

Class:

Parent's Signature

DAMAI SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2016

Secondary Three Express Level

Biology (SPA)
Paper 1

5158/01

11 October 2016

8.15 am – 9.15 am

1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, class and register number in the spaces provided on this question paper and the answer sheet.

INFORMATION FOR CANDIDATES

Write in soft **2B** pencil.

There are forty questions on this paper. Answer all questions.

For each question there are four possible answers, A, B, C and D.

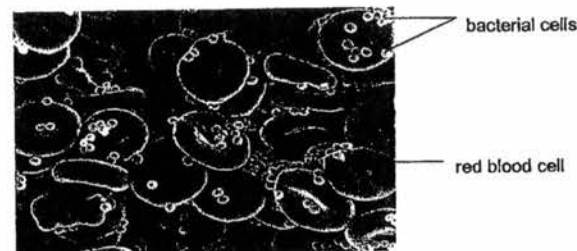
Choose the one you consider correct and shade your choice in soft pencil on the answer sheet.

2

Section A (40 marks)

Shade your answers in the answer sheet provided.

A1 A micrograph of red blood cells and bacterial cells shown below.



A student makes the following conclusion(s):

- I: Red blood cells are bigger than bacterial cells
- II: This micrograph was taken using a light microscope.
- III: Red blood cells and bacterial cells are biconcave in shape.

Based on the micrograph, which of the conclusions are correct?

- A I only
B I and III
C II and III
D III only

A2 What are the levels of organization of a leaf and phloem?

	Leaf	Phloem
A	Organ	Organ
B	Organ	Tissue
C	Tissue	Tissue
D	Tissue	Cell

A3 A student wants to find out if the number of chloroplasts per cell differs from plant species to plant species. What is the dependent variable in his investigation?

- A type of plant species
- B cost of the investigation
- C number of chloroplasts per cell
- D amount of time the plant spends in the sun

This question paper consists of 13 printed pages.

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[Turn over

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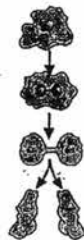
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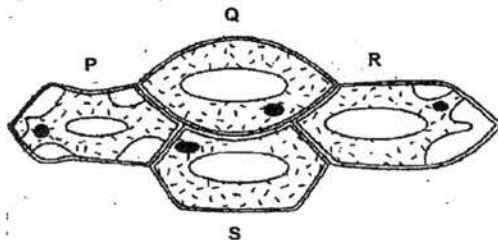
3

- A4 The diagram below shows a typical animal cell.



What activity is the organism exhibiting?

- A movement
C reproduction
- B photosynthesis
D respiration
- A5 Which of the following describes the pathway of a protein from its manufacture to its release from the cell?
- A endoplasmic reticulum → golgi complex → secretory vesicle
B golgi complex → endoplasmic reticulum → secretory vesicle
C secretory vesicle → endoplasmic reticulum → golgi complex
D secretory vesicle → golgi complex → endoplasmic reticulum
- A6 The diagram shows four plant cells in contact with each other.



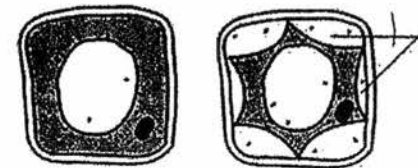
If the plant cells remain in contact as shown, water will move by osmosis from

- A P to Q.
C Q to P.
- B P to S.
C R to S.

4

- A7 An experiment involving osmosis was conducted on plant cells.

The diagram shows a plant cell at the start of the experiment and after being immersed in a concentrated salt solution for 30 minutes.

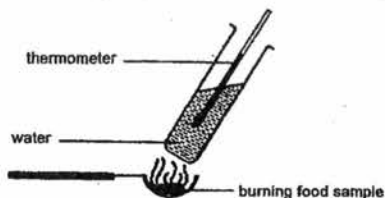


What is found in region X?

- A air
C salt solution
- B cell sap
D water
- A8 Which of the following would speed up the rate of diffusion?
- I: increasing temperature
II: increasing surface area for absorption
III: increasing volume for absorption
IV: increasing concentration gradient
- A I and II
C II and III
- B I, II and IV
D IV only
- A9 During the Benedict's test, the reagents are heated so as
- A to break down starch to glucose.
B to break down starch to reducing sugar.
C to speed up the rate of reaction of the test.
D to denature any proteins that might interfere with the reaction.

5

- A10 Four equal masses of different foods were burned as shown. The temperature of the water was measured before and after each experiment and recorded as shown.



Food Sample	Water temperature at start (°C)	Water temperature at end (°C)
P	18	50
Q	16	97
R	19	35
S	18	80

Which food sample probably contains the most and the least amount of fat respectively?

	Contains the most fats	Contains the least
A	P	R
B	P	S
C	Q	R
D	Q	S

- A11 Which of the following compounds is a protein?

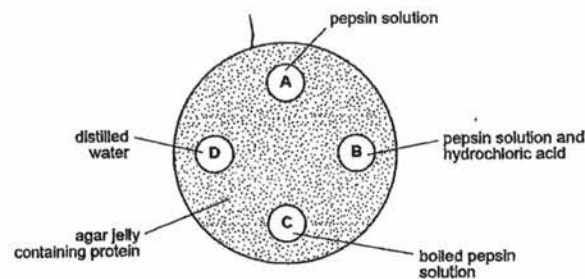
A	$C_6H_{12}O_6$	B	$(C_6H_{12}O_6)_n$
C	$C_{20}H_{41}COOH$	D	$C_{708}H_{1130}O_{224}N_{180}S_4$

- A12 Which of the following sugars make up one molecule of maltose?

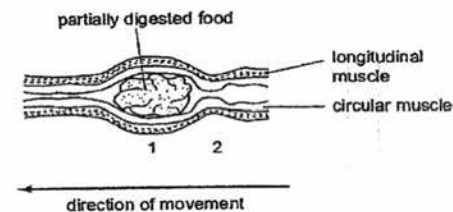
- A two molecules of glucose
 B one molecule of glucose and one molecule of lactose
 C one molecule of glucose and one molecule of fructose
 D one molecule of glucose and one molecule of galactose

6

- A13 A dish is filled with agar jelly containing protein. The protein causes the agar to appear cloudy. Four holes are made in the jelly and each hole is filled with different solutions as shown in the diagram below. After 30 minutes, which hole will be surrounded by the largest clear area?



- A14 The diagram shows a section of the small intestine in which partially digested food is being pushed along.



