Name…….. Class ..…

JUNIOR SECONDARY
SEMI-EXTERNAL EXAMINATION

LIFE SCIENCE

WRITTEN PAPER 2 hours 30 minutes

Marks 130 **Specimen Paper**

No Additional Materials are required:
- Multiple-choice answer sheet
- Non-programmable calculator
- Soft clean eraser
- Soft pencil (type B or HB)

INSTRUCTIONS AND INFORMATION TO CANDIDATES

SECTION A
- Make sure you received the multiple-choice answer sheet (page 31).
- There are thirty questions.
- Answer **all** questions

SECTION B
- Write your answers on the Question paper in the spaces provided.
- Answer all questions.
- Write in dark blue or black pen.
- Use pencil for diagrams, graphs or rough working.
- Do not use correction fluid.
- You may use a Non-programmable calculator
- The number of marks is given in brackets [ ] at the end of each question or part question.

Marks

This document consists of **31** printed pages and **1** blank page.

Republic of Namibia
MINISTRY OF EDUCATION, ARTS AND CULTURE

SECTION A

- Answer **all** questions.
- For each question there are four possible answers, **A**, **B**, **C**, and **D**.
- Choose the **one** you consider correct and record your choice in soft pencil on the multiple-choice answer sheet.
- Each question counts one mark.
- If you want to change an answer, thoroughly erase the one you wish to delete.

---

1 Which component is destroyed in people who are HIV positive?

A lymphocytes
B phagocytes
C platelets
D red blood cells

2 What is a disease causing organism?

A antibody
B host
C pathogen
D phagocyte

3 Which disease exhibits all of the following features?

- It can be transmitted by animals to other animals, including humans.
- One mode of transmission is by transfusion with contaminated blood.
- The causative organism can show multiple drug resistance.
- The majority of humans who die from the disease are children.

A cholera
B HIV / AIDS
C malaria
D tuberculosis

4 Which statement about both B-lymphocytes and T-lymphocytes is correct?

A They become active only when a specific antibody binds to their surface receptor.
B They divide to form clones when meeting an antitoxin in a cell.
C They produce memory cells to respond to an antigen when exposed in the future.
D They release hormone-like cytokines which stimulate release of antibodies.

5 The list shows actions numbered **1**, **2**, **3** and **4**.

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 of the actions **1**, **2**, **3** and **4** would help control the spread of disease?

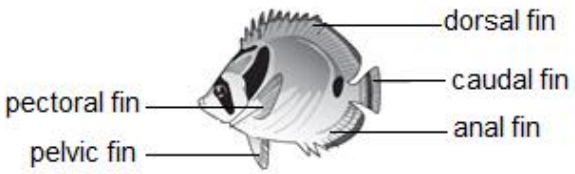
A 1, 2, 3 and 4
B 1, 2 and 3 only
C 2 and 3 only
D 4 only

6 The picture shows an animal.

What is the name of this animal according to the binomial system?

A Catus
B Felisleo
C Male African lion
D Top African jungle carnivore

7 The diagram shows a fish.



Which key identifies the fish?

1 black stripe across the eye ..…… go to 2

no black stripe across the eye ..…..……..…….... **A**

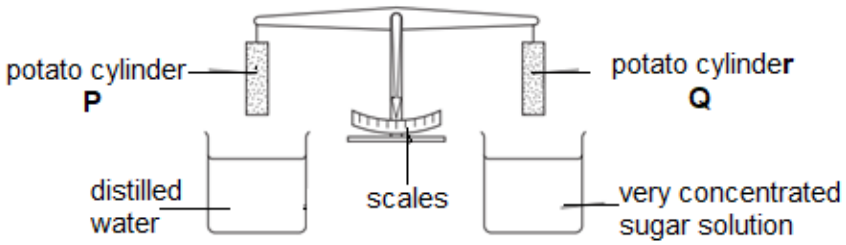
2 black stripe on caudal fin ……..…. go to 3

no black stripe on caudal fin ……...… **B**

3 black spot below dorsal fin ……..…….. **C**

no black spot below dorsal fin …… **D**

8 A student investigates osmosis in potatoes. He set up the apparatus shown.



At the beginning the potato cylinders were exactly balanced.
He immersed the cylinders into the liquids for 4 hours.
After 4 hours, he lifted the potato cylinders out of the liquids.
Potato cylinder **P** was now heavier than potato cylinder **Q**.

Which statement explains what happened?

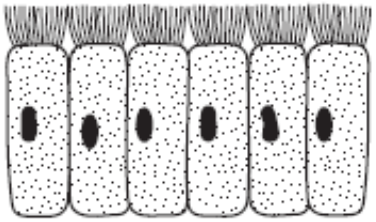
A Water moved into both potato cylinders **P** and **Q**.
B Water moved out of both cylinders **P** and **Q**.
C Water moved into the potato cylinder **P** and out of the potato **Q**.
D Water moved out of the potato cylinder **P** and into the potato cylinder **Q**.

9 Which observations suggest that a cell is eukaryotic?

Key
✓ = found in eukaryotes
× = not found in eukaryotes

	cytoplasm includes endoplasmic reticulum	protein molecules are associated with the DNA	ribosomes distributed through the cytoplasm
A	✓	×	✓
B	×	✓	×
C	×	×	×
D	✓	✓	✓

10 The diagram shows a sample of material taken from an organism.



A cell
B organ
C organ system
D tissue

11 Which substance is transported by xylem vessels?

A carbon dioxide
B oxygen
C sugar
D water

12 Which of the four vertebrates in the table is a mammal?

	scaly skin	hair	four limbs	tail
A	✓	×	✓	✓
B	✓	✓	×	✓
C	×	×	✓	×
D	×	✓	✓	✓

13 What are the chemical elements found in carbohydrates?

A carbon, hydrogen and oxygen
B carbon, hydrogen, oxygen and nitrogen
C carbon, hydrogen, oxygen and sulfur
D carbon, hydrogen, oxygen, nitrogen and sulfur

14 The table shows the mass of some nutrients found in 100 g of four different foods.

food	carbohydrate / g	fat / g	protein / g	vitamin C / mg	vitamin D / mg
beans	10.0	0.4	5.0	3.0	0.0
bread	48.0	1.5	9.0	0.0	0.0
cheese	0.0	34.0	25.0	0.0	0.4
eggs	0.0	11.0	13.0	0.0	1.5

Which foods would best prevent rickets and scurvy?

	rickets	scurvy
A	beans	bread
B	bread	cheese
C	cheese	eggs
D	eggs	beans

15 What is a symptom of scurvy?

A bleeding gums
B breathlessness
C diarrhoea
D pain in joints

16 A person has been smoking heavily for many years. A lot of dust and micro-organisms enter their lungs.

Which statement explains why this occurs?

A Their arteries are blocked with tar.
B The cilia in the trachea have been destroyed.
C The person is addicted to nicotine.
D The surface area of the lungs is reduced.

