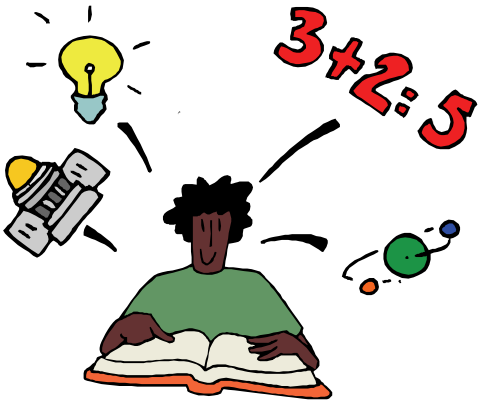
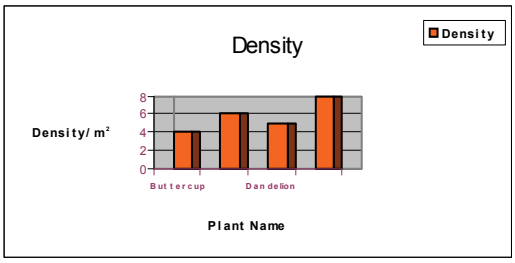
bss
BIOLOGY SUPPORT SERVICE

keeping in touch
with Biology Teachers in Ireland





Sample Biology Leaving Certificate Examination Questions

A Teacher Design Team Resource
Donegal

Introduction

This booklet contains 24 questions suitable for the Leaving Certificate Biology course. It can be used as a workbook or simply as a source of questions. The questions will also be available on the BSS web-site

---

The questions are of 3 types, as on the Leaving Certificate paper.
Section A questions (9 questions)
These are questions with short answes.
The answers are written on the paper.

Section B question (7 questions)
These are questions based on the practical activities of the course. The answers are written on the paper.

Section C questions (8 questions)
These are long questions and the answers are written in an answer book.

This resource was prepared and produced by the Donegal Design Team (Biology) in response to a request by the Biology Support Service for questions for their web-site.

The members of the team were -

Rose Callaghan, St. Columba's Comprehensive School, Glenties.

Danny Gillespie, Carrick Vocational School, Carrick.

Dominick Gallagher, St.Columba's Comprehensive School, Glenties

Kevin Murphy, Moville Community School, Moville.

Ann Wilkinson, Associate to the Biology Support Service.

The team thanks the Biology Support Service and the Donegal Education Centre for their support.

Table of Contents

Section A

Section A questions

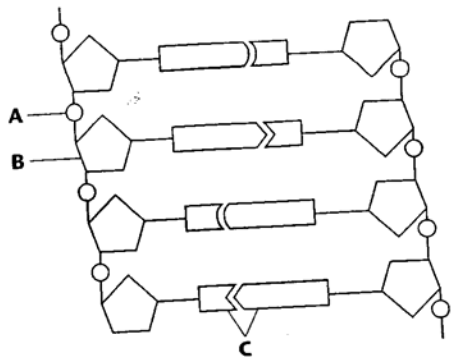
Question1

(a) The diagram shows part of a DNA molecule.

Name the parts labelled A, B, and C.

A_____B_____

C_____



(b) The sequence of bases in a length of DNA are shown below

GCCGATGGCCACGCC

(i) Give the mRNA sequence which would be complementary to the sequence shown above._____

(ii) What is the maximum numbert of amino acids in the protein for which this piece of mRNA could code?_____

(iii) How many different types of tRNA would be used to produce a protein from this piece of mRNA?_____

© Name the process by which mRNA is formed from DNA in the nucleus_____

(d) Name the enzyme used to form mRNA_____

(e) Where are proteins made in the cell?___

Section A
Question 2

Answer 5 questions.

(a) What is diffusion?_____

_____

(b) Give two differences between an Artery and a Vein.

