Education

KwaZulu-Natal Department of Education
REPUBLIC OF SOUTH AFRICA

GR 10 LIFE SCIENCE

LIFE SCIENCES

COMMON TEST

JUNE 2017

NATIONAL SENIOR CERTIFICATE

GRADE 10

MARKS: 150

TIME: $2^1/_2$ hours

N.B. This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number (1.1.1 to 1.1.7) in your ANSWER BOOK, for example 1.1.8 D.

1.1.1 Which ONE of the following blood vessels is responsible for carrying blood away from the right ventricle?

A Pulmonary vein
B Coronary artery
C Pulmonary artery
D Suerior vena cava

1.1.2 In which phase does cytokinesis start to take place?

A Metaphase
B Prophase
C Anaphase
D Interphase

1.1.3 Which chemical reagent is used to test for the presence of glucose in a food sample?

A Iodine solution
B Alcohol
C Millon's reagent/Biuret solution
D Benedict's solution/Fehlings A and B

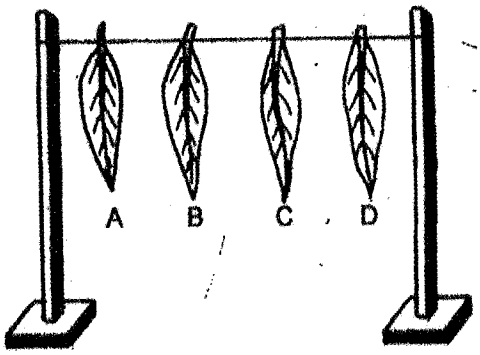
1.1.4 The blood from the pulmonary vein enters the heart at the ...

A left atrium.
B right atrium.
C left ventricle.
D right ventricle.

1.1.5 Which ONE of the following combinations of organic compounds contains carbon, hydrogen and oxygen only?

A Carbohydrates and proteins
B Lipids and proteins
C Proteins and glucose
D Glucose and starch

1.1.6 Study the diagram below showing leaves that have been treated in various ways during an investigation on transpiration, then answer the questions that follow.

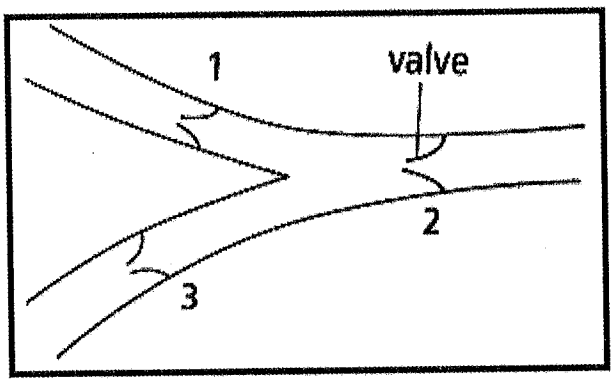


Leaf A – coated with Vaseline on both sides.
Leaf B – coated with Vaseline on the lower surface only
Leaf C – coated with Vaseline on the upper surface only
Leaf D – uncoated

Which one of the following leaves will lose water most rapidly?

A Leaf A
B Leaf B
C Leaf C
D Leaf D

1.1.7 The diagram shows a longitudinal section of a vein.



The direction of blood flow will be from ...

A 1 to 2 and 2 to 3.
B 3 to 2 and 2 to 1.
C 2 to 1 and 2 to 3.
D 1 to 2 and 3 to 2.

(7 x 2) **(14)**

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 to 1.2.8) in the ANSWER BOOK.