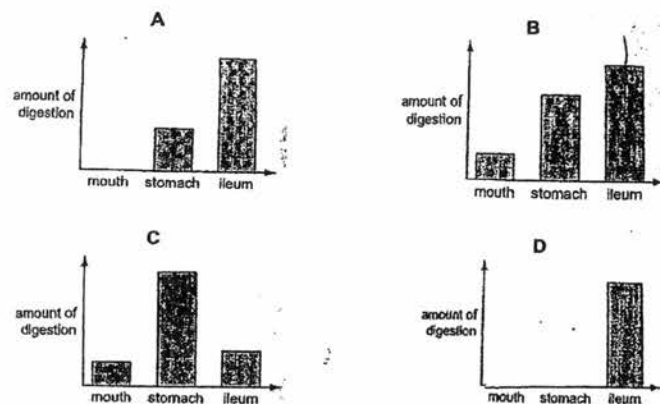
What is the state of the longitudinal muscles at 1 and 2?

	1	2
A	contracted	contracted
B	contracted	relaxed
C	relaxed	contracted
D	relaxed	relaxed

- A15 Which of the following is not an example of an enzymatic reaction?

- A emulsification of fats
 B breakdown of starch in the mouth
 C digestion of sucrose in the small intestine
 D conversion of prothrombin to thrombin during clotting

- A16 Which bar chart represents the amount of **proteins** digested in the mouth, stomach and small intestines of a human being?



- A17 The following secretions are taken from the human alimentary canal.

I: saliva II: gastric juice III: bile
IV: intestinal juice V: pancreatic juice

Which of the secretion(s) is/are acidic?

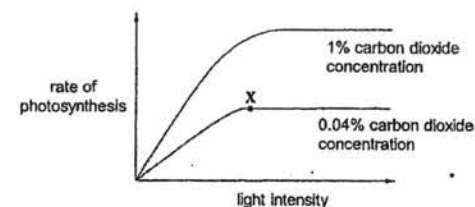
- A I and III only B II only
C III and IV only D V only
- A18 What is the main function of the gall bladder?
- A storage of bile
B absorption of water
C secretion of enzymes
D uptake of monosaccharides and amino acids
- A19 Which order of these events happen in human nutrition?
- A digestion → ingestion → absorption → assimilation
B digestion → ingestion → assimilation → absorption
C ingestion → digestion → absorption → assimilation
D ingestion → digestion → assimilation → absorption

- A20 Which of the following is made from the sugar produced during photosynthesis?

I: cellulose II: lipids III: proteins IV: starch

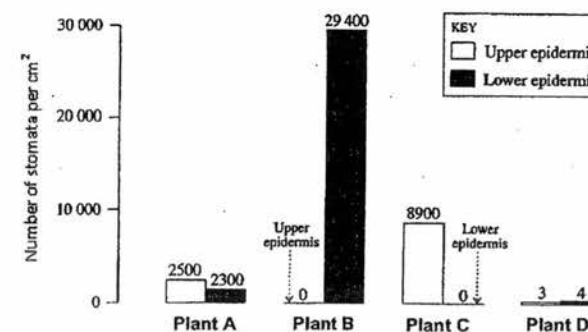
- A I only B I and IV
C II and III D I, II, III and IV

- A21 The graph shows how the rate of photosynthesis in a plant varies with light intensity at two different carbon dioxide concentrations. The temperature is kept constant at 20°C.



From the graph, which is no longer a limiting factor of the rate of photosynthesis at point X?

- A carbon dioxide B light intensity
C temperature D water availability
- A22 The following graph shows the number of stomata on four different plant species.

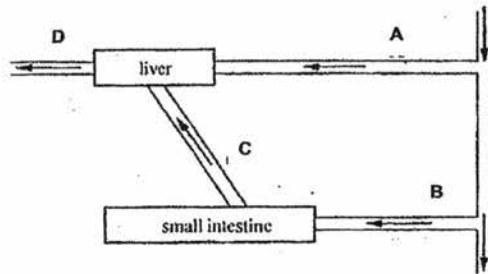


Which plant is an aquatic plant?

A23 Which leaf tissue has the highest concentration of chloroplasts?

- A upper epidermis
C spongy mesophyll
B palisade mesophyll
D lower epidermis

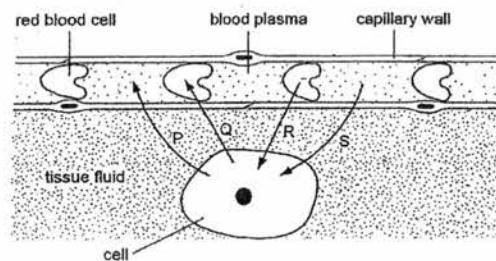
A24 The diagram shows part of the blood system. Which vessel carries blood with the least amount of oxygen?



A25 What of the following is part of the lymphatic system?

- A lacteals
C lentils
B lenticels
D lymphocyte

A26 The diagram below shows a blood capillary with an adjacent cell. The arrows represent the transfer of substances between the capillary and the cell.



Which path represents the path of oxygen in a respiring tissue?

- A P
C R
B Q
D S

A27 Which of the following describes the condition of a person with blood type A?

	Antigen	Antibody
A	A	A
B	A	B
C	B	A
D	B	B

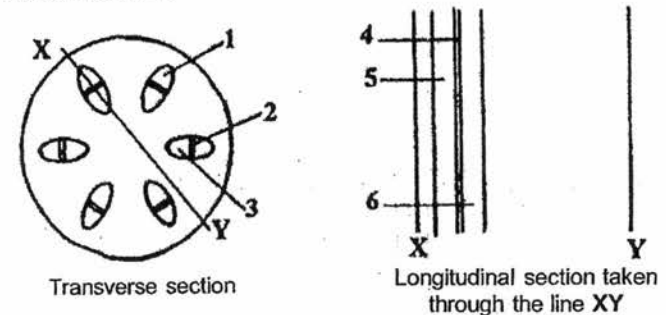
A28 What is the function of the tricuspid valve?

- A to prevent the backflow of blood from the left atrium to left ventricle
B to prevent the backflow of blood from the left ventricle to left atrium
C to prevent the backflow of blood from the right atrium to right ventricle
D to prevent the backflow of blood from the right ventricle to right atrium

A29 Which blood vessel carries blood under the highest pressure?

- A aorta
C pulmonary vein
B pulmonary artery
D vena cava

A30 The following diagrams show the transverse and longitudinal sections through a dicotyledonous stem.



Which part transports sugars and amino acids?

