



*New
Curriculum*

A Practical Approach to

Biology

'O' Level Revision

- With summary notes covering syllabus objectives
- Model ZIMSEC questions and answers

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Biology

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 **SECONDARY
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Anchors of the schools curricula

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CONTENTS

Topic 1: Safety, Careers and Branches of Biology	1
Topic 2: Chemicals of Life	7
Topic 3: Cells and Cellular Activities	14
Topic 4: Enzymes	19
Topic 5: Plant Science	22
Topic 6: Animal Nutrition	37
Topic 7: Human Digestive System	42
Topic 8: Human Respiratory System	49
Topic 9: Human Transport System	53
Topic 10: Excretion	61
Topic 11: Homeostasis	64
Topic 12: Nervous System	66
Topic 13: Skeletal System	74
Topic 14: Reproduction in Humans	79
Topic 15: Microbiology and Biotechnology	84
Topic 16: Genetics	87
Topic 17: Biodiversity	92
Topic 18: Ecosystems	96
Topic 19: Health and Diseases	99

Examination Papers

Examination 1

Paper 1	102
Paper 2	111
Paper 3	114

Examination 2

Paper 1	116
Paper 2	123
Paper 3	128

Examination 3

Paper 1	129
Paper 2	134
Paper 3	136

Examination 4

Paper 1	137
Paper 2	144
Paper 3	147

Examination 5

Paper 1	148
Paper 2	154
Paper 3	156

Examination 6

Paper 1	158
Paper 2	163
Paper 3	165

Examination 7

Paper 1	167
Paper 2	174
Paper 3	177

Examination 8

Paper 1	180
Paper 2	192
Paper 3	194

Examination 9

Paper 1	196
Paper 2	208
Paper 3	210

Examination 10

Paper 1	212
Paper 2	225
Paper 3	227

Answers	229
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INTRODUCTION

Biology 'O' level Revision Guide is a comprehensive book with notes and examinations sections. The notes section comprises of comprehensive topic by topic notes. The examinations section has Zimsec specimen papers: 1, 2 and 3 plus the marking guides. The main aim of the book is to assist you to prepare fully for the Biology examinations. Prior to looking at the marking scheme be sure to attempt the examination questions in writing. Be sure to revise the questions you get wrong up until you get it right.

Above all, practice makes perfect and repetition makes the concept linger in your mind.

Structure of papers

- Paper 1 – comprised of 40 multiple choice questions
- Paper 2 – consist of Section A and B. Answer 6 questions in Section A. Answer 4 questions from Section B.
- Paper 3 – Answer all the practical questions

Answering techniques

- Never skip any questions.
- Read and understand the demands of the questions.
- Write neatly and eligibly.

Common errors in Biology

- Do not waffle. Answer the questions.
- Where necessary, draw a diagram to support your explanations.
- Answer your questions in order.
- Use the correct English language (British), no slang use. Do not use vernacular language in your explanations.
- Essay type questions must be characterised by an introduction, body (with main points and examples) and a conclusion.
- Draw clear and annotated diagrams.

Malpractice

- Do not copy in the examination.
- Do not go into the examination room with “discs” of notes.
- Do not ink acronyms or diagrams on your body.



Study tips

Stage 1: Planning

- Planning your revision is crucial if you are to take control of your learning and not get too stressed.
- This is not an easy task because to do it well, one has to plan in greater detail.
- Remember, 30 minutes sessions are the best and then take a short break.
- It is better to do one or two hours a night over a long period of time than cram it all in the last minute.

Date	Session 1 (30 minutes)	Session 2 (30 minutes)	Session 3 (30 minutes)
Monday 22/11/2022	Mathematics	Science	English
Area	Number	Planets	Anthology
Method	Mind mapping	Cards	Notes
Aim	To understand	To list the...	To look for...

Stage 2: Creating an effective revision space

A clean, well equipped and ventilated study environment helps revision. It removes distractions and promotes an organised approach to studying. Include the following in your study space.

- Tidy and undisturbed place to work
- Have a comfortable chair
- Use a table which gives enough room for books and writing materials
- A bright lamp or light source
- Pens, pencils, highlighters (optional), scrap paper and other equipment

Stage 3: Active revision techniques

Simply reading is a poor way of studying. Do the following to stay ahead.

- Summarise points on revision cards.
- Use mnemonics.
- Make mind maps or spider diagrams, stick them on the wall.
- Repeat lists or processes aloud over and over again.
- Tape notes and play them back.
- Set yourself questions from your notes – go over wrong answers.
- Explain work to a friend or parent.
- When you feel ready, practice exam questions.

Safety in the laboratory

Laboratory accidents are usually a result of carelessness.

Causes of laboratory accidents

Laboratory accidents can be caused by several reasons.

Fire

- When working with hot surfaces and flammable materials, fire becomes a common danger.
- Review and practice the proper procedures to ensure you minimise the risk of fire in the laboratory.
- All flammable materials should be properly stored and sealed.
- Inspect burners for leaks to avoid sudden flares.



Fig. 1.1 Fire accident

Fumes

- Fumes are vapours (gases), dusts and/or smoke.
- They are given off by a substance because of a chemical transformation such as reaction, heating, explosion or detonation.



Fig. 1.2 Fumes accident

Acids and strong bases

- Acids and bases have corrosive properties.



Fig. 1.3 Hydrofluoric acid burns



Fig. 1.4 Sodium hydroxide burn

- The most frequently reported toxic effects include liver disease, nephropathy, coagulation disorders and nervous system disorders.
- Corrosive substances cause harm to tissues such as skin, eyes, mucous membranes and breathing passages.

- The amount of harm caused by chemical burns from acids and bases depends on the concentration of the substance and the duration of exposure.

Handling of micro-organisms

- Improper handling of microbes can lead to exposure to infectious agents or biohazards.
- They cause infectious diseases such as flu and measles.
- They can also contribute to many non-infectious chronic diseases such as cancer and coronary heart disease.

Improper handling of apparatus

- Improper handling of laboratory apparatus can result in slips, trips and falls.
- This can be due to disorganised working and storage areas.

Electricity



Fig. 1.5 Electrical accidents

- Potential exposures to electrical hazards can result from faulty electrical equipment/instrumentation or wiring, damaged receptacles and connectors or unsafe work practices.
- These risks can lead to people being exposed to electrical hazards including electric shock, arc blasts, electrocutions, fires and explosions.

Explosion



Fig. 1.6 Reactive chemical explosion

- They result from overheating, leakage, or spillage of flammable chemicals, or gases exposed to excessive heat, an open flame or electric sparks in the laboratory.
- Be careful when working with flammable or explosive chemicals and avoid heat or electric sparks nearby.

Types of injuries

Chemical and thermal burns

- If you are to handle chemicals, wear protective gloves.
- Always treat chemicals with the necessary caution, measure chemicals carefully, contain potentially irritating or hazardous chemicals and use only approved containers when you are transferring chemicals.
- Chemical burns should be treated by flushing the affected area with a large amount of cool, running water for at least 15 minutes. If the burnt area is large or if the affected person is dizzy or weak, seek medical assistance immediately.

Cuts

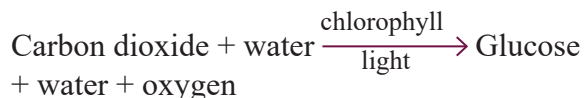
- The use of sharp tools in the laboratory setting can cause scrapes and cuts.

Photosynthesis defined

- Photosynthesis is the process by which green plants manufacture their own food in the presence of sunlight energy.
- Green plants make glucose from carbon dioxide and water.
- At the same time, oxygen is made and released as a waste product.
- The reaction requires energy. Light

energy is trapped by the chlorophyll pigment in plants.

- Photosynthesis can be summed up in the following equation.



- The following conditions are necessary for photosynthesis to take place.







Table 5.1

Condition	Description
Carbon dioxide	<ul style="list-style-type: none"> • Carbon dioxide moves to the leaf from the atmosphere by diffusion through tiny holes in the leaf called stomata. • Carbon dioxide is not present in high concentrations in the air compared to its concentration inside the leaf. This is because the cells inside the leaf are always manufacturing their own food (at daytime), converting carbon dioxide into the glucose. • Thus, the concentration of it inside the leaf decreases, making a concentration gradient for diffusion from the atmosphere to the leaf.
Water	<ul style="list-style-type: none"> • The water is absorbed by the roots of the plants, transported upwards through a hollow tube called the xylem vessel until it reaches the leaf where photosynthesis takes place. • Excess water leaves the cell through the stomata. This is called transpiration.
Sunlight	<ul style="list-style-type: none"> • It is captured by a chemical molecule called chlorophyll (Chl). • The leaves are always exposed to sunlight at daytime. • The sun penetrates the transparent layers on the leaf until it reaches the mesophyll layer, where photosynthesis take place. • Palisade cells are nearer to the surface of the leaf than the spongy cells. Therefore, they receive more light hence facilitating photosynthesis. • Chlorophyll is found in the leaves but it is also present in the stem.

Plant pests

- A pest is any organism such as fungi, insects, rodents and plants that harm crops.
- There are two major types of plant pests which are the tissue-eating and sap-sucking pests.
- The following table describes the two types of plant pests.

Table 5.5

	Sap-sucking pests	Tissue-eating pests
Food source	Plant sap	Plant leaves, twigs, branches and tree trunks
Symptoms of infestation	<ul style="list-style-type: none"> • White or yellow spots • Brown patches on leaves • Silver or bronze stippling • Leaf-curling 	<p><i>Caterpillar feeding results in:</i></p> <ul style="list-style-type: none"> • leaves with only veins left • shoot dieback • defoliation <p><i>Bagworm feeding results in:</i></p> <ul style="list-style-type: none"> • circular holes on leaves
Examples	<p>Mealybugs</p> 	<p>Caterpillars</p> 
	<p>Whiteflies</p> 	<p>Bagworms</p> 
	<p>Scale insects</p> 	

Plant diseases

Table 5.6

Plant disease	Description
Bacterial wilt	<ul style="list-style-type: none"> • It is caused by a soil-borne bacterium named <i>Ralstonia solanacearum</i> (formerly known as <i>Pseudomonas solanacearum</i>). • Potato wilt bacterium mainly inhabits the root. It enters the root system at points of injury caused by farm tools or equipment and soil pests.
Fungal rust	<ul style="list-style-type: none"> • The rusts are a group of fungal diseases affecting the aerial parts of plants. • Leaves are affected the most. Rust can also be found occasionally on stems and even flowers and fruit. • The spore pustules produced by rusts vary in colour. It varies according to the rust species and the type of spore that it is producing.