1.2.1 The plant tissue that actively divides by mitosis to form new cells

1.2.2 The loss of water droplets through the pores of leaves as a result of root pressure and high humidity

1.2.3 Apparatus used to measure the rate of transpiration

1.2.4 The opening at the base of the skull through which the spinal cord passes

1.2.5 The membranes which enclose and protect the heart

1.2.6 The chamber in the heart that receives oxygenated blood from the left atrium

1.2.7 The combination of autumn wood and spring wood formed in a single year through secondary thickening

1.2.8 Vessels that return components of tissue fluid back to the blood system

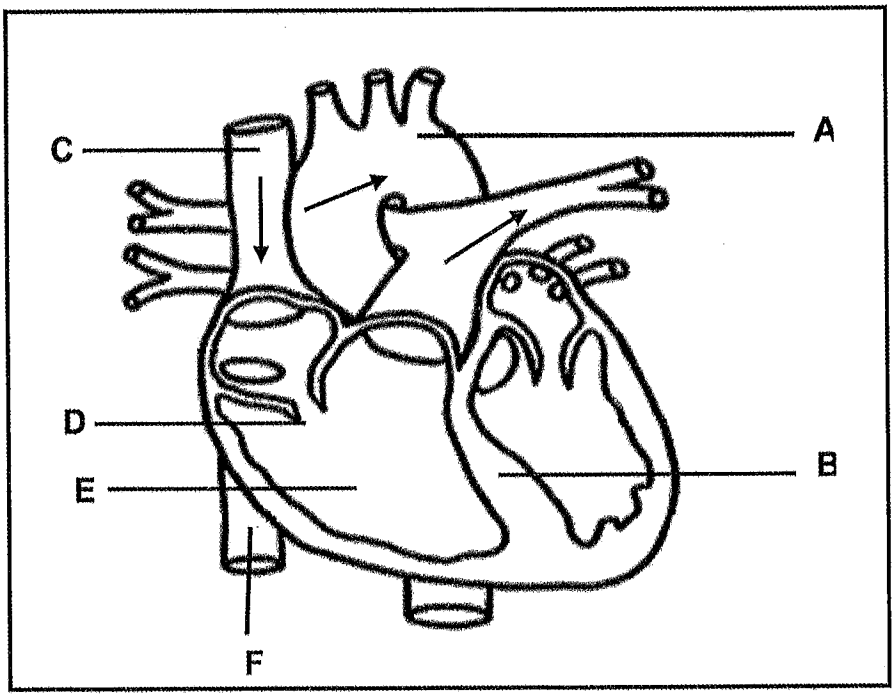
(8 x 1) **(8)**

1.3 Indicate whether each of the statements in COLUMN I applies to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B**, or **none** next to the question number (1.3.1 to 1.3.4) in the ANSWER BOOK.

COLUMN I	COLUMN II
1.3.1 Contraction of the heart muscles	A Diastole B Systole
1.3.2 Transports waste to the kidneys	A Lymphatic system B Blood system
1.3.3 Has a secretory function in the cell	A Chromoplast B Centriole
1.3.4 Role of mitosis	A Growth B Reproduction

(4 x 2) **(8)**

1.4 The diagram below shows the human heart.



1.4.1 Identify:

(a) **A** (1)

(b) **E** (1)

(c) **F** (1)

1.4.2 Give the LETTER and the NAME of the part that:

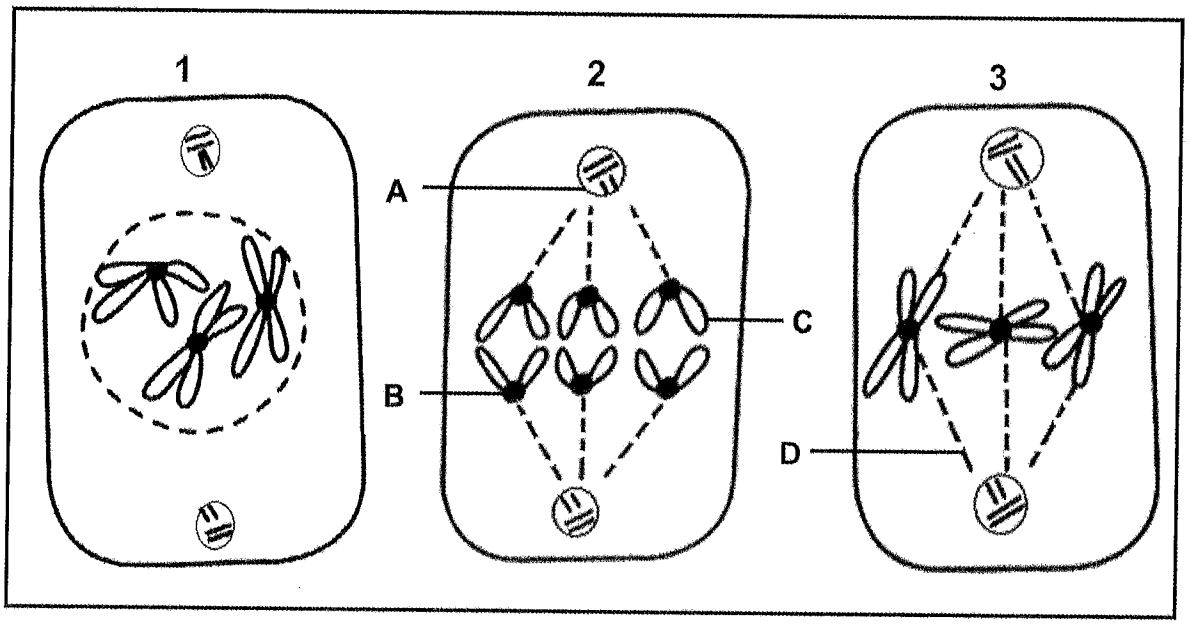
(a) Carries blood from the upper part of the body to the heart (2)

