ZHONGHUA SECONDARY SCHOOL
Mid-Year Examination 2017

CANDIDATE NAME		( )
CLASS	2 E	

LOWER SECONDARY SCIENCE **09 May, 2017**

Secondary 2 Express **2 hours**

Set by: **Ms Rozianna / Mr Yusuf / Mr Christopher Lim**

Vetted by: **Mr Ong Kai Kun**

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class inthe spaces at the top of this page and on all separate answer paper used.

Write in dark blue or black pen.

You may use a pencil for any diagrams, graphs or rough working.

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

Section A

There are **thirty** questions on this paper. Answer all questions. For each question there are four possibleanswers **A**, **B**, **C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate OTAS Answer Sheet.

Section B

Answer **all** questions.

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

Section C

Answer **all** 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.

All essential working must be shown clearly.

A copy of the Periodic Table is printed on page 24.

For examiner's use	
Section A	/30
Section B	/30
Section C	/30
Total	

Section A

Answer **all**questions.

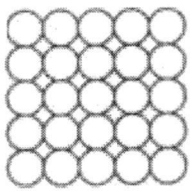
1 An empty sealed container contains air.
Which statements describe the behavior of air particles in the container?

1 More particles will be found at the bottom after some time.
2 The particles are evenly spaced and far apart.
3 The particles are held by very weak forces of attraction.
4 The particles are in constant and random motion.

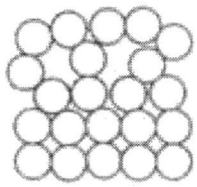
A **1** and **2** **B** **1** and **3** **C** **2** and **3** **D** **3** and **4**

2 Which of the following would show the arrangement of particles in a lump of solid sugar?

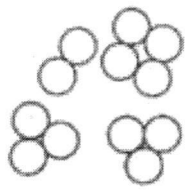
A



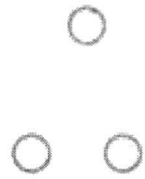
B



C



D



3 Which of the following statements best describes the particles in liquid?

A Liquid particles are closer than those particles in a solid.

B Liquid particles are in continuous random motion.

C Liquid particles are stationary in an ordered arrangement.

D Liquid particles vibrate about fixed positions.

4 Which of the following takes place when steam condenses?

A The molecules decrease in size.

B The molecules gain energy from their surroundings.

C The molecules increase in size.

D The molecules lose energy to their surroundings.

5 A student prepared a blood smear to be viewed under a microscope by adding a drop of blood and a drop of distilled water onto a glass slide, before covering it up with a cover slip. When viewed under the microscope, the glass slide appeared empty.

Which best explains the observations?

A The blood cells burst.

B The water caused the blood cells to shrink.

C The blood dried up before water was added.

D The drop of water diluted the blood so much that the blood cells are far away from each other.

6 Which of the following correctly states a difference between diffusion and osmosis?

	diffusion	osmosis
A	requires a selectively permeable membrane	does not require a selectively permeable membrane
B	does not only involve water molecules	involves only water molecules
C	against a concentration gradient	along a concentration gradient
D	does not require energy	requires energy

7 The table shows the concentrations of ions in cell sap found in vacuole of freshwater algae and the pond water in which the algae grow in.

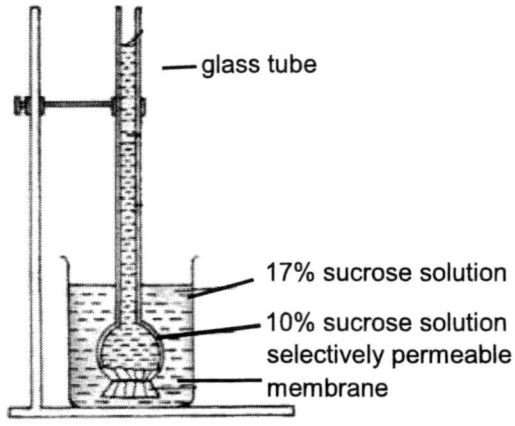
ion	sap concentration / mg ions dm^{-3}	pond water concentration / mg ions dm^{-3}
Ca^{2+}	25.0	2.6
Mg^{2+}	22.1	5.8
Na^{+}	48.7	1.8
K^{+}	48.0	0.7

Which process accounts for the movement of ions into the cell sap?