(1)_____

(2)_____

(c) Name the blood vessel which carries digested food from the Ileum to the Liver _____

(d) Enzymes are specific, what does this mean? _____

_____

(e) What does A.T.P. stand for?_____

(f) What is a Bioreactor?_____

_____

Section A

Question 3

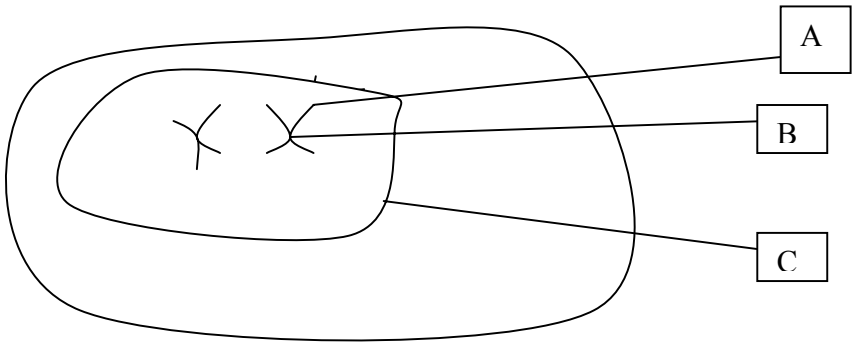
Each of the terms in column 3 is related to one of the terns in column 1. Write in column 2 in each case the term from column 3 that most appropriately matches it. The first one is completed, as an example for you.

Column 1	***Column 2***	***Column 3***
Lacteal	Villus	Stem
Cerebellum		Growth regulator
Humerus		Spermatozoon
Auxin		Bone
Osteoblast		Seed
Testa		Trachea
Y-Chromosome		Heart
Nephron		Villus
Glottis		Glomerulus
Systole		Brain
Lenticels		Arm

Section A

Question 4

The diagram below shows a cell in an early stage of mitosis.



a) Name the structure above at

A_____

B_____

C_____

B)Name one region in a plant where mitosis takes place

_____

c) Name one place in an animal /human where mitosis takes place?

_____

d) Explain what is meant by:

i) Haploid number _____

ii) Diploid number?_____

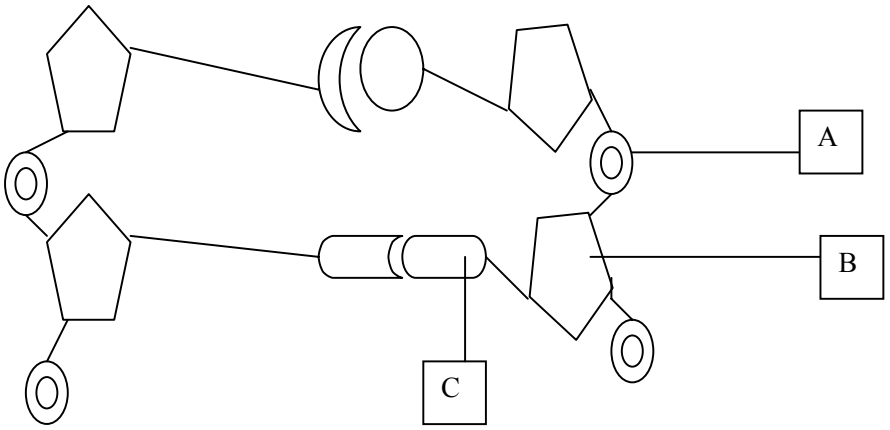
e) For the cell above, put down the value of the diploid number “n"?

_____

Section A

Question 5

1) The diagram below represents a piece of DNA molecule



a) Name the parts labelled A_____

B_____C_____

b) Parts A B and C make up a _____.

c) Where in a cell does protein synthesis take place?_____

d) Why is protein synthesis needed in a normal cell?

_____

e) Explain the following terms with reference to DNA

1) Replication

_____

2) Transcription

_____

f) Name two ways in which transfer RNA differs from DNA

_____

_____

Section A

Question 6

Answer ***five*** of the following

(a) Bacteria survive adverse conditions by forming_____

(b) Amoeba belongs to the Kingdom_____

(c) In humans, haemoglobin is found in _____cells.

