



PROVINCE OF KWAZULU-NATAL

DEPARTMENT OF EDUCATION

STEP-AHEAD SUPPORT DOCUMENT

MARKING GUIDELINE

GRADE 10

LIFE SCIENCES

JANUARY 2021

PREFACE

This support documents serves to assist Life Sciences teachers and learners on how to deal with curriculum gaps and learning losses as a result of the impact of COVID 19 in 2020. It also captures the challenging topics in the Grade 10 work. The Marking Guideline document should be used in conjunction with the 2021 Recovery Annual Teaching Plan. It will cover the following:

Topic	Page
Inorganic and Organic Compounds	2-3
Cell and Mitosis	4-5
Animal and Plant Tissues	6-8
Organ- Leaf	8-9
Transpiration	9
Human Skeleton	10
Transport System- Heart	11-12
Biosphere and Biomes	13-18
Biodiversity and Classification	19-20
History of Life on Earth	21-24

TOPIC: Organic and Inorganic Compounds**Activity 1**

- 1
- | | | |
|-----|--|-------------|
| 1.1 | Iron✓ and Iodine✓
They both in smallest quantity✓ / percentage | (3) |
| 1.2 | Oxygen✓ and carbon✓
They both in largest quantity ✓ / percentage | (3) |
| 1.3 | Nitrogen✓ | (1) |
| 1.4 | 1.4.1 Iron✓ | (1) |
| | 1.4.2 Iodine✓ | (1) |
| | 1.4.3 Calcium✓ | (1) |
| 1.5 | 1.5.1 Carry oxygen in the blood✓ | (1) |
| | 1.5.2 To trap sunlight for photosynthesis✓ | (1) |
| 1.6 | Humans are large and multicellular✓, hence have more organic compounds which contain C,H, and O as compared to unicellular micro organism✓ | (2) |
| | | (14) |

Activity 2

- 2.
- | | | |
|-----|--|-------------|
| 2.1 | Lock and key theorem *✓ | |
| | <ul style="list-style-type: none"> Each enzyme has a particular shape✓ The substrate on which the enzyme works fit into the enzyme✓ An enzyme – substrate complex is formed✓ A chemical reaction occurs and the substrate is changed✓ The enzyme and the product are then separated✓ The enzyme is free to react with more of the substrate✓ | (7) |
| 2.2 | Z✓ | (1) |
| 2.3 | Structure represented by Z is unchanged in the reaction✓ | (2) |
| 2.4 | The enzyme acts as a catalyst✓ / facilitate/ control/ speed up the reaction✓ Breaking the substrate down✓ | (3) |
| 2.5 | <ul style="list-style-type: none"> Enzymes are specific to the substrate✓ Because they have a specific shape✓ | (2) |
| | | (15) |

Activity 3

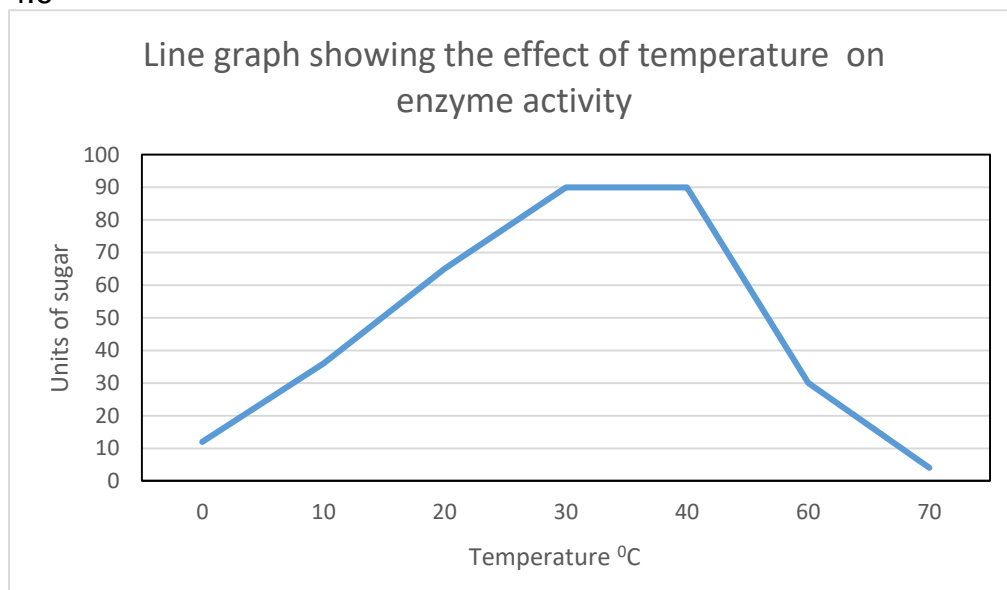
- 3.
- | | | |
|-----|--|-------------|
| 3.1 | 3.1.1 Starch test✓ | (1) |
| | 3.1.2 Glucose test✓ | (1) |
| | 3.1.3 Lipid test✓ | (1) |
| 3.2 | 3.2.1 Starch and Lipids✓ | (2) |
| | 3.2.2 Starch and glucose✓ | (2) |
| 3.3 | 3.3.1 Bright orange✓ | (1) |
| | 3.3.2 Blueish black or purplish black✓ | (1) |
| 3.4 | Q✓ | (1) |
| 3.5 | 3.5.1 Million reagents✓ | (1) |
| | 3.5.2 Brick red colour✓ | (1) |
| | | (12) |

Activity 4

4.