- A 1 and 4
C 2 and 5
B 1 and 5
D 3 and 6

[Turn over

A31 Potassium cyanide is a toxic chemical because it inhibits respiration. Which of the following would most likely happen if a root hair cell was treated with potassium cyanide?

- A uptake of water by osmosis would cease
- B uptake of oxygen by diffusion would cease
- C uptake of minerals by diffusion would cease
- D uptake of minerals by active transport would cease

A32 Which conditions will result in the maximum rate of water uptake by a plant?

	Weather	Temperature	Time of day
A	dry	10°C	midnight
B	dry	20°C	midday
C	wet	20°C	midnight
D	wet	10°C	midday

A33 Which of the following describes what happens to the internal intercostal muscles, ribs and diaphragm during inhalation?

	Internal intercostal muscles	Ribs	Diaphragm
A	relaxes	upwards	contracts
B	relaxes	downwards	contracts
C	contracts	upwards	relaxes
D	contracts	downwards	relaxes

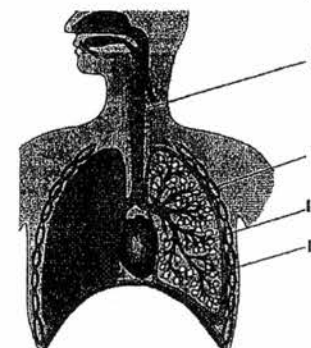
A34 The addictive ingredient of cigarette smoke is

- A adrenaline.
- B carbon monoxide.
- C nicotine.
- D tar.

A35 What causes the symptoms of bronchitis?

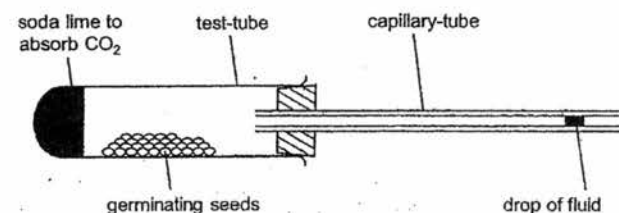
- A breakdown of alveolar wall
- B inflammation of the airway walls
- C narrowing of pulmonary arteries
- D uncontrolled division of lung cells

A36 A diagram of the respiratory system is shown below. Which of the following lists of structures do not possess cartilage?



- A I and II
- B I and III
- C II and IV
- D III and IV

A37 A student set up the following experiment to examine the effects of respiration.



After a few hours, the drop of fluid will

- A move towards the seeds due to the intake of oxygen.
- B move towards the seeds due to the intake of carbon dioxide.
- C move away from the seeds due to the output of carbon dioxide.
- D will not move due to the intake and output of oxygen and carbon dioxide respectively.

A38 Which of the following is an excretory organ?

- A anus
- B large intestine
- C lungs
- D pharynx

A39 What provides the force for ultra-filtration in the nephron?

- A** breakdown of urea
- B** anti-diuretic hormone
- C** contraction of the left ventricle
- D** energy from the mitochondria of the Bowman's capsule

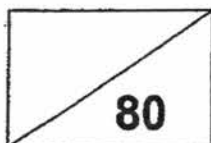
A40 What passes through the membrane of the membranes of the dialysis machine?

- | | |
|--------------------------------------|---------------------------|
| A protein and red blood cells | B protein and urea |
| C red blood cells and urea | D urea and water |

- End of Paper 1 -

Name of setter: Reuben Ng

Name : _____ () Class : _____



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DAMAI SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2016

Secondary Three Express

Biology (SPA)
Paper 2

5158/02

11 October 2016

11.00 am – 12.45 pm

1 hour 45 minutes

INSTRUCTIONS TO CANDIDATES

Write your full name, register number and class in the spaces provided on the cover of this question paper.

Write in dark blue or black pen.

Do not use staples, paper clips, highlighters, glue or correction fluid.

There are 2 Sections to this paper.

Section B and C

Write your answers in the spaces provided on the question paper.

Questions C9 and C10 are compulsory.

Question C11 is in the form of an **Either/Or** question.

INFORMATION FOR CANDIDATES

The number of marks is given in the brackets [] at the end of each question.

For Examiner's Use	
Section A	
Section B	
Section C	

This question paper consists of 14 printed pages including this page.

[Turn over

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Section B (50 marks)
Answer all questions in the spaces provided.

B1 Fig. 1.1 shows a unicellular fungal cell.

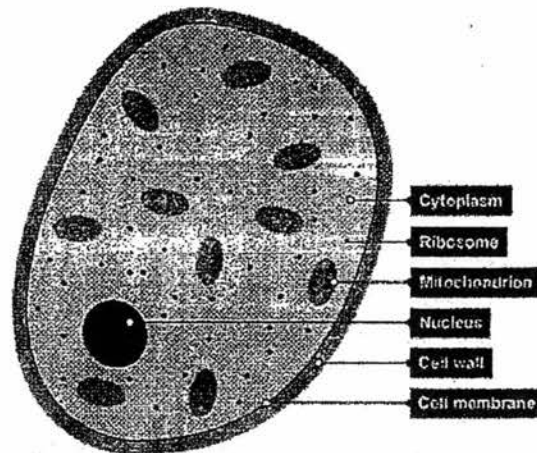


Fig. 1.1

(a) Define unicellular.

.....
..... [1]

(b) A student examines the cell, and almost mistakes it as a plant cell. Suggest why he might have made this mistake.

..... [1]

(c) Describe the function of the following organelles:

(i) cell membrane

..... [1]

(ii) mitochondrion

..... [1]

(iii) cytoplasm

..... [1]

- B2** Fig. 2.1 shows an experimental set up involving a yam tuber. A cavity was bored into a freshly peeled yam tuber. The cavity is filled with concentrated sucrose solution before immersing the yam tuber into a beaker of dilute sucrose solution.

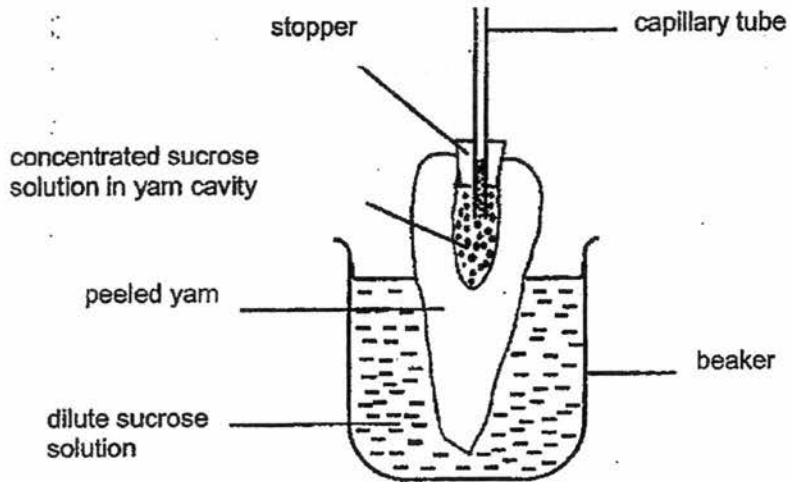


Fig. 2.1

- (a) State what happened to the level of the concentrated sucrose solution in the capillary tube after thirty minutes. Explain your answer.