(d) In herbaceous stems gas exchange takes place through_____

(e) The maintenance of constant conditions in the cells of organisms is known as_____

(f) Name one type of plant vascular tissue_____

Question 7

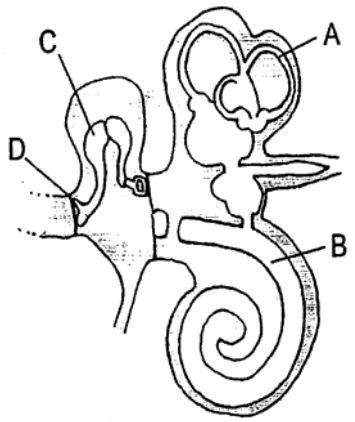
Complete the table, by writing **True *or* False** in the appropriate columns, if the characteristic is found in Prokaryotes **or** Eukaryotes ***or*** both

Characteristic	**Prokaryotic**	**Eukaryotic**
Excretion occurs		
Ribosomes present		
Respiration occurs		
Mitochondria present		
Nuclear membrane absent		
DNA usually in the form of a loop		
Cell wall always present		
Is never multicellular		
Chloroplasts can be present		
Mitosis will always give rise to new individuals		

Section A

Question 8

(a) The diagram show the human ear .Name A.B C and D



A_____ B_____

C_____ C_____

(b) Mark X on the diagram to show the location of the Eustachian tube.

State the function of this tube._____

_____

©What would be the likely effect of serious damage to part A?

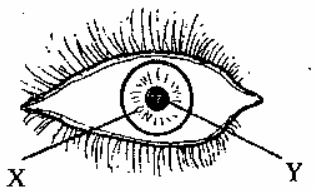
_____

(d) State the function of C?

_____

_____

The diagram shows the front view of the human eye. Name the parts labelled X and Y.



X_____

Y_____

Is the eye shown adapted to bright light or darkness? Give a reason for your answer.

Adapted to_____

Reason_____

Section A

Question 9

(a) Name an autotrophic organism._____

(b)Give the term for the conversion of Atmospheric Nitrogen to Nitrates.

_____

© (i) Name the relationship between two organisms where both benefit.

_____

(ii) Give one example of a predator/prey relationship._____

_____

(d) (i)What is pollution?_____

_____

(ii) Give one example of pollution _____

_____

(iii) How can the type of pollution in your example be counteracted?

_____

_____

_____

(e) (i) What is global warming?_____

_____

(ii) Give one cause of global warming_____

_____

_____

Section B

Section B questions

Question 1

(a) What is Germination

_____

_____

_____

(b) List 3 factors necessary for germination

1_____2_____

3_____

An experiment was carried out to investigate the digestive activity of seeds during germination

(c) What seeds did you use in this experiment_____

How were the seeds treated prior to the investigation?

_____

(d) What other precautions did you take during the investigation?

_____

_____

(e) What did you use as the experimental control

_____

(f) Name the substance which was digested during this experiment

_____

(g) What substance(s) in the seeds carried out this digestion

_____

(h) A chemical was used to test if digestion had occurred. Name this chemical.

_____

(i) Describe how the experimental and control differed in appearance following testing for digestion _____

(j)

_____

Section B

Question 2

(a) (i) Write down a balanced chemical equation for photosynthesis.

_____

(ii) What type of nutrition have the organisms that carry out photosynthesis?

_____

(b) You investigated the effect of an environmental factor on the rate of photosynthesis

(i) How did you vary the environmental factor investigated?

_____

(ii) How did you keep any one factor constant?

_____

(iii)Why was it necessary to keep other factors constant during the experiment?

_____

(iv) The potted indoor plant, the geranium is considered to be unsuitable for use in this experiment. Explain why?

_____

_____

(v) Name the plant you used

_____

(vi) Draw the graph you would expect from the results of your experiment

(vii) What conclusion did you reach based on these results

_____

_____

Section B

Question 3

(1) The conditions needed for seed germination are water, suitable temperature and

_____

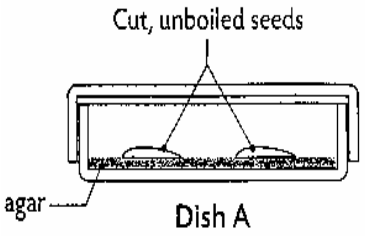
(ii) In which part of a non-endospermic seed is food stored_____

(b) Answer the following questions in relation to an experiment that was carried out to investigate the digestive activity in seeds during germination.