17 Which features are present in gaseous exchange surfaces?

	large surface area	moist	thick walls
A	✓	✓	×
B	✓	×	✓
C	×	✓	✓
D	✓	✓	✓

18 Which of the following are found in blood and lymph and tissue fluid?

1 carbon dioxide
2 fatty acids
3 white blood cells
4 proteins

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

19 Why is the inner lining of the bronchiole folded?

A to allow for expansion during breathing
B to facilitate gaseous exchange
C to increase the surface area
D to trap foreign particles

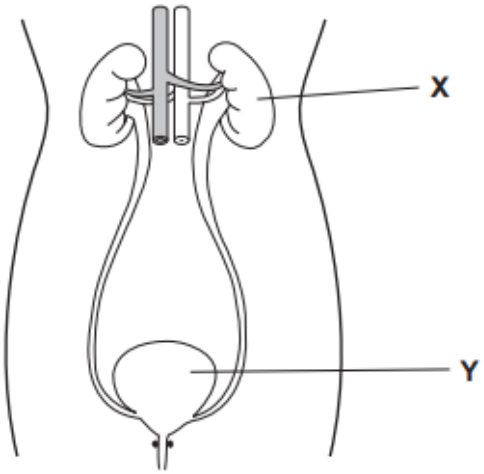
20 The diagram shows cross-sections of three types of blood vessel.

What is the identity of the three vessels?

NOT DRAWN TO THE SAME SCALE

	artery	capillary	vein
A	X	Y	Z
B	Y	X	Z
C	X	Z	Y
D	Y	Z	X

21 The diagram shows some of the structures found in the human abdomen.



What type of structures are **X** and **Y**?

	X	**Y**
A	organ	organ
B	organ	organ system
C	organ system	tissue
D	tissue	organ system

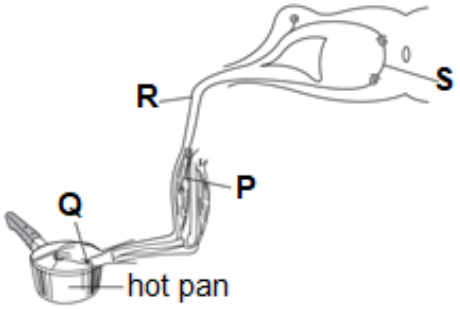
22 The table shows an analysis of urine and of blood after filtration in the kidney.

Which substance is completely reabsorbed by the kidney?

Substance	Percentage of substance in	
	blood	urine
glucose	0.10	0.00
salts	0.30	0.60
urea	0.03	2.00
water	90.00	97.00

A glucose
B salts
C urea
D water

23 The diagram shows the structures involved in a reflex action.



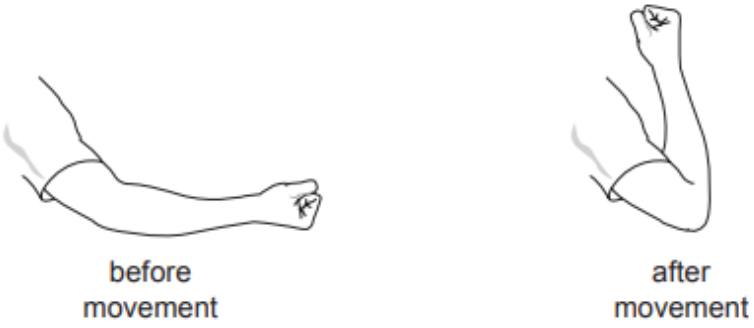
What shows the sequence in which these structures become involved?

A P → Q → R → S
B P → S → R → Q
C Q → R → S → P
D Q → S → P → R

24 Which of these contains relay neurones?

A effector
B eceptor
C spinal cord
D stimulus

25 The diagrams show part of the arm being raised.



Which is the order of events that causes the movement shown in the diagrams?

A impulse in motor neurone → biceps contracts → muscle pulls bone.
B impulse in motor neurone → triceps relaxes → muscle pushes bone.
C impulse in sensory neurone → triceps contracts → muscle pushes bone.
D impulse in sensory neurone → biceps relaxes → muscle pulls bone.

26 Which row shows the organs where eggs and sperms are made?

	eggs	**sperms**
A	fallopian tube	sperm duct
B	ovary	testis
C	ovary	urethra
D	uterus	testis

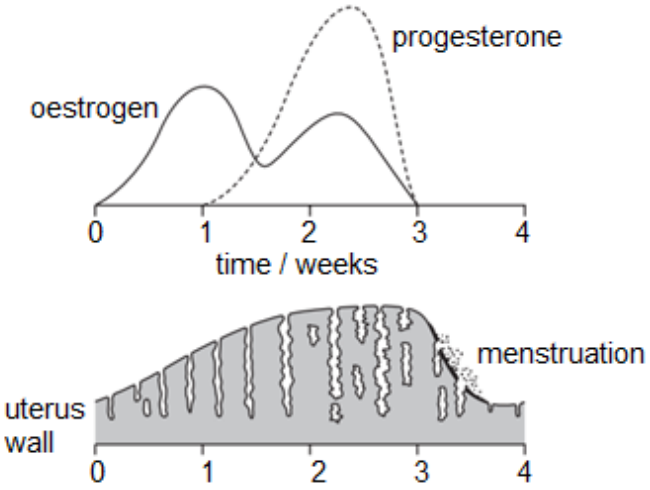
27 Which substance normally passes from a fetus to its mother through the placenta?

A alcohol
B glucose
C oxygen
D urea

28 Which two gases both contribute to global warming?

A carbon dioxide and methane
B methane and oxygen
C oxygen and sulfur dioxide
D sulfur dioxide and carbon dioxide

29 The diagram shows the changes which take place during a woman's menstrual cycle.



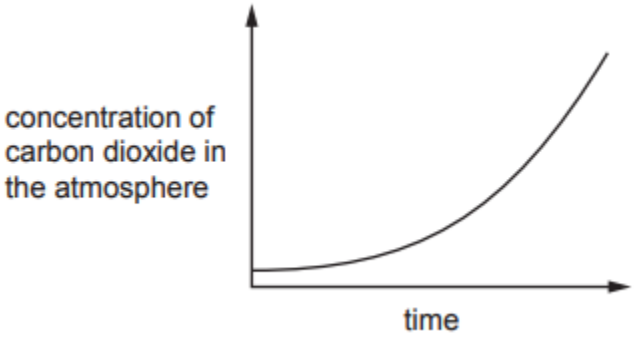
What is occurring at the time of ovulation?

A a fall in the levels of oestrogen and progesterone
B a fall in the level of progesterone only
C a rise in the levels of oestrogen and progesterone
D a rise in the level of oestrogen only

30 Three human activities are listed.

1 burning fossil fuels
2 deforestation
3 overusing fertilisers

Which activities can cause the change shown in the graph?



A 1, 2 and 3
B 1 and 2 only
C 1 only
D 2 and 3 only

For Examiner's Use

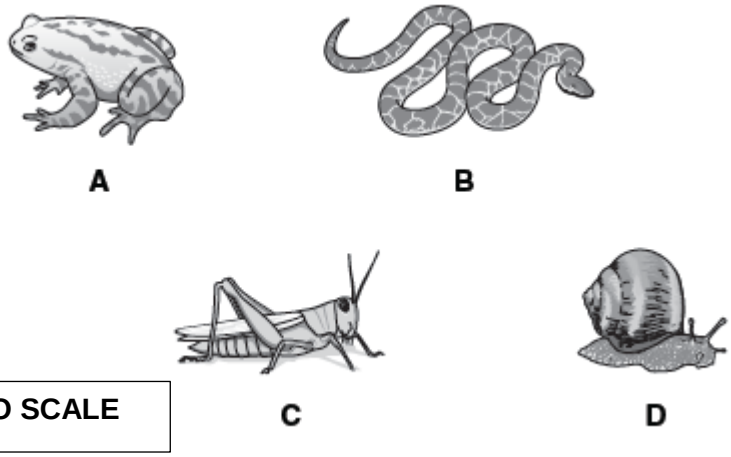
SECTION B

- Write your answers in the spaces provided on the question paper.
- Legible handwriting and neat drawings in pencil, where required, are essential.
- Use pencil for diagrams, graphs or rough working.