.....

 [3]

- (b) Suggest why the yam was peeled.

.....
 [2]

- (c) Predict what would happen to the liquid level in the capillary tube if the dilute sucrose solution was replaced with distilled water.

.....
 [1]

[Turn over

B3 Fig. 3.1 shows the lock and key hypothesis of how enzymes work.

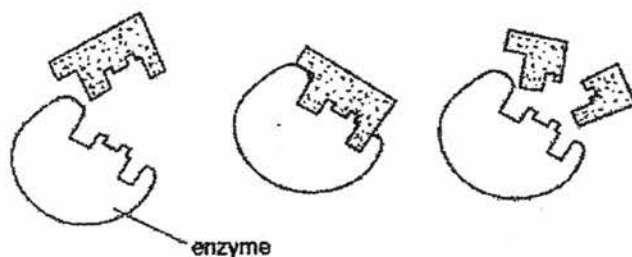


Fig. 3.1

(a) With reference to Fig. 3.1, explain the hypothesis.

.....

.....

.....

..... [3]

(b) State two characteristics of enzymes that can be explained from the hypothesis.

.....

..... [2]

B4 Fig. 4.1 below shows some chemical molecules found in the human body and how they are joined to form larger molecules.

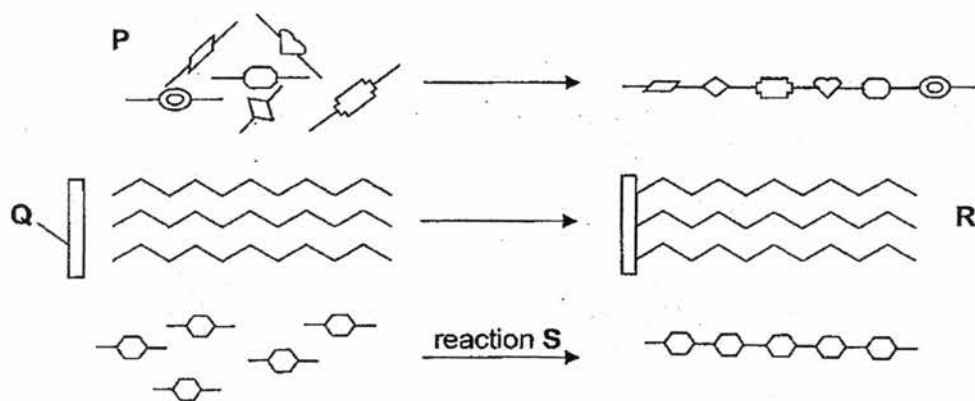


Fig. 4.1

(a) Identify molecules **P**, **Q** and **R**.

P:

Q:

R:

[3]

(b) (i) State which organ is **primarily** responsible to ensure that reaction **S** takes place and name the product formed in this reaction.

.....

..... [2]

(ii) State the importance of reaction **S**.

.....

..... [1]

B5 Fig. 5.1 shows the transverse section of a leaf.

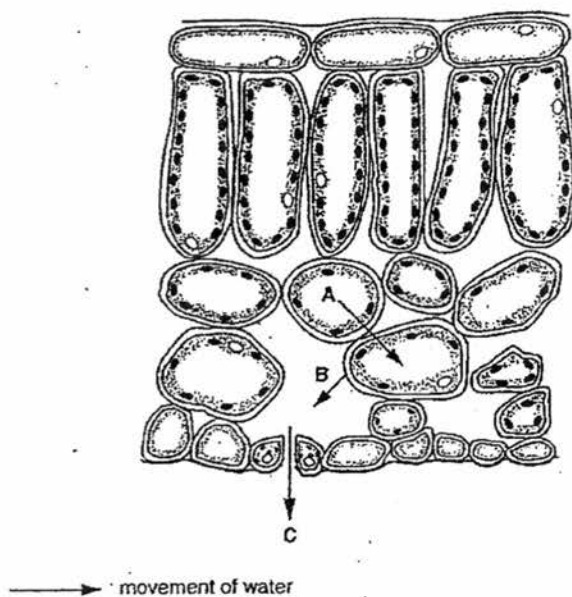


Fig. 5.1

(a) Name the processes **A** and **C**, by which water moves.

A

C

[2]

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[Turn over

- (b) Describe and explain how the xylem is adapted for the transport of water.

.....
 [2]

- (c) Fig. 5.2 shows a potometer. A potometer is a device used to measure the rate of transpiration of a plant.

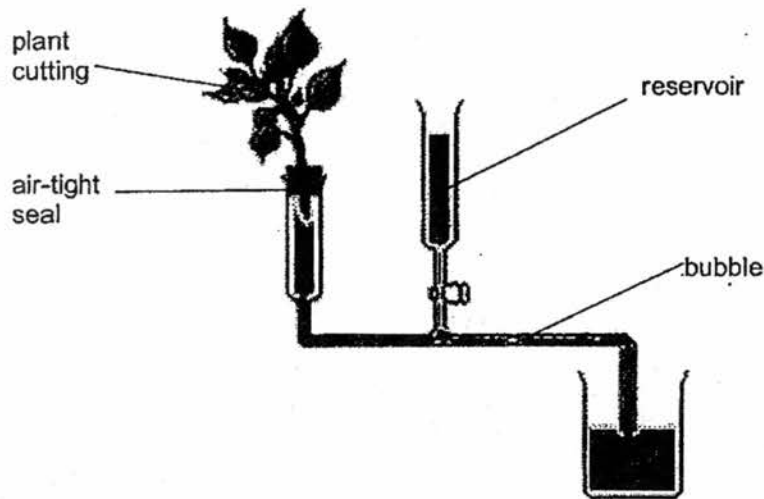


Fig. 5.2

- (i) On Fig. 5.2, draw an arrow to represent the expected movement of the bubble. [1]
- (ii) Suggest the function of the reservoir.
- [1]
- (iii) Explain why the rate of transpiration can only be measured indirectly by the potometer.
- [1]

B6 (a) Write down the word equation of photosynthesis.

