong?

.....

(iii) Name a factor that influences the activity of an enzyme.

.....

(b) In the course of your practical investigations you prepared an enzyme immobilisation.

.....

Answer the following questions in relation to that investigation.

(i) Describe how you carried out the immobilisation.

.....

.....

.....

.....

(ii) In the space provided draw a labelled diagram of the apparatus that you used to investigate **the activity** of the immobilised enzyme.

(iii) Briefly outline how you used the apparatus referred to in (b) (ii) above.

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

2008

9. (a) (i) What is meant by an enzyme's optimum pH?

.....

(ii) What is a denatured enzyme?

.....

(b) In the course of your studies you investigated the effect of denaturation by heat application on the activity of an enzyme.

(i) Name the enzyme that you used.....

(ii) What substrate did you use?

(iii) Describe how you carried out the investigation. In your answer you must refer to the way that you measured the enzyme's activity.....

.....

.....

.....

.....

.....

(iv) State the results that you obtained.

.....

.....

2007

7. (a) (i) What is meant by an enzyme?

.....

(ii) Give an example of a protein that has a **structural** role.

(b) Answer the following questions in relation to an investigation that you carried out to determine the effect of temperature on enzyme action.

(i) Name the enzyme that you used.

(ii) Name the substrate of the enzyme.

(iii) State one factor that you kept constant during the investigation

.....

(iv) How did you keep this factor constant?

.....

(v) How did you vary the temperature?

(vi) How did you measure the rate of activity of the enzyme?

.....

(vii) What was the result of your investigation

2005

7. (a) Immobilised enzymes are sometimes used in bioreactors.

(i) What is a bioreactor?

.....
(ii) State **one** advantage of using an immobilised enzyme in a bioreactor.

.....
(b) Answer the following questions in relation to an experiment that you carried out to immobilise an enzyme and use that immobilised enzyme.

(i) Name the enzyme that you used

(ii) Draw a labelled diagram of the apparatus that you used to immobilise the enzyme.

(iii) Describe how you used this apparatus to immobilise the enzyme. In your answer name the solutions that you used and explain their purpose.

.....
.....
.....
(iv) Describe briefly how you used the immobilised enzyme.

5. Photosynthesis

Investigate the influence of light intensity or carbon dioxide on the rate of photosynthesis.



Investigating effect of light intensity on the rate of photosynthesis

Change light intensity by moving the light relative to the plant

Keep constant:
CO₂ level; temperature;
pH; plant and size of plant

Count the number of bubbles of O₂ per minute

2009

12. (c) One laboratory activity that you carried out demonstrated the influence of light intensity **or** of carbon dioxide concentration on the rate of photosynthesis. Answer the following in relation to this activity:

(i) Explain how you measured the rate of photosynthesis.

(ii) Explain how you varied light intensity **or** carbon dioxide concentration.

(iii) State how you kept another **named** factor constant.

(iv) Draw a graph with labelled axes to show the results that you obtained.

(v) Briefly explain the trend in your graph.

(24)

2007

9. (a) State a precise role for each of the following in photosynthesis:

(i) Carbon dioxide

.....

(ii) Water

.....

(b) Answer the following questions in relation to an activity that you carried out to investigate the influence of light intensity OR carbon dioxide concentration on the rate of photosynthesis.

(i) Name the plant that you used.

(ii) How did you vary light intensity OR carbon dioxide concentration?

.....

(iii) State a factor that you kept constant during the investigation.

(iv) How did you ensure that the factor that you mentioned in (iii) remained constant?

.....

(v) How did you measure the rate of photosynthesis?

.....

(vi) Using labelled axes, sketch a graph to show how the rate of photosynthesis varied with the factor mentioned in (ii) above.

2004

11. (c) The effect of changing light intensity or carbon dioxide concentration on the rate of photosynthesis may be investigated by using the pondweed *Elodea*. Answer the following in relation to this investigation.

(i) Why is a water plant rather than a land plant used in this experiment?

(ii) How is the temperature kept constant in this experiment?

(iii) If pond water is used in the experiment, it is likely to contain dissolved carbon dioxide. Suggest **two** possible sources of carbon dioxide in pond water.

(iv) Explain how light intensity or carbon dioxide concentration may be varied.

(v) Each time light intensity or carbon dioxide concentration is varied a precaution is necessary. What is this precaution and why is it necessary? **(24)**

6. Production of alcohol by yeast

Prepare and show the production of alcohol by yeast.

Key features:

- Active yeast
- Substrate e.g. glucose
- Warm temperature (about 25°C)
- Air lock or layer of oil

Testing for the presence of ethanol:

Iodoform test: Add potassium iodide and sodium hypochlorite
Yellow crystals indicate alcohol

Dichromate test: add potassium dichromate and sulphuric acid
Colour change from orange to green indicates alcohol

2005

11. (c) If yeast cells are kept in anaerobic conditions alcohol (ethanol) and another substance are produced.