1 **(a)** Define the term taxonomy.

…… [1]

Fig. 1.1 shows four different animals.



NOT DRAWN TO SCALE

Fig. 1.1

(b) Classify each animal into its correct group choosing words from this list.

amphibian, bird, fish, insect, mammal, mollusc, reptile

Write your answers in the 'group' column of Table 1.1.
One example has been completed for you.

Table 1.1

	group
A	amphibian
B	
C	
D	

[1]

For Examiner's Use

(c) Using phrases from the list, complete **Table 1.2** by adding **two** features of each animal group, as shown for amphibians.
You may use each feature *once*, *more than once* or *not at all*.

has no backbone **has a backbone** **has feathers**

has fur **has gills** **has scaly skin** **has slimy skin**

has a shell **has 8 legs** **has 6 legs**

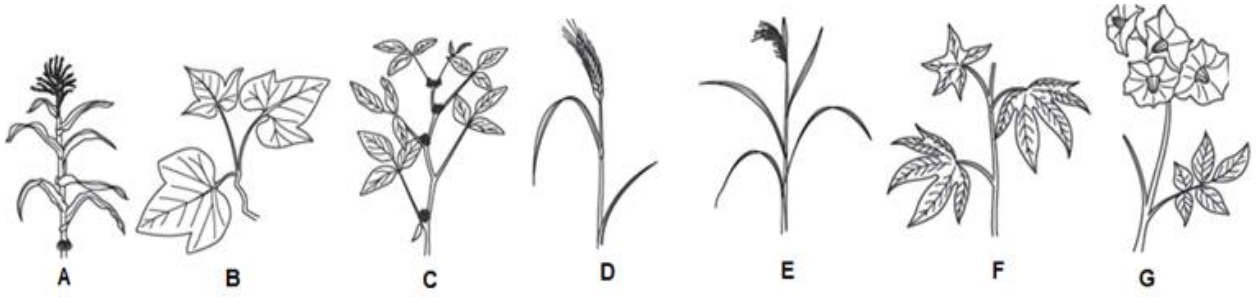
Table 1. 2

	group	**feature 1**	**feature 2**
A	amphibian	has a backbone	has slimy skin
B			
C			
D			

[3]

For Examiner's Use

(d) Fig. 1.2 shows seven plant species that are important crops.



NOT DRAWN TO SCALE

Fig. 1.2

(i) Use the key to identify each species. Write the letter of each species (**A** to **G**) in the correct box beside the key. One has been done for you.

1	(a)	branched veins on leaves	go to 2	
	(b)	parallel veins (not branched) on leaves	go to 3	
2	(a)	leaves divided into leaflets (look like small individual leaves)	go to 4	
	(b)	leaves not divided into leaflets	go to 5	
3	(a)	flowers grouped tightly together at the top of the stalk	*Triticum aestivum*	
	(b)	flowers grouped loosely together at the top of the stalk	go to 6	
4	(a)	large flowers located at top of stem	*Solanum tuberosum*	
	(b)	small flowers located at top of stem	*Glycine max*	
5	(a)	leaves have five lobes	*Manihot esculenta*	**F**
	(b)	leaves have three lobes	*Ipomoea batatas*	
6	(a)	flowers above youngest leaf	*Zee mays*	
	(b)	flowers bend downbelow youngest leaf	*Oryza sativa*	

[3]

(ii) Suggest one other feature that could be used to identify monocotyledonous plants from dicotyledonous plants.

…… [1]

[9]

For Examiner's Use

2 A biologist made a slide of some epidermal cells from a scale leaf of an onion bulb.

Fig. 2.1 is a drawing that the biologist made of one of the cells.

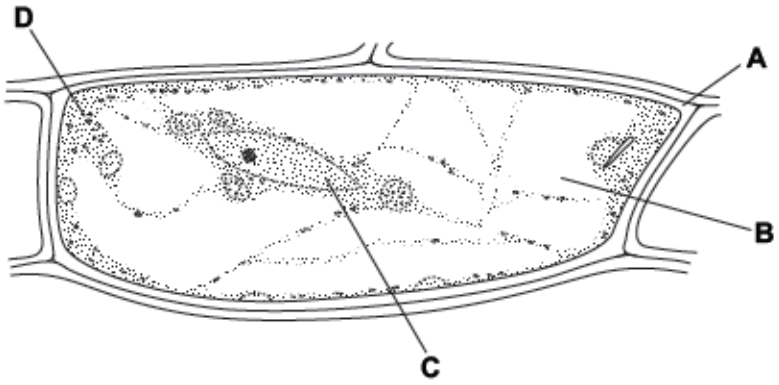


Fig. 2.1

(a) **(i)** On Fig 2.1 , label a partially membrane. [1]

(ii) Table 3 shows the functions of the structures within a plant cell. Complete the table by: naming the part of the cell that carries out each function using the letters from Fig. 2.1 identify the part of the cell named.

Table 2.1

function	letter from fig. 3.1	name
resists the turgor pressure of the cell		
controls the activities of the cell		
site of chemical reactions of the cell including synthesis of proteins		

[3]

For Examiner's Use

(b) The biologist added a few drops of concentrated salt solution to the cells on the slide and took a photograph of the cells, as shown in Fig. 2.2.

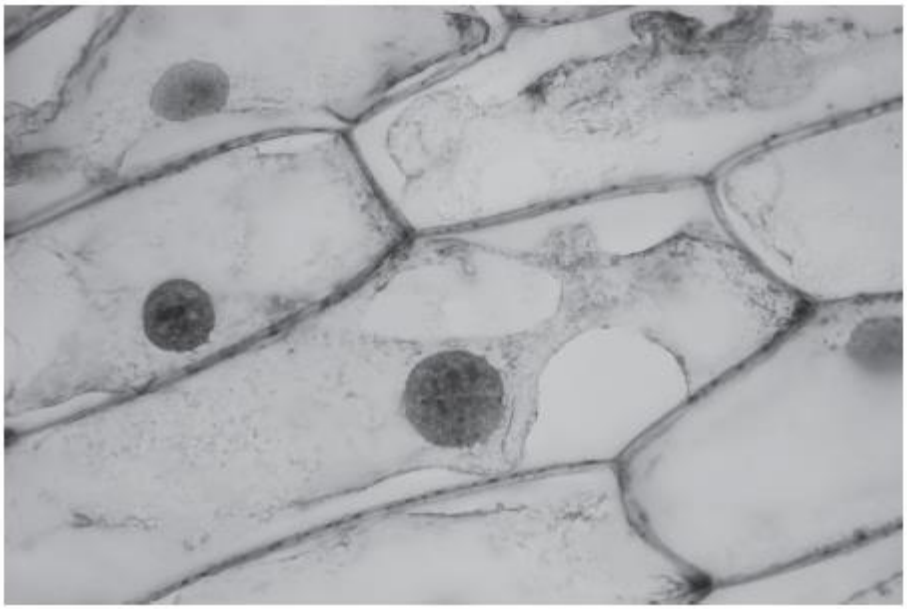


Fig. 2.2

With reference to Fig. 2.2, describe the effect on the plant cells of adding a concentrated salt solution.

.....

.....

.....

.....