..... [1]

(b) Explain the importance of photosynthesis for animals.

.....
.....
..... [2]

(c) Describe the role of guard cells in photosynthesis.

.....
.....
..... [2]

B7 (a) Define respiration.

.....
..... [2]

(b) Describe the events of anaerobic respiration in humans

.....
.....
.....
..... [3]

B8 Fig. 8.1 shows the nephron.

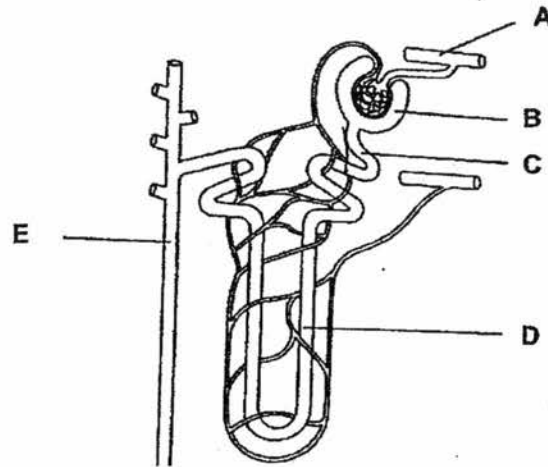


Fig. 8.1

- (a) Name structures A, B and C

A

B

C

[3]

- (b) Other than water, state the substance present in A, B, C, D and E.

..... [1]

- (c) On Fig. 8.1, label the glomerulus using the letter F. [1]

- (d) Explain why glucose is present in B but not in E.

.....

 [3]

- (e) A patient has a damaged kidney. Instead of going for dialysis, he decides to go for an organ transplant.

- (i) Define organ transplant.

.....
 [2]

- (ii) State one advantage of transplants over dialysis.

.....
 [1]

- End of Section B -

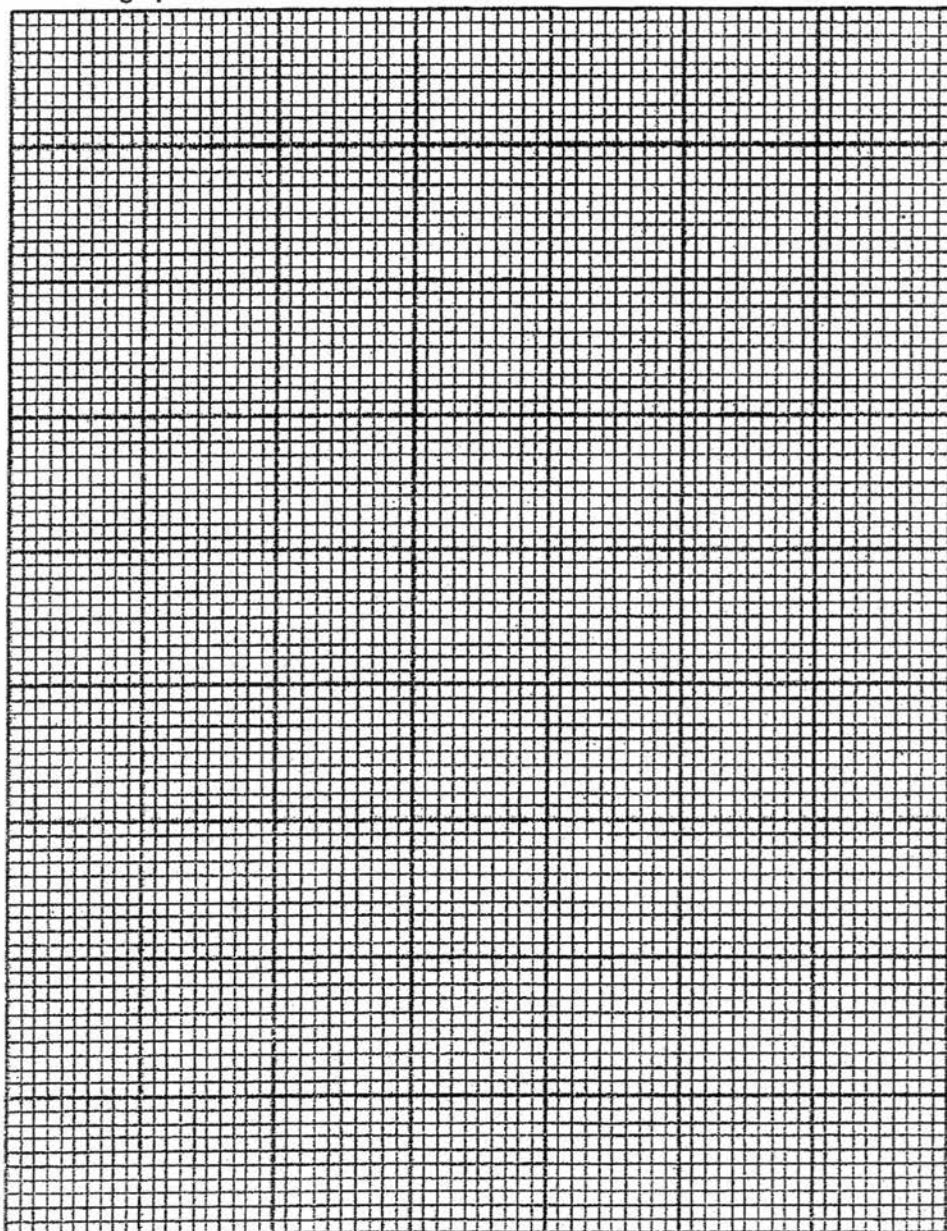
Section C (30 marks)

Answer three questions.

Question **C11** is in the form of Either/Or question. Only one part needs to be answered.**C9** Table 9.1 shows the effect of temperature of the clotting time of blood.**Table 9.1**

Temperature/ °C	10	15	20	25	30	35	40	45
Time/ s	86	58	40	32	28	20	30	60

(a) Plot a graph based on the data from Table 9.1.



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[4]
[Turn over]

- (b) With reference to the graph, describe the relationship between temperature and clotting.

.....

.....

.....

.....

.....

..... [4]

- (c) Outline the main stages in blood clotting.

.....

.....

.....

.....

.....

..... [4]

C10 Fig. 10.1 shows the structures involved in human gaseous exchange.