- (i) Describe, with the aid of a diagram, how you would keep yeast under anaerobic conditions in the laboratory.
- (ii) Name a carbohydrate that you would supply to the yeast as an energy source.
- (iii) Give an account of a chemical test to demonstrate that alcohol (ethanol) has been produced. Include the initial colour and final colour of the test.
- (iv) What is the other substance produced under anaerobic conditions?
- (v) Alcohol (ethanol) production is an example of fermentation. How would you know when fermentation has ceased?
- (vi) Why does fermentation eventually cease? (27)

2004

7. (a) Yeast cells produce ethanol (alcohol) in a process called fermentation.

Is this process affected by temperature?

Explain your answer

.....
.....

(b) Answer the following in relation to an experiment to prepare and show the presence of ethanol using yeast. Draw a labelled diagram of the apparatus that you used.

Name a substance that yeast can use to make ethanol.

What substance, other than ethanol, is produced during fermentation?

Describe the control that you used in this experiment.

.....
Explain the purpose of a control in a scientific experiment.

.....

How did you know when the fermentation was finished?

Why were solutions of potassium iodide and sodium hypochlorite added to the reaction vessels after a certain period of time?

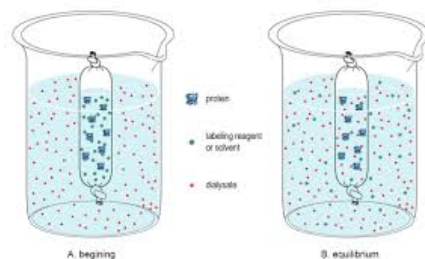
Name a substance produced during aerobic respiration that is not produced during fermentation.

7. Osmosis

Conduct any activity to demonstrate osmosis.

e.g. use Visking tubing / potato cylinders etc.

1. Measure the length and diameter of potato cylinders.
2. Place in solutions of different solute concentration (e.g. sucrose solution)
3. Leave for a few hours
4. Remove cylinders, blot dry and measure length and diameter again.
5. If length and diameter have increased, the potato cylinder absorbed water by osmosis - the solution was more dilute than the cell cytoplasm
6. If the length and diameter decreased, the potato cylinder lost water by osmosis - the solution was more concentrated than the cell cytoplasm



Precautions:

Soak Visking tubing in water first

Don't pull too tightly when tying, but make sure that it's not leaky

Wipe the outside of the Visking bag to remove any sucrose solution that may have spilled over

8. Isolation of DNA

Isolate DNA from a plant tissue.

Extraction of DNA	
Add salt	Causes DNA molecules to clump together
Add washing up liquid	Dissolves membranes
Incubate at 60°C	Breaks H bonds of DNA
Incubate only for 15 minutes	Longer time would lead to DNA molecule breaking
Cool in ice bath	Slows down the breakdown of DNA
Blend	Breaks cell walls
Blend only for 3 seconds	Longer would break the DNA molecule
Filter	Filtrate contains DNA and proteins.
Use coffee filter	Pores of laboratory filter paper are too small - the procedure would be very slow
Add protease	Hydrolyses the protein
Add ice-cold alcohol	Dehydrate the DNA, allowing the DNA to float to the surface of the aqueous layer. It is insoluble in ice-cold alcohol and forms a precipitate at the alcohol-filtrate boundary

2005

8. (a) Explain each of the following terms in relation to DNA.

(i) Replication

.....

(ii) Transcription

.....

(b) As part of your practical activities you extracted DNA from a plant tissue. Answer the following questions in relation to this experiment.

(i) What plant did you use?

(ii) It is usual to chop the tissue and place it in a blender. Suggest a reason for this.

.....

.....

(iii) For how long should the blender be allowed to run?

.....

(iv) Washing-up liquid is normally used in this experiment. What is its function?

.....

(v) Sodium chloride (salt) is also used. Explain why.

.....

(vi) What is a protease enzyme?

(vii) Why is a protease enzyme used in this experiment

.....

(viii) The final separation of the DNA involves the use of alcohol (ethanol). Under what condition is the alcohol used?

9. Leaf yeasts

Investigate the growth of leaf yeast using agar plates and controls.

Leaf used:	ash tree
How collected:	dry day, stored in plastic bag with air (not to crush)
Agar used:	sterile malt agar
Precautions:	sterilise work bench and forceps and other instruments aseptic technique incubate at 25°C incubate upside down control with sterilised leaves
Colonies:	small and pink

2007

8. (a) (i) Name a fungus, other than yeast, that you studied during your course.

.....
(ii) Give **one** way in which the fungus that you have named in (i) differs from yeast.

