



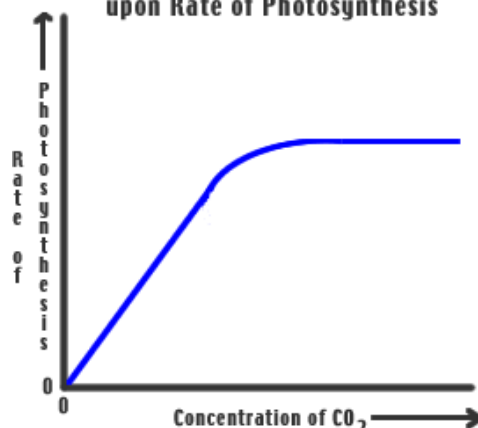
Annual Examinations for Secondary Schools 2019

YEAR 10

BIOLOGY

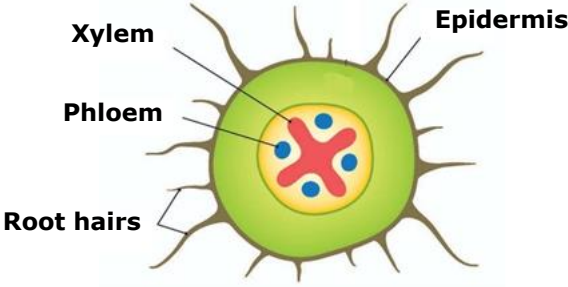
MARKING SCHEME

Section A

1.	a.	Autotrophic	[1]
	b.	i. Chloroplast	[1]
		ii. <p style="text-align: center;">sunlight</p> $\text{Carbon dioxide} + \text{Water} \Rightarrow \text{Glucose} + \text{Oxygen}$ Comments: Award marks only if equation is completely correct.	[2]
	c.	i. <p style="text-align: center;">The Effect of Carbon Dioxide Concentration upon Rate of Photosynthesis</p> 	[2]
		ii. Initially the rate of photosynthesis increases with increasing carbon dioxide concentration . At a certain point, however, the rate of photosynthesis levels off and does not increase anymore even if carbon dioxide concentration increases ... the enzymes all being utilised.	[1] [1]
		iii. Light intensity Comments: Do not accept temperature.	[1]
			TOTAL: 9 marks

2.	a.	Glycogen	[1]
	b.	Nitrogen, Sulphur	[1] [1]

	c.	Starch	[1]
	d.	Excretion	[1]
	e.	Monosaccharides, Hydrolysis OR Catabolic	[1] [1]
	f.	Anaerobic	[1]
TOTAL: 8 marks			

3.	a.	i. Transport of water and dissolved substances taken up by the roots to the upper parts of the plant.	[1]
		ii. <ul style="list-style-type: none"> Xylem vessels are lignified <ul style="list-style-type: none"> provides support and prevents caving in. Xylem vessels lose their end walls <ul style="list-style-type: none"> continuous flow. 	[1/2] [1/2] [1/2] [1/2]
		iii. Water, which is needed for photosynthesis and to keep the cells turgid, cannot travel to all parts of the plant.	[1]
	b.	Phloem	[1]
	c.	i. <div style="text-align: center;">  <p>The diagram shows a cross-section of a root. It has a central vascular cylinder with a red star-shaped Xylem and a yellow ring-shaped Phloem. The outer layer is the Epidermis, and it has several brown Root hairs extending from its surface.</p> </div>	[1/2] for each label
		ii. Transport in xylem is unidirectional – from the roots upwards. Transport in the phloem is bidirectional – from leaves to all other parts of the plant.	[1] [1]
TOTAL: 9 marks			

4.	a.	Meaning	Term	[1/2] each x 4
		An interacting group of various species in a common location.	community	
		Where an organism lives.	habitat	
		A group of organisms of the same species living in the same area.	population	
		Position in a pyramid of numbers.	trophic level	
		Organisms and their environment.	ecosystem	

	b.	i.	<div style="text-align: center;"> </div> <p>Comments: Do not award any marks if the producer is not at the bottom.</p>	[1] Correct sequence [1] Relative size of levels
		ii.	Since the fleas are very small parasites, every rabbit can host more than one flea. Hence the greater number of fleas than rabbits.	[1/2] [1/2]
	c.	i.	Grass	[1/2]
		ii.	Fleas	[1/2]
	d.		<ul style="list-style-type: none"> Not all the food is digested when eaten. Some of the energy is wasted as heat. <p>Comments: Or equivalent.</p>	[1] [1]
	e.		<ul style="list-style-type: none"> The rabbits did not find enough food to eat. Some of the rabbits were killed by the fires. Loss of habitat. <p>Comments: Any two or equivalent.</p>	[1] [1]
TOTAL: 10 marks				