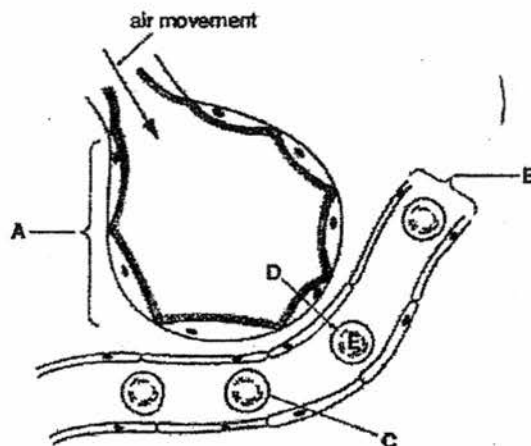


Fig. 10.1

(a) Name the structures A, B and C.

A

B

C [3]

(b) Describe what happens to a molecule of oxygen when it moves from D to E.

.....

 [3]

(c) With reference to Fig. 10.1, state two structural features of the alveoli facilitating gaseous exchange.

.....

 [2]

C11 Either

Fig. 11.1 shows the volume of water gained and lost per day by a person living in a tropical climate.

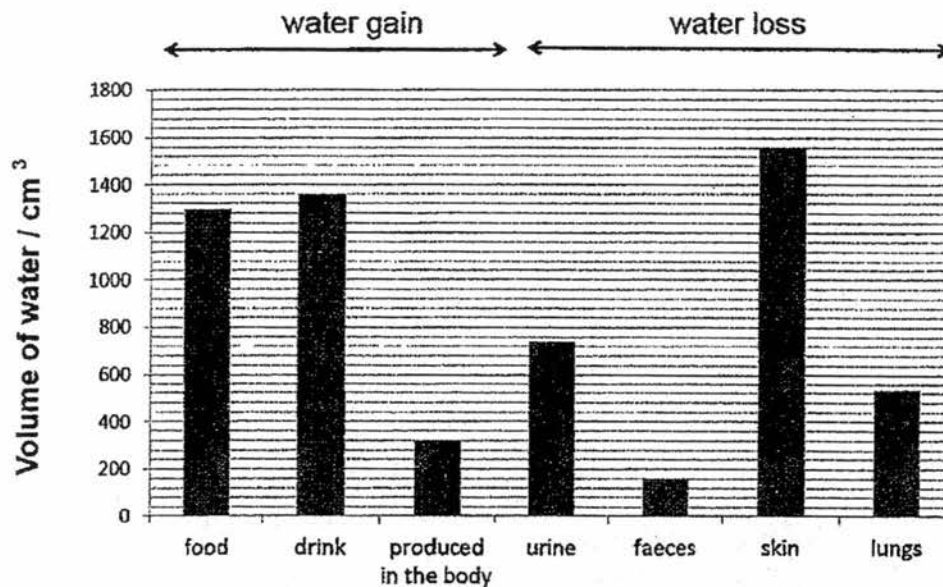


Fig. 11.1

(a) (i) State the form in which water is loss from the lungs.

..... [1]

(ii) Name the process which produces water in the body.

..... [1]

(b) Calculate the net volume of water loss per day.

Volume of water loss= [2]

(c) Predict two ways the volume of water loss would change compared to Fig 11.1 if the weather was much colder.

.....

 [2]

- (d) Describe how the brain is involved in the reabsorption of water.

.....

.....

.....

..... [3]

- (e) Other than the kidneys, list another organ that reabsorbs water.

..... [1]

C11 OR

(a)

Describe the digestion of fats in the human alimentary canal.

.....

.....

.....

.....

.....

..... [4]

(b)

Explain how the structure of villi is adapted for its functions.

.....

.....

.....

.....

..... [3]

(c)

Describe the effects of alcohol on the liver.

.....

.....

.....

.....

..... [3]

- End of Paper 2 -

Name of setter: Reuben Ng

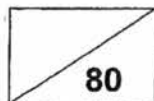


Damai Secondary School
BIOLOGY PAPER 1-2016

ANSWERS

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

Name : _____ () Class : _____



Parent's Signature



DAMAI SECONDARY SCHOOL
END OF YEAR EXAMINATION 2016

Secondary Three Express

Biology (SPA)
Paper 2

5158/02

Tuesday 10 September 2016

8.15 am – 10.15am

2 hours

INSTRUCTIONS TO CANDIDATES

Write your full name, register number and class in the spaces provided on the cover of this question paper.

Write in dark blue or black pen.

Do not use staples, paper clips, highlighters, glue or correction fluid.

There are 2 Sections to this paper.

Section B and C

Answer **all** questions. Write your answers in the spaces provided on the question paper.
Answer **only 3** questions in **Section C**.

INFORMATION FOR CANDIDATES

The number of marks is given in the brackets [] at the end of each question.

For Examiner's Use	
Section A	
Section B	
Section C	

This question paper consists of 14 printed pages including this page.

[Turn over

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2

Section B - 50 marks

Answer all questions in the spaces provided.

B1 Fig. 1 shows a unicellular fungal cell.

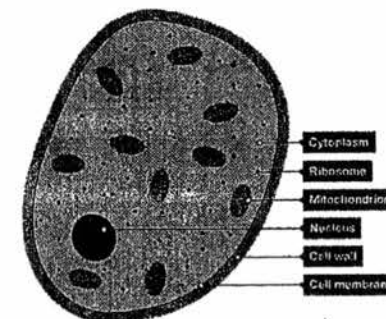


Fig. 1

- (a) Define unicellular.
An organism that only consist of one cell. [1]
- (b) A student examines the cell, and almost mistakes it as a plant cell. Suggest why he might have made this mistake.
The presence of cell wall [1]
- (c) Describe the function of the following organelles:
- (i) cell membrane
Control the substances entering orleaving the cell [1]
- (ii) mitochondrion
Produce energy for the cell [1]
- (iii) cytoplasm
Site at which chemical reactions take place [1]

3

- B2 Fig. 2 shows an experimental set up involving a yam tuber. A cavity was bored into a freshly peeled yam tuber. The cavity is filled with concentrated sucrose solution before immersing the yam tuber into a beaker of dilute sucrose solution.

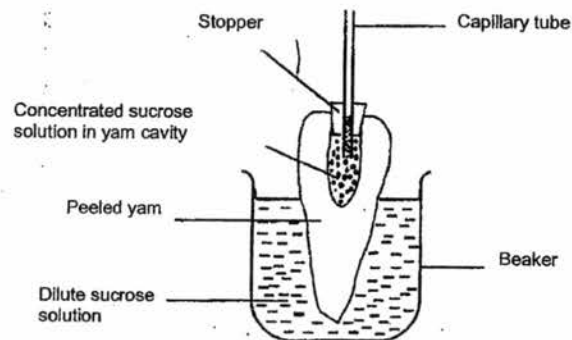


Fig.2

- (a) State what happened to the level of the concentrated sucrose solution in the capillary tube after thirty minutes. Explain your answer.