(i) The diagram shows part of the materials that might be used to carry out this experiment.

Name a seed that could be used in this experiment.

_____

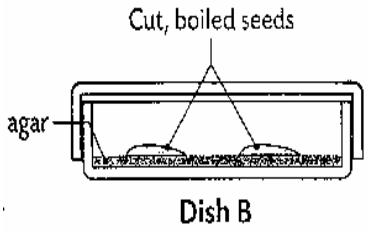


Name the type of agar used.

_____

(ii) Dish B contains cut boiled seeds. Why was this dish set up? _____

_____



(iii)Why must all the seeds used, be sterilised before setting up this experiment?

_____

State how the seeds are sterilised_____

_____

(iv) The plates shown above are incubated at 20°C for 48 hours. The seeds are then removed and the plates tested with a reagent.

Name the reagent_____

(v) Give the result you would expect to get with each of plates A and B.

A_____

_____

(vi) Name the biomolecules active in germinating seeds that is responsible for digestive activity_____

(vii) Identify the particular biomolecule that digests the food substance in the agar plates.

_____

Section B
Question 4

(a) (i)Write a balanced chemical equation for the process of photosynthesis.

_____

(ii) Name the cell organelle in which photosynthesis occurs_____

(b) Answer the following questions in relation to an experiment that you carried out to investigate the influence of an environmental factor on the rate of photosynthesis.

(i) Name a plant you used in the experiment_____

State, why you used this particular plant_____

_____

(ii) Name the environmental factor that you investigated and say how it was varied.

Factor_____How Varied_____

(iii) Name a factor that was kept constant during the experiment and say how this was achieved
Factor_____How achieved_____

(iv) Each time the environmental factor was varied a precaution was necessary
What was the precaution?_____

Why is it necessary?_____

(v) How is the rate of photosynthesis measured?_____

_____

(vi) In the space below draw a graph of the results that you would expect to get in this experiment. Label both axes.

(vii) Briefly explain why the graph takes this shape.

_____

_____

_____

Section B
Question 5

(a) Enzymes are catalytic proteins. Explain the underlined term_____

_____

What is a denatured enzyme?_____

_____

(b) Answer the following by reference to an experiment you have carried out to investigate the effect of pH on the rate of enzyme action.

Name the enzyme and substrate that you used.

Enzyme_____ Substrate_____

Explain how you varied the pH_____

_____

State one factor that you kept constant in this experiment_____

How did you ensure that this factor was kept constant?_____

_____

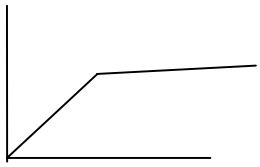
What did you use as an indication of the rate of action of the enzyme?

_____

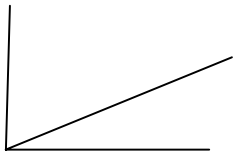
_____

Which of the graphs below best represents the results you might obtain in this experiment?

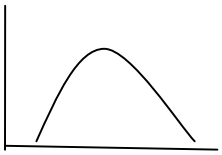
Graph No._____



1



2



3

4

Give a reason for your choice_____

_____

Section B

Question 6

(a) Explain the terms:-

Biosphere_____

Habitat_____

Community_____

Niche_____

Name the ecosystem you studied and from it draw a food web and give two food chains.

Ecosystem name_____

Food Web

Food Chain 1

_____

Food chain 2

_____

©Draw a food Pyramid from your Ecosystem

Food Pyramid

(d) Explain the terms “Reduce, Reuse, Recycle”.

Reduce_____

Reuse_____

Recycle_____

Section B

Question 7

(a) (i) What is osmosis? _____

_____

(ii) Why can osmosis be described as a passive process?

_____

_____

(b) In the space below draw a suitable diagram to illustrate an experimental activity in osmosis that you carried out in the laboratory.