5.	a.	<p>Mean mass = [Sum of 4 individual seedlings] / 4</p> <p>= [0.3+0.2+0.2+0.4] / 4</p> <p>= 1.1 / 4</p> <p>= 0.275</p> <p>= 0.28 g</p> <p>Comments: Deduct 1/2 mark if no working is shown. Deduct 1/2 mark if value is not given to 2 dp.</p>	[1] [1]
	b.	<p>i. Nitrogen</p> <p>Comments: Do not accept nitrates.</p> <p>Seedlings growing in solution without nitrates gained least mass.</p>	[1] [2]
		<p>ii. Nitrogen is an important component of chlorophyll and amino acids. Without chlorophyll the plant cannot photosynthesise. Amino acids are the building blocks of structural proteins and enzymes.</p>	[1]

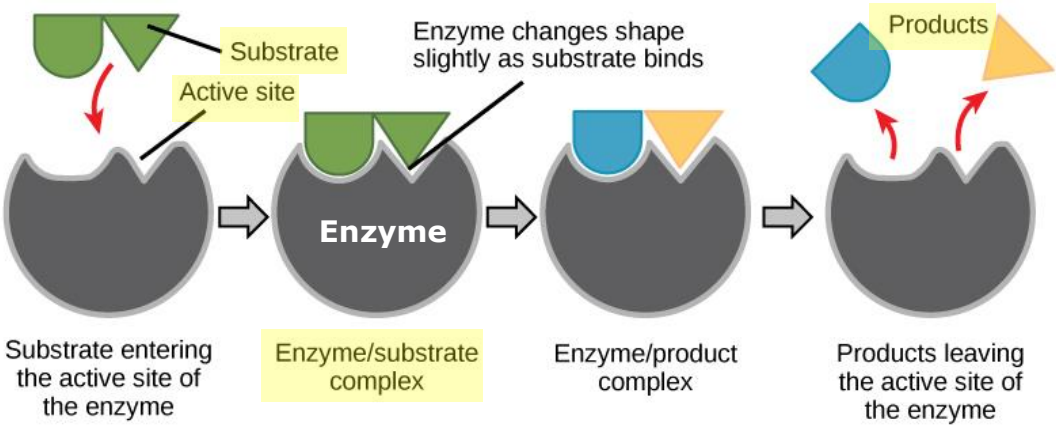
	c.	i. Seeds would have been exposed to the same conditions. OR Seeds would have approximately the same mass. OR The seeds would be genetically similar. Comments: Any one or equivalent.	[1]
		ii. Temperature OR Sunlight OR Amount of water OR Oxygen Comments: Any one or equivalent.	[1]
	d.	i. Calcium Dairy products Comments: Accept any mineral and its respective source. Do not accept vitamins and their sources.	[1/2] [1/2]
		ii. Weak bones and teeth. Comments: Or an equivalent provided it's a symptom caused by a deficiency of the mineral named in d i.	[1]
			TOTAL: 10 marks

6.	a.	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">Stomach</td> <td>An organ for the mixing of food.</td> </tr> <tr> <td style="text-align: center;">Peristalsis</td> <td>Wavelike contractions in the gut that move food along.</td> </tr> <tr> <td style="text-align: center;">Molars</td> <td>Grind food into smaller pieces.</td> </tr> <tr> <td style="text-align: center;">Lipase</td> <td>An enzyme that digests fats into fatty acids and glycerol.</td> </tr> <tr> <td style="text-align: center;">Bile</td> <td>A secretion that emulsifies fats.</td> </tr> <tr> <td style="text-align: center;">Diastema</td> <td>A gap between the incisors and premolars of a herbivore.</td> </tr> </table>	Stomach	An organ for the mixing of food.	Peristalsis	Wavelike contractions in the gut that move food along.	Molars	Grind food into smaller pieces.	Lipase	An enzyme that digests fats into fatty acids and glycerol.	Bile	A secretion that emulsifies fats.	Diastema	A gap between the incisors and premolars of a herbivore.	[1/2] each x 6
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	b.	i. Villus	[1]												
		ii. Comments: Any two or equivalent. <ul style="list-style-type: none"> • Rich blood supply • Large surface area • Thin epithelium 	[1/2] each x 2												
	c.	Lipids Comments: Accept fats.	[1]												