Controlling pests and diseases

- Methods of controlling pests and diseases include:
 - cultural control.
 - host resistance.
 - physical control.
 - mechanical control.
 - biological control.
 - chemical control.

Structures found in plants

- The main structures or ‘organs’ found in plants are the leaves, stems and roots.
- They are made up from groups of specialised tissues that have structures suited to the functions they perform.
- Table 5.7 summarises the main features of these structures and their functions.

Table 5.7

Plant part	Structure	Function
Leaves	<ul style="list-style-type: none"> • Thin with a large surface area. • Cells contain chlorophyll in chloroplasts. 	<ul style="list-style-type: none"> • Short distances for gases to diffuse. • Large area for absorption of light. • They are the main site of photosynthesis.
Stem	<ul style="list-style-type: none"> • Long and cylindrical. • Woody tissues. • It contains xylem and phloem. 	<ul style="list-style-type: none"> • Support the leaves, flowers and fruit; can bend or resist the wind. • Transport water, minerals to leaves. • Transports sugars to roots, flowers, fruit and roots.

<p>Roots</p>	<ul style="list-style-type: none"> • Branch extensively through the soil. • Root hairs provide large surface area. • It contains xylem and phloem. • Root tip-area of cell division. • Root cap-covers the root tip. 	<ul style="list-style-type: none"> • Provides anchorage in the soil. • Enables absorption of water and nutrients. • Enables transport of water and nutrients. • Grows into the soil. • Protects and lubricates the growing root.
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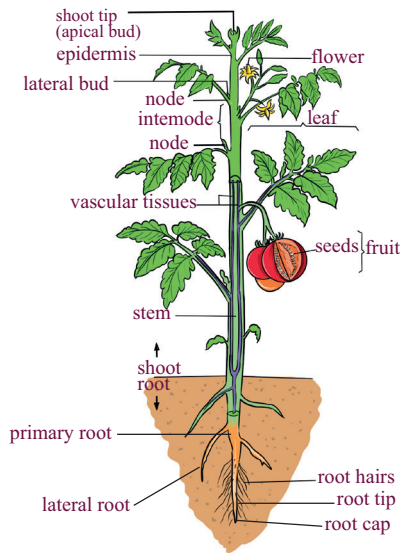


Fig. 5.5 A plant

Vascular tissues

- Flowering plants have a system of vessels that run up and down the plant carrying materials.
- These vessels are called vascular tissues which are made up of xylem and phloem.
- A xylem is a long hollow tube stretching from the root to the leaf and made up of many dead cells.
- The xylem:
 - conducts water and dissolved mineral salts from the roots to the stems and leaves.
 - provides mechanical support for the plant.
 - inner walls of the xylem vessels are strengthened by deposits of a substance called lignin (deposited in the form of rings or spirals).

- Phloem consists mainly of sieve tubes and companion cells.
- The phloem:
 - conducts manufactured food (sucrose and amino acids) from the green parts of the plant to other parts of the plant.
 - sieve tubes have degenerated protoplasm that is connected between sieve tube cells which are kept alive by companion cells.

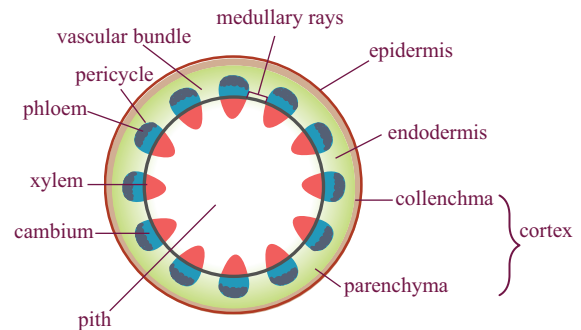


Fig. 5.6 Vascular tissues in the stem

Dicot stem

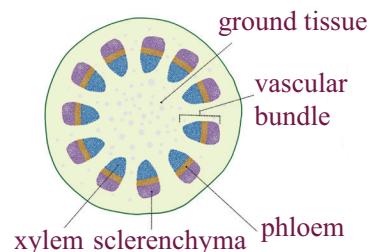


Fig. 5.7 Vascular tissues in the root

Monocotyledons and Dicotyledons

- Plants can either be monocotyledonous or dicotyledonous.
- Monocotyledons are flowering plants or angiosperms bearing seeds with a single cotyledon or embryonic leaf.
- Dicotyledons** are flowering plants or angiosperms bearing seeds with two cotyledons or embryonic leaves.











	Seed	Root	Vascular	Leaf	Flower
Monocot					
	one cotyledon	fibrous roots	scattered	parallel veins	multiples of 3
Dicot					
	two cotyledon	tap roots	ringed	net-like veins	4 or 5

Fig. 5.8 Difference between monocot and dicot

Movement of substances in plants

Movement of substances in plants occur via the xylem and phloem as the major transport vessels.

(a) Xylem

- Xylem vessels are elongated hollow tubes that are made of xylem cells linked end to end.
- Xylem cells are dead at maturity.
- Xylem functions to conduct water and mineral salts from the roots to the leaves as well as to provide mechanical support.

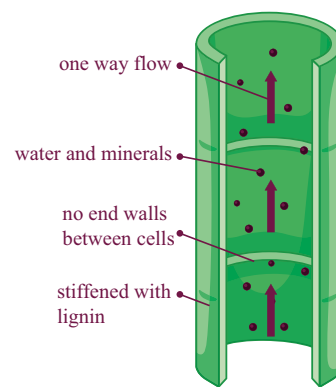


Fig. 5.9 The xylem

(b) Phloem

- The phloem tissue consists of sieve tube elements and companion cells.
- The function of the phloem is to conduct sugars and amino acids from the leaves to other parts of the plant.

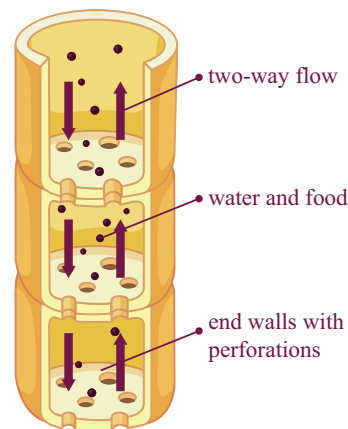


Fig. 5.10 The phloem

(c) Root hairs

- These are tubular outgrowths of root epidermal cells.
- Each root hair is usually an outgrowth of a single epidermal cell. Therefore, they are one cell thick.



Nutrition

- Nutrition is the process of taking in food and converting it into living matter.
- Nutrition is taking in nutrients which are organic substances and mineral ions, containing raw materials and energy for growth and tissue repair, absorbing and assimilating them.
- Nutrition is one of the characteristics of living organisms.
- All organisms do it to obtain energy for vital activities and raw materials needed for growth as well as repair.
- Every individual needs to take in a certain amount of each nutrient daily, depending on their age, size, sex and activity.

Types of nutrients

There are seven types of nutrients.

Table 6.1

Nutrient	Source	Function
Carbohydrates		<ul style="list-style-type: none"> • This nutrient is an organic compound composed of carbon, hydrogen and oxygen. • It is used as an energy resource. • It is essential in respiration to release energy. • It is used in creating the cellulose, the substance forming cell walls of plant cells.
Proteins		<ul style="list-style-type: none"> • These are also organic compounds. • They contain the elements carbon, hydrogen, oxygen, nitrogen and sometimes phosphorus or sulphur. • The needs for proteins include making and creating new body cells, growth and repair, making enzymes (they are proteins in nature), build up hormones and making antibodies.

The role of the liver

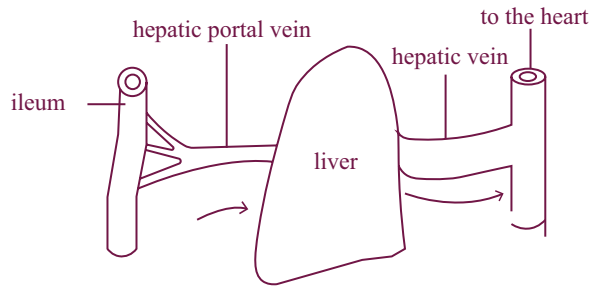


Fig. 7.4 The liver





- The liver plays many roles like:
 - carbohydrate metabolism.

- fat metabolism.
- breakdown of red blood cells.
- protein metabolism.
- detoxification.

Mammalian teeth

- Teeth are made of calcium salts.
- The job of teeth is to cut, tear and grind food giving it more surface area for faster digestion. Teeth also perform mechanical digestion.

Table 7.3

Type of tooth	Function	Illustration
Incisor	These are the teeth in front of each jaw They act like a blade to cut food (for example, to cut a bite of a sandwich) they have a (chisel-like surface)	
Canines	These are two in each jaw They are very pointed, in humans and they are used for the same purpose as incisors However, in carnivores they are longer and sharper and used to kill the prey	
Premolar	There are four on the sides of each jaw They are used to cut and grind food	
Molar	There are six at the back of each jaw, two of them are wisdom teeth They have the same use as premolars.	

Parts of a tooth

- The tooth is divided into two parts, the crown and the root.

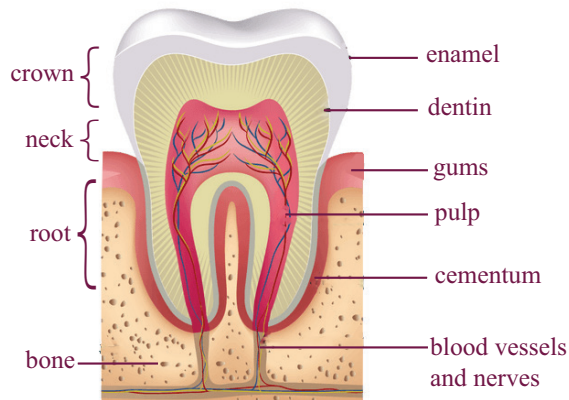


Fig. 7.5 The tooth structure

- Parts of the tooth are as follows.
 - The enamel is made of calcium salts, it is very strong.
 - The dentine is covered by the enamel and surrounds the pulp cavity.
 - The pulp cavity contains the nerves and blood vessels.