.....
(b) Answer the following questions in relation to your investigation of the growth of leaf yeast.

(i) It was necessary to use a nutrient medium. What is a nutrient medium?

.....
(ii) Name the nutrient medium that you used.

(iii) The nutrient medium should be sterile. Explain the underlined term.

.....
(iv) Describe, in words and/or labelled diagram(s), how you conducted the investigation.

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

(v) What was the result of your investigation?

.....
.....

2005

9. (a) (i) Yeasts are eukaryotic organisms. What does this mean?

.....
(ii) To which kingdom do yeasts belong?

(b) Answer the following questions in relation to an experiment that you carried out to investigate the growth of leaf yeast.

(i) From which plant did you collect the leaf sample?

(ii) Describe how you collected the leaf sample.

(iii) What did you do with the leaves when you returned to the laboratory?

.....
.....

(iv) Nutrient agar plates are used in this experiment. What are nutrient agar plates and what is their purpose?

.....
.....

(v) What did you observe in the agar plates at the end of the experiment?

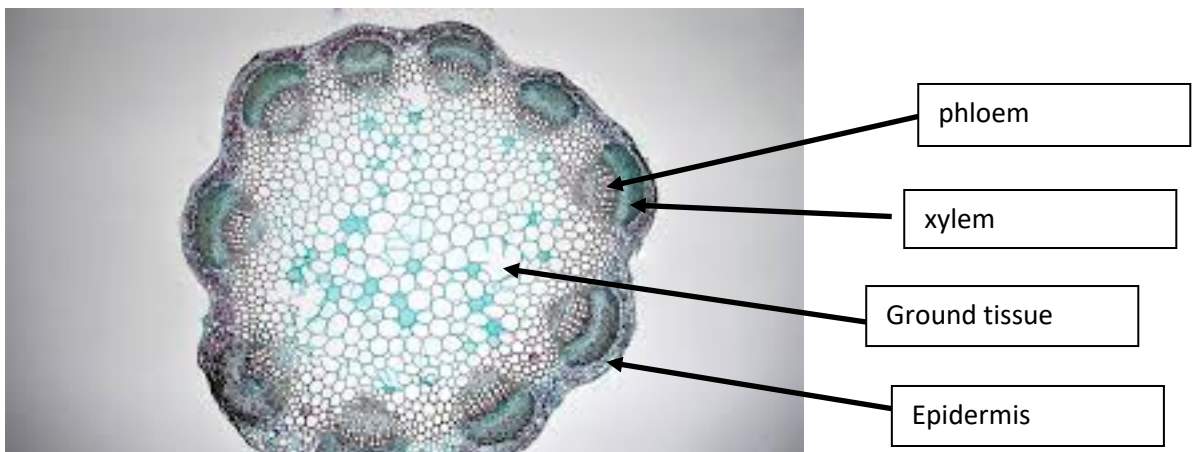
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.....

(vi) Having finished the experiment, what did you do with the agar plates?

.....

10. Plant structure

Prepare and examine microscopically the transverse section of a dicotyledonous stem (x100, x400).



2009

7(a) (i) Why is a dicotyledonous (dicot) plant so called?

.....

(ii) Name a dicotyledonous plant.

.....

(b) (i) Describe in detail how you prepared a microscope slide of a transverse section of the stem of a dicotyledonous plant.

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

(ii) Give an account of the procedures that you followed in order to view your slide under the microscope.

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

(iii) In the space below draw enough of your section to show and label the location of **each** of the following:

1. Phloem.
2. Xylem.
3. Ground tissue.

2006

14. (iv) In the course of your practical work you cut and observed a transverse section of a stem.

Answer the following in relation to that procedure.

1. What did you use to cut the section?
2. How did you support the stem while you were cutting the section?
3. How did you transfer the section to a microscope slide?

2005

8. (a) Observation of a transverse section of a dicotyledonous stem reveals vascular and other tissues.

Name **two** of the tissues that are not vascular tissues.

1 2

(b) Answer the following questions in relation to the preparation of a microscope slide of a transverse

section of a dicotyledonous stem.

State **one** reason why you used an herbaceous stem rather than a woody one.

.....
.....

Explain how you cut the section.

.....
.....

Why is it desirable to cut the section as thinly as possible?

.....