	d.	i. Liver	[1]
		ii. The concentration of absorbed nutrients from the gut may be higher or lower than that which is actually allowed inside the body.	[1]
		The liver regulates the concentration of these nutrients before they enter the general circulation.	[1]
			TOTAL: 9 marks

Section B

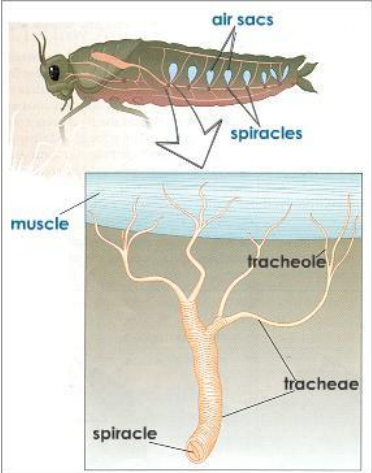
1.	a.	i. Aerobic respiration	[1]
		Comments: Do not accept respiration.	
		ii. $\text{Glucose} + \text{Oxygen} \Rightarrow \text{Carbon dioxide} + \text{Water} + \text{Energy}$	[1]
		Comments: Award mark only if equation is completely correct.	
	b.	i. Both the breathing rate and heart rate increase gradually during a race until they reach a plateau that cannot be exceeded.	[1] [1]
		ii. At the end of the race extra oxygen needs to be taken up by the lungs to pay off the oxygen debt.	[1/2] [1/2]
		This 'extra oxygen' is used for the breakdown of lactic acid which accumulates in the muscle cells as a result of anaerobic respiration. This takes place in order to supply the extra energy that is required during the race.	[1/2] [1/2]
	c.	i. Cell A is a white blood cell (phagocyte).	[1]
		The large multilobed nucleus is a characteristic feature.	[1]
		Cell B is a red blood cell.	[1]
		The biconcave shape is a characteristic feature.	[1]
		ii. A specialised cell is one whose structure is different from that of the typical plant/animal cell so that it is better adapted to carry out its function.	[1]
		The white blood cell's multilobed nucleus enables it to change its shape as it engulfs pathogens.	[1]
		The biconcave shape of the red blood cell increases its surface area available for the absorption of oxygen.	[1]
		iii. White blood cells play an important role in protecting the body against harmful pathogens	[1]
		– they increase in number in order to fight off and destroy the invading pathogen.	[1]
			TOTAL: 15 marks

2.	a.	Pepsin is a protein digesting enzyme.	[1]
	b.	<p>The reaction investigated is a catabolic one.</p>  <p>Comments: Deduct one mark if the diagram drawn represents an anabolic reaction.</p>	<p>[1] x 5 for each label</p>
	c.	<p>i. Optimum temperature – 40°C This is the temperature at which the reaction proceeds at the fastest rate.</p>	<p>[1] [2]</p>
		<p>ii. Denatured – temperatures higher than 40°C At temperatures higher than the optimum temperature, the shape of the active site is altered. As a result, the substrate can no longer fit inside it.</p>	<p>[1] [1] [1]</p>
	d.	<p>Enzymes are:</p> <ul style="list-style-type: none"> • catalysts • pH sensitive • proteins • substrate specific • sensitive to inhibitors <p>Comments: Any one or equivalent.</p>	[1]
	e.	<p>Enzymes are used:</p> <ul style="list-style-type: none"> • in biological detergents • to extract juice from fruit • to change the flavour of food • to make medical products such as reagent sticks • to smoothen leather <p>Comments: Any one or equivalent.</p>	[1]
TOTAL: 15 marks			