- 4.1 To investigate the effect✓ of temperature on enzyme activity✓ (2)
- 4.2 4.1.1 Temperature✓ (1)
- 4.2 4.1.2 Enzyme amylase activity✓ (1)
- 4.3 As the temperature increases✓ the enzyme increases /decrease/
remains the same✓ up to optimum temperature (2)
- 4.4 Repeat ✓ the investigation until results are the same
Use same sample✓ of enzyme in each temperature and workout
average (2)
- 4.5
- Type of enzyme (amylase) ✓
 - Duration✓
 - Amount of enzyme amylase✓
 - Amount of starch ✓
- (4)

4.6



- 4.7 As temperature increased, the enzyme activity increased✓ up to 40
°C and any further increase in temperature caused the enzyme
activity to decrease✓. (6)
- 4.8 Accept (first hypothesis)✓ – since the enzyme activity did increase as
the temperature increased up to 40 °C✓ (2)
- 4.9 Optimum temperature✓ – Is the temperature at which the enzyme
activity is the best✓ (2)
- 4.10 40✓°C✓ (2)
- (26)**

TOPIC: Cell and Mitosis

Activity 1

1.				
	1.1.	Prokaryotes ✓	(1)	
	1.2	Unicellular ✓	(1)	
	1.3	Eukaryote ✓	(1)	
	1.4	a cell ✓	(1)	
	1.5	Organelles ✓	(1)	
			(5)	

Activity 2

2.				
	2.1	The cytoplasm is found within the cell membrane and it surrounds all the organelles ✓	(1)	
	2.2	It can be very watery or like a colourless jelly ✓	(1)	
	2.3	<ul style="list-style-type: none"> ▪ Water ✓ ▪ Mineral salts ✓ ▪ Sugars ✓ ▪ Amino acids ✓ ▪ Fatty acids ✓ ▪ Glycerol ✓ ▪ Enzymes ✓ ▪ Nucleic acids ✓ ▪ Vitamins ✓ 	(4)	
		(Any 4)	(6)	

Activity 3

3.				
	3.1	Mitochondria ✓	(1)	
	3.2	A- outer membrane B- cristae ✓	(1)	
	3.3	Cellular respiration ✓	(1)	
	3.4	$64/25000 = 0.00256 \text{ mm}$ ✓	(3)	
			(6)	

Activity 4

4.				
	4.1	Turgid ✓	(1)	
	4.2	Contractile vacuole ✓	(1)	
	4.3	Endosmosis ✓	(1)	
	4.4	Osmoregulation ✓	(1)	
	4.5	Flaccid ✓	(1)	
	4.6	Exosmosis ✓	(1)	
			(6)	

Activity 5

5.				
	5.1	1 Nucleolus (starting to disappear) ✓	(1)	
		2 nuclear membrane (starting to disappear) ✓	(1)	
		3 nucleoplasm✓	(1)	
		4 centriole✓	(1)	
		5 spindle fibres✓	(1)	
		6 centromere✓	(1)	
		7 chromatid✓	(1)	
		8 chromosome✓	(1)	
		9 cell membrane✓	(1)	
	5.2	An animal cell ✓; centrioles are present or there is no cell wall✓	(2)	
			(11)	

Activity 6

6.				
	6.1	A- Centromere✓ B-chromatid✓ D-nucleolus✓ E- centriole✓	(4)	
	6.2	4✓ -1✓- 5✓- 2✓- 3✓	(5)	
	6.3	4✓	(1)	
			(10)	

TOPIC: Animal and Plant Tissues

1.				
	1.1	cell✓	(1)	
	1.2	Tissue✓	(1)	
	1.3	Meristematic✓	(1)	
	1.4	Permanent✓	(1)	

Activity 2

2.								
	2.1	2.1.1 Columnar✓ 2.1.2 Ciliated columnar✓		(1) (1)				
	2.2	Both contains many cells with the same structure✓ -performing the same function✓		(2)				
	2.3	<table><tr><td>A Simple Columnar</td><td>B Ciliated columnar</td></tr><tr><td>No cilia✓</td><td>Have cilia✓</td></tr></table> <p>✓ - for tabulating</p>		A Simple Columnar	B Ciliated columnar	No cilia✓	Have cilia✓	(3)
A Simple Columnar	B Ciliated columnar							
No cilia✓	Have cilia✓							
	2.4	<ul style="list-style-type: none">• Produces mucus✓ to trap dust✓• has cilia✓ to move the trapped dust out of the body✓ <p>Mark first ONE only (Any 1 x 2)</p>		(2)				
				(9)				

Activity 3

3.				
	3.1	3.1.1 Ligament✓ 3.1.2 Adipose tissue✓ 3.1.3 Cartilage✓ 3.1.4 Blood✓	(1) (1) (1) (1)	
	3.2.	3.2.1 It contains high calcium content✓ which strengthen✓ the Bones. 3.2.2 It contains non-elastic fibres✓ which prevent stretching of ligaments✓ 3.3.3 Have angular arrangement of myofibres✓ gain leverage✓ when they contract	(2) (2) (2)	
			(10)	