(c) Explain briefly what happened at each stage of the experimental process and describe the results obtained.

_____

_____

_____

_____

_____

_____

(d) Explain why the process of salting a fish will help to preserve it.

_____

_____

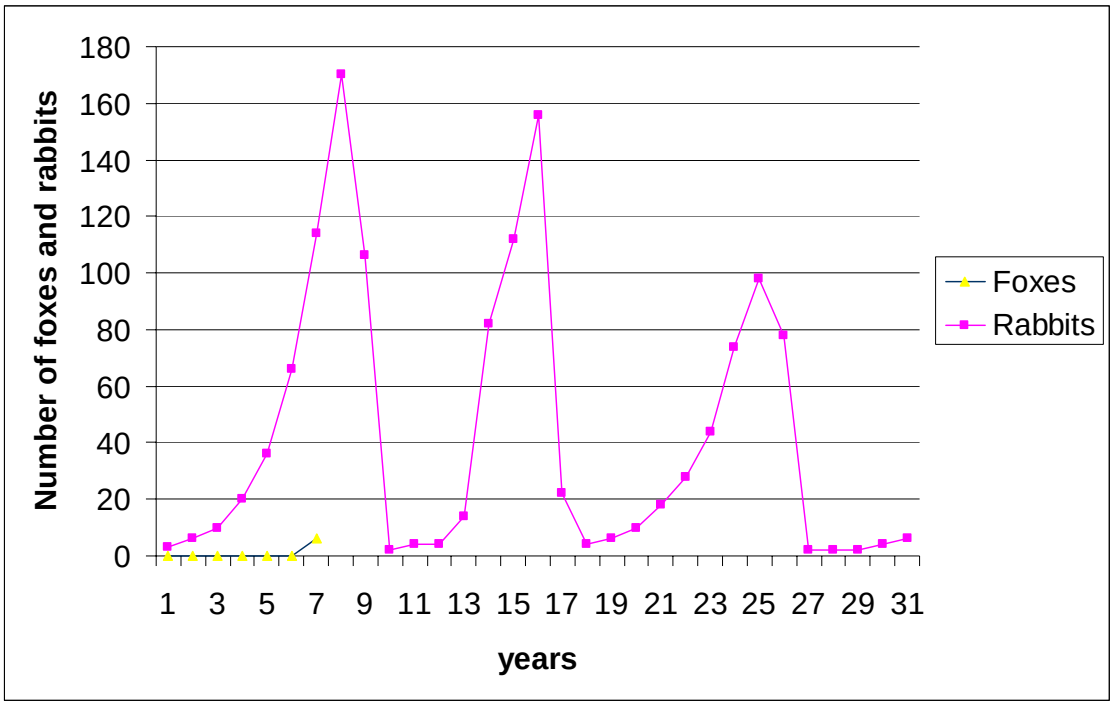
_____

Section C

Section C questions

Question 1

In 1974 a small number of rabbits were introduced to a previously uninhabited island off the coast of Ireland. A number of years later a small number of foxes (6 approx) were brought to the island. The graph below shows the changes in the rabbit population during the years following 1974. (Year 1 is 1974)



(i) In which year did the foxes cross to the island?

(ii) Copy the graph into your answer book and sketch on it the changes you would expect in the fox population since their arrival on the island

(iii) Explain the pattern shown in the graph. What name is given to the type of relationship between the two animals?

(iv) How could the foxes have benefited the rabbit population

(v) Other than the effect of the foxes name two other factors which might account for a decline in the rabbit population

Section C

Question 2

a Define metabolism

Name one enzyme controlled process that occurs in plants (9)

b

(i) What is an enzyme?

(ii) To which group of biomolecules do enzymes belong

(iii) Briefly explain the active site theory in relation to enzyme activity

(iv) Name one catabolic enzyme. Identify the substrate and product(s) of the named enzyme.

(v) What is meant by the term "optimum activity" as applied to pH range

c An experiment was carried out to compare the action of immobilised yeast enzymes with free yeast enzymes at different temperatures. The following results were obtained.

