Name:	Index Number:	Class:

HUA YI SECONDARY SCHOOL

2E Mid Year Examination 2017 **2E**

SCIENCE

Section A

9May 2017

2 hours

Candidates answer on the Multiple Choice Answer Sheet
Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write your Name, Index Number and Class on all the work you have done.
Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.

There are **thirty** 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 record your choice in **soft pencil** on the separate Optical Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

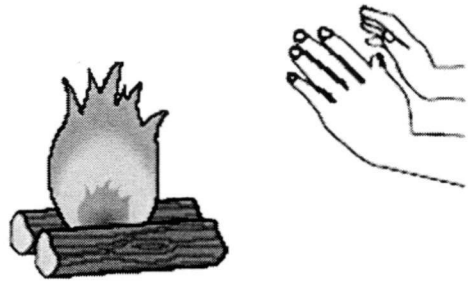
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

[Turn Over]

Setter:Mr Jonathan Goh

Section A (30 marks)

1 The diagram shows a person warming his hands beside a campfire.



What are the main processes that transfer heat from the fire to his hands?

I	conduction
II	convection
III	radiation

A III only
B I and III only
C II and IIIonly
D I, II and III

2 Which of the following statements is **not** true of conduction?

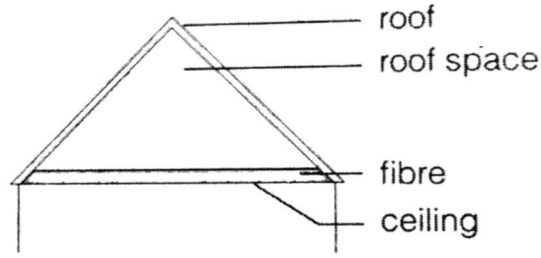
A Conduction can only occur between objects that are in direct contact with each other.
B Conduction can take place in all three states of matter.
C Conduction is the process of heat transfer by the movement of molecules.
D Conduction involves the vibration and collision of particles with each other.

3 There are many methods of heat transmission. Which method is reduced by the vacuum in a vacuum flask?

I	conduction
II	convection
III	radiation

A I only
B I and II only
C I and IIIonly
D I, II and III

4 Fibre is used for home insulation as shown.



How does fibre prevent heat from passing easily through the ceiling?

A Fibre allows air to pass through easily.
B Fibre is tightly packed.
C Fibre is warm.
D Fibre traps air.

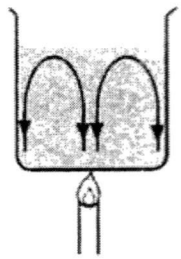
5 Arrange the following objects in sequence based on their ability to conduct heat, starting from the best conductor of heat.

I copper
II nitrogen
III oil
IV vacuum

A I, II, III, IV
B I, III, II, IV
C III, I, II, IV
D IV, III, II, I

6 Which of the following diagrams correctly shows the direction of convection currents in a beaker of liquid when it is heated?

A



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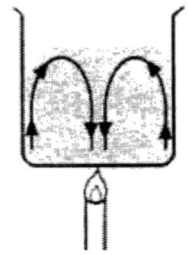

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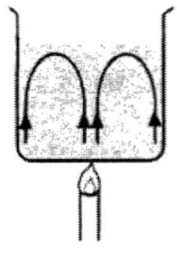
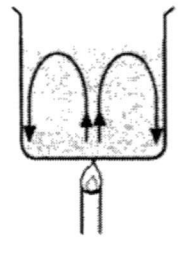


D



7 The freezing points of four substances are given below:

substance	freezing point / °C
Ammonia	-79
Ethanol	-120
Mercury	-39
Water	0

The four substances above were kept in a very cold freezer. After 2 hours, only one of the substances was found to be still in the liquid state, while the other three are frozen solid. Which of the following is the most likely temperature of the freezer?

A 0°C
B -100°C
C -50°C
D -200°C

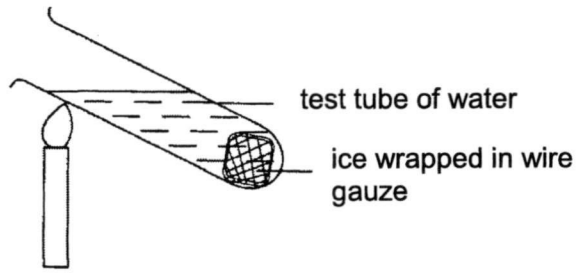
8 What is the function of bile?

A It breaks up large fat droplets into smaller fat droplets.
B It is an enzyme that breaks down all nutrients into smaller molecules.
C It will absorb fats and allow fats to be chemically digested
D It will allow food to travel through the small intestine faster.

9 Which one of the following substances does not have to be digested before it can pass through a cell membrane?

A fats
B glucose
C proteins
D starch

10 In this diagram, the water at the top boils but the ice wrapped in wire gauze at the bottom of the test tube does not melt. Which of the following conclusions can be drawn?

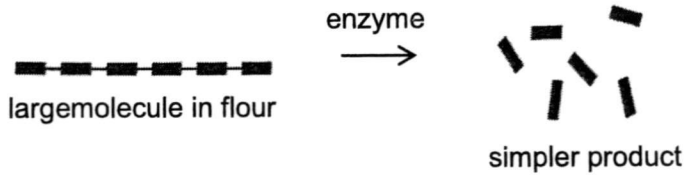


A water has a low boiling point compared to the ice.
B gauze is a good conductor of heat.
C water is a poor conductor of heat.
D the flame is a non-luminous flame.

11 A piece of plant tissue is transferred from a beaker of water into a concentrated sugar solution. Which of the following correctly describes what happens?

	movement of water	volume of tissue cells
A	enters the cells	decreases
B	enters the cells	increases
C	leaves the cells	decreases
D	leaves the cells	increases

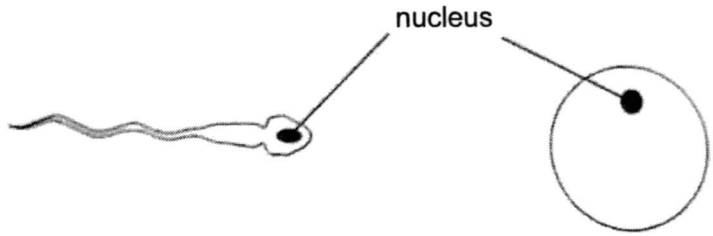
12 This diagram represents a large molecule found in flour which is broken down to a simpler product by an enzyme.



Which row identifies the large molecule and the enzyme?