.....

.....

..... [3]

For Examiner's Use

(c) Fig. 2.3 shows a sample of human blood using a microscope.

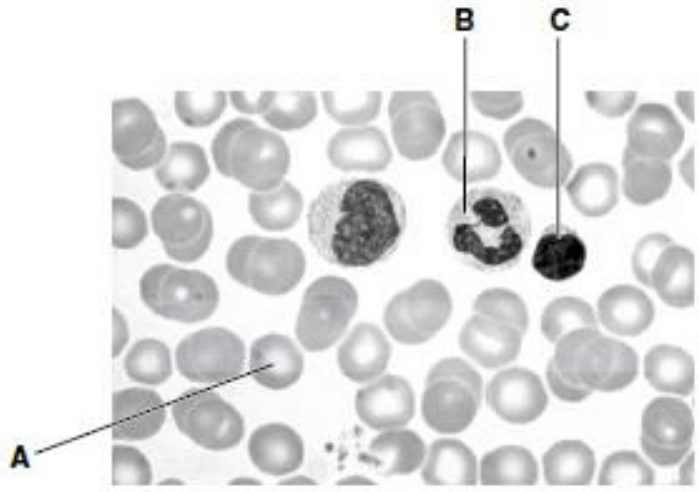


Fig. 2.3

(i) Name the type of cell labelled **A** in Fig. 2.3. State the function of this type of cell.

type of cell:……

function: ……..…….…… [2]

(ii) Identify the type of cells labelled **B** and **C**.

B …….

C ……..…..….. [2]

For Examiner's Use

(d) Figure 2.4 is a photograph (micrograph) of a mitochondrion taken using a scanning electron microscope.

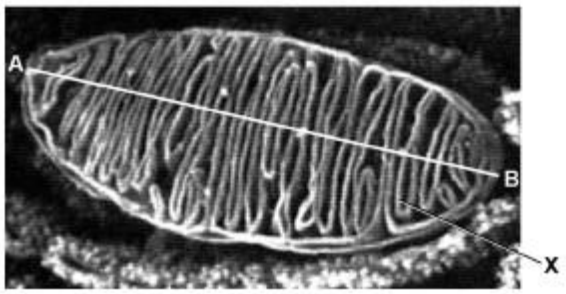


Fig. 2.4

(i) Name the part of the mitochondrion labelled **X** in Fig. 2.4.

…… [1]

(ii) The actual length of the mitochondrion between points **A** and **B** is 4µm.
What is the magnification of the mitochondrion in Figure 2.4?
Show your working.

Magnification: …… [2]

[14]

For Examiner's Use

3 **(a)** Table 3.1 shows some information about four infectious diseases.

Complete blank spaces in table 3.1.

Table 3.1

infectious disease	name of pathogen	type of pathogen	main mode of transmission
HIV/AIDS	human immunodeficiency virus (HIV)	virus	sexual contact
cholera	Vibrio cholerae		
tuberculosis	(iii)	bacterium	
malaria	Plasmodium vivax or P. malarae		

[6]

(b) Natural immunity and artificial immunity can both be acquired in a passive or in an active manner. Table 3.2 shows information about immunity acquired by individuals, **P** and **Q**. Complete the Table.

Table 3.2

Description of event	outcome for the individual	production of memory cells / yes or no	type of immunity acquired by individual
individual P is injected with a live, weakened disease-causing organism	individual P does not become ill from the disease and has long-lasting protection from the disease		……
individual Q is injected with antibody against a specific disease-causing organism	individual Q does not become ill from the disease but is ill with the disease a year later		

[4]

(c) Describe how a person may become infected with TB.

‘.....

.....

.....

.....

..... [3]

For Examiner's Use

(d) Fig. 3.1 shows part of the human arm.

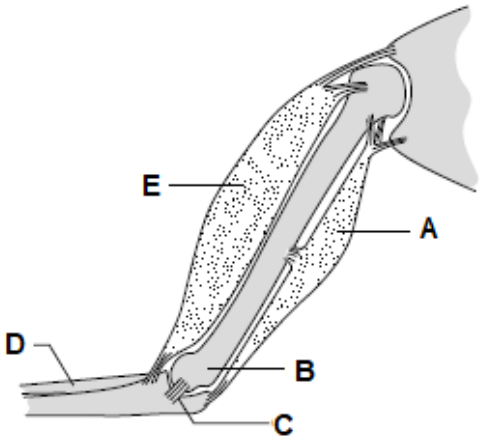


Fig 3.1

(i) State which letter shows:

the biceps; ..... [1]

the triceps. ..... [1]

(ii) Explain what is meant by *antagonistic muscles.*

.....

..... [1]

[16]

For Examiner's Use

4 **(a)** Five types of animal and plant cells and five possible functions of such cells are shown below.

Draw one straight line from each type of cell to a function of that cell.

type of cell	function of cell
red blood cell	absorption of mineral salts
root hair cell	transport of oxygen
white blood cell	movement of mucus
xylem	protection against pathogens
ciliated cell	structural support

Fig. 4.1

[5]

(b) Table 4.1 shows some of the external features of the five classes of vertebrates. Complete the table by using a tick (✓) to indicate if each class has the feature or a cross (×) if it does not. The first row has been completed for you.

Table. 4.1

feature	fish	amphibian	reptiles	birds	mammals
mammary glands	×	×	×	×	✓
fur / hair					
scales / scaly skin					
external ears					
feathers					

[4]

[9]

For Examiner's Use

5 Table 5.1 shows a student's daily water gains and losses.

Table 5.1

water gain / cm^3		water loss / cm^3	
drink	1650	urine	1500
food	800	faeces	100
water released in chemical reactions	350	expired air	400
		sweat	……
total	2800	total	2800

(a) Complete the table by calculating the volume of sweat lost by the student.

Show your working in the space below.

[1]

(b) Name the organ responsible for:

1. excreting water in expired air; .....

2. releasing water by sweating; .....

3. forming urine; .....

4. reabsorbing water from undigested food to form faeces. ..... [4]

(c) On a hot day the student still took in 2800cm^3 of water.

Suggest and explain what would happen to the volume of sweat and urine produced.

sweat .....

.....

..... [2]

urine .....

.....

..... [2]

[9]

For Examiner's Use

6 **(a)** Fig. 6.1 shows a diagram of the heart.

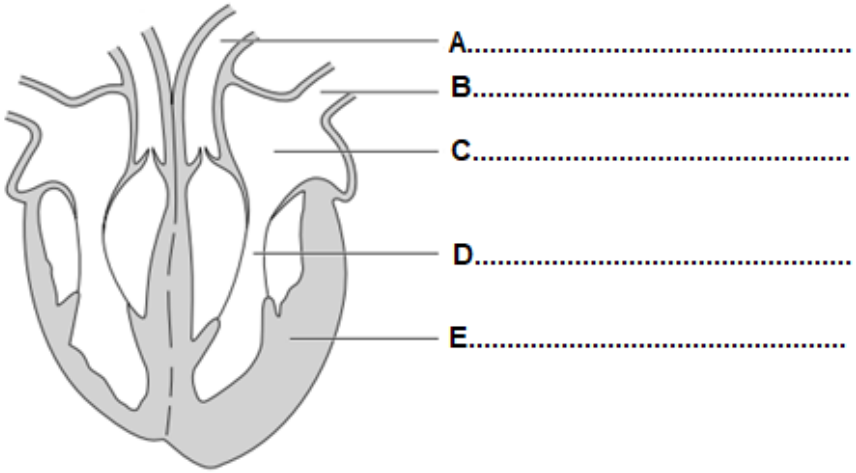


Fig. 6.1

(i) Complete Fig. 6.1 by adding names to the label lines.