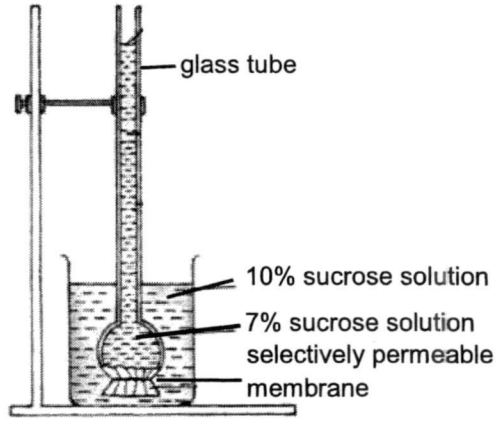
A osmosis
B diffusion
C plasmolysis
D active transport

8 The diagram shows four experiments on osmosis. Which set-up will have the greatest increase in liquid level in the glass tube?

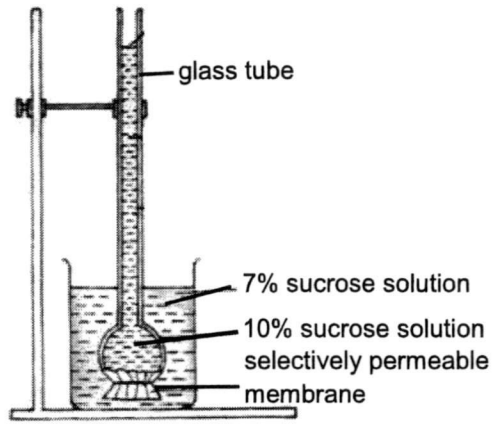
A



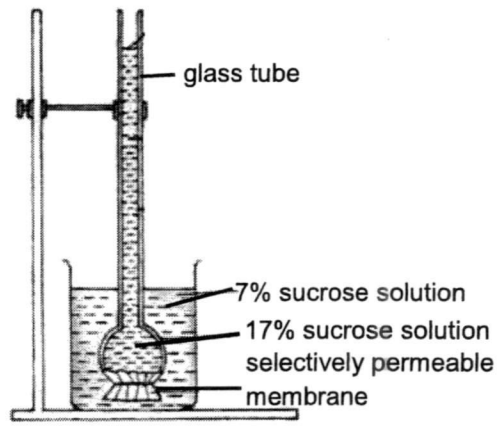
B



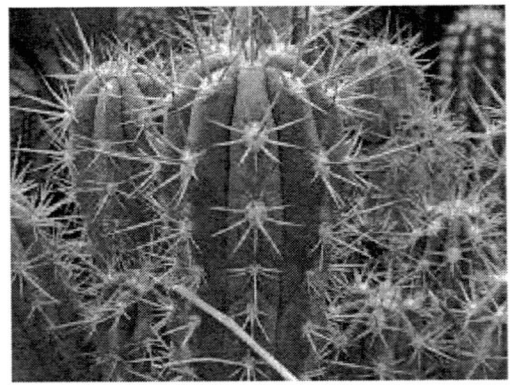
C



D



9 The cactus, commonly found in deserts, has spine-looking leaves that are very thin, sharp and stiff.



What is the purpose of these spines?

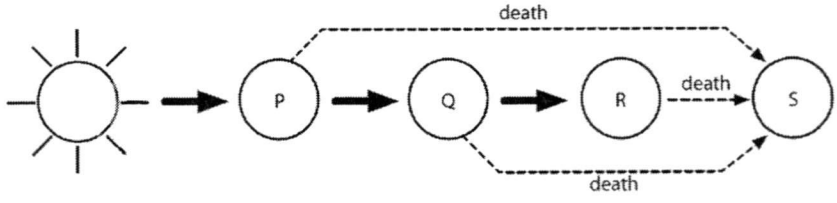
1 to photosynthesize
2 to protect the cactus from animals
3 to reduce water loss

A 1only **B** 1 and 2 **C** 2 and 3 **D** All of the above

10 Which of the following options correctly describes the various processes involved in the carbon cycle?

	removes carbon dioxide from atmosphere	adds carbon dioxide to atmosphere
A	combustion and respiration	photosynthesis and decomposition
B	photosynthesis and respiration	combustion and decomposition
C	respiration	combustion and decomposition
D	photosynthesis	respiration and decomposition

Study the food chain and answer questions **11** and **12**.