Tooth decay

- Tooth decay is caused by food particles that stay in the mouth.
- The bacteria that lives in our mouth feeds on these food particles, they respire anaerobically producing lactic acid.
- Like any acid, lactic acid reacts with the enamel and dissolves it away reaching the dentine. A toothache results.
- Methods of preventing tooth decay are as follows.
 - Reduce sugar intake to prevent bacteria respiring.
 - Brush teeth to remove the plaque layer of bacteria and saliva on our teeth and neutralise mouth.
 - Use toothpaste or water containing fluoride because it is absorbed by the teeth and helps to stop the attack by the acid.
 - Pay regular visits to the dentist.

Breathing

- Breathing is the transport of oxygen from the outside air to the cells and carbon dioxide from the cells to the outside air.
- Breathing is not the same as cellular respiration, which is the process by which an organism breaks down food molecules to release energy for life processes.

The human respiratory system

The human respiratory system is made up of air passages, lungs and the respiratory muscles.

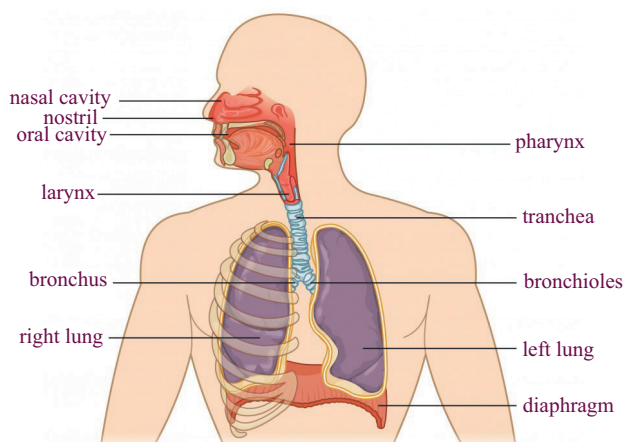


Fig. 8.1 The respiratory system parts

Table 8.1

Respiratory part	Description
Nasal passage	Passage leading from the nostrils lined with a moist mucus membrane
Pharynx	Common passage for the opening of the oesophagus and the trachea

Larynx	Voice box containing vocal cords.
Trachea	A tube supported by C-shaped cartilage connecting the larynx and the lungs. The C-shaped cartilage prevents the trachea from collapsing as the air pressure in the lungs change. It branches into two bronchi, one to each lung.
Bronchi	Branches repeatedly within the lungs to produce numerous finer tubes called bronchioles. The bronchioles at the end of the branching terminate in clusters of air sacs called alveoli.
Lungs	Located in the pleural cavity, they are enclosed by the pleura, a two-layered membrane structure. The inner layer is in contact with the lungs while the other layer adheres to the wall of the chest cavity.

In association with the respiratory system are related muscles, ribs and diaphragm.

Inhalation

- During inhalation, the diaphragm contracts, flattens and moves downwards.
- The external intercostal muscles contract while the internal intercostal muscles relax.

Blood

- The blood is a fluid.
- It consists of several types of cells floating in a liquid called plasma.

Table 9.2

Component	Function
Red blood cells	To transport oxygen from the lungs to the body cells.
White blood cells	To protect the body by killing bacteria which causes diseases, also known as pathogens.
Platelets	To prevent bleeding when the skin is cut and stop bacteria from entering the systems through the wound.
Plasma	To transport substances from one place to another.

Red blood cells

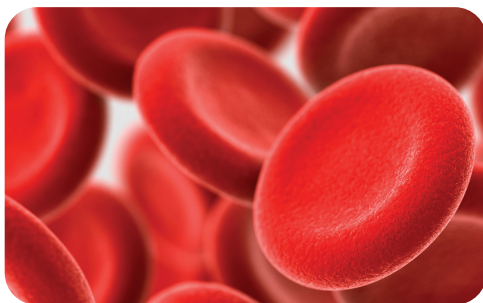


Fig. 9.3 The red blood cell

- These are minute, circular, biconcave and do not have a nucleus.
- The red blood cell shape increases the surface area, allowing efficient diffusion of gases across the surface.
- The red blood cell can change their shape as they squeeze through the narrow blood capillaries.
- Haemoglobin in the cytoplasm readily forms oxyhaemoglobin with oxygen and readily releases oxygen in regions of low oxygen concentration.

- Haemoglobin is:
 - produced in the bone marrow.
 - has a life-span of 120 days.
 - destroyed in the spleen, lymph nodes, bone marrow and liver.

White blood cells

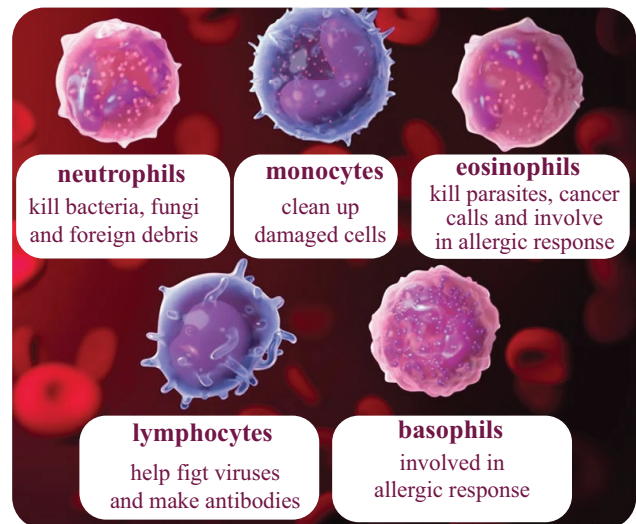


Fig. 9.4 Types of white blood cells

- White blood cells are larger than red blood cells but fewer in number.
- They all have nuclei.
- They all can move by a crawling movement, enabling them to squeeze out of the capillaries into the tissues.
- White blood cells have a short life-span of two to three days.

Platelets

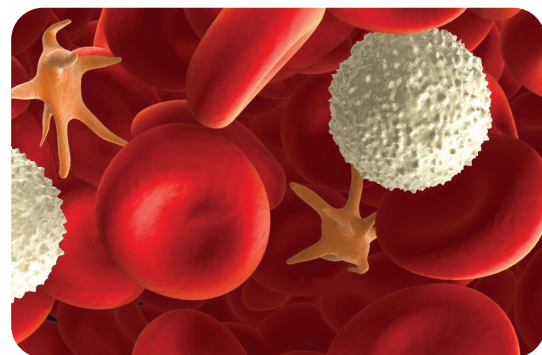


Fig. 9.5 Platelets in the blood

Heredity

- Hereditary traits are traits that can be passed on from one generation to the next.
- Genetics is the scientific study of heredity. It is the study of how traits are passed on from parents to their offspring.
- Scientists who study heredity are called geneticists.

Basic definitions in heredity

Chromosome

- This is a rod like structure visible in the nucleus during cell division.
- It is made up of deoxyribonucleic acid (DNA).
- It carries the information for making new animal or plant bodies.
- Each chromosome may carry many genes along its length.

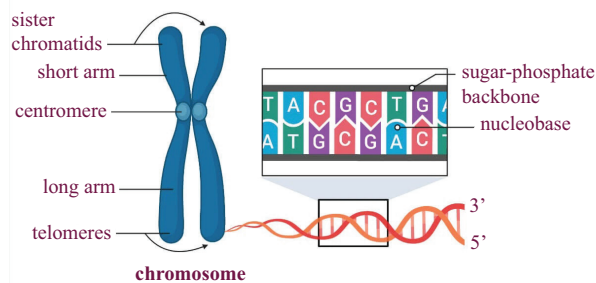


Fig. 16.1 Chromosome structure

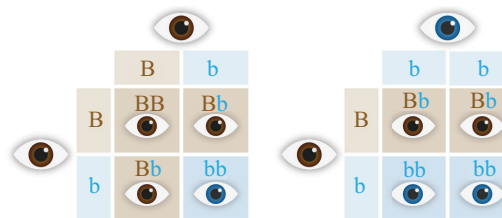
Gene

- A gene is a short length of DNA found on a chromosome that codes for a particular characteristic (expressed by the formation of different proteins).

- The position of a gene on a chromosome is its locus (plural: loci).
- Each gene can exist in two or more different forms called alleles.

Allele

- These are different from genes.
- They occupy the same relative positions on a pair of homologous chromosomes.
- Alleles are represented by letters.
- Alleles can be:
 - dominant, it expresses itself and gives the same phenotype in both the homozygous and heterozygous conditions.
 - recessive, it does not express itself in the heterozygous condition but only in the homozygous conditions.



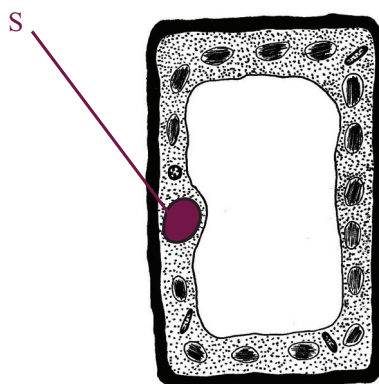
B – dominant brown eye allele BB ● brown eyes
 b – recessive blue eye allele Bb ● brown eyes
 bb ● blue eyes

Fig. 16.2 Alleles for blue and brown eyes

Homologous chromosomes

- Chromosomes exist in pairs, one from the male and the other from the female parent.
- Chromosomes are similar in shape and size.
- They have exactly the same order or sequence of gene loci, alleles of gene loci may not be the same.

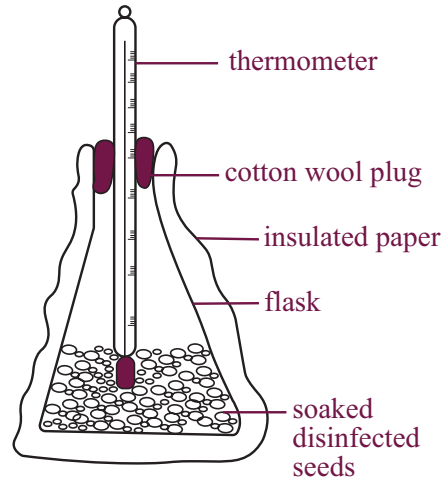
6. Which adaptation of a plant reduces transpiration?
- Large surface area of a leaf.
 - Small surface area of a leaf.
 - Thin layer of a cuticle on a leaf.
 - Large number of stomata on a leaf.
7. Which method of propagation is used to grow Irish potatoes?
- Cuttings.
 - Rhizomes.
 - Seeds.
 - Tubers.
8. One method that may lead to spread of HIV/AIDS is
- faithfulness to one uninfected partner.
 - abstinence from sexual activities.
 - sharing contaminated needles.
 - proper use of condoms.
9. The diagram below shows a palisade cell.