Activity 4

4.				
	4.1	C✓ – striated muscles✓	(2)	
	4.2	4.2.1 C✓ 4.2.2 F✓	(1) (1)	
	4.3	C – It is formed by the striated muscles✓ E – It is formed by smooth muscles✓	(2)	
	4.4	The body will not sense the stimulus✓ from the environment and chemical changes✓ within the body	(2)	
			(8)	

Activity 5

5.										
	5.1	(a) Meristematic✓ (b) Lateral✓ (c) Phloem✓ (d) Chlorenchyma✓ (c) to (f) can be in any order (e) Sclerenchyma✓ (f) Parenchyma✓	(6)							
	5.2	✓for tabulating <table><tr><th>Apical meristematic</th><th>Lateral meristematic</th></tr><tr><td>• Located at the tip of the plant✓</td><td>• Located at the lateral part (lower branches) of the plant✓</td></tr><tr><td>• Leads to the upward growth of the plant✓</td><td>• Leads to the development of lower branches✓</td></tr></table>	Apical meristematic	Lateral meristematic	• Located at the tip of the plant✓	• Located at the lateral part (lower branches) of the plant✓	• Leads to the upward growth of the plant✓	• Leads to the development of lower branches✓	(5)	
Apical meristematic	Lateral meristematic									
• Located at the tip of the plant✓	• Located at the lateral part (lower branches) of the plant✓									
• Leads to the upward growth of the plant✓	• Leads to the development of lower branches✓									
			(11)							

Activity 6

6.

6.1

Tissue	Name	Location	Function
A	6.1.1 Collenchyma✓	6.1.2 Vascular bundles of leaves✓	6.1.3 Strengthens and supports the aerial parts of plants✓
B	6.1.4 Parenchyma✓	6.1.5 Roots, stems and leaves✓	6.1.6 Packaging tissue, stores starch and allows the movement of water✓
C	6.1.7 Xylem✓	6.1.8 Vascular bundles of roots, stems and leaves✓	6.1.9 Transport water through a plant and, provides support and strength to the plant✓

(9)

Activity 7

7.				
	7.1	B✓ Xylem vessels✓ C✓ Sclerenchyma✓	(2) (2)	
	7.2	- Cells are elongated and non-living✓/joined end to end forming long, continuous tubes✓ - Contains thickened✓/lignified walls to withstand pressure of water✓ - Perforated with pits✓ for lateral water transport✓ (Any 2 x 2)	(4)	
			(8)	

TOPIC: Organ- Leaf

Activity 1

1.

- 1.1 To anchor the plant firmly to the soil ✓ (2)
Absorb water and mineral salts from the soil
- 1.2 They store food and water✓
They transport food from the leaves to the roots✓
They hold the flowers in a favourable position for pollination✓ (Any 2) (2)
- 1.3 Xylem✓ (2)
Phloem✓ (2)
(6)

Activity 2

- 2.
- 2.1 Root✓ (1)
 - 2.2 2- Parenchyma cortex✓
5- Tonoplast✓
8- Cell wall✓ (3)
 - 2.3 3- direct water into the xylem of the stem✓
4- transport water and minerals from the roots to the stem and to the leaves. ✓
-It also gives strength to the plant✓ (2)
 - 2.4 - cross section are perforated or completely absent✓
- xylem of roots thus forms continuous tubes with xylem of stems and leaves✓
- xylem vessels have no living contents allowing water to flow freely inside✓
- walls of vessels tracheids not completely thickened✓
- unthickened portions and pits allow water to move across the roots and stem✓ (4)
- (10)**

Activity 3

- 3.
- 3.1 A-epidermis✓ (1)
B-sclerenchyma cap✓ (1)
E-xylem✓ (1)
 - 3.2 In stems the arrangement of vascular bundles form a ring while in roots it is in a star shape✓✓ (2)
 - 3.3 Function of B-support and strengthens the plant✓
Function of C- Packaging tissue✓
-Stores food✓ (2)
- (7)**

TOPIC: Transpiration

Activity 4

- 4.
- 3.1 Potometer✓ (1)
 - 3.2 (a) Temperature✓ (1)
(b) Rate of transpiration✓ (1)
- To prevent air from entering✓
- and blocking the xylem vessels✓ (2)
- To measure the rate of absorption✓
- which indicates the rate of transpiration (2)
To move the air bubble back✓ (1)
They did the investigation three times✓/repeated the investigation (1)
- Same apparatus✓/potometer
- Same light intensity✓/wind/humidity
- Same person✓ to conduct investigation Any (2)
- (11)**_

TOPIC: Human Skeleton

Activity 1

1.

1.1

AXIAL SKELETON	APPENDICULAR SKELETON
List must include bones from : facial bones, cranium, foramen magnum, palate and Jaws	List must include bones from : pectoral girdle, upper limbs, pelvic girdle and lower limbs

1.2

B - clavicle✓

C -scapula ✓

F - humerus✓

H - radius✓

J - ulna✓

L - phalanges✓

1.3

I - pelvis✓

M - femur✓

N - patella✓(knee cap)

O - tibia✓

P - fibula✓

Q - metatarsals✓

R - phalanges✓

(6)

(6)

(7)

(19)

Activity 2

2.

2.1

- Cranium provide protection to the brain✓

- Foramen magnum bring about bipedalism✓ (walking on two limbs)

- Facial bones and jaws give shape✓

- Pelvic girdle provides support and lower limb for movement✓

- Pectoral girdle and upper limb bring about support and functioning of the skeleton✓

-bones protect internal organs✓

- contraction and relaxation of the muscles brings about

movement✓of mammals, since muscles are attached to bones✓.