11 In this food chain, what does **S** represent?

A decomposer **B** parasite **C** predator **D** producer

12 How is energy lost by **Q** in the food chain?

1 not all plant parts are consumed by herbivores
2 as heat energy released during respiration
3 through waste products in faeces
4 used for growth and repair in **Q**

A 1only **B** 1 and 2 **C** 1, 2&3 only **D** All of the above

13 What would most likely result if all decomposers in a particular ecosystem were wiped out?

A There would be a decline in the atmospheric carbon dioxide, affecting rates of photosynthesis.

B More food would be available for other consumers in the ecosystem.

C There would be no significant impact as the dead organisms will decompose naturally.

D The other organisms in the ecosystem would experience slower death rates.

14 A man suffers from a condition which results in the weakening of the walls of his aorta. This causes it to lose its elasticity.

Which of the following is not a likely consequence of the condition?

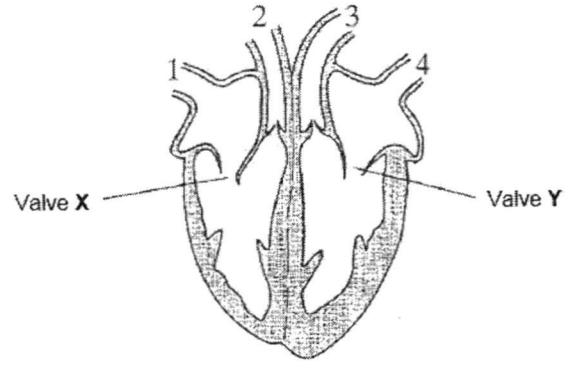
A bursting of aorta leading to severe loss of blood

B inability of artery wall to withstand high blood pressure

C restriction of blood flow through the aorta

D widening of lumen of aorta

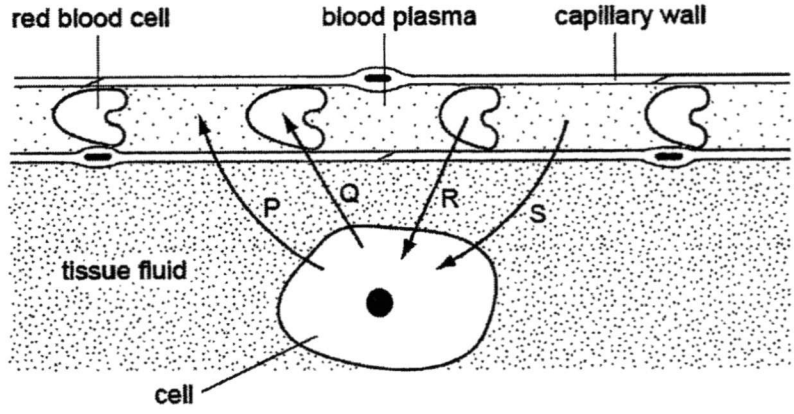
15 The diagram shows a cross-section of a human heart



What happens when blood is being pumped to the lungs?

	action of valves	vessel through which blood passes to the lungs
A	valve Y opens	4
B	valve Y closes	3
C	valve X opens	1
D	valve X closes	2

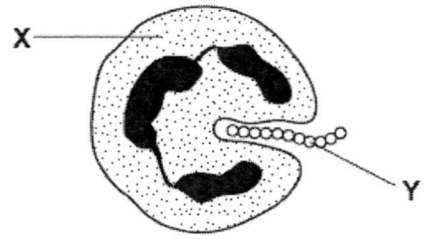
16 The diagram shows a blood capillary with an adjacent cell. The arrows represent the exchange of substances between the capillary and the cell.