Temperature ^{o}C	0	10	20	30	40	50	60	70
Enzyme Activity (form A)	0	29	52	80	98	46	0	0
Enzyme Activity (form B)	0	19	38	61	74	76	75	0

(i) State one way by which the enzymes could have been immobilized

(ii) Using the same axes –Enzyme activity *Vs* Temperature-plot the graphs to show the activity of both forms of the enzyme

(iii) At what temperature were both forms of the enzyme equally active

(iv) Which of the two graphs A or B in your opinion represents the results for the immobilised enzymes? Give reasons for your choice.

(v) Why does the activity of both forms of the enzyme decline at higher temperatures?

Section C

Question 3

(a) Distinguish between an open blood system and a closed blood system. Name one animal with each type of circulation.

(b) Draw a **diagram of the heart** and label four chambers, four blood vessels and four valves.

(c) Describe an experiment, which investigates the effect of exercise on the pulse rate of a human. Give sample results that you might expect to find.

(d) What effect has smoking on the circulatory system?

Question 4

(a) Distinguish between autotrophic and heterotrophic nutrition.

(b) Draw a **labelled diagram of a tooth**. Give the names and functions of the four types of teeth and give the human dental formula.

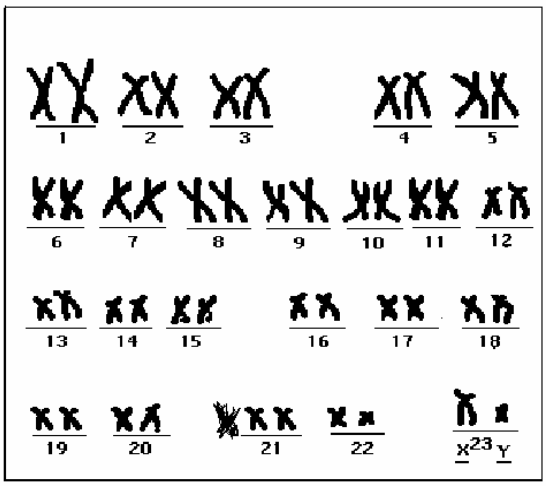
(c) Draw a **diagram of the Alimentary Canal** showing five labels. Indicate where Digestion, Absorption and Assimilation take place.

(d) Name the two vitamins produced by symbiotic bacteria in the alimentary canal.

Section C

Question 5

1. The diagram shown below represents a human karyotype (a display of paired chromosomes)



a) Name the condition caused by chromosome Set 21 shown.

b) Explain how the condition shown above is caused.

c) State one other feature of the above set of chromosome and explain the effect on the phenotype.

d) Sickle cell anaemia is a genetic defect caused by a mutated gene. Why does this mutated gene produce abnormal red blood cells?

e) If red blood cells are not the correct shape how would this affect oxygen transport around the human body.

f) Explain the terms listed below.

a) Homozygous

b) Sex linkage

c) In vitro fertilisation

Section C

Question 6

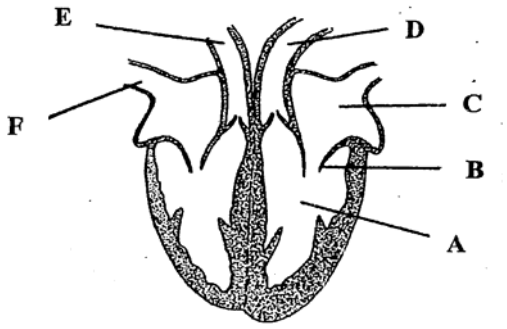
(a) The human heart system can be described as a closed, two-circuit system consisting of the pulmonary and systemic circulations.

(i) Distinguish between the pulmonary and systemic circulations.

(ii) Give **one** advantage of a two-circuit circulatory system.

(iii) Why is a closed system considered to be more efficient than an open system?

(b) The diagram shows a human heart with its associated blood vessels.



)

(i) Name the parts A,B,C,D,E and F

(ii) What is the precise function of the part labelled **B**?

(iii) To where does vessel **E** carry blood.

(iv) Give a structural difference between chambers **A** and **C**.