(b) Prevents blood from flowing back into the right atrium (2)

(c) Is a muscular wall that seperates the ventricles (2)

(9)

1.5 The diagrams below represent different phases of mitosis.



1.5.1 Identify part **A**. (1)

1.5.2 Rearrange the numbers **1**, **2** and **3** to show the correct sequence in which the phases of mitosis occur. (2)

1.5.3 Give the LETTER and the NAME of the part that:

(a) Pulls chromatids to opposite poles (2)

(b) Is produced through replication of genetic material (2)

(c) Joins chromatids together (2)

1.5.4 How many chromosomes will be present in each cell at the end of the process of mitosis represented in the diagram? (1)

1.5.5 What disease is caused by the uncontrolled division of cells by mitosis? (1)

(11)

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1 Read the extract below.

Minerals and vitamins in traditional food

In the inland region in Southern Africa, *intshungu* (traditional plants) are eaten like spinach. Intshungu is natural growing during spring. About 3 million tons of *intshungu* is wasted, whilst around 6 million of South Africans may use it to prevent diseases. Deforestation and drought is currently affecting the growth of intshungu. This traditional plant is a valuable source of the minerals potassium and iron and vitamins A and C.

People should be encouraged to protect this traditional plant from extinction especially in rural areas where it could help to reduce diseases in people.

2.1.1 From the passage above state TWO factors that affect the growth of intshungu. (2)

2.1.2 Why is *intshungu* recommended for the people suffering from:

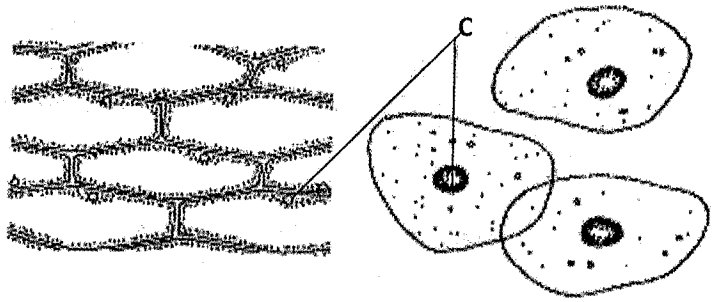
(a) Poor vision (1)
(b) Bleeding gums (1)

2.1.3 Intshungu is natural growing. It does not need application of fertilisers.

Describe the effect of fertilisers on the ecosystem when it is washed from farms into nearby ponds. (5)
(9)

2.2 Describe THREE properties of enzymes. **(6)**

2.3 The diagram below represents plant and animal cells.



2.3.1 Which of the drawings (**A** or **B**) represent plant cells? (1)

2.3.2 Tabulate TWO differences between plant and animal cells that are visible in the diagram. (5)

2.3.3 List TWO similarities between plant and animal cells that are visible in the diagram. (2)

2.3.4 List TWO functions of the part **C**. (2)

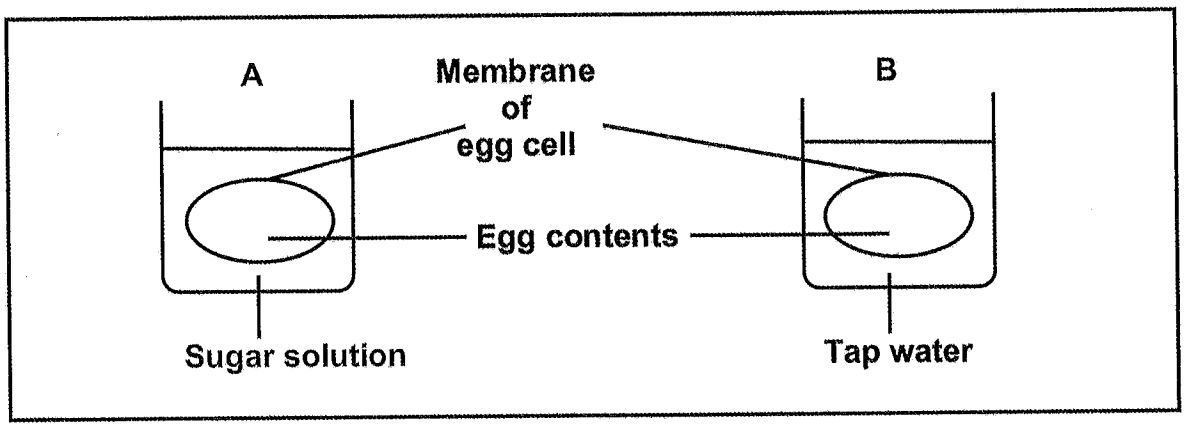
2.3.5 Energy in living cells is generated in the mitochondria.