Which of the following arrows represent glucose, carbon dioxide and oxygen?

	glucose	carbon dioxide	oxygen
A	S	Q	P
B	S	P	R
C	R	Q	S
D	R	P	Q

17 The diagram shows a human blood cell **X**.

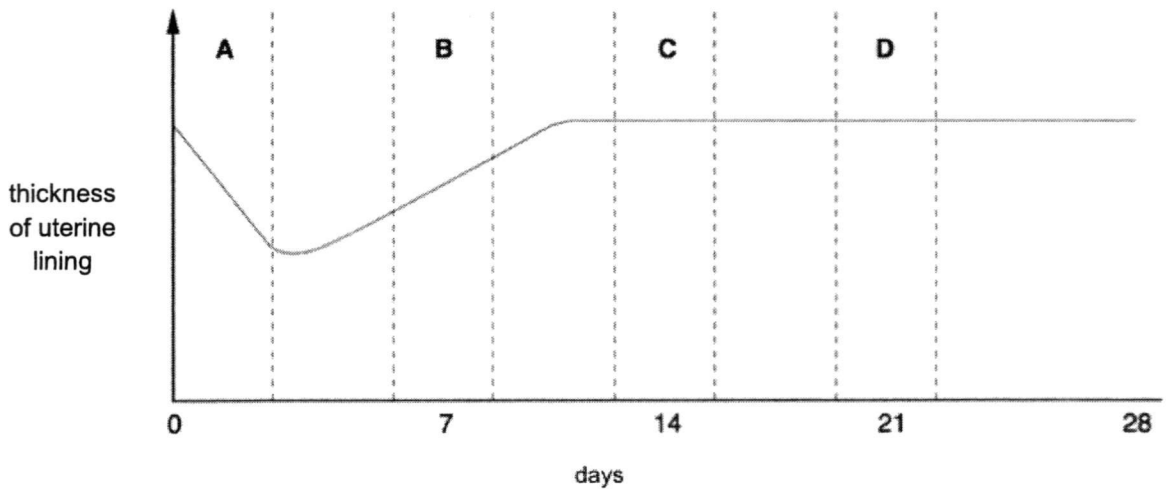


What type of blood cell is **X** and what is happening at **Y**?

	X	Y
A	phagocyte	microbes being ingested
B	phagocyte	antibodies being produced
C	lymphocyte	microbes being ingested
D	lymphocyte	antibodies being produced

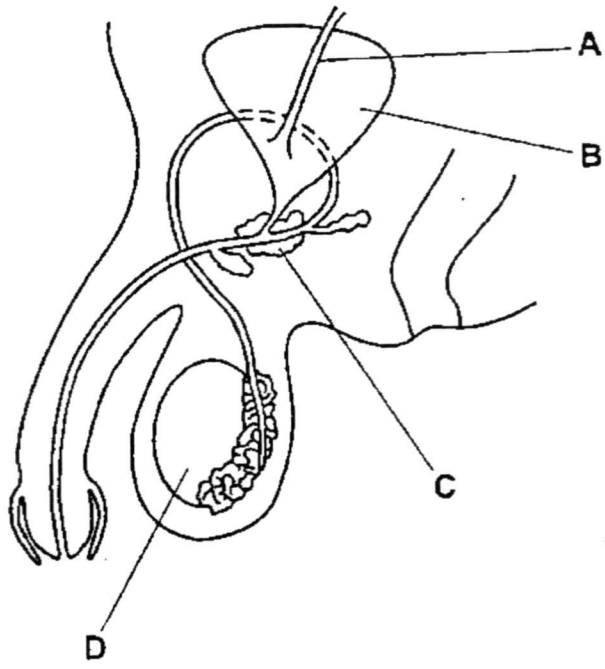
18 The diagram shows the thickness of the uterine lining during the menstrual cycle.

During which part of the cycle is the woman most fertile?



19 The diagram shows the male reproductive system.

Which structure produces the fluid part of semen?



20 Which of the statements about birth control methods is false?

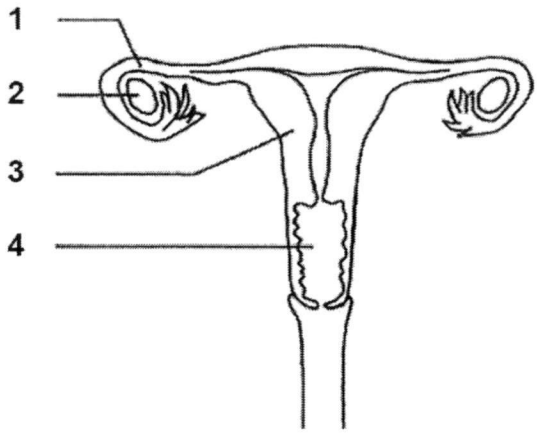
A Ligation is an option for couples who do not want to have children permanently.