What is the function of S?

- It stores salts and sugars.
 - It controls the cell's activities.
 - It carries out photosynthesis.
 - It controls what gets in and out of the cells.
10. A toddler is suffering from a deficiency disease which causes bones to remain soft and become deformed. The disease is caused by lack of
- carbohydrates.
 - vitamin D.
 - iodine.
 - proteins.

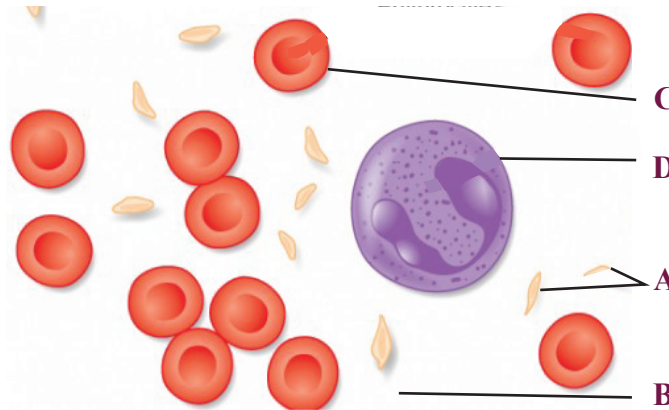
11. The diagram shows apparatus to investigate a biological process.



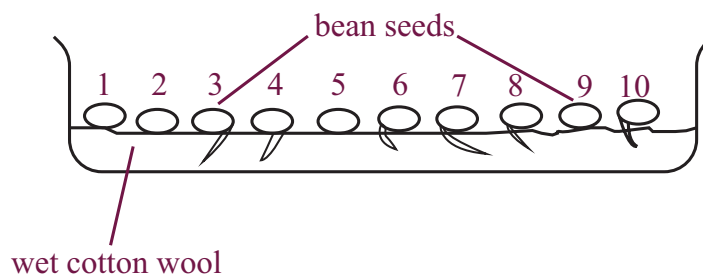
Which process causes the temperature in the flask to increase?

- A. Decay.
 - B. Respiration.
 - C. Germination.
 - D. Gaseous exchange.
12. The diagram shows some components of human blood.

Which component of blood transports oxygen to the body cells?



13. A container shows germinating bean seeds.



Calculate the percentage germination value.

- A. 4%
- B. 6%
- C. 40%
- D. 60%

14. Which method of contraception is effective in the prevention of sexually transmitted infections?
- A. Condom.
B. Spermicide.
C. Rhythm method.
D. The contraceptive pill.
15. Which pH range turns the universal indicator to blue?
- A. 0 to 2. B. 4 to 6. C. 7 to 8. D. 8 to 11.
16. Which nutrient provides energy?
- A. Carbohydrate. B. Vitamin C. C. Fibre. D. Iron.
17. What is the function of the gall bladder?
- A. It stores bile.
B. It stores urine.
C. It produces bile.
D. It produces urea.
18. The diagram below shows a condition caused by malnutrition.

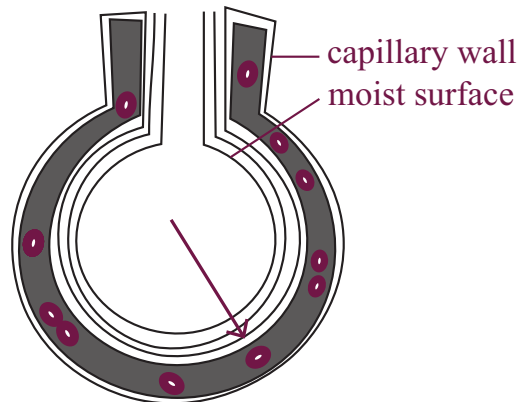


What is the name of the condition?

- A. Obesity. B. Diabetes. C. Kwashiorkor. D. Anorexia nervosa.
19. Benedict's solution was added to a food sample. The mixture was heated. A brick red colour was observed.
- Which food component was present?
- A. Fat B. Starch C. Protein D. Glucose

20. During anaerobic respiration
- A. oxygen is used.
 - B. alcohol is produced.
 - C. lactic acid is produced in plant cells.
 - D. a large amount of energy is released.

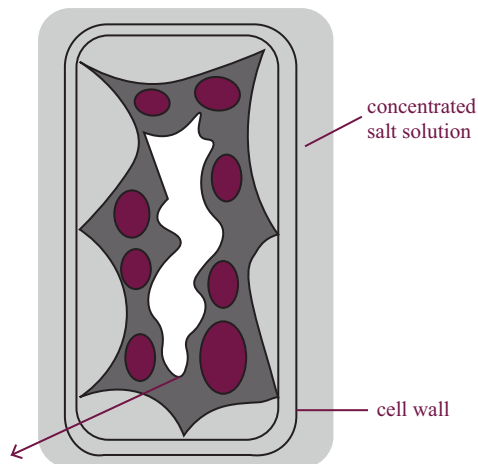
21. The structure of an alveolus is shown.



Which gas moves in the direction of the arrow?

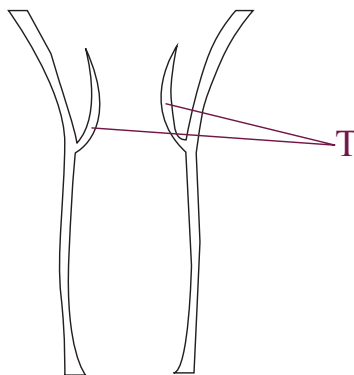
- A. Carbon monoxide.
 - B. Carbon dioxide.
 - C. Nitrogen.
 - D. Oxygen.
22. A plant cell is shown after it has been placed in a concentrated salt solution.

Which substance moves in the direction of the arrow?



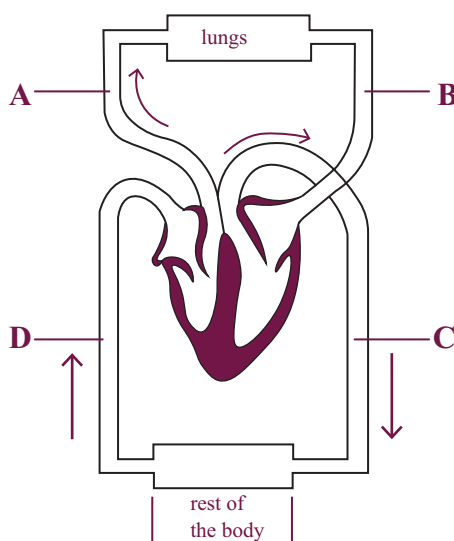
- A. Salt.
- B. Ions.
- C. Water.
- D. Cytoplasm.

23. Below is the internal section of a blood vessel.



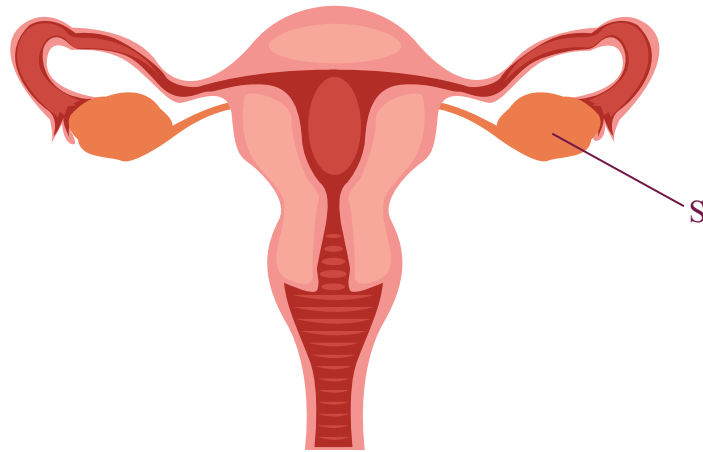
What is the function of T?

- A. It is to increase blood flow towards the heart.
 - B. It is to increase the lumen of the blood vessel.
 - C. It is to push blood towards the heart.
 - D. It is to prevent the back flow of blood.
24. The diagram shows the human circulatory system.
Which blood vessel **A, B, C** or **D** has high blood pressure?



25. A woman starts her menstrual flow on the 2nd of April.
When is she expected to ovulate?
- A. 7 April.
 - B. 12 April.
 - C. 16 April.
 - D. 2 May.
26. Which part of the male reproductive system stores sperms?
- A. Prostate gland.
 - B. Sperm duct.
 - C. Epididymis.
 - D. Testis.

27. Below is the reproductive system of a woman.



Which part is S?

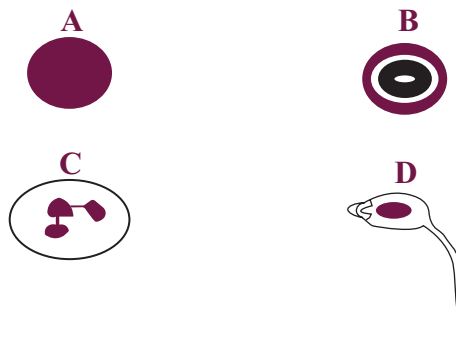
- A. Cervix. B. Ovary. C. Uterus. D. Oviduct.

28. Which disease is spread by drinking contaminated water?

- A. Ebola. B. Typhoid. C. Malaria. D. Chancroid.

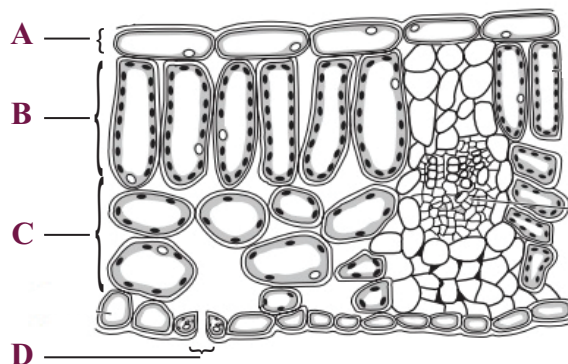
29. Below are some specialised human cells.

Which cell, **A**, **B**, **C** or **D** is the target of HIV?