Make a labelled drawing of a mitochondrion. (4)
(14)

2.4 The following steps were followed during an investigation:

- The shell was removed from 2 eggs
- The two resulting egg cells surrounded by a cell membrane were used in the investigation
- Egg cell **A** was placed in a beaker containing sugar solution
- Egg cell **B** was placed in a beaker containing tap water

The diagram below shows the set up of the investigation.



2.4.1 State the process that is being investigated. (1)

2.4.2 Explain why cell **B** is expected to be larger after two days. (2)

2.4.3 Explain why it is necessary to remove the shell from the egg? (2)

2.4.4 State any TWO factors that should be kept constant in this investigation. (2)

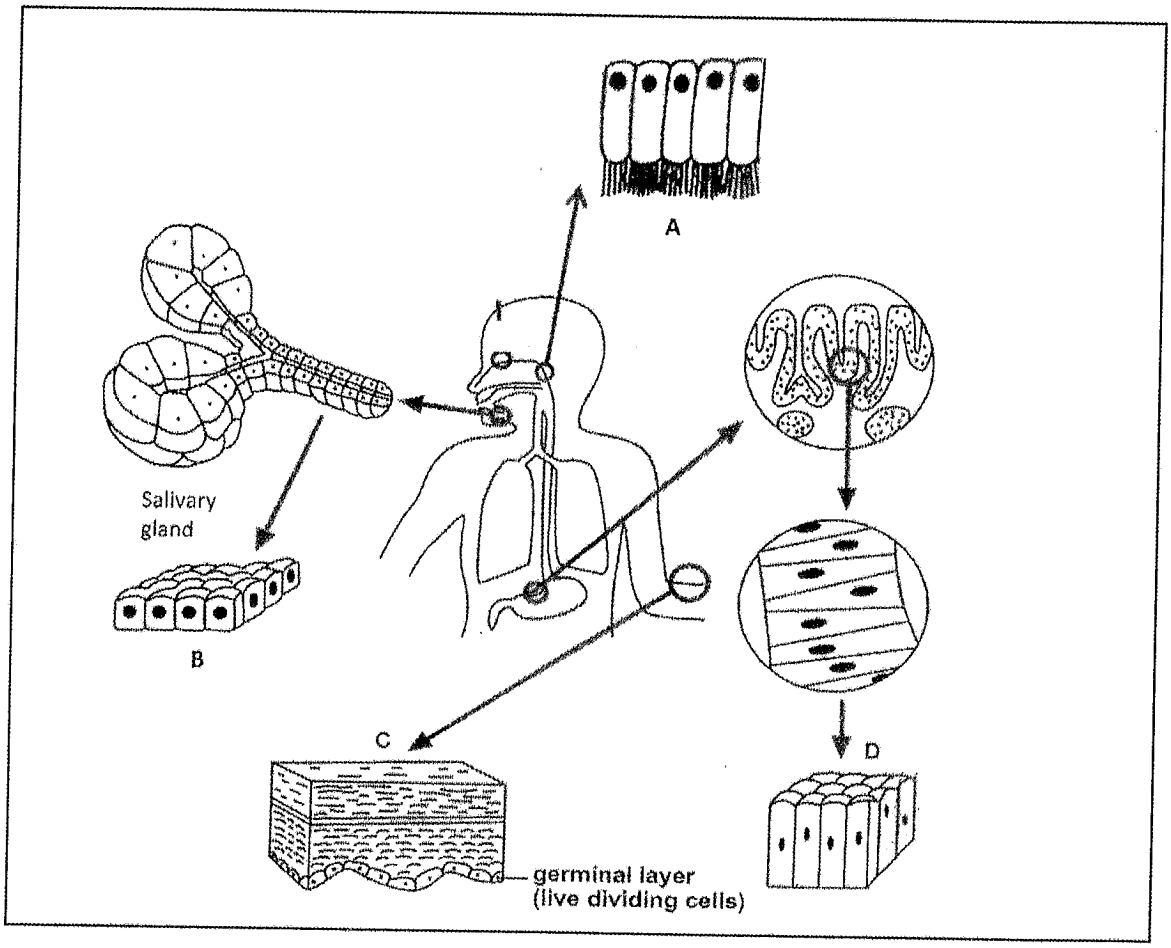
(7)