B The spermicide is usually used together with a condom to kill sperms.

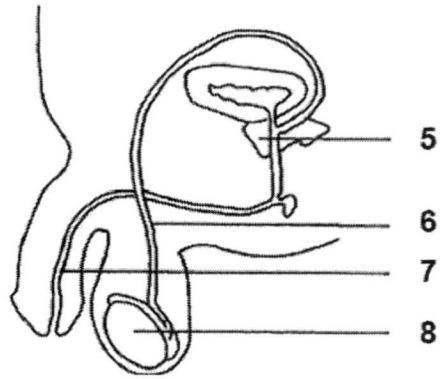
C Females consume contraceptive pills to prevent ovulation.

D The intra-uterine device is inserted to prevent the fertilization of eggs in the uterine lining.

21 The diagrams show the human reproductive systems.



Female reproductive system



Male reproductive system

Which structures serve similar functions?

A 1 and 6

B 2 and 5

C 3 and 7

D 4 and 8

22 The element with atomic number 4 is likely to have similar chemical properties to the element with atomic number

A 3 **B** 5

C 11 **D** 20

23 A chloride ion has the same number of electrons as_____.

A an argon atom. **B** a bromine atom.

C a fluoride ion. **D** a sodium ion.

24 Consider the composition of the particles **W**, **X**, **Y** and **Z** below. Which species is a positive ion?

particle	number of protons	number of neutrons	number of electrons
W	9	10	10
X	11	12	11
Y	12	12	12
Z	13	14	10

A W

B X

C Y

D Z

25 How many protons, neutrons and electrons are there in the antimony(III) ion, $^{123}_{51}Sb^{3+}$?

	protons	neutrons	electrons
A	51	72	48
B	51	72	51
C	54	72	51
D	72	51	48

26 The mass number of an element **T** is 40. When the element forms an ion, the electronic structure can be written as _____.

A 2.8.8

B 2.8.8.1

C 2.8.8.2

D 2.8.8.8.8

27 Element **X** has the electronic structure 2, 8, 5. Element **Y** has the electronic structure 2, 8, 7. What is the likely formula of the compound containing only **X** and **Y**?

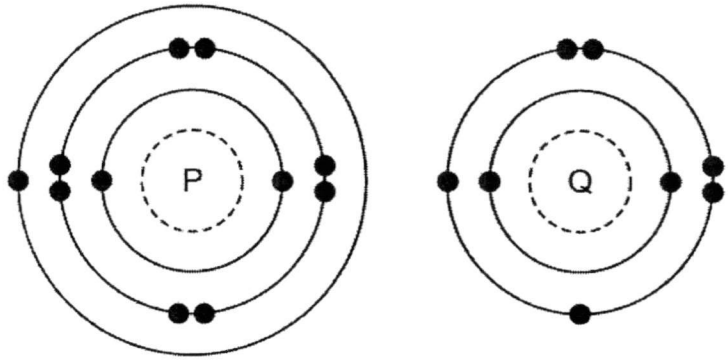
A **XY**

B XY_3

C X_3Y

D X_5Y_7

28 The electronic structures of atoms **P** and **Q** are shown.



P and **Q** react to form an ionic compound.

What is the formula of this compound?

A PQ_2 **B** P_2Q

C P_2Q_6 **D** P_6Q_2

29 A water molecule is formed when 2 hydrogen atoms and 1 oxygen atom form a bond. Which of the following statement is correct for the bond formation?

A Each hydrogen atom loses one electron to the oxygen atom.

B The oxygen atom loses two electrons to the hydrogen atoms.

C The oxygen atom shares two pairs of electron with each of the hydrogen atoms.

D The oxygen atom shares one pair of electrons with each of the hydrogen atoms.