-bones in the ear enable (ossicles) hearing✓

(10)

TOPIC: Transport System

Activity 1

1.
 - 1.1 Double circulation: it's the circulation of blood through two pathways or circuit ✓✓ (2)
 - 1.2 Pulmonary circulation ✓ and systemic circulation ✓ (2)
 - 1.3
 - A = Superior vena cava ✓
 - B = inferior vena cava ✓
 - C = Hepatic vein ✓
 - D = Hepatic portal vein ✓
 - E = renal vein ✓
 - F = pulmonary vein ✓
 - G = Pulmonary artery ✓
 - H = Aorta ✓
 - I = Hepatic artery ✓
 - J = Mesenteric artery ✓
 - K = Renal artery ✓
 - 1.4 **Pulmonary circulation:** deoxygenated blood leaves the right ventricle ✓ and enters the pulmonary artery ✓ through the semilunar valve ✓ and the lungs ✓. The oxygenated blood ✓ leaves the lungs and enters the left atrium through pulmonary vein ✓ (11)
 - 1.5 **Systemic circulation:** oxygenated blood leaves the left ventricle ✓ and enters the aorta ✓. (6)
 - The aorta then branches, and send oxygenated blood to the liver, intestine, kidney, legs and abdomen ✓.
 - Digested food is absorbed in the intestines.
 - Oxygenated blood with nutrients enters the hepatic portal vein then enters the liver ✓.
 - The blood leaves the liver via the hepatic vein and enters to the inferior vena cava ✓.
 - The aorta sends the oxygenated blood to the abdomen and legs ✓.
 - Deoxygenated blood leaves the legs and abdomen and enter to the inferior vena cava ✓.
 - Deoxygenated blood from arms and head is collected by the superior vena cava ✓.
 - Deoxygenated blood from the superior and inferior vena cava is received by the right atrium ✓

(10)
(31)

Activity 2

2.
 - 2.1
 - A
 - 1 General diastole ✓ , X = 0.4s ✓
 2. Semi lunar valve ✓
 3. Bicuspid valve ✓ and tricuspid valve ✓
 - B
 - Atrial systole ✓ , Y = 0.15s ✓
 4. Atria ✓
 5. bicuspid ✓ and tricuspid valve ✓
 6. Ventricles ✓
 - C
 - Ventricular systole ✓ , Z = 0.3s ✓
 7. ventricles ✓
 8. bicuspid and tricuspid valve ✓
 9. semilunar valve ✓
 10. pulmonary artery/ Aorta ✓
 11. Aorta or pulmonary artery ✓

(7)
(17)

Activity 3

- 3.
- 3.1 G – Right atrium✓
D – Left ventricle✓ (2)
 - 3.2 (a) A✓ (1)
(b) B✓ (1)
 - 3.3 Wall E is thicker than F✓
- because the left ventricle has to pump blood to all body regions✓
- while the right ventricle only has to pump blood to the nearby lungs.✓ (2)
 - 3.4 Cardiac muscles will not receive oxygen and nutrients✓
- Muscle cells may die✓/ stop contraction (3)
- May lead to heart attack✓ (9)

Activity 4

- 4.
- 4.1 (a) Vein✓ (1)
(b) Capillary✓ (1)
 - 4.2 - To withstand the high pressure✓ (2)
- created by the pumping of the heart✓
 - 4.3 - Single layer of cells✓ (2)
to allow oxygen and nutrients to diffuse into the tissues✓/CO₂ and
excretory waste to diffuse from the tissues
 - 4.4

Pulmonary artery	Pulmonary vein
Low concentration of oxygen✓	High concentration of oxygen✓
High concentration of carbon dioxide✓	Low concentration of carbon dioxide✓
High concentration of glucose	Low concentration of glucose✓
Low concentration of metabolic waste✓	High concentration of metabolic waste✓

Table (1) and (Any 2 x 2)

(5)
(11)

BIOSPHERE AND BIOMES

Activity 1

1.1		
1.1.1	Gauteng,✓Mpumalanga,✓Kwa Zulu-Natal,✓Eastern Cape✓, Free-State✓ (Any 1)	(1)
1.1.2	The summers are hot with high rainfall.✓ The winters are cold with frost✓ (Any 1)	(1)
1.1.3	The soil has a high humus content.✓ Areas with high rainfall the soil is easily✓ leached and becomes acidic✓ (Any 1)	(1)
1.1.4	This biome is dominated by grasses.✓	(1)
1.1.5	Western Cape: in the George-Knysna-Mossel Bay area✓ KwaZulu Natal, Limpopo, Eastern Cape,Mpumalanga✓ (Any 1)	(1)
1.1.6	Dominated by large shrubs and trees	(1)
1.1.7	Rainfall seasons vary, in some forests it rains only in winter, while in other forests it rains in summer only and others it rains all year round.✓	(1)
1.1.8	This biome has a thick layer of soil and it may be shallow in other parts.✓ The soil here is very rich, because it is mixed with the falling leaves, fruit and bird and mammal dropping ✓ (Any 1).	(1)
1.1.9	Western cape	(1)
1.1.10	Mainly dwarf shrubs and it has endemic species✓	(1)
1.1.11	The soil is very varied of different pH and quality✓ The soil is sandy and alkaline along the coast✓ The soil is sandy but acidic inland✓ (Any 1)	(1)
1.1.12	dwarf shrubs with fine leaves✓	(1)
1.1.13	A type of vegetation with a well-developed grassy layers and an upper layer of woody plants✓	(1)
1.1.14	summers are hot and wet winters are cool	(1)
1.1.15	soil is mostly sandy, ✓ It has a moderate amount of nutrients✓ (Any 1)	(1)
1.1.16	This biome is dominated by grasses, large shrubs and trees.✓ This type of vegetation is suitable for grazing animals✓ (Any 1)	(1)
1.1.17	Northern Cape✓	(1)
1.1.18	It is a semi -desert area.✓	(1)
1.1.19	This is a semi desert area.✓ It receives very little rainfall✓ Summers are very hot and winters are very cold.✓ (Any 1)	(1)
1.1.20	Vegetation is dominated by grasses and dwarf shrubs.	(1)
1.1.21	Kwa-Zulu Natal, Eastern cape✓ (Any 1)	(1)
1.1.22	It occurs in river valleys✓	(1)
1.1.23	High rainfall✓	(1)
1.1.24	Thick layer of soil mixed with leaves and animal droppings✓	(1)
		(24)