Choose names from the list below:

aorta **atrium** **muscular wall** **pulmonary artery**
Pulmonary vein **septum** **vena cava** **ventricle** [5]

(ii) On Fig. 6.1, label the heart chamber that pumps blood to the lungs.

..... [1]

For Examiner's Use

(b) The volume of blood the heart pumps out per minute is called the cardiac output. Fig. 6.2 shows how the cardiac output changes for students **F** and **G** as exercise increases.

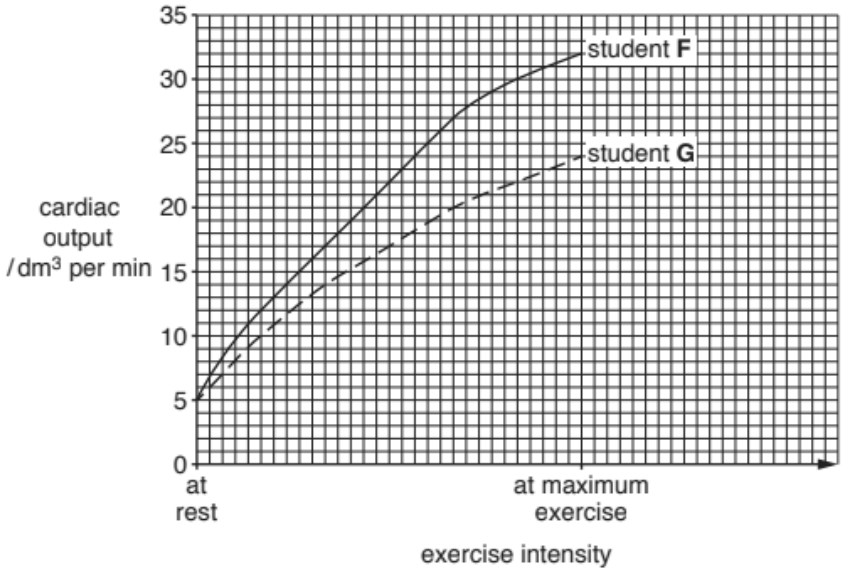


Fig. 6.2

(i) Use Fig. 6.2 to state the cardiac output for student **F** when resting and when doing maximum exercise.

when resting .....

when doing maximum exercise ..... [2]

(ii) Calculate the percentage increase in cardiac output of student G from rest to maximum exercise.
Show your working.

.....% [2]

(iii) Suggest two ways the activity of the heart changes to produce an increase in cardiac output.

1 .....

2 ..... [2]

(b) During exercise, student F has a higher cardiac output than student G.
Suggest one reason for this difference.

.....

..... [1]

[13]

For Examiner's Use

7 Over-consumption of alcohol is a problem in some countries including Namibia.

(a) State two long term effects on the body of drinking too much alcohol.

1……

2…….. [2]

(b) Fig. 7.1 shows the relationship between blood alcohol content and the risk of having a road accident.

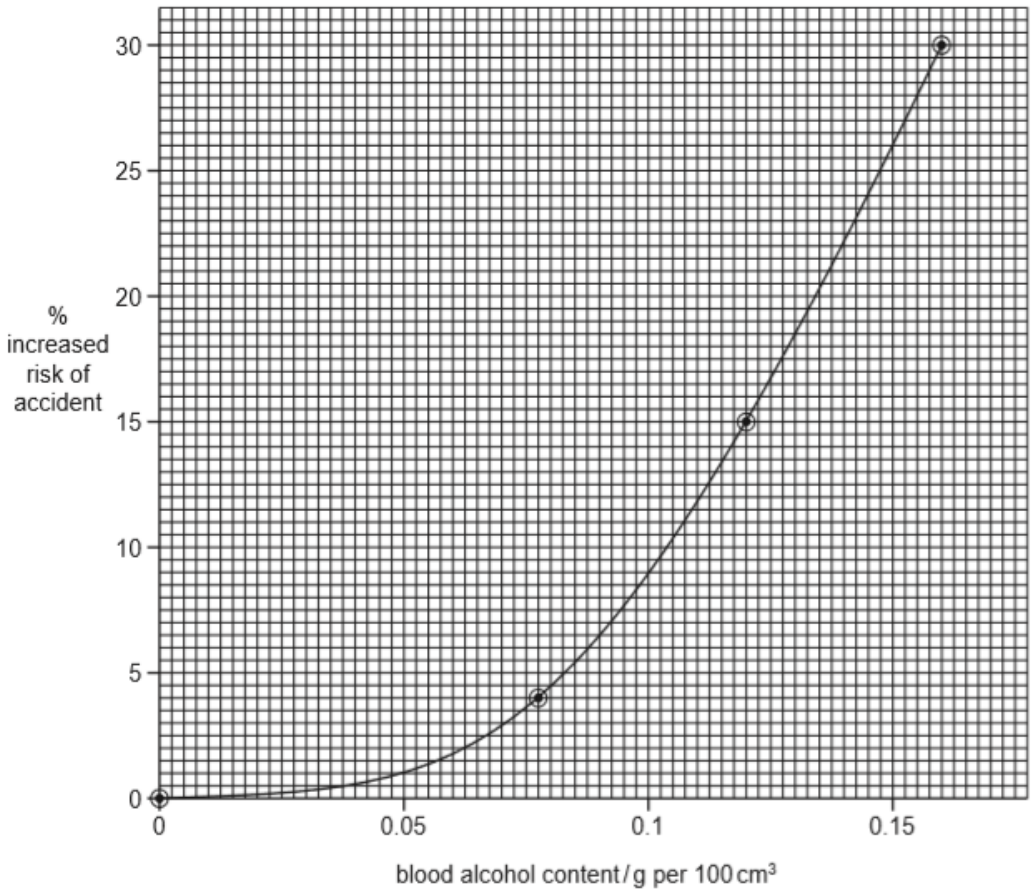


Fig. 7.1

(i) Use the graph to predict the increased risk of a road accident if a driver had a blood alcohol content of 0.10 g per 100 cm^3 increased risk.

…… [1]

(ii) Describe the relationship shown by the graph between blood alcohol content and the risk of having a road accident.

.....

.....

..... [2]

For Examiner's Use

(iii) With reference to the nervous system, explain how drinking alcohol before driving increases the risk of having an accident.

.....

.....

.....

..... [3]

(iv) Name the **two** components that form the central nervous system (CNS).

1 .....

2 ..... [2]

(v) Sense organs respond to specific stimuli.

Name **three** different stimuli that the sense organs in the human body can detect.

1 .....

2 .....