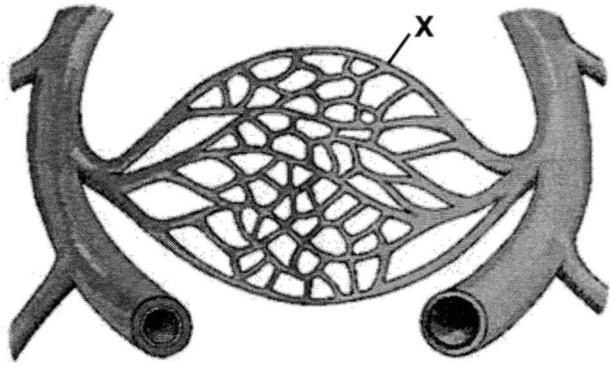
	large molecule	enzyme
A	fat	protease
B	glucose	amylase
C	protein	protease
D	starch	amylase

13 The diagram shows two gametes involved in human reproduction.
What is immediately formed by the fusion of the nuclei of the two gametes?



A a baby
B an egg
C an embryo
D a zygote

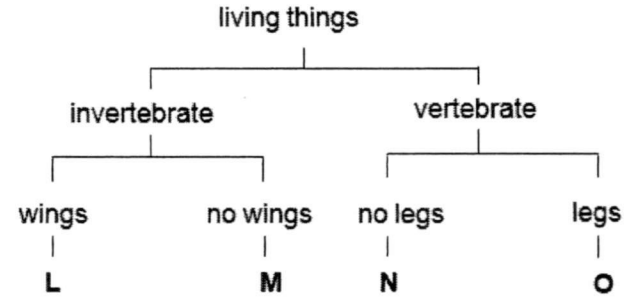
14 The diagram below shows a structure found in the human circulatory system.



What is the structure labeled**X**?

A arteries
B capillary
C heart
D veins

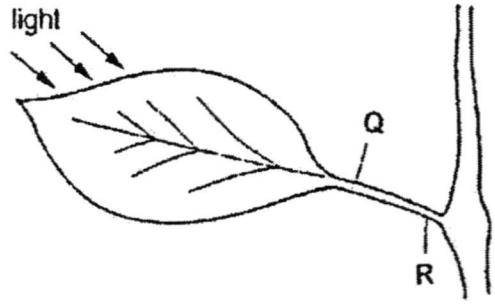
15 Study the dichotomous key below.



What can organisms **L**, **M**, **N** and **O** be?

	L	M	N	O
A	butterfly	slug	fish	zebra
B	dragonfly	ladybug	snake	panda
C	moth	centipede	frog	wolf
D	worm	ant	crocodile	deer

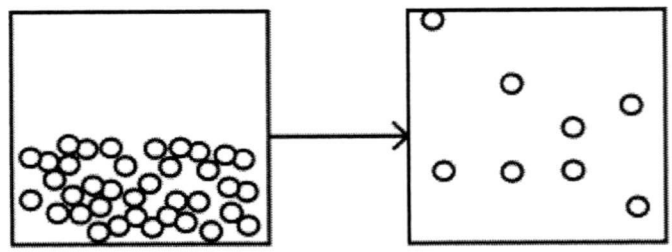
16 The diagram shows a young leaf attached to a plant.



In which direction do sugars and water move in the xylem and phloem between point **Q** and point **R**?

	in xylem	in phloem
A	sugars move from **Q** to **R**	water moves from **R** to **Q**
B	sugars move from **R** to **Q**	water moves from **Q** to **R**
C	water moves from **Q** to **R**	sugars move from **R** to **Q**
D	water moves from **R** to **Q**	sugars move from **Q** to **R**

17 A diagram shows the particles of a substance undergoing a change.

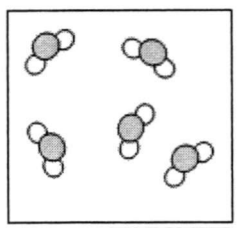


Which process is occuring to the substance?

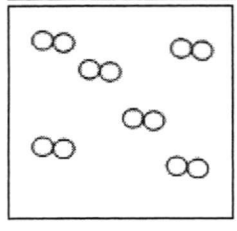
A condensation
B evaporation
C freezing
D melting

18 H and F are both elements. Which of the following best represents the substance HF?

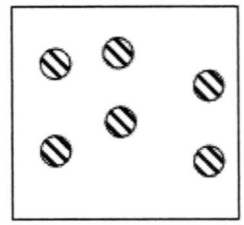
A



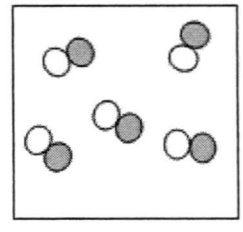
B



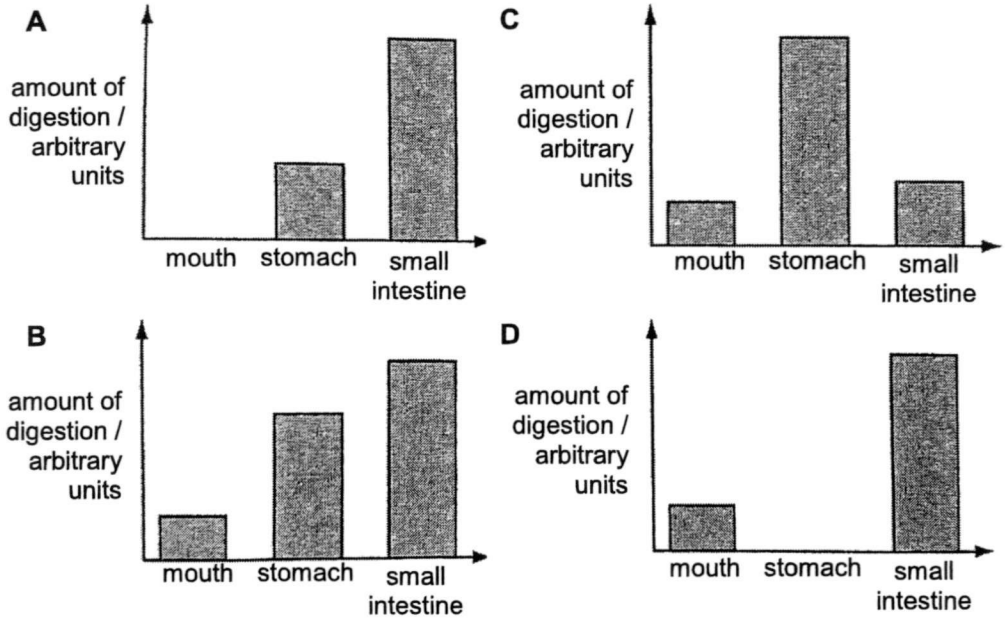
C



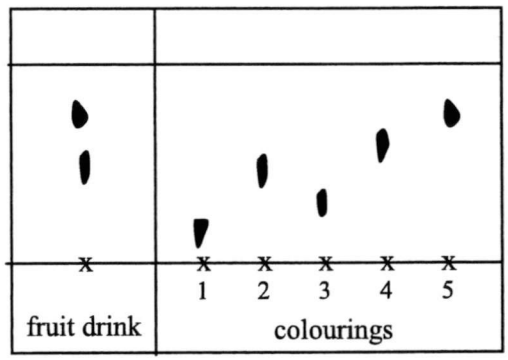
D



19 Which bar chart represents the amount of starch chemically digested in the mouth, stomach and small intestine of a human?