1.2

- 1.2.1 The Biosphere is that portion of the earth where organisms exist therefore it includes all parts of the earth✓ (2)
- 1.2.2 A Biome is characterised by a specific climate which influences its plant and animal life therefore it refers to distinct locations on earth

	CLIMATE	FLORA (PLANTS)
FORESTS	Winter rainfall region. Cool moist environment, good rainfall. High transpiration rate. Microclimates exist. ✓	Stratification of various trees including, yellow woods, stinkwood. Various fern species at ground level. ✓
GRASSLANDS	Summer rainfall region. Hail storms and winter frost. Rainfall higher than Savanna and lower transpiration rate leads to higher moisture content. ✓	Variety of grass species. Scarcity of tree species. Frost restricts tree growth. ✓
SAVANNA (Bushveld)	Drier part – Kalahari. Moist eastern area. Summer rainfall region. ✓	Thorn trees and Boabab. ✓
FYNBOS	Winter rainfall, summers are dry with strong winds and winters are cold with lots of rain and snow. ✓	Ericoids (small flowers), Restoids (reed species) and Proteoids (protea species). ✓
SUCCULENT KAROO	Winter rainfall but scarce. Hot dry climate. ✓	Acacia trees, Namaqualand spring flowers. Small succulent trees, Nama Karoo plants. ✓
NAMA KAROO	Arid	Hardy bushes and grasses.
THICKET	Low rainfall, previously forested areas	Low impenetrable forest of evergreen, succulent and spiny trees

(10)
(12)

Activity 2

- 2.1 The study of the interaction✓ between organisms themselves ✓ and the interaction between the organism and the environment✓ (3)
- 2.2
- Polluting the environment✓
 - Deforestation✓
 - Burning of fossil fuels✓
 - Overconsumption of natural resources✓
 - Exploitation of natural resources ✓
- Any 3 (3)
- (6)

Activity 3

3.1	3.1.1	Tadpoles✓, frog✓, fish✓, snail✓, flies✓, water weeds✓	(6)	
	3.1.2	light✓, water✓	(2)	
			(8)	

3.2	3.2.1	Slope✓-Inclination/Steepness of the mountain✓ Altitude✓ - height of the mountain/position above sea level✓ Aspect✓ – position of an area in relation to the sun.✓	(6)	
	3.2.2	A✓-Sunrays falling on North facing slope ✓	(2)	
		B✓-Sunrays not falling directly on it✓	(2)	
	3.2.3	B✓	(1)	
	3.2.4	B✓	(1)	
			(12)	

3.3	3.3.1	Slope✓, altitude✓	(2)	
	3.3.2	Temperature✓, light✓, water✓ + Any	(2)	
	3.3.3	Exposed to a lot of light✓/receive less rainfall✓	(2)	
	3.3.4	Supports✓ forests of bamboo and yellowwoods✓	(2)	
	3.3.5	To withstand✓ the extremely cold temperatures✓	(2)	
			(10)	

3.4	3.4.1	Radiation✓ /wind velocity	(1)	
	3.4.2	Rapid surface runoff✓/soil erosion/soil degradation	(1)	
	3.4.3	South facing side receives less solar radiation✓/sun Will therefore be cooler✓ loses less water/there will be less Transpiration✓/evaporation compared to North-facing side (Any 2)	(2)	
			(4)	