3 ..... [3]

[13]

For Examiner's Use

8 Fig. 8.1 represents an example of a human menstrual cycle.

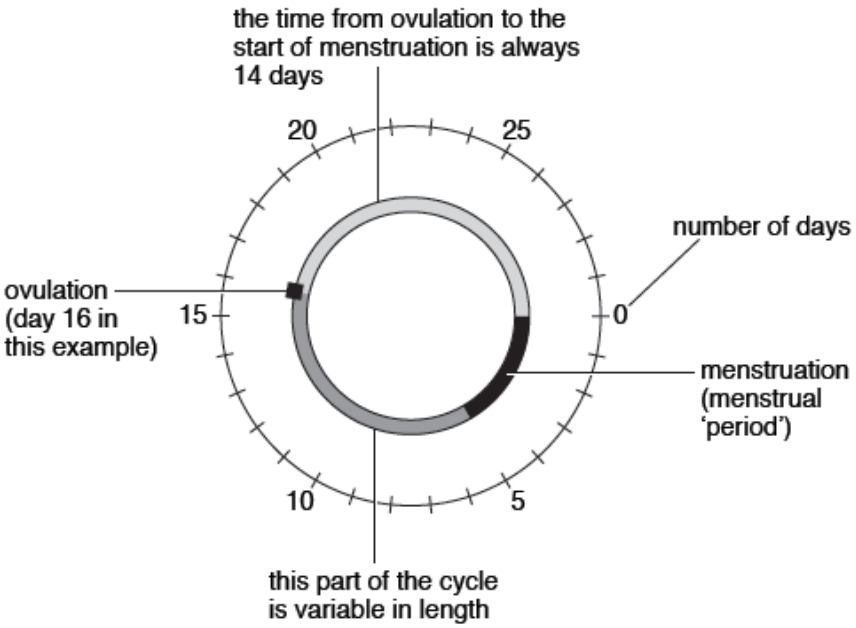


Fig. 8.1

(a) State the part of the menstrual cycle which is always the same length.

..... [1]

(b) **(i)** A woman's period started on August 2nd and her next period started on August 29th.

Calculate the length of her menstrual cycle for that month. B

..... days [1]

(ii) Human sperms can live for up to 48 hours in the female's reproductive system, and human eggs live for 24 hours after release.

Ovulation occurred on 16th August.

State the dates in August on which intercourse could result in fertilisation taking place. ..... August. [2]

(iii) When a woman becomes pregnant a placenta and umbilical cord will form.

Suggest **three** substances which must be able to pass from the woman to the developing fetus across the placenta.

1 .....

2 .....

3 ..... [3]

For Examiner's Use

(vi) During menstruation a woman loses blood. This can cause a woman to be anaemic. Symptoms of anaemia are lack of energy, pale colour and tiredness

Explain how these symptoms can be caused by the blood loss during menstruation.

.....

.....

.....

.....

.....

..... [3]

[10]

For Examiner's Use

9 Increasing human population is linked to a change in carbon dioxide concentration in the atmosphere. Fig. 9.1 shows the carbon dioxide concentration between 1958 and 2010 measured at Mauna Loa, Hawaii.

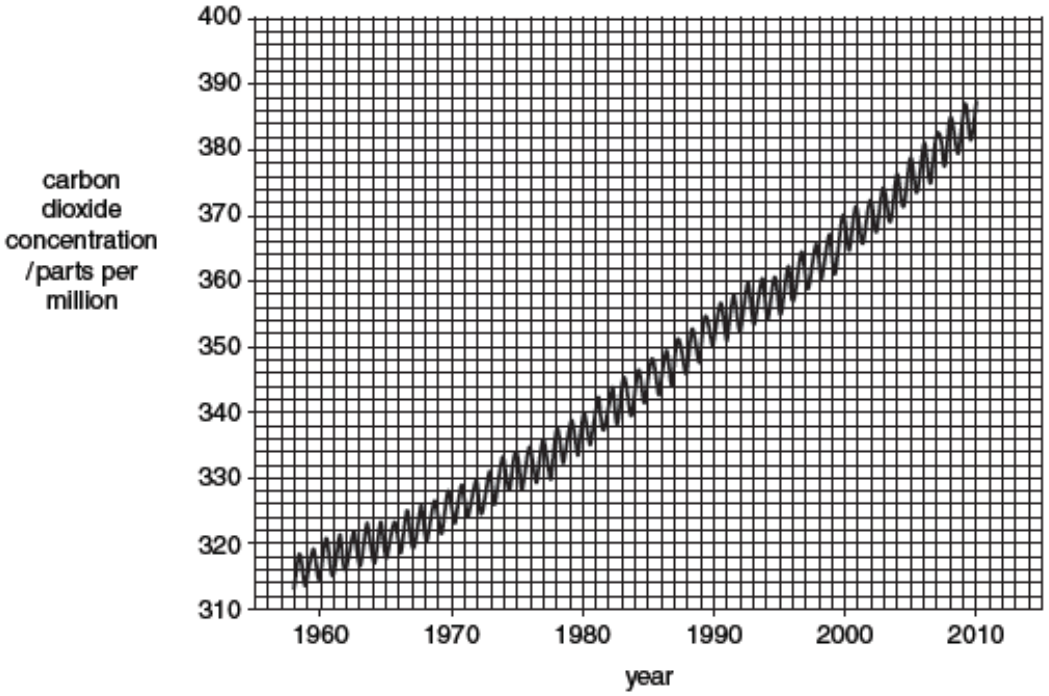


Fig. 9.1

(a) With reference to Fig. 9.1, describe how the carbon dioxide concentration has changed between 1958 and 2010.

.....

.....

.....

.....

.....

..... [3]

For Examiner's Use

(b) **(i)** Carbon dioxide is a greenhouse gas.

Name **one other** greenhouse gas.

..... [1]

(ii) Explain how carbon dioxide enhances the greenhouse effect.

.....

.....

.....

.....

.....

…….. [3]

[7]

MULTIPLE CHOICE ANSWER SHEET

Name of learner:

Record your choice (possible answers, **A**, **B**, **C** or **D**) by **shading** in soft pencil on this answer sheet.
If you want to change an answer, thoroughly erase the one you wish to delete.

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
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18				
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29				
30				

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SECTION A: KEY AND GRID

Setting Grid Life Science Written Paper								
Question	**Key**	**Syllabus reference and Topic**	**Assessment Objectives**			**Target Grade**		
			A	**B**	**C**	**AB**	**CD**	**EU**
1	A	2.1	1					
2	C	2.2		1				
3	C	2.2	1					
4	C	2.2		1		1		
5	B	2.3	1					
6	B	3.1	1				1	
7	C	3.2		1		1		
8	D	4.1		1	1	1		
9	D	4.1		1		1		
10	D	4.1	1				1	
11	D	4.2	1					1
12	D	5.1		1		1		
13	A	6.1	1					1
14	D	6.1		1		1		
15	A	6.1	1					1
16	B	7.1		1		1		
17	A	7.1		1			1	
18	A	7.2		1			1	
19	A	7.2	1				1	
20	A	7.2	1					1
21	A	7.3	1					1

22	A	7.3	1					1
23	C	7.4		1			1	
24	C	7.4		1		1		
25	A	7.5		1		1		
26	B	7.6	1					1
27	D	7.7		1		1		
28	A	7.7		1			1	
29	C	8.1	1				1	
30	B	8.1		1		1		
Total			9	20	1	6	15	9
Target grade			9	20	1	6	15	9

SECTION B: MARK SCHEME AND GRID

<table>
<tr><th>Question 1</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td>Taxonomy is the branch of biology that deals with the identification and naming of living things</td><td>[1]</td><td></td></tr>
<tr><td>(b) (i)</td><td><table><tr><td></td><td>group</td></tr><tr><td>A</td><td>Amphibian</td></tr><tr><td>B</td><td>Reptile</td></tr><tr><td>C</td><td>Insect</td></tr><tr><td>D</td><td>Mollusc;</td></tr></table></td><td>[1]</td><td>All correct for 1 mark</td></tr>
<tr><td>(ii)</td><td><table><tr><td></td><td>group</td><td>Feature 1</td><td>Feature 2</td></tr><tr><td>A</td><td>amphibian</td><td>has a back bone</td><td>has slime</td></tr><tr><td>B</td><td>reptile</td><td>has a back bone</td><td>has scaly skin;</td></tr><tr><td>C</td><td>insect</td><td>no back bone</td><td>has, 6/3 pairs, of legs;</td></tr><tr><td>D</td><td>mollusc;</td><td>no back bone</td><td>has a shell;</td></tr></table></td><td>[3]</td><td></td></tr>
</table>