(v) Explain why the wall of chamber A is much stronger than the wall of the corresponding chamber on the other side.

(vi) Name the type of muscle from which the heart is made?

(vii) Draw a transverse section of vessel **D** and label three parts.

© (i) The human breathing rate depends on the concentration of a gas in the blood. Name the gas and give the precise location of the centre which detects it. concentration.

(ii) The breathing system of a large organism must have an efficient respiratory surface. List **three** features of an efficient respiratory surface. Draw a labelled diagram of the relevant parts of the human breathing system to show these features.

(iii) Describe the steps involved in the inhalation stage of breathing.

(iv) Asthma and bronchitis are common disorders of the breathing system. Answer the following in relation to **one** of these disorders.

State the disorder to which you refer.

Give one possible cause, a way of prevention and one method of treatment.

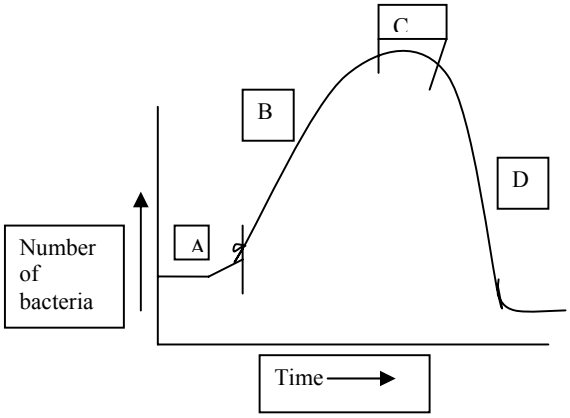
Section C

Question 7

(a) (i) Name the kingdom to which bacteria belong.

(ii) Bacteria can be classified into **<u>three</u>** main types based on their shape. Name and draw a sketch of each type.

(b) The graph shows the growth curve of bacteria in a culture on a nutrient medium.



(i) Name each of the stages of the curve labelled **A, B, C** and **D**.

(ii) Explain what is taking place at stage **A**.

(iii) Give **2** possible reasons for the decrease in bacterial numbers at stage **D**.

(iv) Imagine that the curve represents the growth of Streptococci, bacteria, which cause a throat infection. At what stage in the growth curve would the person have a high temperature?

(v) Streptococci bacteria are **<u>pathogenic</u>**. What does this mean?

© **<u>Batch flow culture</u>** and **<u>continuous flow culture</u>** are two methods of food processing using bacteria.

(i) Briefly distinguish between the two methods underlined.

(ii) Comment on the relevance of the growth curve for each method.

(iii) Batch flow culture is used more often than continuous flow culture. Give two advantages of batch flow culture.

(iv) Antibiotics are usually produced using batch flow culture.
What are antibiotics?
Name the gene-containing structure that night be used to give antibiotic resistance to a bacterium.

Section C

Question 8

(a) Explain the following terms as used in genetics.

Allele **heterozygous** **incomplete dominance**

(b) In guinea pigs the coat colour is determined by one pair of allelic genes and coat type by another pair.

The following crosses were carried out;

1. A black guinea pig was crossed with a white guinea pig and all the offspring were black.

2. A guinea pig with rough coat was crossed with a guinea pig with a smooth coat and all the offspring were rough coat.

3. Some black guinea pigs with rough coats were crossed with white guinea pigs with smooth coats producing four different types of offspring in equal numbers.

(i) Give the dominant allele for each gene.

(ii) Give the genotypes of the parents and of the offspring in cross 3.

(iii) Which phenotypes of the offspring in cross 3 suggest that independent assortment has taken place?

(iv) Would you expect different phenotypes if the genes for coat colour and coat type were located on the same chromosome? Explain your answer.

(v) What term is used to describe genes on the same chromosome?

© (i) In humans the sex of the individual is determined by the sex chromosome. Explain with the aid of a diagram how the father always determines the sex of the child.

(ii) Say how the sex chromosomes of a butterfly differ from that of a human.

(iii) Name two sex-linked defects in humans. Where are these sex-linked traits located?