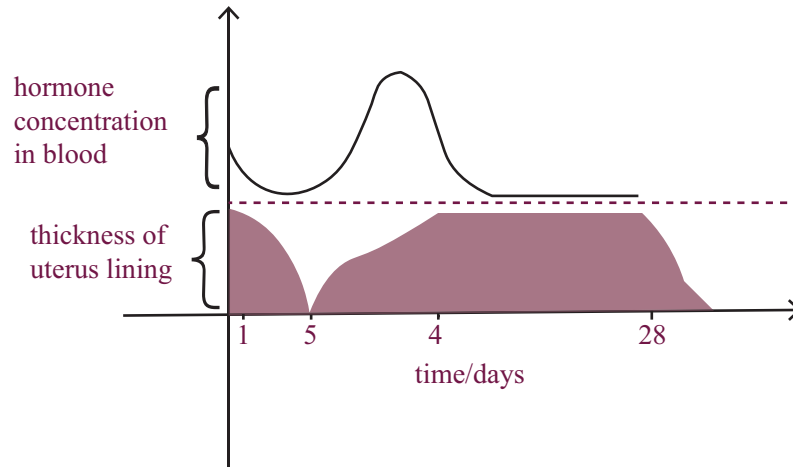


30. The diagram below shows the internal structure of a leaf.

In which tissue **A**, **B**, **C** or **D** does photosynthesis take place?



40. The graph shows some of the changes during a 28-day menstrual cycle.

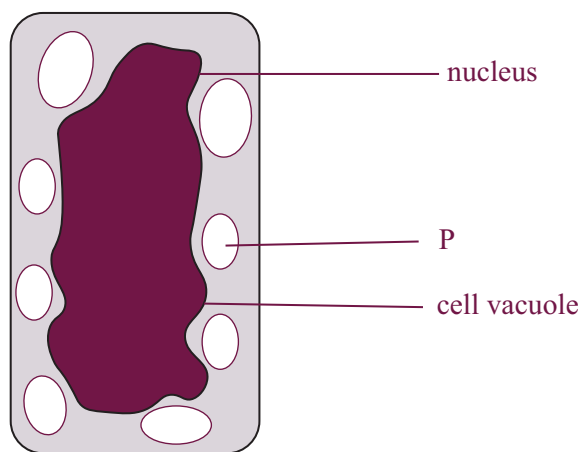


What is the function of the hormone?

- A. It causes ovulation.
- B. It prevents ovulation.
- C. It rebuilds the uterus lining.
- D. It maintains the uterus lining.

EXAMINATION PRACTICE 1**PAPER 2****TIME:** 2 hoursIn Section A, answer **all** questions and Section B answer any **four** questions.**Section A***Answer all questions.*

1. Below is a palisade cell.



- (a) (i) Identify structure **P**. [1]
 (ii) Explain how the palisade cell is adapted for its function. [4]
 (b) State **two** nutrient deficiency diseases in humans. [2]
 (c) Differentiate between plant and animal cells. [3]
2. (a) Name **three** types of teeth and give one function for each. [6]
 (b) (i) Explain the importance of chemical digestion. [3]
 (ii) State the enzyme that converts starch to maltose in the mouth. [1]
3. (a) Define the term pollination. [3]
 (b) Explain the importance of coloured petals, sticky pollen grains and enclosed anthers in an insect pollinated flower. [7]
4. (a) Define germination. [2]
 (b) State **two** conditions necessary for germination. [2]
 (c) Explain the term “vegetative propagation.” [2]
 (d) State **two** advantages of reproducing plants using seeds over vegetative propagation. [4]

5. The diagram below shows a male gamete.

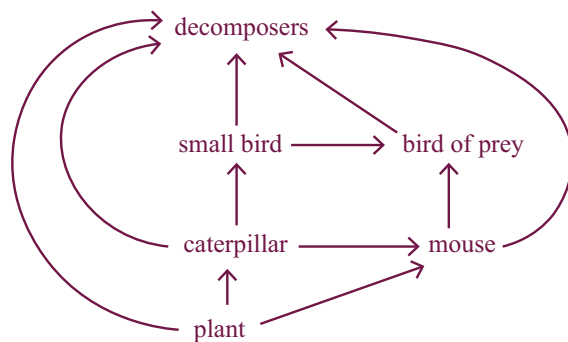


- (a) Name of the male gamete shown. [2]
 (b) Explain how the structure of the male gamete is related to its function. [6]
 (c) Suggest why the male gametes need to be produced in large quantities compared to the female gametes. [2]
6. (a) State **two** phases of the menstrual cycle. [2]
 (b) Draw an annotated diagram of the female reproductive system. [5]
 (c) State the part of the female reproductive system where the implantation of the fertilised ovum takes place. [1]
 (d) Name **two** substances which move from the mother to the foetus through the placenta. [2]

Section B

Answer any **four** questions.

7. A food web of an ecosystem is shown below.



- (a) (i) State what is represented by arrows between organisms. [1]
 (ii) State the organism that feeds on all other organisms in the web. [1]
 (iii) State, with reasons, an organism in the web which could exist in small numbers. [2]
- (b) Explain how a food web is a better representation of what happens in an ecosystem than a food chain. [1]
- (c) State **two** activities of a man that can be harmful to an ecosystem. [2]
 (d) Give **two** factors that reduce the rate of transpiration. [2]
8. (a) State **two** differences between the structure of an insect pollinated and a wind pollinated flower. [4]

EXAMINATION PRACTICE 1**PAPER 3****TIME:** 1 hour 30 minutesAnswer **all** questions.

You are provided with one thin slice of fruit P for (1), one thick slice of fruit P for (2) and one thick slice of another fruit Q for (3).

1. Proceed as follows.

- Place the thin slice of fruit p on a white tile provided and cut the slice into two equal parts through the diameter. [1]
- Remove the central fleshy area of each half of the thin slices of fruit P, leaving the outer edge about 2-3mm thick. [1]

(a) Draw sketches of the strips in the spaces provided in table 1.1 and table 1.2 at the beginning of the experiment.

Table 1.1

Strip at the beginning	Strip in distilled water after 40 minutes

[4]

Table 1.2

Strip at the beginning	Strip in sucrose solution after 40 minutes

[4]

- Place one strip in a petri dish containing distilled water and the other in a petri dish containing sucrose solution. [1]
 - Leave the strips in the dishes for 40 minutes. [1]
During this time, continue with question 2 and 3.
- (b) Observe and draw sketches of the strips in tables 1.1 and 1.2 after 40 minutes. [1]
- (c) Explain the changes in shape of the strip in distilled water and sucrose solution. [6]

EXAMINATION PRACTICE 7**PAPER 3****TIME:** 1 hour 30 minutesAnswer **all** questions.

1. You are going to determine the concentration of glucose solution **X**.

Benedict's solution is used to test for reducing sugars, such as glucose.

You are provided with Benedict's solution and five test tubes containing 5cm³ of:

Distilled water labelled **W**.

0,2% glucose solution labelled **A**.

0,4% glucose solution labelled **B**.

0,6% glucose solution labelled **C**.

Unknown glucose solution labelled **X**.

- Using the measuring cylinder or syringe provided, add 5cm³ of Benedict's solution to each of these five test tubes.
- Place the test tubes in a beaker to use as a water bath.
- When ready, raise your hand to request hot water which the supervisor will pour into your water bath.
- Record the start time when the hot water was added to the water bath in **(a)(i)**.
- Leave the test tubes for 10 minutes. While you are waiting, start Question 2.

- (a) (i)** After 10 minutes remove the test tubes from the water bath and place them in the test tube rack. Record the time. [1]

- (ii)** Record the colours of the contents of each test tube in table 1.1.

Table 1.1

Test-tube	Glucose solution concentration (%)	Observations
W	0,0 (distilled water)	
A	0,2	
B	0,4	
C	0,6	
X	Unknown	

- (b) (i)** Using your observations table 1.1, estimate the % concentration of glucose solution **X**. [4]

- (ii)** Explain how you estimated this concentration. [1]

- (iii)** Suggest how you could determine a more accurate % concentration for glucose solution **X**. [2]

- (c)** Explain why it was important to test distilled water with Benedict's solution. [1]

(d) A student is given a 1% glucose solution. Describe how the student should use it to produce 5cm³ of 0,5% glucose solution. [2]
Approximately 20 minutes after removing the test tubes from the water bath, observe them again and answer (e)(i) and (e)(ii).

(e) (i) Describe the contents of the test tubes now, compared to when you first placed them in the test tube rack. [2]

(ii) Solids may form after the Benedict's test.
Suggest how you could separate any solid from a solution and obtain its mass. [2]

2. Carrots are a food containing vitamin C. They can be frozen to be preserved and stored. Some students measured the vitamin C content of fresh and frozen carrots. They then boiled the carrots in water and measured the vitamin C content again. Their results are shown in table 2.1.

Table 2.1

Carrots	Vitamin C/mg per 100g
Fresh	5,9
Fresh, boiled	3,6
Frozen	2,5
Frozen, boiled	2,3

(a) Construct a bar chart of the data in table 2.1 on the grid. [4]

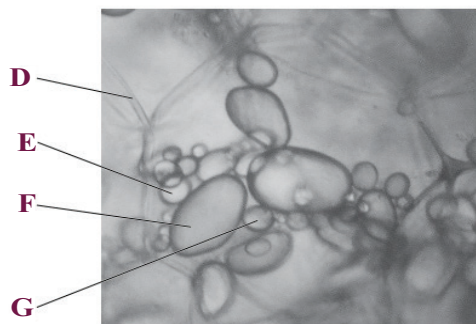
(b) (i) State which boiled carrots contained the most vitamin C. [1]

(ii) Suggest two conclusions the students could reach from these results. [2]

(c) Carrots can be cooked by heating them in an oven or by boiling them in water. You want to investigate the effect of these two cooking methods on the vitamin C content of cooked carrots. Describe how you would do this investigation.
There is a simple test that can be used to measure vitamin C content.

You do not need to know this test. Refer to the vitamin C test in your answer. [6]

3. The potato is a plant that can store starch grains in its cells. The diagram below shows some of its starch grains as seen under the microscope.



(a) Identify the structure labelled **D**. [1]

(b) Draw the starch grains labelled **E**, **F** and **G** as they appear in the diagram.
Grain **F** should be at least 60mm long.