<table>
<tr><th>Question 1</th><th colspan="4">Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>(c) (i)</td><td colspan="4"><table>
<tr><td>Triticum aestivum</td><td>D</td></tr>
<tr><td>Solanum tuberosum</td><td>G</td></tr>
<tr><td>Glycine max</td><td>C</td></tr>
<tr><td>Marihotesculerta</td><td>F</td></tr>
<tr><td>Ipomoea batatas</td><td>B</td></tr>
<tr><td>Zea mays</td><td>A</td></tr>
<tr><td>Oryzasativa</td><td>E</td></tr>
</table></td><td>[3]</td><td>5/6 right = 3
3/4 right = 3
1/2 right = 1
0 right = 0</td></tr>
<tr><td>(ii)</td><td>1
2
3
4
5
6
7
8</td><td>general feature:

leaf, width/shape;
leaf connection to stem/AW;
number of (named) flower parts;
number of dicotyledons/seed leaf;
leaves;
type of root;
pattern of vascular bundels;
present/absence of cambium/AW;</td><td>monocotyledon feature:

narrow leaves;
sheath/no petiole;
flower parts in multiples of 3
one cotyledon/seed leaf;
fibrious roots;
scattered vascular bundles;
no cambium/woody tissue</td><td>Max 1</td><td>Mark answer in context of general feature or referring to monocotyledonous plant –second feature

[Total = 9]</td></tr>
</table>

<table>
<tr><th>Question 2</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>(a) (i)</td><td>either cell or tonoplast membrane labelled;</td><td>[1]</td><td>label line must end on membrane</td></tr>
<tr><td>(ii)</td><td>
<table>
<tr><th>function</th><th>letter from Fig. 3.1</th><th>name</th></tr>
<tr><td>resists the turgor pressure of the cell</td><td>A</td><td>cell wall;</td></tr>
<tr><td>controls the activities of the cell</td><td>C</td><td>nucleus;</td></tr>
<tr><td>Site of chemical reactions of the cell including synthesis of proteins</td><td>D</td><td>cytoplasm</td></tr>
</table>
</td><td>[3]</td><td>Ignore ribosome/mitochondria</td></tr>
<tr><td>(b)</td><td>cytoplasm/vacuole decrease in size/volume;
(some) cell membrane/cytoplasm, pulls away/AW, from cell wall;
Plasmolysis/cells are plasmolysed;
Cells are flaccid/not turgid/lose turgor;
Cell walls no longer, pushed outward/withstand pressure;</td><td>[3]</td><td></td></tr>
</table>

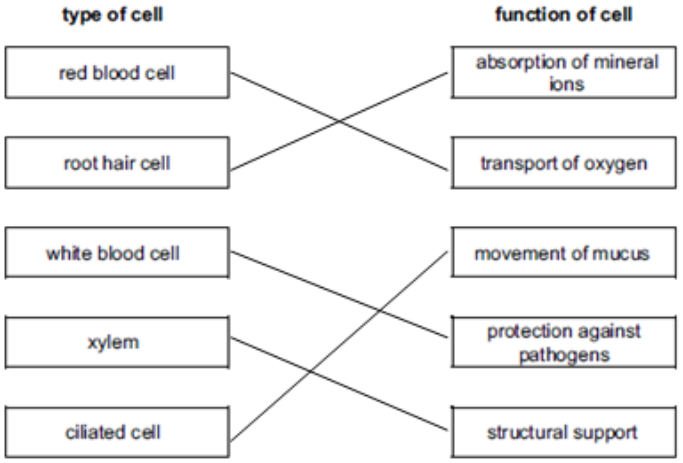
Question 2		Answers	Marks	Guidance
(c)	(i)	T- Red blood cell; absorb/carry/transport oxygen; Transport CO_2	[2]	
	(ii)	**B** phagocyte /; **C** lymphocyte**A/W**;	[2]	**A** white blood cell
(d)	(i)	Crista/cristae	[1]	Ignore matrix
	(ii)	Accept values between 20.8 µm (83mm) and 21,3 µm (85mm) Magnification = $\frac{image\ size}{object\ size}$	[1] [1]	Formula given/used but calculation wrong, award 1 mark

<table>
<tr><th>Question 3</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>(a)</td><td>
<table>
<tr><th>infectious disease</th><th>name of pathogen</th><th>type of pathogen</th><th>main mode of transmission</th></tr>
<tr><td>HIV/AIDS</td><td>human immunodeficiency virus (HIV)</td><td>virus</td><td>sexual contact</td></tr>
<tr><td>cholera</td><td>Vibrio cholerae</td><td>bacterium
A bacteria</td><td>Ingestion of contaminated water and food</td></tr>
<tr><td>tuberculosis</td><td>Mycobacterium, tuberculosis; or M.bovis;</td><td>bacterium</td><td>aerosol/droplets/ infection;
A described;
A airborne droplets;
R air droplets alone</td></tr>
<tr><td>malaria</td><td>Plasmodium vivax or P. malarae</td><td>Protoctist;
A protozoa
Aprotoctist (a)</td><td>Feeding/sucking blood/AW, by Anopheles/mosquito;
A mosquito/Anopheles, bite
Amosquito/Anopheles, Is vector</td></tr>
</table>
</td><td>[6]</td><td></td></tr>
</table>

<table>
<tr><th>Question 3</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>Description of event</th><th>outcome for the individual</th><th>production of memory cells / yes or no</th><th>type of immunity acquired by individual</th></tr>
<tr><td>individual P is injected with a live, weakened disease-causing organism</td><td>individual P does not become ill from the disease and has long-lasting protection from the disease</td><td>yes</td><td>artificial active</td></tr>
<tr><td>individual Q is injected with antibody against a specific disease-causing organism</td><td>individual Q does not become ill from the disease but is ill with the disease a year later</td><td>no</td><td>artificial passive</td></tr>
</table>
</td><td>4</td><td></td></tr>
<tr><td>(c)</td><td>1 infected person, coughs / sneezes / breathes out / AW, droplets ;
2 droplets containing, bacteria / pathogen / M. tuberculosis ;
3 airborne droplets / droplets in air / moist air, inhaled / inspired / breathed in (by uninfected person) ;
4 consumption of, milk / meat, containing, bacteria / pathogen /M. tuberculosis / M. bovis</td><td>3</td><td>A droplets if mp 2 given
A by, aerosol, infection / transmission</td></tr>
<tr><td>(d) (i)</td><td>A triceps

E biceps;</td><td>1

1</td><td></td></tr>
<tr><td>(ii)</td><td>two muscles that have opposite effect;</td><td>1</td><td></td></tr>
</table>