20 The diagram shows a chromatogram produced to find out which colourings are found in a certain fruit drink.



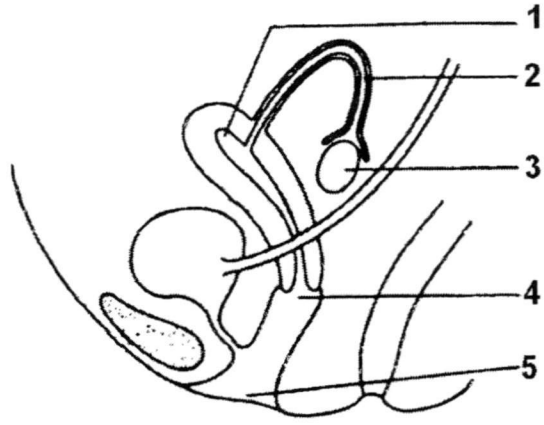
Which colourings are found in the fruit drink?

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

21 Which of the following can prevent the contraction of sexually transmitted diseases during sexual intercourse?

A condom
B ligation
C oral contraceptive pill
D spermicide

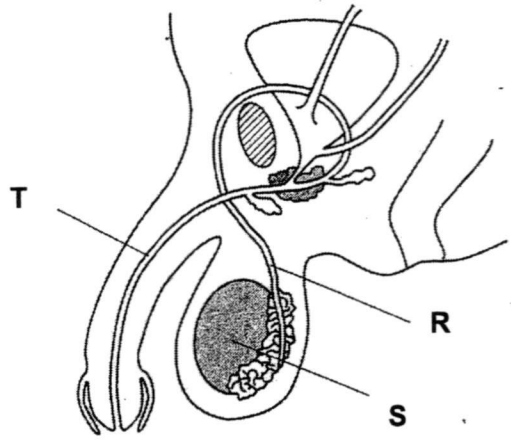
22 The diagram shows a side view of the structures in the lower abdomen of a woman.



Which of the following regions accurately indicate the site of sperms released during intercourse and site of fertilization?

	sperms released	site of fertilization
A	2	3
B	4	1
C	4	2
D	5	1

23 The diagram shows the male reproductive system.



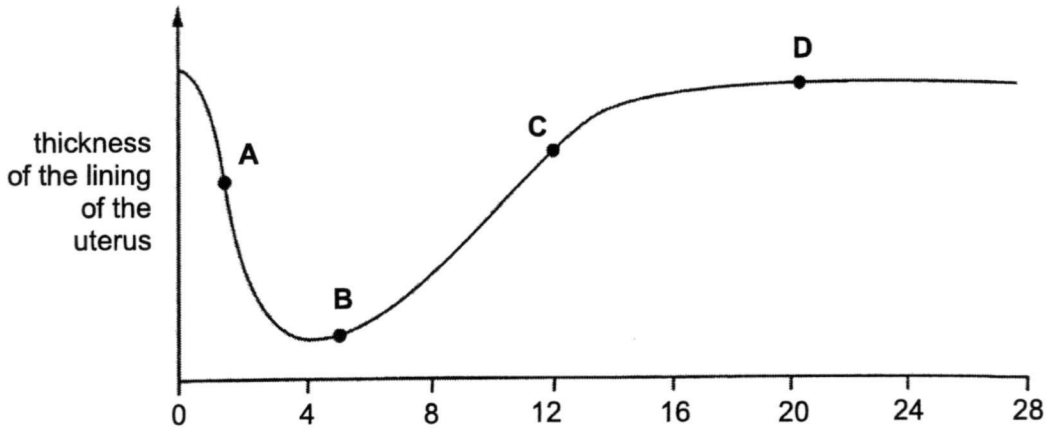
What are the structures **R**, **S** and **T**?

	R	S	T
A	urethra	scrotum	vas deferens
B	uterus	scrotum	vas deferens
C	vas deferens	testis	urethra
D	vas deferens	testis	uterus

24 Which one of the following correctly shows the cause of AIDS, gonorrhoea and syphilis?

	AIDS	syphilis	gonorrhoea
A	bacterium	bacterium	bacterium
B	virus	bacterium	bacterium
C	virus	virus	virus
D	bacterium	virus	bacterium

25 The graph shows the changes that take place in the thickness of the uterus lining during a woman's menstrual cycle.
At what point is menstruation occurring?

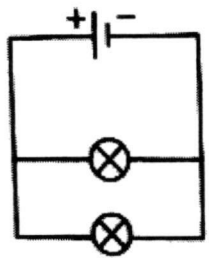


26 Cancer is the uncontrolled growth of cells in the body. Which part of the cell has most likely malfunctioned to cause this?

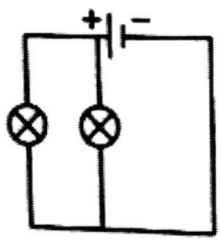
A cell membrane
B cytoplasm
C vacuole
D nucleus

27 Which of the following circuits is **not** a parallel circuit?

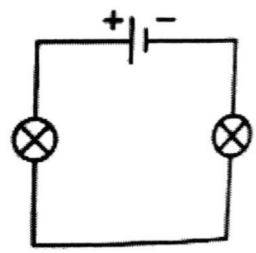
A



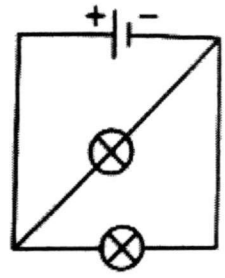
B



C



D



28 A car is parked in the afternoon sun. Which of the following changes would increase the rate of heat gain by the car?

A drill holes in the top of the car
B paint the car silver
C park the car on a metal plate
D roughen the car's surface

29 Which of the following does **not** increase the strength of an electromagnet?

A Increasing the current of the circuit flowing around it.
B Increasing the number of turns of the wire in the coil.
C Thickening the wires of the electromagnet.
D Winding the coil around an iron core.

30 The definition of potential difference across a component is _____

A the amount of energy needed to move one unit of electric charge across it.
B the amount of energy that flows from a point of higher potential to a point of lower potential.
C the ratio of thecurrent flowing in the component to the resistance across a component.
D the energy needed to move one electron from the positive to the negative terminal of the dry cell.

End of Section

Name:	Index Number:	Class:

HUA YI SECONDARY SCHOOL

2E

MidYear Examination 2017

2E

SCIENCE

Section B and C

9 May2017

2hours

Candidates answer on the Question Paper.
Additional Materials: NIL

READ THESE INSTRUCTIONS FIRST

Write your Name, Index Number and Class on all the work you have done.
Write in dark blue or black pen.
You may use a pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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

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

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

For Examiner's Use	
Section B	
Section C	
Total	

This document consists of **17** printed pages including the cover page.