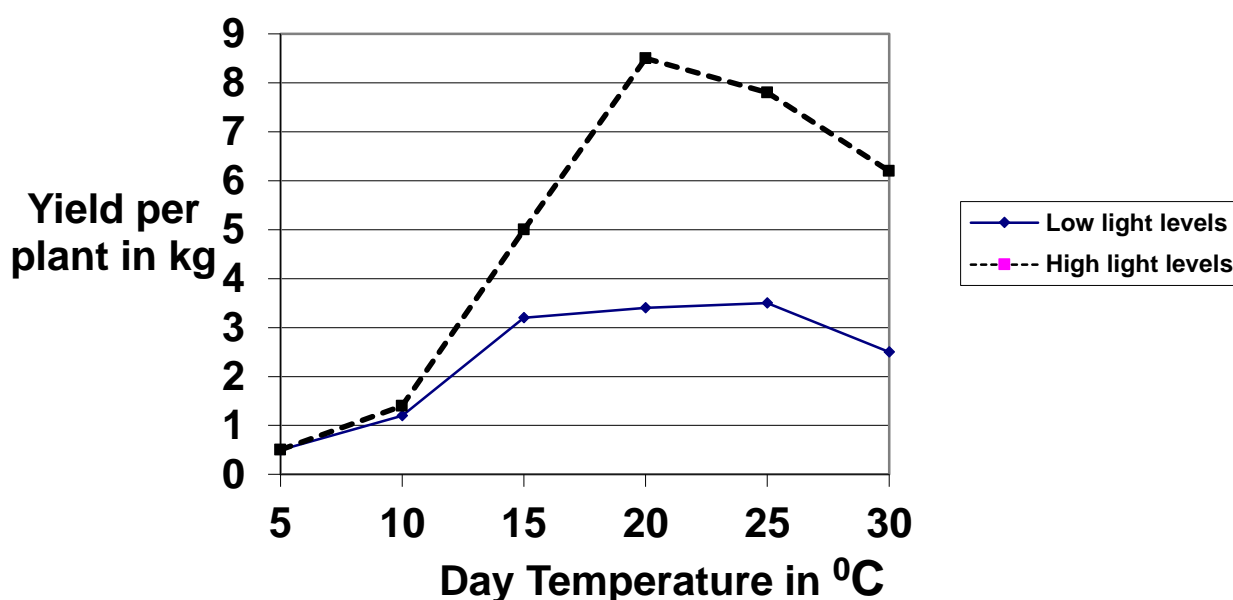
Activity 4

4.1	4.1.1	a) Water holding capacity✓ b) Soil samples✓	(1) (1)	
	4.1.2	25 ml✓	(1)	
	4.1.3	Coarse sand	(1)	
	4.1.4	Repeat the investigation✓ Have more than one set of each soli sample✓ / use average reading	(1) (1)	
	4.1.5	No air✓ No oxygen available for respiration✓ Leading to rotting✓/ death of plant roots	(3)	
	4.1.6	Equal amount of water in each soil type✓ Same amount of soil type✓ Same apparatus✓ (Any 2)	(2)	
			(11)	

4.2	4.2.1	Decide on the sample size✓ Decide on how to record results✓ Decide on apparatus to be used✓ Decide on duration of the investigation✓ Decide on method to be used✓ Decide on the age of the plants to be used✓ (Any 2)	(2)	
	4.2.2	Plant type✓	(1)	
	4.2.3	Plant type C✓	(1)	
	4.2.4	Same amount of water✓ Same temperature✓ Same duration of investigation✓ Same species of plants✓ Same amount of light✓ (Any 1)	(1)	
			(5)	

Activity 5

5.1 Graph showing the effect of different temperatures and levels of light intensities on the growth of tomato



(12)

5.1.2	The higher the amount of light in the environment, the higher the tomato yield.✓	(2)	
5.1.3	a. 3 kg✓✓ b. 7 kg✓✓	(2) (2)	
5.1.4	Low temperature✓ slows down the yield of tomato✓	(2)	
5.1.5	5 ✓kg✓	(2)	
5.1.6	20°C✓ -25°C✓	(2)	
5.1.7	Although the temperature was increasing✓✓ factors such as light intensity might have been a limiting factor✓	(2)	
5.1.8	Water✓✓ soil✓	(2)	
		(28)	

5.2	5.2.1	A✓ – nitrogen fixation✓ B✓ – lightning✓ / free-living nitrogen fixing bacteria	(4)	
	5.2.2	fungi✓ and bacteria✓	(2)	
	5.2.3	by denitrification bacteria	(1)	
	5.2.4	urea✓ and uric acid✓	(2)	
			(9)	

Activity 6

6.1	6.1.1	A- evaporation✓ B-transpiration✓ C- rain fall✓ D-other forms of precipitation✓ □	(4)	
	6.1.2	- rain✓ / mist✓ / dew✓ / frost✓ / snow✓ etc. Any	(2)	
			(6)	

6.2	6.2.1	Fossil fuel combustion✓, Animal respiration✓, plant respiration✓, Animal decomposition✓	(4)	
	6.2.2	Photosynthesis✓	(1)	
			(5)	

Activity 7

7.	7.1	(a) grass✓	(1)	
		(b) rabbit✓	(1)	
		(c) fox✓	(1)	
	7.2	$10/100 \times 100$ ✓ or $1 \times 100/10$ ✓ =10%✓ =10%✓	(3)	
	7.3	– no eating of the entire organism✓ at each trophic level -energy lost in faeces and urine✓ -energy lost as heat during respiration✓ (Any 2)	(2)	
	7.4	grass → rabbit → fox✓✓	(2)	
	7.5	sunlight✓	(1)	
			(11)	

Activity 8

8.1	8.1.1	- there will be an increase in the pondweed✓ resulting in blocking of sun's rays to other plants for photosynthesis✓ - hence, less O ₂ for other consumers in the pond✓ - there will be a decrease in eel population and bird population✓	(4)	
	8.1.2	- the eel population will increase✓ - hence more eel will feed on tadpole✓ - resulting in a decrease in the tadpole population✓ - therefore, pondweed will increase✓	(4)	
			(8)	