<table>
<tr><th>Question 4</th><th>Answers</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>(a)</td><td> 
</td><td>5</td><td>award marks based on origins of lines.
2 or more lines from a type of cell- no marks with the exception of 2 lines from the ciliated cell joining with movement of mucus and protection against pathogens</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>feature</th><th>fish</th><th>amphibian</th><th>reptile</th><th>birds</th><th>mammals</th></tr>
<tr><td>mammary glands</td><td>x</td><td>x</td><td>x</td><td>x</td><td>√;</td></tr>
<tr><td>fur/hair</td><td>x</td><td>x</td><td>x</td><td>x</td><td>√;</td></tr>
<tr><td>scales/scaly skin</td><td>√</td><td>x</td><td>√</td><td>√</td><td>x;</td></tr>
<tr><td>external ears</td><td>x</td><td>x</td><td>x</td><td>x</td><td>√;</td></tr>
<tr><td>feathers</td><td>x</td><td>x</td><td>x</td><td>√</td><td>x;</td></tr>
</table>
</td><td>4</td><td></td></tr>
</table>

Question 5	Answers	Marks	Guidance
(a)	800 (cm^3);	1	
(b)	lung(s); 2. skin; R sweat gland 3. kidney; 4. large intestine/colon;	4	
(c)	(SWEAT) (volume of sweat) would increase/ref. to more AW; ref. to cooling effect/stop body overheating AW; linked to first (URINE) (volume of urine) would decrease/ref. to less AW; due to increase in sweat production/reduce chance of dehydration AW/ less water in blood/to keep water in blood constant; due to secretion of ADH/due to increased absorption in nephron;	2 2	**R** explanation if volume is wrongly stated

Question 6		Answers	Marks	Guidance
(a)	(i)	A = aorta; B = pulmonary vein; C = atrium; D = ventricle; E = muscular wall;	5	
	(ii)	right ventricle;	1	
(b)	(i)	5 and 32; dm3 per min;	2	
	(ii)	380;;	2	(19 ÷ 5) × 100 = 1 mark
	(iii)	heart beats faster; heart pumps more blood out per beat / beats with more force per beat;	2	
	(iv)	F is fitter/AW/ has a stronger heart /is exercising more vigorously / has a larger body / larger heart /is male;	1	**ora** for **G**

Question 7	Answers	Marks	Guidance
(a)	1. liver, damage / failure / disease / cirrhosis ; R destroys A hardens 2. brain damage / loss of brain cells / loss of neurones / loss of memory / AW ; 3. cancer of correct named part of body ; 4. stomach ulcers ; 5. heart disease / stroke / AW ; 6. 6high blood pressure / hypertension ; 7. alcoholism / addiction / dependence / tolerance ; 8. (risk of) damage, to fetus / pregnant woman's baby / fetal alcohol syndrome / AW ; 9. increased risk of miscarriage ;	max 3	**AVP**
(b) (i)	(x) 9.0 (%);	1	
(ii)	as blood alcohol content of blood increases, so does risk of accident / AW; relevant comment on part of graph ; use of figures; little increase in risk up to, 0.05 / 0.075, g 100 cm^{-3} greater increase in risk above, 0.05 / 0.075, g 100 cm^{-3} comparative use of figures – must use figures from both axes	max 2	

Question 7	Answers	Marks	Guidance
(b) (iii)	1. depressant ; 2. slows down nerve impulses ; 3. slows down / increases, reaction / response, time(s) ; 4. e.g. for stimulus or response – traffic lights / braking / swerving / stopping / **AW**; 5. blurred / double / impaired / poor, vision **AW**; 6. poor / lack of, co-ordination / **AW**; 7. overconfidence / poor decision making / memory impaired; 8. poor judgment (of distances); 9. poor concentration / less aware;	max 3	**R** 'signals' / 'messages' **A** ref to reflexes **R** reaction time decreases A dizziness
(iv)	brain; spinal cord;	2	
(v)	light; sound; chemicals; temperature (change); object touching skin; pressure against skin; damage to skin;	max 3	**A**: position of body in space / **AW** **I** named sense organ

Question 8	Answers	Marks	Guidance
(a)	from ovulation to start of menstruation	1	
(b) (i)	27 days;	1	
(ii)	12^{th} to 16^{th} August	2	**R** if only 1 date is given without indicating the full range. **NB**: note that sperms can live for 5 days whereas the egg disintegrates after 1 day.
(iii)	oxygen; glucose; amino acids; glycerol; fatty acids; minerals / iron / calcium; vitamins / vitamin C / vitamin D; antibodies; water;	max 3	**A** any suitable named vitamin or mineral ion ignore nutrients / proteins / hormones
			Total [7]

Question 9	Answers	Marks	Guidance
(a)	1. overall carbon dioxide concentration increases; 2. at a steady rate; 3. there are minor fluctuations in carbon dioxide concentration; 4. the fluctuations occur, regularly / yearly / seasonally; 5. use of comparative figures with year and concentration with units;	max 3	**A** gradual **I** constant
(b) (i)	methane;	1	**I** carbon dioxide / carbon monoxide / waterunqualified. **A** other correct greenhouse gases
(ii)	1. radiation / light from the Sun hits, Earth/ atmosphere; 2. (named) short-wave radiation passes through carbon dioxide layer; 3. re-radiated / reflected, from the ground as long-wave radiation / infrared / heat energy; 4. long-wave radiation / infrared / heat energy, trapped / prevented from escaping 5. from atmosphere by carbon dioxide;	max 3	**I** climate change **A** re-emitted
			Total [7]

SPECIFICATION GRID

	Setting Grid- LIFE SCIENCE							
Question	**Syllabus reference**	**Bullets**	**Assessment Objectives**			**Target Grade**		
	Topic		**A**	**B**	**C**	**AB**	**CD**	**EU**
Q1 (a)	3.1	1	1					1
(b)	5.1	3	1					1
(c)	5.1	3	3				2	1
(d) (i)	3.2	4		3		1	2	
(ii)	5.1	2		1			1	
Q2								
(a) (i)	4.1	6			1			1
(ii)	4.1	3		3			3	
(b)	4.1	8			3		2	1
(c) (i)	7.2	2	2				1	1
(ii)	7.2	2	2					2
(d) (i)	4.1	3		1				1
(ii)		1.3		2			2	
Q3 (a)	2.2	1		6			4	2
(b)	2.3	3		4		1	2	1
(c)	2.2	2		3		1	1	1
(d) (i)	7.5	1	2					2
(ii)	7.5	1		1			1	
Q4 (a)	4.2	1	5			2	2	1
(b)	5.1	2		4			3	1
Q5 (a)	7.3	5		1			1	
(b)	7.3	3		4			3	1
(c)	7.3	3		4		1	2	1

Q6 (a) (i)	7.2	1	5			2	2	1
(ii)	7.2	2			1		1	
(b) (i)	7.2	3		2		2		
(ii)	7.2	3		2			1	1
(iii)	7.2	3		2			2	
(iv)	7.2	3		1			1	
Q7 (a)	7.4	3	2				1	1
(b) (i)	7.4	3		1		1		
(ii)	7.4	3		2		2		
(iii)	7.4	3		3		2	1	
(iv)	7.4	1	2					2
(v)	7.4	8	3				1	2
Q8 (a)	7.6	4	1				1	
(b) (i)	7.6	4		1			1	
(ii)	7.7	1		2		1	1	
(iii)	7.7	2		3			2	1
(iv)	7.7	2		3		1	1	1
Q 9 (a)	8.1	1		3		2	1	
(b) (i)	8.1	3	1					1
(ii)	8.1	4		3		1	1	1
Total			**30**	**65**	**5**	**20**	**50**	**30**