It will rise [1]

The water potential in the cavity is **lower** than in the beaker [1]
Thus water **moved from the beaker to cavity via osmosis** [1]

- (b) Suggest why the yam was peeled.

The skin of the yam is **impermeable** [1]

Peeling **exposes the yam membrane** which is partially-permeable [1]

- (c) Predict what would happen to the liquid level in the capillary tube if the dilute sucrose solution was replaced with distilled water.

The liquid level **will go higher** [1]

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4

- B3 Fig. 3 shows the lock and key hypothesis of how enzymes work.



Fig. 3

- (a) With reference to Fig. 3, explain the hypothesis.

- Keys have a **specific/complementary shape** to locks [1]
- Similarly, the **active site** of an enzyme is specific to certain substrates [1]
- Substrates that fit the active site will form an enzyme-substrate complex and **the reaction will be catalysed** [1]
- Substrates that do not fit the active site **will not be catalysed** [1]

(max three marks)

- (b) State two characteristics of enzymes that can be explained from the hypothesis.

Enzymes are **unchanged** at the end of the reaction [1]

Enzymes are **specific** [1]

(max three marks)

- B4 Fig. 4 below shows some chemical molecules found in the human body and how they are joined to form larger molecules.

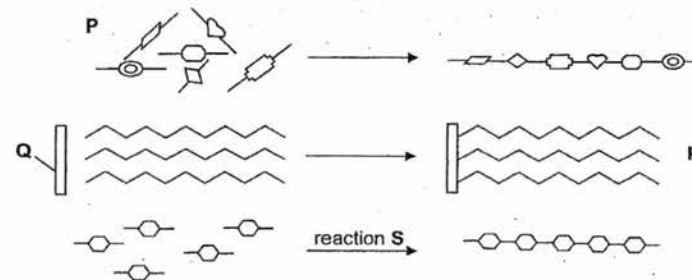


Fig. 4

- (a) Identify molecules P, Q and R.

P: amino acids

Q: glycerol

R: Fat/lipid

[3]

- (b) (i) State which organ is **primarily** responsible to ensure that reaction S takes place and name the product formed in this reaction.

Liver

Glycogen [2]

- (ii) State the importance of reaction S:

it lowers the blood-glucose level

It allows the storage of carbohydrates

[1]

OR

- B5 Fig. 5.1 shows the transverse section of a leaf.

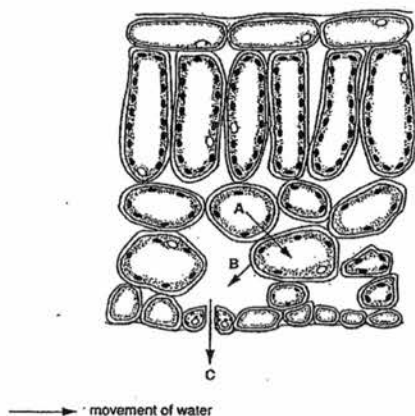


Fig. 5.1

- (a) Name the processes A and C, by which water moves.

A osmosis

C Diffusion

[2]

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- (b) Describe and explain how the xylem is adapted for the transport of water.

No protoplasm [1]

Allows the **unhindered movement** of water [1]

- (c) Fig. 5.2 shows a potometer. A potometer is a device used to measure the rate of transpiration of a plant.

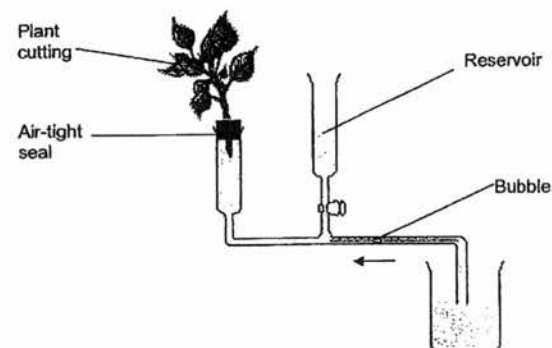


Fig. 5.2

- (i) On Fig. 5.2, draw an arrow to represent the expected movement of the bubble. [1]
(See diagram)

- (ii) Suggest the function of the reservoir.

To **reset** the bubble's position/ to move the bubble to the right [1]

- (iii) Explain why the rate of transpiration can only be measured indirectly by the potometer.

It measures the **rate of water uptake**, not loss [1]

- B6 (a) Write down the word equation of photosynthesis

Water + Carbon dioxide → Oxygen + glucose [1]
(Chlorophyll and sunlight may be included)

- (b) Explain the importance of photosynthesis for animals.

OR
It produces oxygen [1]
Which animals require for respiration [1]
It makes its own food [1]
Which animals require for nutrition [1] directly or indirectly

- (c) Describe the role of guard cells in photosynthesis.

It controls the stomata [1]
Which allows the entry of carbon dioxide [1]

- B7 (a) Define respiration.

The breakdown/oxidation of food [1] to produce energy [1]

- (b) Describe the events of anaerobic respiration in humans

When the demand for oxygen exceeds oxygen supply to the muscles [1]
The muscles will convert glucose directly into lactic acid [1]
Generating little energy [1]

- B8 Fig. 8 shows the nephron.

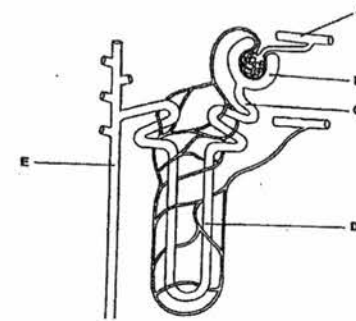


Fig. 8

- (a) Name structures A, B and C

A Afferent arteriole

B Bowman's capsule

C Proximal convoluted tubule

[3]

- (b) Other than water, state the substance present in A, B, C, D and E.

urea [1]

- (c) On Fig. 8, label the glomerulus using the letter F.

[1]

- (d) Explain why glucose is present in B but not in E.

Glucose is small enough to be present in B [1]
after ultrafiltration [1]
However, glucose will be reabsorbed in the convoluted tubule and Loop of Henle [1]

- (e) A patient has a damaged kidney. Instead of going for dialysis, he decides to go for an organ transplant.

- (i) Define organ transplant.

The transfer of a set of healthy tissues [1] from one person to another. [1]

- (ii) State one advantage of transplants over dialysis.