- (c) (i) On your drawing, draw a line to indicate the maximum length of grain **F**. Measure this length and record it. [2]
- (ii) The actual length of grain **F** is 0,03mm. Calculate the magnification of your drawing to the nearest whole number. [2]
- (d) Describe how to prepare a slide of potato tissue to observe starch grains as clearly as possible under a microscope. [3]

EXAMINATION PRACTICE 8

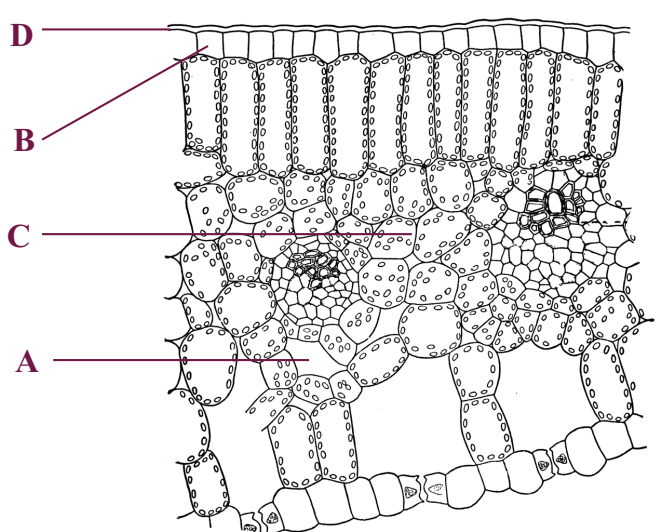
PAPER 1

TIME: 1 hour

Answer **all** questions.

- What are the chemical elements found in carbohydrate?
 - Carbon, hydrogen and oxygen only.
 - Carbon, hydrogen, oxygen and nitrogen only.
 - Carbon, hydrogen, oxygen and sulphur only.
 - Carbon, hydrogen, oxygen, nitrogen and sulphur only.
- A protease is added to a cloudy suspension of protein in a test tube and kept at 37°C. After eight minutes, the suspension changes from cloudy to transparent. Which product or products will now be present in the test tube?
 - Amino acids.
 - Fatty acids.
 - Glycerol.
 - Simple sugars.
- The following can be used to write a word equation for photosynthesis.
 - Carbon dioxide.
 - Light and chlorophyll.
 - Glucose and oxygen.

Which shows the correct word equation for photosynthesis?

- 1 → 2 in the presence of 3.
 - 1 → 3 in the presence of 2.
 - 2 → 3 in the presence of 1.
 - 3 → 1 in the presence of 2.
- The photograph shows a section through the leaf of a plant. Which label shows the position of the cuticle?
 

9. These actions listed below may be important in controlling the spread of disease

1. Washing hands after going to the toilet.
2. Disposing of waste frequently.
3. Using separate cutting boards for meat and salad.
4. Disposing of raw sewage into a river.

Which would help control the spread of disease?

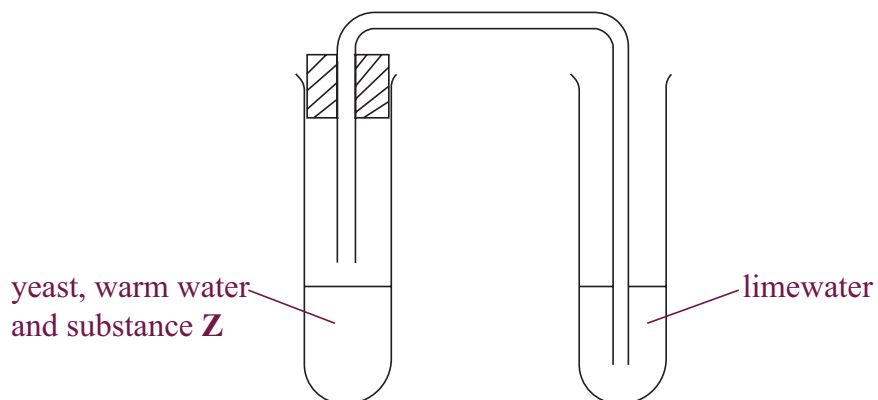
- A. 1, 2, 3 and 4.
- B. 1, 2 and 3 only.
- C. 2 and 3 only.
- D. 4 only.

10. The table shows some of the features of respiration.

Which row is correct for anaerobic respiration?

	Amount of energy released per glucose molecule	Chemical reaction	Released carbon dioxide
A	High	Always the same	Sometimes
B	Low	Different in different organisms	Sometimes
C	High	Different in different organisms	Always
D	Low	Always the same	Always

11. The diagram below shows some apparatus used to investigate respiration. Yeast, warm water and substance **Z** were put into a test tube. After a while, the lime water began to go cloudy.



What is substance **Z**?

- A. Alcohol.
- B. Glucose.
- C. Nitrogen.
- D. Oxygen.

12. The diagram below shows a boy blowing up a balloon.



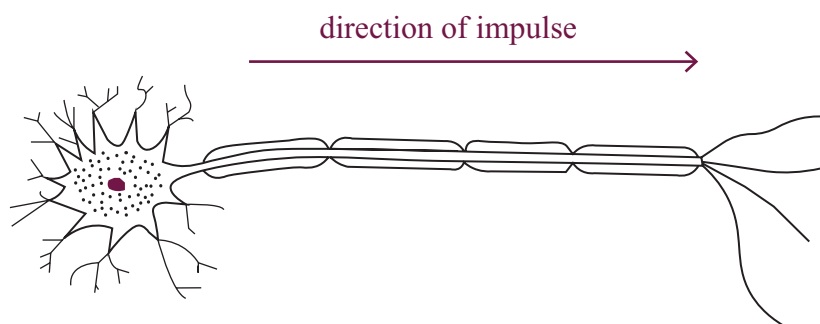
How do the proportions of gases in the air inside the balloon compare with the air outside the balloon?

	Carbon dioxide	Oxygen	Water vapour
A	Less	More	More
B	Less	More	Less
C	More	Less	More
D	More	Less	Less

13. _____ produces urea.

A. Bladder **B.** Kidney **C.** Liver **D.** Pancreas

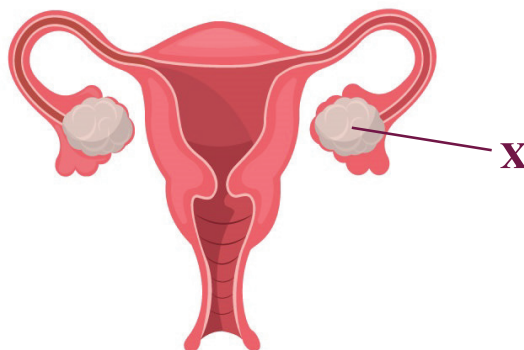
14. The diagram below shows a neurone carrying an impulse.



Which row describes the type of neurone and the direction of impulse?

	Type of neurone	Direction of impulse
A	Motor	Towards the spinal cord
B	Motor	Away from the spinal cord
C	Sensory	Towards the spinal cord
D	Sensory	Away from the spinal cord

15. _____ can be an effector in a reflex arc.
- A. A gland B. A light receptor C. The brain D. The spinal cord
16. The diagram below shows the female reproductive system.



What is the function of the part labelled X?

- A. Gamete production and hormone secretion.
 B. Gamete production only.
 C. Hormone secretion only.
 D. Zygote production and hormone secretion.
17. The diagram shows the menstrual cycle of a woman during the month of September?

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Key

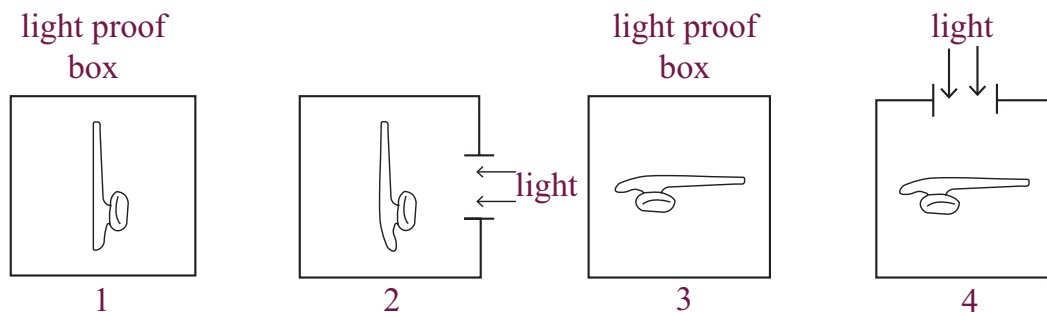
= ovulation
 = mensuration

Why is it that fertilisation can not take place if sperms are released into the vagina on 8th of September?

- A. Sperms are washed out of the female uterus by the menstrual flow.
 B. Sperms can survive in the female reproductive system for only 3-4 days.
 C. Sperms must be released after ovulation for fertilisation to take place.
 D. The uterus lining is washed out of the female body during menstruation.

18. Some roots are known to be gravitropic.

Which pair of diagrams show a controlled experiment to find out if these roots are also phototropic?



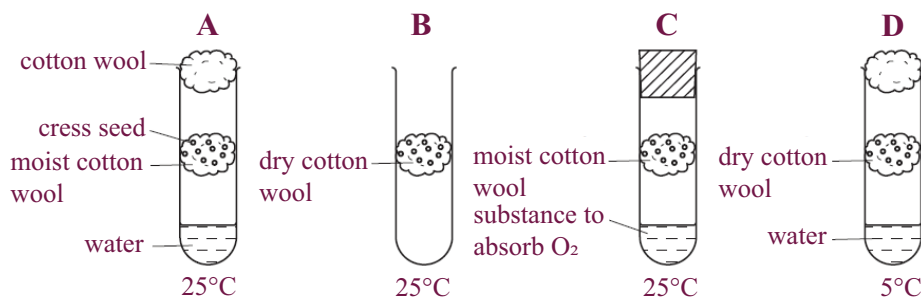
- A. 1 and 2. B. 1 and 3. C. 2 and 3. D. 2 and 4.

19. _____ is a term used for the transfer of a gene from one organism to another.

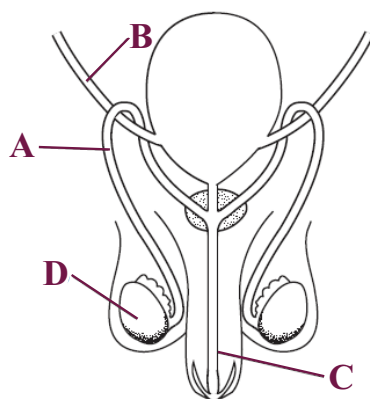
- A. Artificial selection B. Genetic engineering
C. Mutation D. Natural selection

20. In an experiment to investigate the effects of various environmental factors on germination, four boiling tubes were set up as shown.