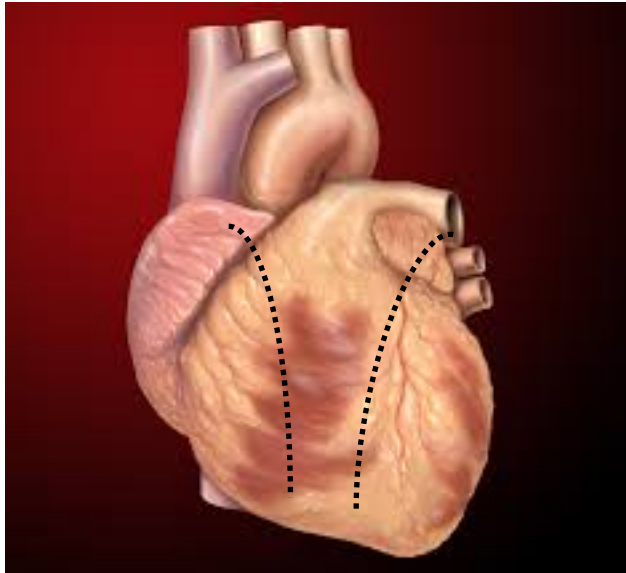
Draw a diagram of the section as seen under the microscope. Label the vascular tissues that can be seen.

State one precise function of each of the vascular tissues labelled in your diagram.

.....
.....

11. Heart dissection

Dissect, display and identify an ox's or a sheep's heart.



Ventral side up (rounded side/convex side)
 Left side of heart on right side
 Identify major vessels (vena cava, pulmonary artery, pulmonary vein, aorta)

Use a scalpel to make an incision through the right atrium.
 Continue the incision through the right ventricular wall, parallel to the septum.
 Repeat on the left side.

Structures visible:
 Right side: Tricuspid valve, heart strings, thin ventricle wall; semilunar valves
 Left side: Bicuspid valve, heart strings, thick ventricle wall; semilunar valves

2005

9. (a) (i) Cardiac muscle may be described as a contractile tissue. Explain the meaning of the underlined term.

.....
 (ii) Which chamber of the heart has the greatest amount of muscle in its wall?

.....
 (b) Describe how you dissected a mammalian heart in order to investigate the internal structure of atria and ventricles.

.....
 Draw a labelled diagram of your dissection to show the location and structure of the bicuspid and tricuspid valves.

State the procedure that you followed to expose a semilunar valve.

.....

What is the function of a semilunar valve?

.....
 Where in your dissection did you find the origin of the coronary artery?

.....

12. Effect of exercise on pulse or breathing rate
Investigate the effect of exercise on the breathing rate or pulse of a human.



On the Wrist

1. Measure rate at rest
2. Do a specified exercise
3. Immediately measure the rate again
4. Continue measuring until resting rate is recovered

Fitter person : Lower resting heart rate
 Recovers resting rate more quickly after exercise

13. Plant growth regulators

Investigate the effect of I.A.A. growth regulator on plant tissue.

General finding: Stimulation of shoots, inhibition of roots, at higher concentration of IAA
 Stimulation of roots, inhibition of shoots, at lower levels of IAA

2008

8. Growth regulators in plants can promote growth or inhibit it.

(a) Give an example of each of the following:

(i) A growth regulator that promotes growth

(ii) A growth regulator that inhibits growth.....

(b) In the course of your studies you investigated the effect of a growth regulator on plant tissue.

Answer the following questions in relation to that investigation.

(i) Name the plant that you used

(ii) Describe how you carried out the investigation

.....

- (iii) Give a safety precaution that you took while carrying out the investigation

 (iv) State the results that you obtained

14. Factors required for germination

Investigate the effect of water, oxygen and temperature on germination.

Control	No Oxygen	No Water	Cold
Moist cotton wool	Moist cotton wool	Dry cotton wool	Moist cotton wool
Room temperature or incubator at 25°C	Room temperature or incubator at 25°C	Room temperature or incubator at 25°C	Fridge (4°C)
Aerated	Boiled water with oil	Aerated	Aerated
Growth	No growth	No growth	No growth

15. Digestive activity during germination

Use starch agar or skimmed milk plates to show digestive activity during germination.

Used starch agar

Amylase from germinating seeds diffused into agar and digested starch

Testing the agar with iodine showed

- clear yellow zones around the live seeds - the starch had been digested
- all blue/black around killed seeds - the starch had not been digested

Precautions:

Aseptic techniques and sterile instruments and work surface - otherwise microorganisms from air or hands could enter the plate and digest starch.

2009

7. (a) (i) What is meant by *germination*?

.....
.....

(ii) Why is digestion necessary in a germinating seed?

.....
.....

(b) (i) Digestive activity during germination can be demonstrated by using agar plates. What is an agar plate?

.....
.....

(ii) An extra food material is added to the agar plate for **this** demonstration. Give an example of such an extra food material.

.....
.....

(iii) Outline the procedures that you carried out in setting up this demonstration.

.....
.....

(iv) What control did you use for this demonstration?

.....
.....

(v) What procedure did you carry out in order to show that digestive activity had taken place?

.....
.....

(vi) Describe the results that you obtained in:

1. The experimental plate.

.....
.....

2. The control plate.

.....
.....