2.5 Describe the structure and function of phloem tissue. **(4)**

[40]

QUESTION 3

3.1 Study the diagrams below and answer the questions that follow.



3.1.1 Identify the tissues labeled **A**, **B** and **D**. (3)

3.1.2 State ONE function of each of the tissues labeled **B** and **D** in the locations seen in the diagrams above. (2)

3.1.3 State TWO ways in which tissue **A** is adapted for its function. (2)

3.1.4 Tissue **C** makes up the skin in our body.

Explain why it should consist of actively diving cells. (2)

(9)

3.2 An investigation was carried out to determine the shortage of blood type 'O' that faces South Africa in three different blood banks (**A**, **B**, **C**). Blood from a person with blood type 'O' can be used safely in transfusions into patients of any other blood type.

The table below shows the blood units available and the blood units required by each blood bank.

BLOOD BANK	UNITS OF TOTAL BLOOD in 2016 (litres)	
	Units of blood available	Units of blood required
A	20	35
B	122	550
C	181	510

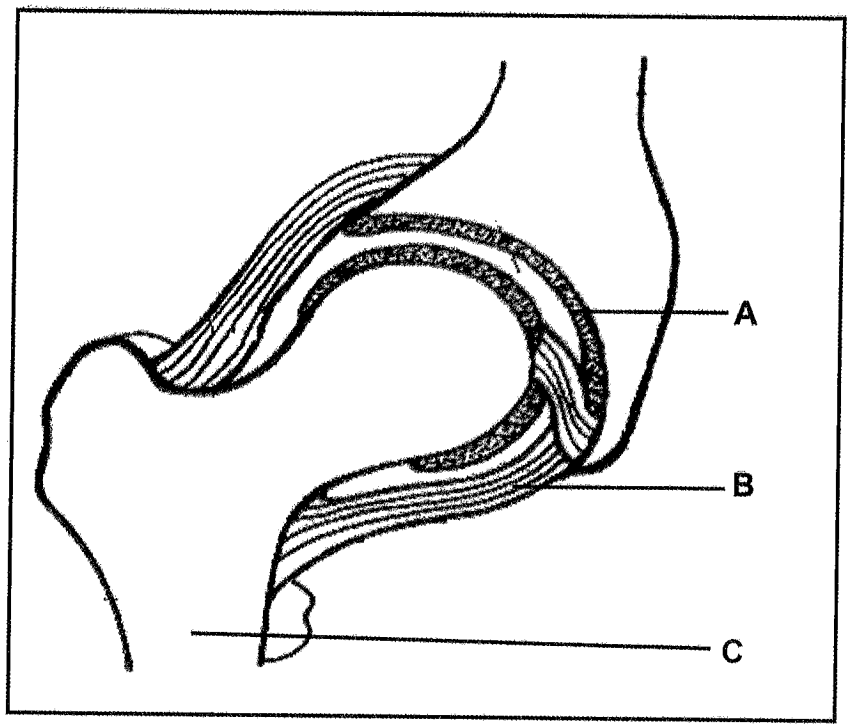
3.2.1 Draw a bar graph to represent the units of blood available in each of the the three different blood banks. (6)

3.2.2 State ONE reason why blood type 'O' is most important. (1)

3.2.3 How many blood units are needed in Blood Bank **C** to reach the maximum units required? Show ALL working. (2)

(9)

3.3 The diagram below represents a synovial joint.



3.3.1 Identify this type of synovial joint. (1)

3.3.2 Identify:

(a) Tissue **A** (1)

(b) Bone **C** (1)

3.3.3 What type of movement does this joint allow? (1)

3.3.4 Explain ONE function of the fluid found between the bones of this joint. (2)

3.3.5 Explain what will happen to a person if part **B** is damaged. (3)

3.3.6 Tendons which join muscle to bone consist of white fibrous tissue.

Explain the consequence if tendons were made of yellow elastic tissue instead. (2)

3.3.7 Various types of diseases are associated with the skeletal system. Identify the disease characterized by each of the following:

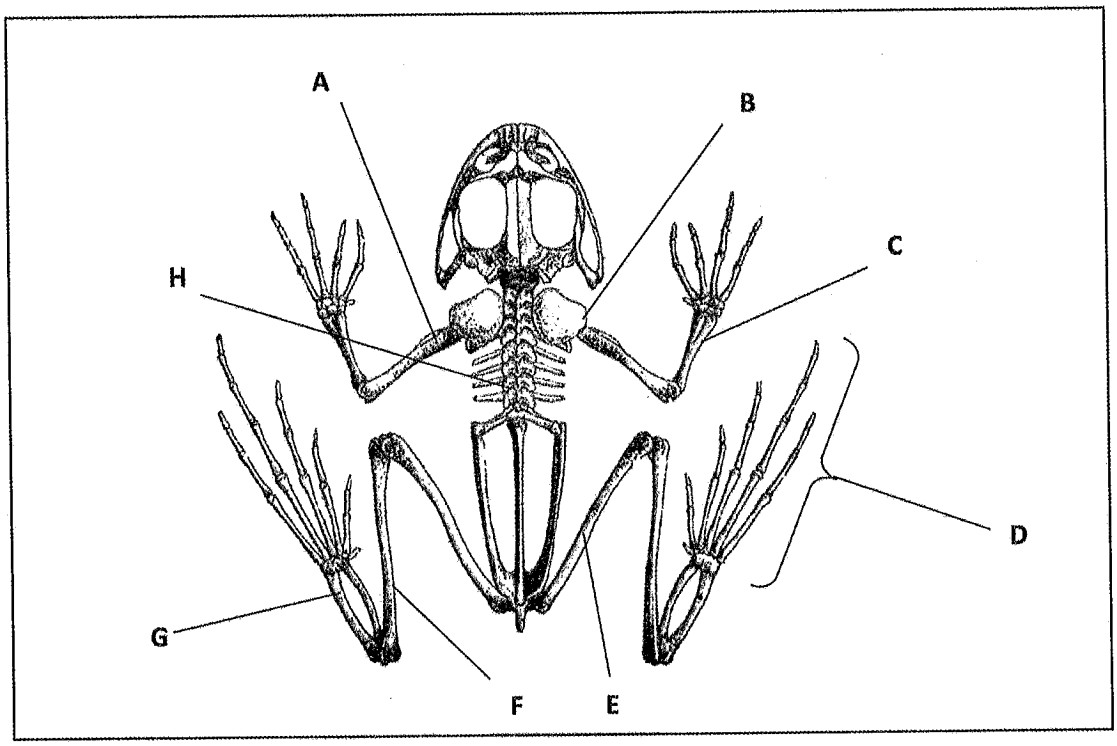
(a) Bowing of the legs

(b) Weak and brittle bones

(c) Inflammation and pain at the joints (3)

(14)

3.4 The diagram below the skeletal system of a frog.



3.4.1 Identify bones:

(a) **A** (1)

(b) **B** (1)

(c) **G** (1)

3.4.2 Write down the LETTER only of the part that represents the:

(a) Radius/ulna (1)

(b) Tibia/fibula (1)

(c) Vertebra (1)

3.4.3 In comparison to body size, the bones in part **D** are longer than the same bones in a human.

Provide a possible explanation for this. (2)

(8)

[40]

TOTAL SECTION B: 80

SECTION C

QUESTION 4

Water moves from the soil into the root hair and then to the xylem of the root from where it moves upwards to the leaves where it is used in the palisade cells of the leaf in photosynthesis.

Explain the ways in which the root hair, the xylem and the palisade cells are adapted for the above functions.

Content: (17)
Synthesis: (3)

(20)

NOTE: NO marks will be awarded for answers in the form of flowcharts, tables or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150

Grades 10 + 11

Education

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REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES

MARKING GUIDLELINE

COMMON TEST

JUNE 2017

NATIONAL SENIOR CERTIFICATE

GRADE 10

This marking guideline consists of 7 pages.