[Turn Over]

Setter: Mr Jonathan Goh

Section B (40 marks)
Short Structured Questions
Answer **all** the questions in this section.

1 Fig 1.1 shows a diagram of the human digestive system.

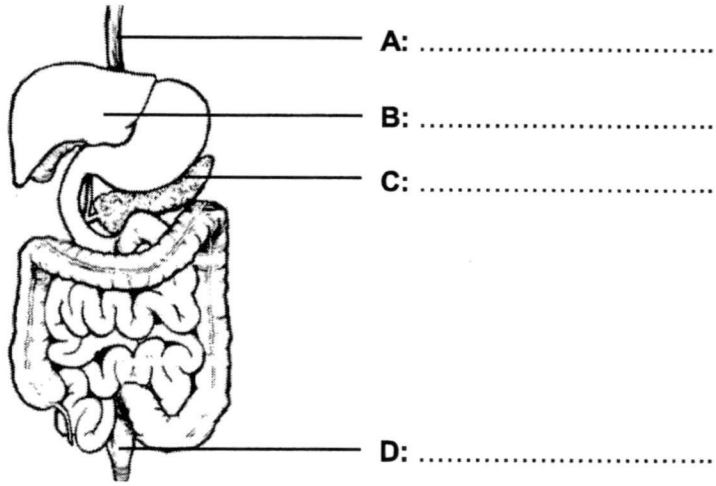


Fig 1.1

(a) On Fig 1.1, label structures **A**, **B**, **C**, and **D.** [2]

(b) Name the organ in which absorption occurs.

..... [1]

(c) Sally eats a large amount of butter.Describe what happens as it undergoes chemical digestion in the various parts of her digestive system. Your answer should include any relevantenzymes, and products after digestion.

.....

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.....

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.....

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..... [2]

[Total: 5]

2 Fig 2.1 shows the chambers of a mammalian heart.

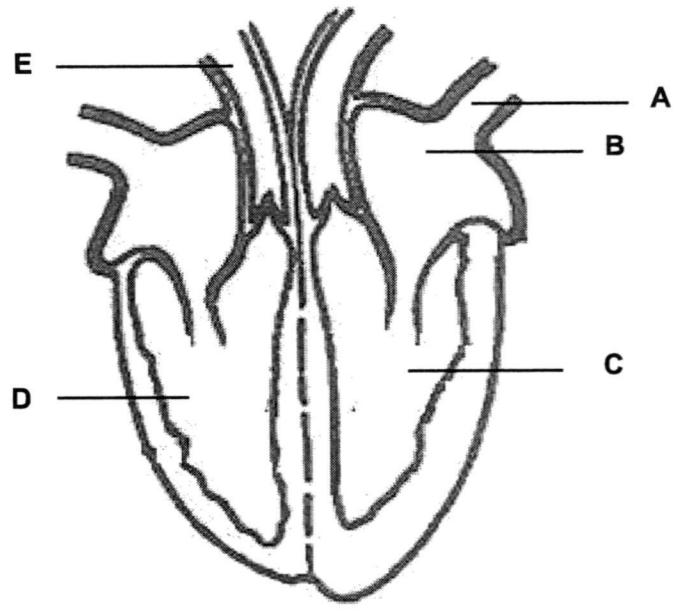


Fig 2.1

(a) Identify the parts labelled **A**, **B**, **C**, and **E**

A:..... **B**:.....

C:..... **E**:..... [2]

(b) Draw arrows in and out of **B** and **C** to show the movement of the blood. There should be an arrow entering and exiting each chamber. [1]

(c) Explain the difference in thickness between structure **C** and **D**, with reference to where they pump blood to.

.....

.....

.....

..... [2]

(d) Fig 2.2 shows a frog heart. The muscular wall separating the two bottom chambers of the heart has a hole in it. Besides this, all other functions of the heart are the same as the mammalian heart.

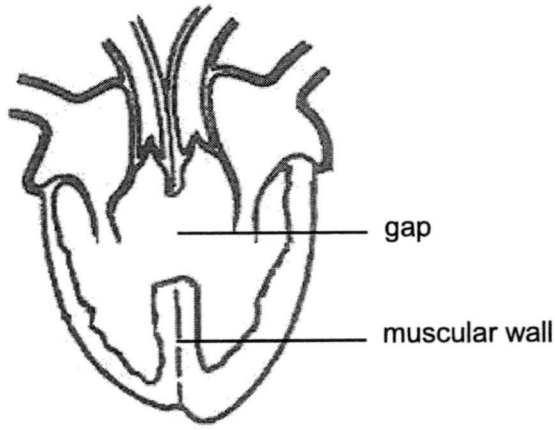


Fig 2.2

With reference to any differences between Fig 2.1 and 2.2, suggest if a frog heart or a mammalian heart is more efficient in transporting oxygen to the body tissues. Explain your answer.

.....

.....

..... [2]

[Total :7]

3 The photomicrograph Fig 3.1shows red blood cells.

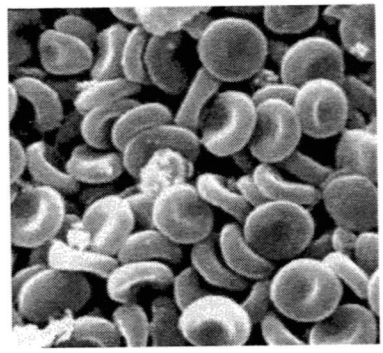


Fig 3.1

(a) How does the shape of the red blood cell help it to carry out its function?

.....

..... [2]

(b) Red blood cells flow through a capillaryin the lungs. A diagram of this is shown below in Fig3.2.

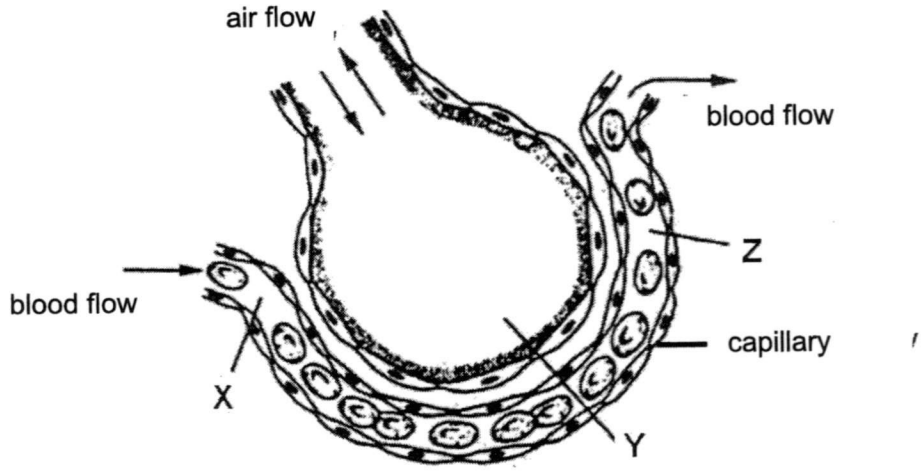


Fig 3.2

Describe one difference in the blood found at X and Z.