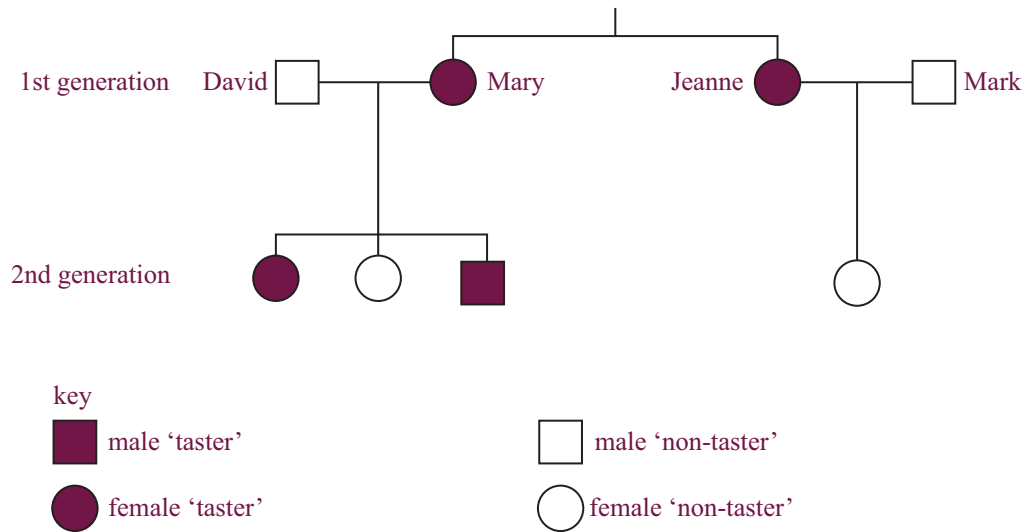
In which tube would the seeds germinate most quickly?



21. The diagram shows some parts of the male reproductive system. Which part is cut during vasectomy?



22. The diagram shows a family tree and the inheritance of the ability to taste a certain substance. The allele for the ability to taste this substance is dominant.



23. Which statement about genotypes of the sisters Mary and Jeanne is correct?
- Mary is heterozygous and Jeanne is homozygous.
 - Mary is homozygous and Jeanne is heterozygous.
 - They are both heterozygous.
 - They are both homozygous.
24. An eagle is shown below.



Eagles have hooked beaks that help them to ingest food.

This is an example of

- adaptation.
- assimilation.
- nutrition.
- variation.

31. Lichens are formed from two different organisms living together. The table shows some of the characteristics of two organisms, X and Y, found in most lichens.

X	Y
Made of strands called hyphae	Single celled
Hyphae have cell walls and many nuclei	Cell contains a nucleus and chloroplast

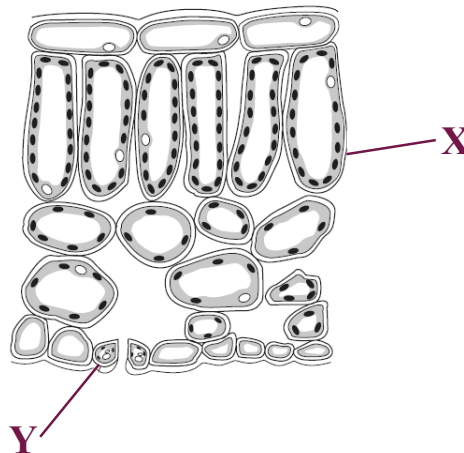
Which kingdoms are represented by X and Y?

	X	Y
A	Fungus	Plant
B	Fungus	Protocist
C	Protocist	Fungus
D	Protocist	Plant

32. Two types of cells, one animal and one plant, were examined using a light microscope. Which row shows the correct combination of cellular features that would be observed in the cells?

	Cell structure observed			
	Animal cell		Plant cell	
A	Chloroplast	Membrane	Vacuole	Cytoplasm
B	Cytoplasm	Nucleus	Chloroplast	Membrane
C	Membrane	Cell wall	Cytoplasm	Nucleus
D	Nucleus	Chloroplast	Cell wall	Membrane

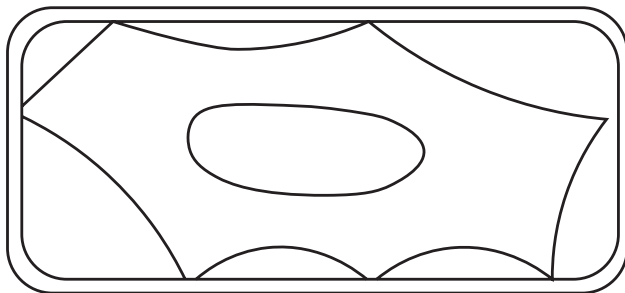
33. The diagram below shows part of a leaf in cross section.



Structures X and Y are both part of the same

- A. cell B. organ C. tissue D. vessel
34. How does carbon dioxide and oxygen move into and out of a mesophyll?
- A. Active transport. B. Diffusion.
 C. Respiration. D. Transpiration.

35. The diagram below shows a plant cell after it has been submerged in a solution, **P**, for 20 minutes.



Which row best describes the water potential of solution **P** and the condition of the cell?

	Water potential of solution P	Condition of the cell
A	Higher than the cell sap in the vacuole	Plasmolysed and turgid
B	Higher than the cell sap in the vacuole	Under high turgor pressure
C	Lower than the cell sap in the vacuole	Plasmolysed and flaccid
D	The same as the cell sap in the vacuole	Under low turgor pressure

36. The table below shows the concentrations of sugar and starch in an onion.

Total sugar including reduce sugar/g per 100g	Starch/g per 100g
3,7	0,0

The onion is tested with Benedict's solution and iodine solution.

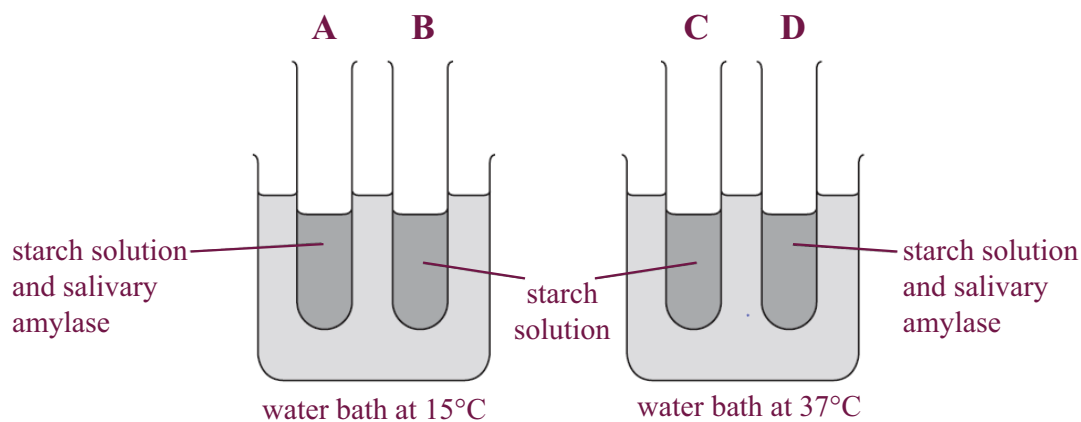
Which set of results is correct?

	Benedict's solution	Iodine solution
A	Blue	Blue-black
B	Blue	Brown
C	Brick red	Blue-black
D	Brick red	Brown

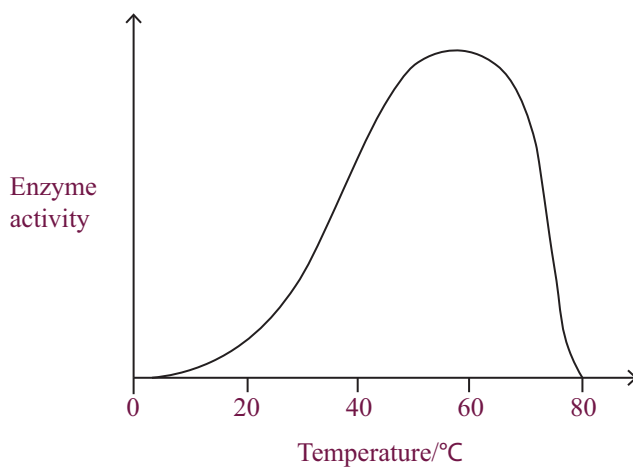
37. The base sequence of part of one strand of a DNA molecule is shown. ATAGCC.
What is the base sequence of the other strand?

- A.** GCGATT
- B.** CGCTAA
- C.** TATCGG
- D.** ATAGCC

38. The apparatus shown below is used for an experiment on starch digestion. Which test tube contains the most sugar after 20 minutes?



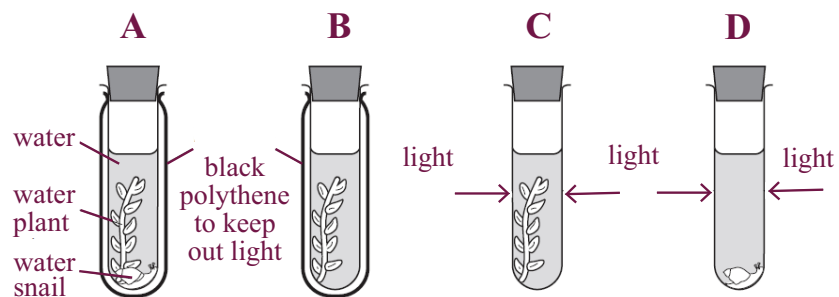
39. The graph below shows the effect of temperature on the action of an enzyme.



Why does the rate of reaction change when the temperature is increased from 20°C to 30°C?

	More kinetic energy of particles	More frequent collisions of particles
A	✓	✓
B	✗	✓
C	✓	✗
D	✗	✗

40. An experiment was carried out using the apparatus shown. The carbon dioxide content of the water in each test tube was measured at the start and again three hours later. In which test tube would there be a decrease in carbon dioxide content?