3.	a.	i. Mass excreted is equivalent to the mass found in urine. So, mass excreted = amount filtered – amount reabsorbed = 53 – 28 = 25 g	[1]
		ii. 537 g of sodium are reabsorbed from 540 g which are filtered. % Sodium reabsorbed = $537/540 \times 100$ = 99.44 = 99.4%	[1] Working [1] Correct answer
	b.	i. Liver	[1]
		ii. Extra proteins taken up in the diet are deaminated because they cannot be stored in the body.	[1] [1]
	c.	i. Glucose is a useful substance for the body.	[1]
		ii. Plasma protein molecules are too big to pass from the glomerulus into the Bowman’s capsule.	[1]
	d.	i. On a hot day, the body produces a SMALLER volume of urine that is DARKER in colour.	[1/2] [1/2]
		ii. Antidiuretic hormone Comments: Accept also ADH.	[1]
		iii. Collecting tubules ADH causes the tubules to reabsorb more water from the glomerular filtrate.	[1] [1]
		iv. Hypothalamus	[1]
	e.	i. Lungs OR Skin	[1]
		ii. Lungs – Carbon dioxide OR Skin – Water OR Salts	[1]
			TOTAL: 15 marks

4.	a.	i. Both are blood vessels .	[1/2]
		Capillaries are very narrow and just one cell thick .	[1/2] [1/2]
		They allow the diffusion to take place between the blood and the tissue fluid that bathes the cells.	[1/2] [1/2]
		Veins have thicker walls and a wider lumen .	[1/2] [1/2]
		The blood flowing through them returns to the heart at a low pressure , so the presence of valves prevents its backflow .	[1/2] [1/2] [1/2]
		Comments: Accept well annotated diagrams with the above highlighted characteristics.	
		ii. Both are stages involved in the breakdown of food . Mechanical digestion refers to the breakdown of food by means of teeth . Chemical digestion refers to the breakdown of food by means of enzymes .	[1] [1] [1]
		iii. Both are lipids . Fats are solids at room temperature . Oils are liquids at room temperature .	[1] [1] [1]
	b.	The airways of a smoker's lungs produce large amounts of mucus that make him/her suffer from a persistent cough . This causes the bursting of the alveoli and the smoker suffers from shortness of breath .	[1] [1] [1] [1]
TOTAL: 15 marks			

5.	a.	i. Waxy cuticle	[1]
		ii. Reduces water loss by transpiration.	[1]
	b.	i. Being situated 'deeper down' in the leaf , the cells at C will trap a smaller amount of sunlight when compared to the cells at B. As a result, they are less efficient at carrying out photosynthesis.	[1] [1]

	<p>ii. The leaf:</p> <ul style="list-style-type: none"> • has a flattened shape – larger surface area to trap sunlight. • is thin – shorter diffusion distances for carbon dioxide to enter and oxygen to leave the leaf. • has stomata – pores which can open to allow the exchange of gases. • has internal air spaces in the mesophyll layer – facilitates the uptake of carbon dioxide. <p>Comments: Any two or equivalent adaptations with corresponding explanation.</p>	<p>[1/2]</p> <p>[1/2]</p> <p>[1/2]</p> <p>[1/2]</p>
c.	i. Guard cells	[1]
	ii. Respiration	[1]
	iii. Carbon dioxide and Oxygen	[1,1]
d.	<p>i. Tracheal system</p>  <p>Insects breathe through spiracles (small holes in their abdomen). Air enters through the spiracles and travels along a network of tubes called tracheae to all parts of the body, supplying the organs directly with air.</p> <p>The tracheae branch repeatedly and end as very fine thin walled tubules called tracheoles which allow diffusion of oxygen and carbon dioxide into and out of the tissues.</p>	<p>[1]</p> <p>[1/2]</p> <p>[1/2]</p> <p>[1/2]</p> <p>[1/2]</p>
	<p>ii. Insects have a relatively small surface area to volume ratio when compared to an <i>Amoeba</i>.</p> <p>This implies that diffusion all over the body surface of an insect, to absorb the required oxygen and remove the unwanted carbon dioxide, will not be as efficient as in an <i>Amoeba</i>.</p> <p>Hence the need for a specialised exchange surface as the tracheal system.</p>	<p>[1]</p> <p>[1]</p>
TOTAL: 15 marks		