.....

.....

..... [1]

(c) A cross section of a blood vessel is shown below in Fig 3.3.

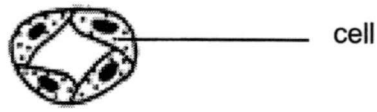


Fig3.3

With reference toFig 3.3, identify the blood vessel and explain how one of its features helps it to carry out its function.

.....

..... [2]

[Total: 5]

4 Fig 4.1 shows abeaker containing iodine solution and two Viskingtubings sealed at their ends. Starch and human saliva was mixed and placed in viskingtubing X. Starch was placed in visking tubing Y.

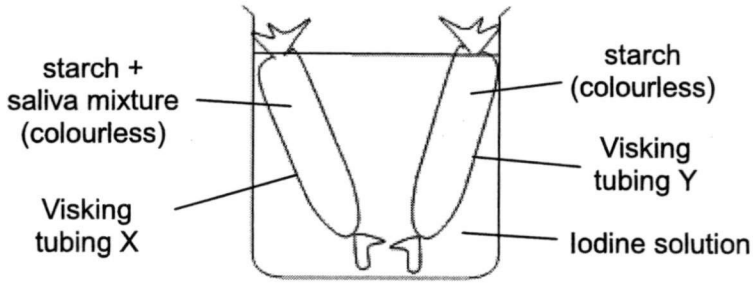


Fig 4.1

(a) Describe what happens to the starch in visking tubing X after 1 hour.

.....

..... [1]

(b) Assume that visking tubing is similar to a cell membrane, and that iodine particles are smaller than maltose, glucose, and glycerol particles. After 1 hour, state any colour changes in

(i) visking tubing X

.....

..... [1]

(ii) visking tubing Y

.....

..... [1]

(c) **(i)** Briefly explain your answer in **4(b)(i)**.

.....

.....

.....

..... [2]

(ii) Briefly explain your answer in **4(b)(ii)**.

.....

.....

.....

..... [2]

[Total: 7]

5 Plants wilt when they do not receive enough water.

(a) Jimmy waters a plant daily. Describe how water enters the roots of the plants.

.....

.....

.....

..... [2]

(b) Jimmy continues to water the plant, but puts 5mg of fertilizer into the pot daily. Fertilizer is soluble in water. After a while, the plant began to wilt. Suggest a reason for this and explain your answer.

.....

.....

.....

..... [2]

[Total: 4]

6 **(a)** Fig 6.1 shows a metal electric kettle connected to a plug.

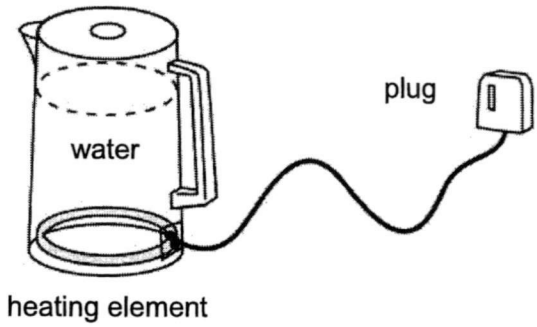


Fig 6.1

Describe the main process by which all the water is heated in the electric kettle.

.....

.....

.....

.....

..... [3]

(b) Fig 6.2 shows a plastic spoon and a metal spoon of the same length placed inside a cup of hot water. The same amount of butter is stuck to the end of each spoon handle.

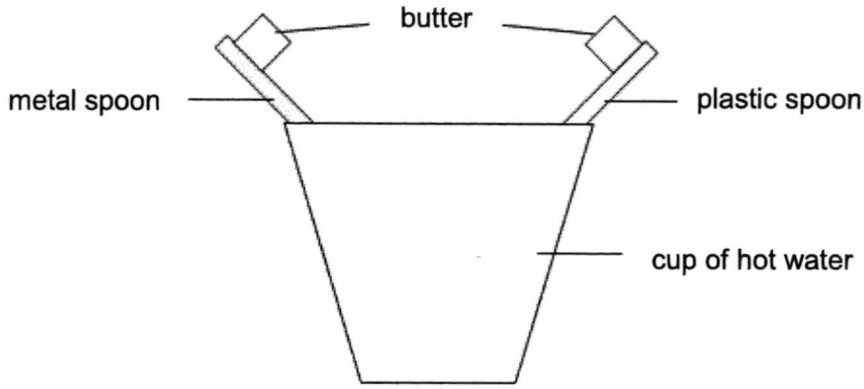


Fig 6.2

(i) Name the process that transfers heat to the spoons.

..... [1]

(ii) On which spoon will the butter melt first? Explain your answer.

.....

..... [1]

(iii) With reference to the particles of the plasticspoon, explain how heat is transmitted from the end of the plasticspoon in the cup of hot water, to the end of the plasticspoontouching the butter.

.....

.....

..... [2]

[Total: 7]

7 You are provided with the following electrical components.

- Two dry cells
- Three identical light bulbs
- A variable resistor
- Two switches
- An ammeter
- A voltmeter

In the box provided below, draw **one** circuit diagram that includes all the electrical components given above, with the following conditions:

(a) The three light bulbs are parallel to each other. [1]

(b) When one switch is opened and the other is closed, only two light bulbs will light up. [1]

(c) The brightness of all the bulbs can be adjusted together. [1]

(d) An instrument to measure the current in the whole circuit. [1]

(e) An instrument to measure the potential difference across a light bulb. [1]

[Total: 5]

Section C (30 marks)
Free Response Questions / Data-Based Questions
Answer **all**questions.

8 **(a)** Explain why physical digestion is important.

.....

.....

..... [2]

(b) A woman's digestive system is pictured in Fig 8.1. She undergoes an operation and removes a portion of her digestive system as shown in Fig 8.2.

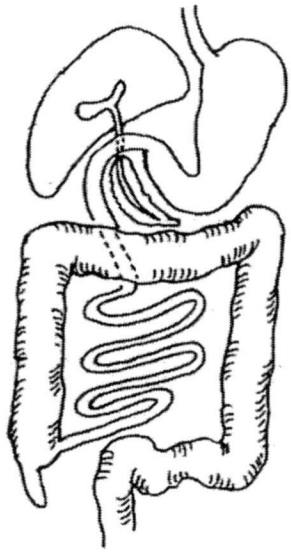


Fig 8.1

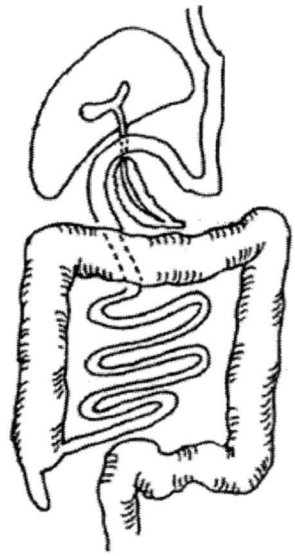


Fig 8.2

(i) Name the organ removed.