SECTION A

QUESTION 1

1.1

1.1.1 C✓✓
1.1.2 C✓✓
1.1.3 D✓✓
1.1.4 A✓✓
1.1.5 D✓✓
1.1.6 D✓✓
1.1.7 C✓✓

(7 x 2) **(14)**

1.2

1.2.1 Meristematic✓
1.2.2 Guttation✓
1.2.3 Potometer✓
1.2.4 Foramen magnum✓
1.2.5 Pericardium✓
1.2.6 Left ventricle✓
1.2.7 Annual ring✓
1.2.8 Lymph✓ vessel

(8 x 1) **(8)**

1.3

1.3.1 B✓✓
1.3.2 B✓✓
1.3.3 None✓✓
1.3.4 Both✓✓

(4 x 2) **(8)**

1.4

1.4.1 (a) Aorta✓ (1)
(b) Right ventricle✓ (1)
(c) Inferior vena cava✓ (1)

1.4.2 (a) C✓ Superior vena cava✓ (2)
(b) D✓ Tricuspid valve✓ (2)
(c) B✓ Septum✓ (2)
(9)

1.5

1.5.1 Centriole✓ (1)
1.5.2 1, 3 and 2✓✓ (2)
1.5.3 (a) D✓ spindle fibre✓ (2)
(b) C✓ chromatid✓ (2)
(c) B✓ centromere✓ (2)
1.5.4 3✓ (1)
1.5.5 Cancer ✓ (1)
(11)

TOTAL SECTION A 50

SECTION B

QUESTION 2

2.1

2.1.1 - Deforestation✓
- Drought✓ (2)
MARK FIRST TWO ONLY

2.1.2 (a) Has vitamin A✓ for good vision (1)
(b) Has vitamin C✓ for healthy gums (1)

2.1.3 - Results in eutrophication✓
- leading to algal bloom/excessive growth of algae✓
- Sunlight may not reach plants growing in deeper water✓
- Prevents photosynthesis✓ of other water plants
- Plants may die✓
- Decomposition/bacterial activity increases✓
- Reduce oxygen in water✓
- causing animals to die✓ Any (5)
(9)

2.2

- Substrate specific✓/Specific enzyme acts on a specific substrate
- It's shape allows it to act✓ or fit in a specific substrate

- Enzymes are sensitive to temperature changes✓
- At lower temperatures, enzyme is inactive✓
- At higher temperatures, enzyme becomes denatured✓ Any (2)

- Enzymes are sensitive to pH changes✓
- Enzymes denature when exposed outside its pH range✓
- Work within their optimum pH✓ Any (2)
3 x 2 **(6)**

2.3

2.3.1 A✓ (1)

2.3.2

Plant cell	Animal cell
Cell wall is outermost✓	Cell membrane is outermost✓
Regular shape✓	Irregular shape✓
Large vacuole✓	Vacuole small/absent✓

1 for table + any 2 x 2 (5)

MARK FIRST TWO ONLY

2.3.3 - Have nuclei✓
- Have cell membranes✓
- Have cytoplasm✓ Any (2)
MARK FIRST TWO ONLY

2.3.4 - Controls all activities of the cell✓
- Controls hereditary characteristics✓ (2)
MARK FIRST TWO ONLY

2.3.5

Caption✓
Any 3 correct labels
(outer membrane, inner membrane, cristae, matrix, ribosome) ✓✓✓ (4)
(14)

2.4

2.4.1 Osmosis✓ (1)

2.4.2 - Water molecules move from tap water into the egg cell✓
- as a result of a concentration gradient✓/since tap water has a higher concentration of water (2)

2.4.3 - To expose cell membrane✓/ remove the impermeable shell
- so that water can pass through✓ (2)

2.4.4 - Size of beaker✓
- Amount of sugar solution and tap water✓
- Size of egg✓
- Eggs from same animal✓
- Same method to remove shell✓ Any (2)
MARK FIRST TWO ONLY
(7)

2.5 - Phloem consists of sieve tubes✓
- with sieve plates✓
- and companion cells✓
- They transport food from the leaf✓ **(4)**

[40]