8.2	8.2.1	Food Web✓	1	
	8.2.2	Energy flow✓ / shows which organism feeds on another	1	
	8.2.3	a) Lion✓ / Hyena/hawk b) Rabbit✓?Impala/Buffalo	1 1	
	8.2.4	It feeds on Rabbits✓ and Buffalo✓	2	
	8.2.5	Hawk✓	1	
	8.2.6	Feeds only on Rabbits ✓/ No other food source on this food web	1	
	8.2.7	Number of hyenas will increase✓ due to more food available to them✓ less competition for food from Lions.	2	
			(10)	

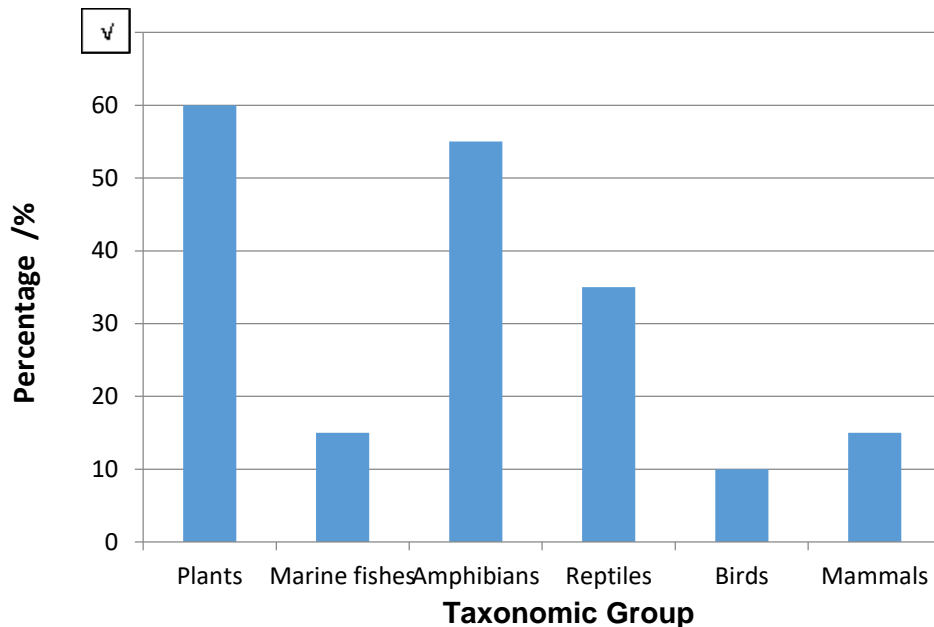
Activity 1

1.1 Plant and animal species that occur naturally in one area or region only.✓

(1)

1.2

Bar Graph to illustrate the Percentage of Endemic Species in different Taxonomic Groups.



RUBRIC for MARKING the BAR GRAPH		Marks allocated	
1.	Correct type of graph (bars and not histogram or line)	1	
2.	Correct title (complete with 2 variables of the two axes)	1	
3.	X-axis correct, even and correct labelling	1	
4.	Y-axis correct, even intervals and correct labelling	1	
5.	Plotting of bars:	Three to five bars correct: 1 marks	All six bars correct 2 marks:

(6)

(7)

Activity 2

2.1	2.1.1	- Monera✓ - Protista✓ - Fungi✓	Any	(2)
	2.1.2	140 + 110 + 90 + 82 = 422✓ $\frac{82}{422} \times 100\%$ ✓ 19.4%✓		(3)
				(5)
2.2	2.2.1	Prokaryote✓		(1)
	2.2.2	Eukaryote✓		(1)
	2.2.3	Eukaryote✓		(1)
	2.2.4	Eukaryote✓		(1)
	2.2.5	Unicellular✓		(1)
	2.2.6	Multicellular✓		(1)
	2.2.7	Multicellular✓		(1)
	2.2.8	Bacteria✓		(1)
	2.2.9	Fungi/Mushroom✓		(1)
	2.2.10	Animal/Dog✓		(1)
				(10)

Activity 3

3.	3.1	<u>Felis</u> ✓ <u>domesticus</u> ✓		(2)
	3.2	- they have hair on their bodies✓ - they are warm blooded✓ - females feed their young with milk from mammary glands✓ - they have differentiated teeth✓	(Any 2)	(2)
	3.3	The lion and the cat belong to the same family✓		(1)
				(5)

HISTORY OF LIFE ON EARTH

Activity 1

1.
 - 1.1 The division of the earth into smaller units based on the major geology/rock formations that happened in that time✓✓. (2)
 - 1.2 It makes it easier to understand the vast time intervals that have occurred in the past✓✓. (2)
 - 1.3 Million years ago✓ (1)
 - 1.4 3800✓mya✓ (2)
 - 1.5 500✓ mya✓ (2)
 - 1.6
 - Plant photosynthesise so they add oxygen to the atmosphere ✓
 - Which is necessary for cellular respiration of all organisms✓
 - The atmospheric oxygen also created the ozone layer ✓
 - Which protects terrestrial organisms from radiation✓
 - So plants had to produce sufficient oxygen plus the ozone layer✓
 - Before other organisms could move to land✓ Any 4 (4)
 - 1.7 Devonian✓ (1)
 - 1.8 tertiary✓ and Quaternary ✓ (2)
 - 1.9 250 mya✓ - 65 mya✓ = 185mya ✓ (3)
- (19)**