..... [1]

(ii) Suggest what effect this would have on her digestion, and hence what effect this would have on her body.

.....

.....

.....

.....

.....

..... [3]

[Total: 6]

9 Five strips of potato are cut from the same potato. They are measured and placed into five different Petri dishes, each with a different concentration of sucrose solution (a type of sugar). After 20 minutes, the strips are removed and their lengths are measured. The data from this experiment is given in Table9.1.

Table 9.1

dish	concentration of sucrose solution the Petri dish is filled with / g/ml	original length of the strip / cm	final length of the strip / cm	change in length of thestrip / cm
A	2.4	7.0	6.4	-0.6
B	2.2	7.0	6.6	-0.4
C	2.0	7.0	6.8	-0.2
D	1.6	7.0	7.2	+0.2
E	1.4	7.0	7.4	+0.4

(a) Suggest and explain what has happened to the potato strip in Dish E after 20 minutes.

.....

.....

.....

.....

..... [3]

(b) Flora put the results of the experiment into a graph, shown in Fig9.2.

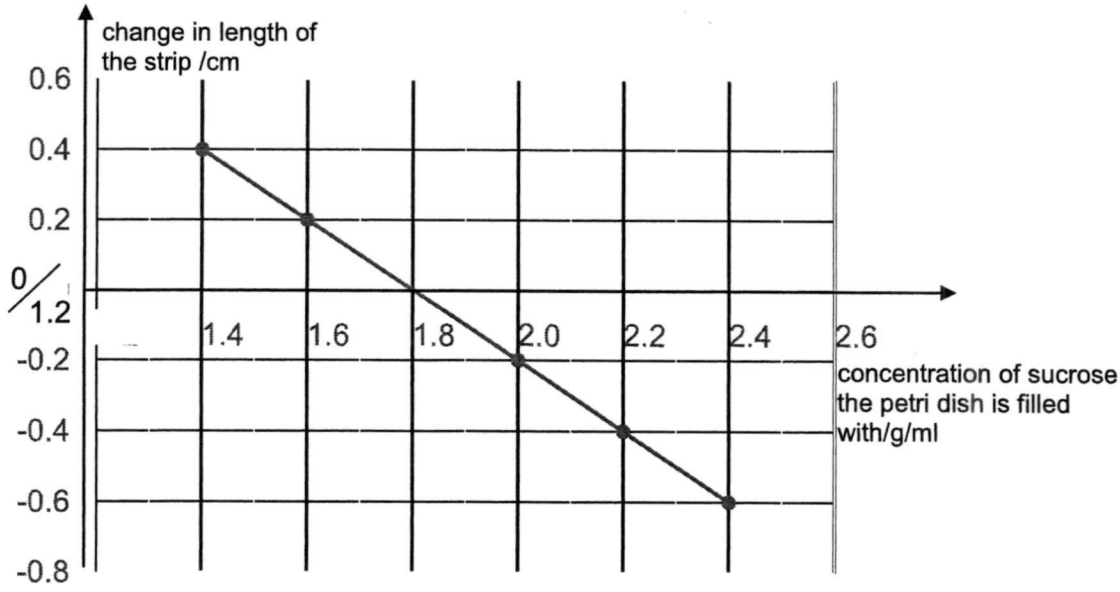


Fig9.2

(i) Based on the graph, predict the final length of a 7.0cm potato strip if it was immersed in a solution of 2.3 g/ml.

..... [1]

(ii) Suggest the concentration of sucrose in the cells of the potato strip. Explain your answer using the data given.

.....

.....

..... [2]

(c) Suggest an improvement to the experiment to increase the reliability of the results.

..... [1]

[Total: 7]

10 The days of March 2017 are given in Table 10.1. Angie began menstruating on the 2nd of March (indicated by a *) Assume Angie's menstrual cycle is regular.

Table 10.1

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
		1	2*	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

(a) State the last day that Angie should expect to stop bleeding.

..... [1]

(b) What is the date that Angie would most likely ovulate?

..... [1]

(c) Assuming that Angie gets pregnant, describe and explain what would happen toAngie's uterine lining.

.....

.....

..... [2]

(d) If no fertilization occurs,

(i) what would happen to the uterine lining?

.....

..... [1]

(ii) On which date would this start to happen?

..... [1]

(e) Explain clearly how an inter-uterine device works to prevent a pregnancy.

.....

.....

..... [2]

[Total: 8]

11 Jocelyn uses an electric hair dryer to dry her hair. Fig 11.1 shows the variation of the voltage and current of the hair dryer.

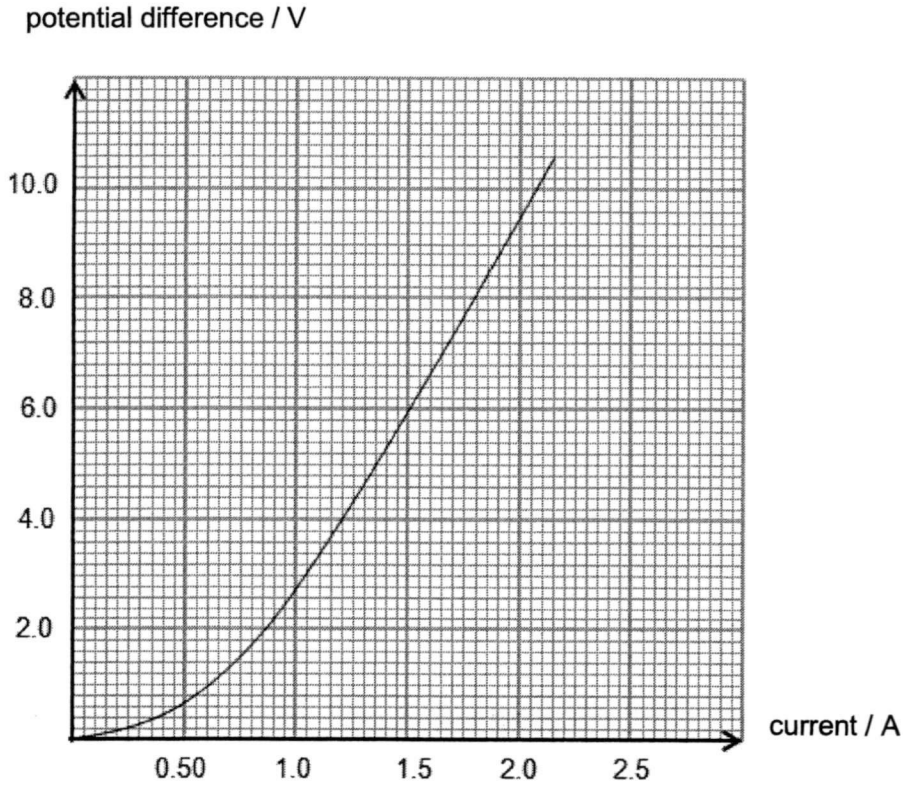


Fig 11.1

(a) Define *current*.