Paper 1 Examination Answers

Exam 1	Exam 2	Exam 3	Exam 4	Exam 5	Exam 6	Exam 7	Exam 8	Exam 9	Exam 10
1. A	1. A	1. C	1. D	1. D	1. C	1. A	1. A	1. C	1. B
2. A	2. C	2. A	2. C	2. A	2. A	2. A	2. A	2. D	2. A
3. B	3. D	3. A	3. A	3. B	3. B	3. D	3. B	3. D	3. C
4. A	4. B	4. D	4. C	4. D	4. C	4. A	4. D	4. A	4. A
5. C	5. D	5. B	5. B	5. B	5. D	5. A	5. A	5. D	5. A
6. B	6. D	6. C	6. D	6. A	6. C	6. C	6. C	6. B	6. A
7. D	7. B	7. A	7. B	7. A	7. B	7. B	7. C	7. A	7. D
8. C	8. A	8. D	8. A	8. C	8. D	8. A	8. C	8. C	8. C
9. B	9. B	9. C	9. C	9. C	9. B	9. B	9. B	9. A	9. C
10. B	10. D	10. D	10. D	10. A	10. A	10. A	10. B	10. C	10. C
11. B	11. B	11. B	11. A	11. C	11. C	11. B	11. B	11. B	11. D
12. C	12. D	12. A	12. A	12. A	12. C	12. D	12. C	12. C	12. A
13. D	13. B	13. A	13. C	13. C	13. C	13. D	13. C	13. B	13. C
14. A	14. B	14. C	14. A	14. B	14. C	14. C	14. B	14. D	14. B
15. D	15. C	15. B	15. B	15. C	15. A	15. A	15. A	15. C	15. B
16. A	16. C	16. A	16. C	16. B	16. B	16. A	16. A	16. D	16. B
17. A	17. C	17. C	17. C	17. A	17. A	17. A	17. B	17. C	17. C
18. A	18. C	18. A	18. B	18. C	18. B	18. A	18. A	18. B	18. B
19. D	19. D	19. D	19. B	19. B	19. A	19. D	19. B	19. B	19. B
20. C	20. C	20. B	20. A	20. C	20. D	20. A	20. A	20. B	20. B
21. D	21. D	21. C	21. A	21. A	21. A	21. B	21. A	21. B	21. D
22. C	22. D	22. B	22. D	22. C	22. B	22. C	22. C	22. D	22. C
23. D	23. B	23. B	23. C	23. B	23. B	23. B	23. A	23. B	23. B
24. C	24. B	24. C	24. B	24. B	24. B	24. A	24. D	24. D	24. C
25. C	25. A	25. B	25. C	25. D	25. B	25. D	25. D	25. B	25. D
26. C	26. B	26. A	26. B	26. C	26. A	26. A	26. B	26. D	26. C
27. B	27. D	27. C	27. B	27. D	27. B	27. D	27. C	27. D	27. A
28. B	28. D	28. B	28. B	28. C	28. A	28. D	28. A	28. D	28. D
29. A	29. D	29. D	29. A	29. B	29. C	29. A	29. B	29. B	29. D
30. B	30. D	30. C	30. C	30. A	30. C	30. A	30. D	30. B	30. D
31. B	31. A	31. C	31. D	31. D	31. D	31. A	31. A	31. C	31. B
32. C	32. B	32. B	32. B	32. B	32. A	32. C	32. B	32. D	32. D
33. D	33. C	33. C	33. A	33. B	33. D	33. C	33. B	33. B	33. B
34. C	34. C	34. A	34. A	34. D	34. C	34. A	34. B	34. B	34. D
35. D	35. C	35. C	35. D	35. D	35. C	35. B	35. D	35. A	35. D
36. B	36. B	36. B	36. D	36. B	36. D	36. C	36. C	36. B	36. C
37. A	37. A	37. A	37. C	37. A	37. A	37. D	37. D	37. C	37. C
38. A	38. B	38. D	38. C	38. D	38. B	38. C	38. A	38. A	38. C
39. D	39. C	39. A	39. D	39. B	39. D	39. B	39. C	39. B	39. A
40. C	40. D	40. C	40. B	40. B	40. B	40. A	40. A	40. B	40. A

Examination 1 Paper 2 Answers

1. (a) (i) • chloroplast
 • in the palisade cell, the structures which are many and cylindrical are the chloroplasts
- (ii) • column shapes for exposure to sunlight
 • numerous chloroplasts for maximum absorption of light
- (b) • kwashiokor
 • goitre
 • rickets
 • scurvy
 • anaemia
 • night blindness

(c)

Plant cell	Animal cell
usually they are larger than animal cells	usually smaller than plant cells
cell wall present in addition to plasma membrane and consists of middle lamellae, primary and secondary walls	cell wall absent
plasmodesmata present	plasmodesmata absent
chloroplast present	chloroplast absent
vacuole large and permanent	vacuole small and temporary
tonoplast present around vacuole	tonoplast absent
centrioles absent except motile cells of lower plants	centrioles present
nucleus present along the periphery of the cell	nucleus at the centre of the cell
lysosomes are rare	lysosomes present
storage material are starch grains	storage material are glycogen granules

2. (a) • canine-tearing, gripping
 • incisor-cutting, biting
 • premolar-crushing, grinding/ chewing
 • polar-crushing, grinding/chewing
- (b) (i) increases food solubility for absorption (into the blood stream)
 (ii) salivary amylase
3. (a) transfer of pollen grains from anther to stigma.
 (b) • coloured petals attract insects which transfer pollen grains
 • sticky pollen grains stick to the insect and are transferred to other flowers
 • enclosed anthers brushes with insect to transfer pollen grains to the insect.
4. (a) the development of a plant from a seed or spore after a period of dormancy
 (b) moisture/ water
 warmth/suitable temperature
 air/oxygen
 (c) is an asexual method of plant reproduction that occurs in its leaves, roots and stem
 (d) provides genetic variation
 plants can be spaced
 reduced competition for resources
 propagation can be in larger numbers
5. (a) sperm cell
 (b) • tails helps it to swim in the female reproductive
 • reduced cytoplasm reduce weight/ for faster swimming
 • acrosome helps to penetrate the ovum
 • nucleus at the front for quick entrance into the ovum

Examination 7 Paper 3 Answers

1. (a) (i) two times recorded + total time 10 minutes
 (ii) distilled water blue ; 0.6% (C) solution at 10 minutes orange/brick red colour ; any intermediate colour between blue and orange/brick red for A and B ; solution X colour between OR the same as that of 0.2% and 0.4% solution
 (b) (i) between 0.2 and 0.4
 (ii) appearance intermediate between these two concentrations
 (iii) use dilutions of glucose between 0.2% and 0.4% ; compare colour of solution X with these colours
 (c) (control) to show the colour (of Benedict's) when no (reducing) sugar/ glucose present
 (d) either 2,5cm³ of glucose solution ; same volume / 2,5cm³ of water OR Known/ measured/ stated volume of glucose solution + same volume of water; measure 5cm³ of diluted solution
 (e) (i) solid/ precipitate settling at the bottom of test tubes; 0,6% solution (c) has most solid at the bottom of test tube; 0,2% to 0,6% (A-C) solutions have increasing amount of solid with increasing concentration
 (ii) filter; residue / solid dried + mass measured
2. (a) axes fully labelled; linear scale of vitamin C content + at least half of grid used in both directions; four data values plotted correctly; all bars ruled and of equal width + bars not touching
 (b) (i) fresh (boiled)
 (ii) boiling/ cooking decreases vitamin C OR more vitamin C in fresh than boiled ; freezing decreases vitamin C OR more vitamin C in fresh than frozen
 (c) carrots of same age or type or species / same carrot; same mass/ volume of carrots used; both cooking methods (oven, boiling) used; same temperature/ for same time; vitamin C test used/content determined before cooking; vitamin C test used/ content determined after cooking; repeat procedure to see if similar results are obtained
3. (a) cell wall
 (b) clear continuous (outer) line for grain F + no shading; grain F at least 60mm long + grains touching; correct relative proportions of all three grains
 (c) (i) straight line drawn on maximum length of F; measurement (+/-1mm)
 (ii) candidates measurement from drawing 0,03; answer to the nearest whole number
 (d) scraping from cut surface/ thin section; drop of iodine solution/ iodine in potassium iodide solution; to stain; cover slip; prevent or remove air bubbles; excess stain mopped up/ removed / washed off

Examination 8 Paper 2 Answers

1. (a) the skin consists of many layers which possess blood capillaries which are quite close to the skin surface. On a cold day, the body tends to lose more heat to the surroundings thus the skin will regulate its various reaction to minimise heat loss. Firstly, the

Examination 9 Paper 3 Answers

1. (a) (i)

	S1	S2
Temperature/ °C	0-3	70-80
mass of beaker and water/g	mass recorded, greater than mass of beaker,	mass recorded, greater than mass of beaker,
mass of beaker/g	mass recorded,	mass recorded,
mass of water/g	difference of the two masses,	difference of the two masses,

Mass of 20cm³ of S1 is expected to be less than that of 20cm³ of S2

(ii) working for S1

$$\text{density} = \frac{\text{mass}}{\text{volume}} = \text{answer in g/cm}^3$$

Working for S2

$$\text{density} = \frac{\text{mass}}{\text{volume}} = \text{answer in g/cm}^3$$

(iii) freezing/ density property

- (iv)
- freezing water/ ice floats on the surfaces
 - insulates liquid water below
 - protecting organisms from freezing
 - cold water near ice sinks/ warm water rises to the top/ refers to convection
 - allow mixing of water
 - to distribute nutrients/ oxygen

- (b)
- fill a beaker/ container with (coloured) water
 - place a capillary tube in the water
 - mark the initial level of water
 - observe and mark the new level of water after a given time

2. (a) (i) Drawings of specimen A

- continuous lines
- proportion
- reasonable size filling more than half of the space
- any 2 correct labels from petals/ sepals/ stigma/ styles/ ovary/ anther/ filament/ ovules

Drawing of specimen B

- continuous lines
- proportion
- reasonable size filling more than half of the space
- any 2 labels: nodes/ roots/ shoots

(ii) A – sexual reproduction

B – vegetative/ asexual reproduction

(iii)

	Name of part	Function
Specimen A	petals sepals stigma style ovary ovules anther filament	attract insects protect flower bud receives pollen holds/supports the stigma produce ovules female sex cells/ fertilisation produce pollen support anther
Specimen B	Nodes Roots Shoots	Produce new roots/ shoots Absorb water/ mineral salts Has leaves for photosynthesis

- (iv) any two observed related to labelled parts, size, colour and shape