Activity 2

- 2
 - 2.1 Extinction✓ (1)
 - 2.2 evolution ✓ (1)
 - 2.3 biogeography ✓ (1)
 - 2.4 palaeontology✓ (1)
 - 2.5 History✓ (1)
 - 2.6 plate tectonics✓ (1)
 - 2.7 Fossils✓ (1)
 - 2.8 Ice age✓ (1)
 - 2.9 Geological time scale✓ (1)
 - 2.10 Continental drift ✓ (1)
- (10)**

Activity 3

3.				
	3.1	<p>(a) Increase in levels of oxygen.</p> <ul style="list-style-type: none"> - 3,5 years ago there was no Oxygen✓ - fossil records show that the first living organisms, bacteria, were anaerobic which meant they did not need oxygen to survive. - Cyanobacteria (blue-green bacteria) appeared at the same time as the anaerobic bacteria. They removed carbon dioxide from the air and released oxygen. These were the first organisms to photosynthesise.✓ - the levels of oxygen in the atmosphere increased. ✓ - new forms of life were able to evolve. ✓ - as the percentage of oxygen increased in the atmosphere, organisms were able to grow in volume and size. ✓ <p>(Any 2)</p> <p>(b) Climate change- e.g. Ice age</p> <p>Periods of extreme cold were followed by warm and sometimes very dry periods. (there have been four ice ages)</p> <ul style="list-style-type: none"> - an ice age occurs when a thick layer of ice covers much of the Earth.✓ - during warm periods, when the ice melts, the level of the ocean will rise flooding low lying areas of land.✓ <p>(This change explain why fossils of marine organisms are now found on high-lying land.) e.g:</p> <ul style="list-style-type: none"> -bivalves and ammonites found on the Makhathini flats in northern KZN. ✓ - trilobites in the Karoo✓ <p>(Any 2)</p> <p>(c) Geological events</p> <ul style="list-style-type: none"> - the Earth is divided into tectonic plates, which move very slowly. ✓ - the movement of tectonic plates causes continental drift. ✓ 	(2)	(2)
				(2)
				(6)

Activity 4

4.				
	4.1	Permian✓ period	(1)	
	4.2	Million years ago	(1)	
	4.3	The number of reptile species decreased✓ The number of mammal species increased✓	(2)	
	4.4	Reptiles✓; birds✓ and mammals✓. Any 2	(2)	
	4.5	Birds are more closely related to reptiles✓, they share an immediate✓/ more recent common ancestor✓	(3)	
			(9)	

Activity 5

5.				
	5.1	Fossil✓evidence/Paleontological studies	(1)	
	5.2	65✓million years ago✓/mya	(2)	
	5.3	- A comet, an asteroid or part of a star✓from outer space struck the Earth/Gulf of Mexico, which resulted in - large clouds of dust blocking out the sun✓ - which stopped photosynthesis✓ - and also caused global cooling✓/dinosaurs might have been Whectotherms and not able to live in the cold - Also led to world-wide fires✓ - and monstrous tsunamis✓	(6)	
			(9)	

Activity 6

6.				
		- volcanic eruption✓ - impacts of large asteroids or comets✓ - glaciations and ice age✓ - extra-terrestrial radiation✓	(4)	

Activity 7

7				
		The extinction of large numbers of species✓over a relatively short period of time✓as a result of catastrophic event/ massive change in environmental conditions✓	(3)	

Activity 8

8.				
	8.1	Radiometric dating✓ and relative dating✓	(2)	
	8.2	(a) $X = 28\,650$ ✓mya✓ (b) $Z = 3,125$ ✓ %✓	(2) (2)	
	8.3	After 60 million years✓ there is no more carbon-14 remaining✓ in the fossil.	(2)	
	8.4	Not all organisms become fossilised.✓ Some fossils might not have been found.✓	(2)	
			(10)	

Activity 9

9.				
	9.1	<i>Archaeopteryx</i> ✓ (and✓ for underlining to show it is a scientific name)	(2)	
	9.2	<p>A skull with teeth and jaws✓more similar to dinosaurs✓ Had three claws on the end of the bones of each wings✓more similar to dinosaurs✓ (Any 1 2)</p> <p>OR</p> <p>Had feathers✓more similar to birds✓ Had three forward-pointing toes and one backward pointing toe✓more similar to birds✓ (Any 1 x 2)</p>	(2)	
	9.3	<p>The organism had died next to the flood plain✓ Sediments✓piled up over the organism reducing oxygen flow✓Soft parts decayed✓ Over time minerals seeped into the bones✓replacing the organic part✓ (Any 4)</p>	(4)	
			(8)	

Activity 10

10.				
		<ul style="list-style-type: none"> Habitat destruction✓ - habitat are destroyed to build more homes✓/ roads/ factories/ cities to grow crops/ and to graze animals for the expanding of human population. Invasive alien species✓ - these plants crowd out and take over the habitats of the indigenous plants✓. Population explosion of humans✓ - many people mean more demand on the natural environment✓. Pollution✓ - many people release more greenhouse gases into the atmosphere increasing global warming✓ / more waste is produced/ more factories which may release all sorts of pollutants are required to make more material goods/ more crops are needed to make more food. / the poisons that are used in farming to control pests (pesticides) and weeds (herbicides) pollute soil and water Over exploitation of natural resources✓ - indigenous species become extinct✓. 		(10)