.....

..... [1]

(b) **(i)** Use the graph to determine the current when a potential difference of 6 V is applied.

..... [1]

(ii) Hence, calculate the resistance of the hair dryer when the potential difference is 6V.

..... [1]

(c) Fig 11.2 shows the same electric hair dryer connected in parallel with a 6 Ω resistor and also to a 3 Ω resistor in series.

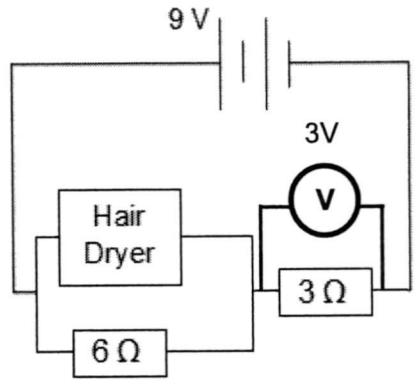


Fig. 11.2

(i) Calculate the current flowing through the hair dryer.

..... [1]

(ii) Calculate the total resistance of the circuit.

..... [2]

(d) A circuit is shown in Fig 11.3 with two identical light bulbs.

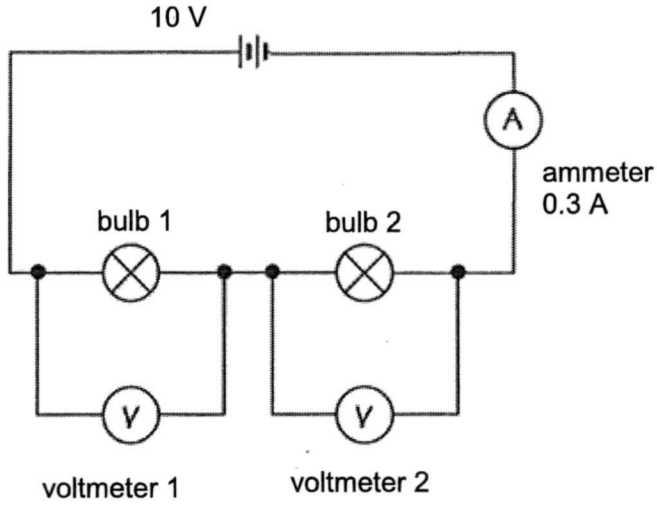


Fig11.3

(i) Using arrows, label the electron flow in the circuit above. [1]

(ii) Calculate the reading on each voltmeter.

Voltmeter 1: .....

Voltmeter 2: ..... [1]

(iii) The circuit is adjusted to include a new resistor R as shown in Fig 11.4.

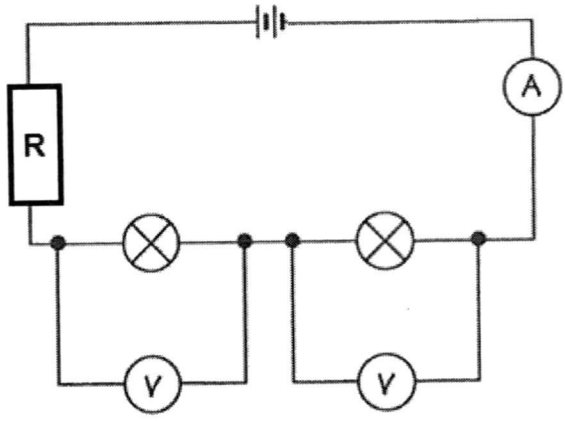


Fig 11.4

Explain how this will affect the brightness of the lightbulbs.

.....

.....

..... [1]

[Total: 9]

End of Paper

PAPER 1 Answers

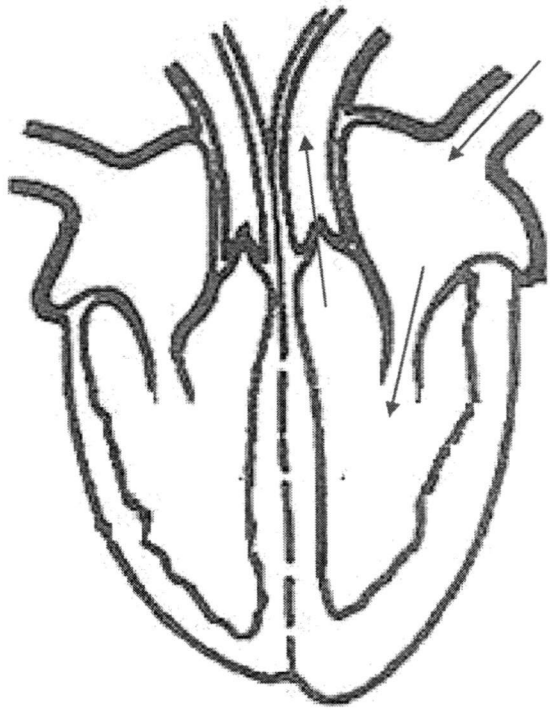
1	2	3	4	5	6	7	8	9	10
A	C	B	D	B	D	B	A	B	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	D	B	A	D	B	D	D	B
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	C	C	B	A	D	C	A	C	A

PAPER 2 Answers

Section A (50 marks)

1	**(a)**	A: oesophagus B: Liver C: Pancreas D: Rectum	1 mark per 2 correct. No half marks awarded. 2 marks max.
	(b)	Small intestine / ileum (R: mispelling)	1 mark
	(c)	The **fats** in the butter will be broken down into **fatty acids and glycerol** by **lipase** in**intestinal juice**and **pancreatic juice**in the **small intestine**.	1 1
		Total	5

2	**(a)** **&** **(b)**	A: Pulmonary vein B: Left Atrium C: Left Ventricle E: Pulmonary artery	(a) 1 mark per 2 right answers. No half marks awarded. (b) 1 mark per half of the heart, award marks as long as there are arrows of correct direction entering and exiting each chamber.