No need to go for frequent treatments [1]

- End of Section B -

Section C - 30 marks

Answer three questions.

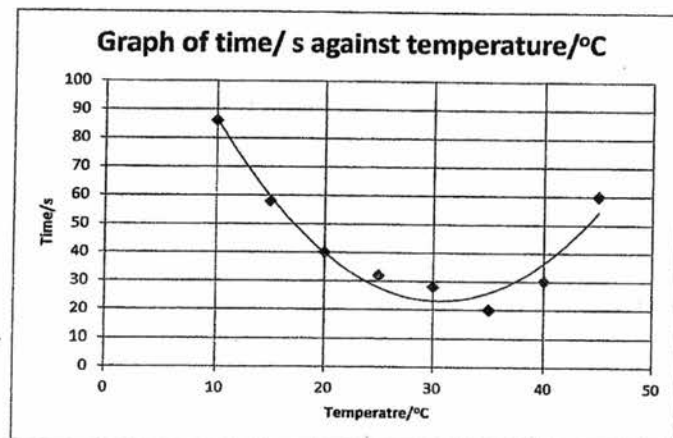
Question C11 is form of Either/Or question. Only one part needs to be answered.

C9 Table 9 shows the effect of temperature of the clotting time of blood.

Table 9

Temperature/°C	10	15	20	25	30	35	40	45
Time/s	86	58	40	32	28	20	30	60

(a) Plot a graph based on the data from Table 9.



Axes [1]
 Points [1]
 best fit curve [1]
 Scale [1]

23.7

(b) With reference to the graph, describe the relationship between temperature and clotting.

As **temperature increases** from 10 to 35 °C, the time taken for **clotting decreases** from 86 to 20s [1]

When temperature **increases** from 35 °C, the time taken to clot **increases**. [1]

The **optimum temperature** for clotting is 35 °C [1]

Use of **data numbers** [1]

(c) Outline the main stages in blood clotting.

Peter's **damaged tissues and platelets** would release **thrombokinase** in the blood. [1]

Thrombokinase in the presence of calcium ions converts **prothrombin** to **thrombin** [1]

Thrombin converts **fibrinogen** to **fibrin** [1]

The insoluble fibrin threads **entangle blood cells** and a **clot is formed**, preventing further bleeding [1]

C10 Fig. 10 shows the structures involved in human gaseous exchange.

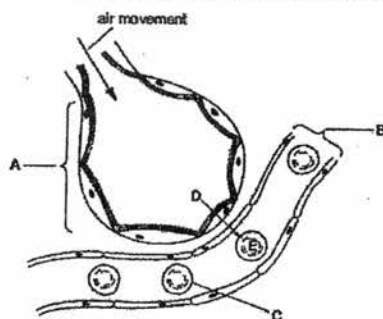


Fig. 10

(a) Name the structures A, B and C.

A Alveolus

B Capillary

C Red blood cell

[3]

(b) Describe what happens to a molecule of oxygen when it moves from D to E.

Oxygen in D gets **dissolved in the thin film of moisture** at the alveoli [1]

The oxygen then moves to the blood in E via **diffusion** [1]

Oxygen **combines with the haemoglobin** in E [1]

(c) With reference to Fig. 10, state two structural features of the alveoli facilitates gaseous exchange.

One cell thick walls → increases rate of diffusion

Closely associated with blood capillaries → continual diffusion [1]

Richly supplied with blood capillaries → high rate of diffusion [1]

(Max three marks)

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C11 Either

Fig. 11 shows the volume of water gained and lost per day by a person living in a tropical climate.

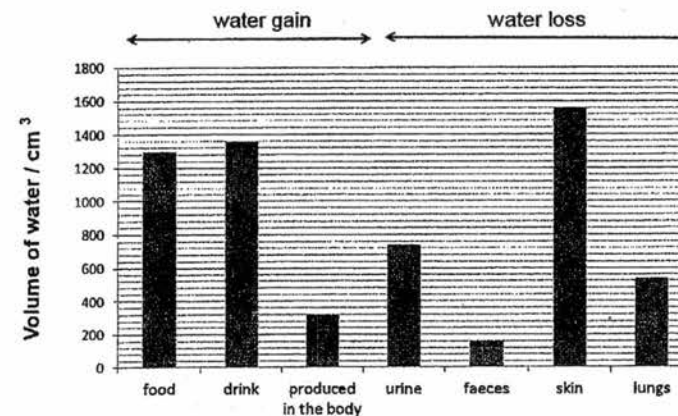


Fig. 11

(a) (i) State the form in which water is lost from the lungs.

Water vapour [1]

(ii) Name the process which produces water in the body.

Condensation [1]

(b) Calculate the net volume of water loss per day.

Water gained = $1300 + 1360 + 320 = 2980 \text{ cm}^3$ [1]

Water loss = $740 + 160 + 1560 + 540 = 3000 \text{ cm}^3$

Net water loss = $3000 - 2980 = 20 \text{ cm}^3$

Volume of water loss = 20 cm^3 [1]

(c) Predict two ways the volume of water loss would change compared to Fig 11 if the weather was much colder.

Water loss via **skin will decrease** [1]

Water loss via **urine will increase** [1]

- (d) Describe how the brain is involved in the reabsorption of water.

The changes in osmotic pressure is detected by the **hypothalamus** [1]
 The pituitary gland then releases **anti-diuretic hormone** [1] which controls the permeability of nephron to water
 If **more ADH** is released, **more water is reabsorbed**. [1]

- (e) Other than the kidneys, list another organ that reabsorbs water.

Large intestine/small intestine [1]

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C11 OR

- (a) Describe the digestion of fats in the human alimentary canal.

In the small intestine, **bile** released from the gall bladder **emulsifies** the fats [1]
 This creates a **large surface area/ increases the rate of digestion** [1]
Intestinal lipase and pancreatic lipase [1]
 Will break down fats into **fatty acid and glycerol** [1]

- (b) Explain how the structure of villi is adapted for its functions.

One cell thick → allows quicker diffusion of substances [1]
Presence of microvilli → more greater area for absorption of substances [1]
Close to blood capillaries and lacteals → continual maintenance of concentration gradient and hence continual diffusion [1]

- (c) Describe the effects of alcohol on the liver.

Liver is involved with the **breakdown** of alcohol [1]
 via **alcohol dehydrogenase** [1]
 Excess alcohol will cause **cirrhosis** of liver [1]
 where liver tissue will turn into **fibrous tissue** [1]
 (max 3 marks)