QUESTION 3

3.1

3.1.1 A – Ciliated epithelium✓
B – Cuboidal epithelium✓
D – Columnar epithelium✓ (3)

3.1.2 B – Secretes saliva✓
MARK FIRST ONE ONLY

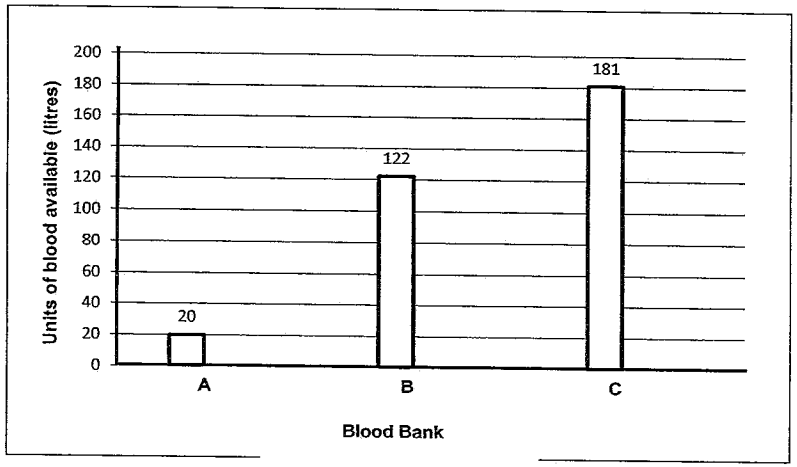
D – Produces mucus✓/Helps in movement of food (2)
MARK FIRST ONE ONLY

3.1.3 - Goblets cells secrete mucus to trap dust✓
- Cilia to drive dust out✓ (2)
MARK FIRST TWO ONLY

3.1.4 - Produce new cells✓
- to replace cells being lost/tissue being worn out✓ (2)
(9)

3.2

3.2.1



(6)

Correct type of graph	1
Caption	1
Correct labels for X-axis and Y-axis	1
Correct scale for X-axis and Y-axis	1
Plotting of bars	1: 1 to 2 bars plotted correctly 2: all 3 bars plotted correctly

3.2.2 Can be safely used by patients with any other blood types✓ (1)

3.2.3 510 – 181✓ = 329✓ (2)
(9)

3.3

3.3.1 Ball-and-socket joint✓ (1)

3.3.2 (a) Cartilage✓ (1)
(b) Femur✓ (1)

3.3.3 Movement in all directions✓/ Movement in 360^0 (1)

3.3.4 - Lubricates joints✓
- to reduce friction✓ (2)

3.3.5 - Bones at the joints will not be held together✓
- No control of joint movement✓
- Dislocation may occur✓ Any (3)

3.3.6 - Tendons will stretch✓
- without pulling the bone✓
- and hence movement will be affected✓ Any (2)

3.3.7 (a) Rickets✓
(b) Osteoporosis✓
(c) Arthritis✓ (3)
(14)

3.4

3.4.1 (a) Humerus✓ (1)
(b) Scapula✓ (1)
(c) Tarsals✓ (1)

3.4.2 (a) C✓ (1)
(b) F✓ (1)
(c) H✓ (1)

3.4.3 - Provides a large surface area✓
- for swimming✓/for propulsion during jumping (2)
(8)

[40]

SECTION C

QUESTION 4

Structural suitability of root hair

- Elongated✓
  to expose a large surface area for absorption✓
- Thin✓
  to grow between fine particles and maintain contact with water✓
- Large vacuole✓
  with low water concentration allowing osmosis✓
- Thin cell wall,✓/no cuticle
  to allow membrane to be in contact with water✓
- Thin cytoplasm✓
  to allow easier movement of water into the vacuole✓ Any (3 x 2) (6)

Structural suitability of xylem

- No cross walls✓
  to allow unimpeded flow of water✓/easy water movement
- Has bordered pits✓/unthickened portions
  for lateral transport✓
- Lignin✓
  for support✓/prevent collapse/ withstand pressure
- No living contents✓/hollow
  for unimpeded water movement✓/easy water movement
- Long tubes✓/cells joined end to end
  to transport water to greater heights✓ Any (4 x 2) (8)

Palisade Cells

- Long cells✓
  allowing deeper penetration of light✓
- Large number of chloroplasts✓
  To trap optimum light✓
- Thin walled cells✓
  For easy diffusion of water/carbon dioxide✓
- Located just below epidermis✓
  for easy access to light✓
- Arranged perpendicular to leaf surface✓
  so that more cells can be exposed to light✓ Any (3)

Content **(17)**
Synthesis **(3)**
[20]

ASSESSING THE PRESENTATION OF THE ESSAY

RELEVANCE	LOGICAL SEQUENCE	COMPREHENSIVE
All information provided is relevant to the topic.	Ideas arranged in a logical/ cause-effect sequence.	Answered all aspects required by the essay in sufficient detail.
All information is relevant to adaptations of the: - Root hair - Xylem - Palisade cells There is no irrelevant information	Structure appropriately linked to unction in adaptations of the: - Root hair - Xylem - Palisade cells	Obtained at least the following on adaptations for each of the following: - Root hair (4/6) - Xylem (4/8) - Palisade cells (2/3)
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150