2	(a) & (b)		(b) 1 mark per half of the heart, award marks as long as there are arrows of correct direction entering and exiting each chamber.
	(c)	Structure C is **thicker** than D because C pumps to **all parts of the body** while structure D pumps **bloodto the lungs.**	1 1
	(d)	The mammalian heart is more efficient as**oxygenated and deoxygenated** blood are separate.	1 1
		Total	7

3	(a)	Red blood cells are **biconcave in shape**, which **increases the surface-area-to-volume ratio** of the cells. This allows them to take in or release **oxygen** at a **faster rate.**	1 1
	(b)	The blood at Z has a lower concentration of carbon dioxide than the blood at X. / The blood at Z has a higher concentration of oxygen than the blood at X.	1
	(c)	It is a capillary The capillary walls are **one-cell thick**. This allows **quick diffusion** of substances in and out of the capillary.	1 1
		Total	5

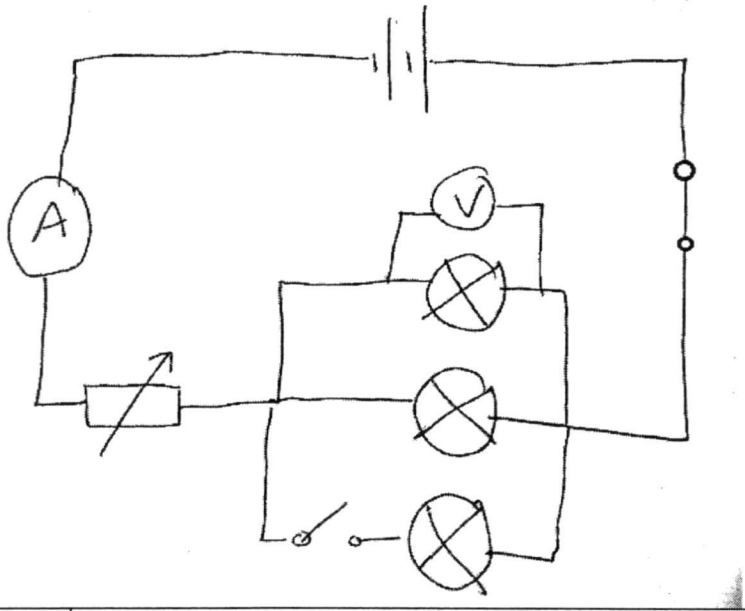
4	(a)	The **starch** will be broken down by the **amylase** in	1 (need starch, amylase,

		saliva to **maltose**.	maltose)
	(bi)	The colourless mixture in Visking tubing x will turn **yellowish brown. / brown**	1
	(bii)	The colourless mixture in Visking tubing y will turn **blue-black**.	1
	(ci)	Iodine particles will move by **diffusion** into Visking tubing X The Visking tubing will contain **maltose** particles / **absence of starch**. The Visking tubing will remain brown.	1 1
	(cii)	Iodine particles will move by **diffusion** into Visking tubing Y. The Visking tubing will contain **starch** particles due to absence of amylase, which react/interact with iodine to give a **blue-black**colouration.	1 1
		Total	7

5	**(a)**	The soil that the plant is in will have a higher water potential than the root cells. Therefore, water will move by osmosis, from the soil into the root cells, down a water potential gradient, across a partially-permeable membrane And water will enter the roots of the plant.	1 1 No mark given.
	(b)	The soil in Plant A's pot has a lower water potential than the root cells as fertilizer is dissolved in it. Therefore, there is no more **water potential gradient** and osmosis cannot occur / plants need a higher potential in the soil outside their roots in order for them to absorb water.	1 1 Award mark as long as understanding is shown.
		Total	4 marks

6	**(a)**	The water at the bottom of the kettle is heated, **expands**, becomes **less dense** and **rises**. The cooler water at the top of the kettle is **denser** and **sinks**. A **convection current is** formed that heats up all the water in the kettle.	1 1 1
	(bi)	Conduction	1
	(c)	The metal spoon Because it is a better conductor of heat	1 Must identify as metal spoon AND explain to get the 1 mark.
	(d)	Particles of the metal spoon in the water**gain kinetic**	1

		energy and **vibrate faster**. These particles **collide** with their **less energetic neighboring particles** and **transfer** the **energy** to them.	1
			Total 7 marks

7			1 mark award for each of the criteria, 5 marks max.
		Total	5

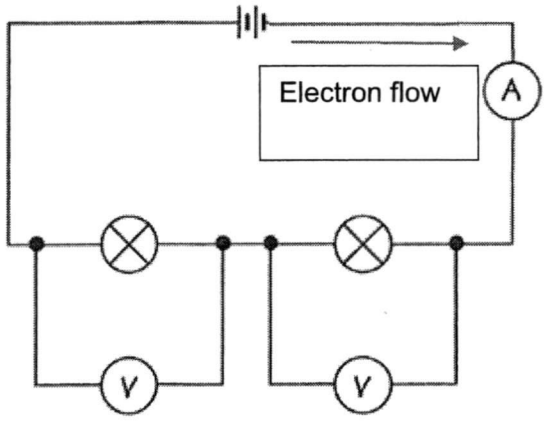
8	**(a)**	Physical digestion (leads to a **larger surface area** of food) and allows **chemical digestion to occur at a faster rate** on the food.	1 mark 1 mark
	(bi)	The stomach	1 mark
	(bii)	No **churning of food** will occur and chemical digestion will be slower/less food will be chemically digested **Less protein will be chemically** digested/digested by protease. However, there is still protease in the small intestine. The woman will probably be slower to repair cells/tissue / May be less energetic/ other acceptable answer	1 mark awarded for understanding. 1 mark 1 mark for any option
		Total	6

9	**(a)**	Water has entered the potato strip from the sucrose solution By osmosisdown a water potential gradient, across a partially-permeable membrane And caused it to increase in length/ swell	1 1 1

	(bi)	6.5cm (R: no unit)	1 Reject -0.5cm
	(ci)	The concentration of sucrose would be 1.8 mg/l (r: no unit) This is the value at which there is **no change** in the length of the potato strip and therefore no **osmosis** occurring. (If students ask, this means there is no osmosis, and hence no water potential gradient, so the water potential and concentration is equal in and out of the cells.)	1 1
	(c)	Perform the experiment with more potato strips in each concentration and take the average / alt – other logical acceptable	1
		Total	7

10	**(a)**	6th March	1
	(b)	15th March	1
	(c)	Angie's lining would likely **thicken or maintain its thickness / become rich in blood capillaries** To supply any foetus with **nutrients and oxygen** for growth.	1 1
	(di)	The uterine lining would break down and be **discharged / leave the vagina**	1
	(dii)	30th March	1
	(e)	The IUD **disrupts the function of the uterus** by **preventing** the embryo from **implanting** in the uterine lining.	1 1
		Total	9

11	**(a)**	**current** is the rate of flow of electric charge.	1
	(bi)	1.5A	1
	(bii)	4 Ω	1
	(ci)	9/4 = 2.25A	1
	(cii)	1/Reff of parallel = 1/6 + 1/4 Reff of parallel = 2.4 Ω Reff of total circuit = 2.4 + 3 Reff of total circuit = 5.4 Ω	1 for Rparallelcalc and ans 1 for Rtotalcalc and ans.

	(di)		1 mark for electron flow, award marks as long as the arrow is pointing in the right direction.
	(dii)	5V for both values.	1 mark awarded only if both voltmeters are 5V
	(diii)	The resistor would increase the **total resistance** of the circuit and therefore **decrease current.** Therefore, the lightbulbs would decrease in brightness/ become dimmer	1 mark for understanding.
		Total	9