30 The bonding of electrons of a compound formed between **Y** and fluorine is shown below.

Whichof the following is the formula of the compound formed between **Y** and magnesium?

A MgY **B** Mg_2Y_3

C MgY_2 **D** Mg_3Y_2

Zhonghua Secondary School
Mid-Year Examination 2017
Secondary 2 Express

NAME: _____ ( )

CLASS: 2 E _____

For Examiner's Use	
Section B	30
Section C	30
Total	

Section B

Answer **all** the questions.

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

B1 The kinetic particle theory states that all matter are made up of particles which are in constant, random movement.

(a) Complete Table 1.1.

Table 1.1

	helium gas	water	iron
arrangement of particles		no regular pattern; particles are relatively close together	
forces of attraction between particles		strong but weaker than solid	
movement of particles	particles move freely and randomly in all directions at high speeds		

[6]

(b) In the boxes, draw the arrangements of particles of helium gas and iron at room temperature.

helium gas

iron

[2]

[Total:8]

B2 Fig. 2.1 shows an experiment where potato strips of equal dimensions are immersed in glucose solutions of different concentrations.

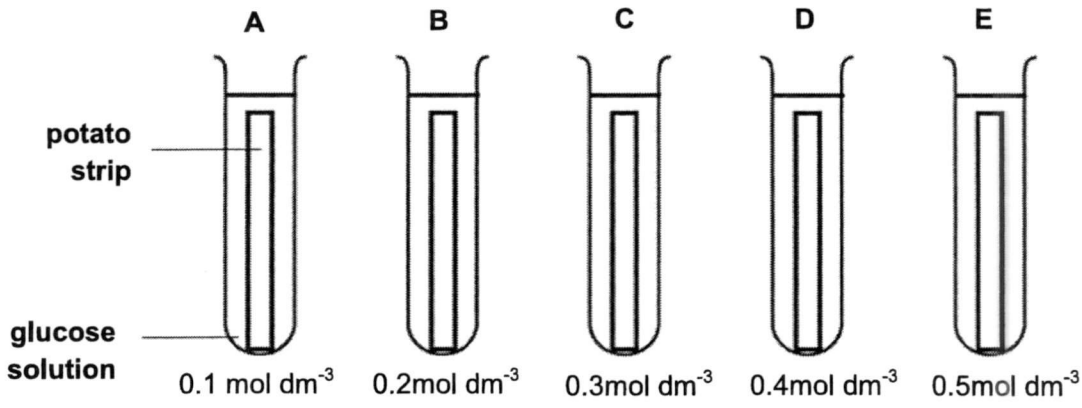


Fig. 2.1

(a) Define diffusion.

.....

..... [1]

(b) Which potato strip shows the largest decrease in length? Explain your answer.

.....

.....

.....

..... [2]

(c) For the strip mentioned in (b), suggest how can you modify the experiment to allow the strip to decrease in length, in a shorter time?

.....

..... [1]

[Total: 4]

B3 Fig. 3.1 shows the side view of a female reproductive system.

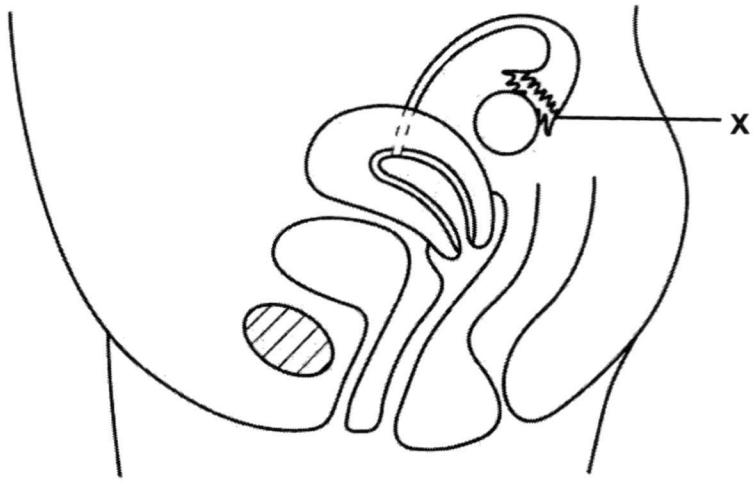


Fig. 3.1

(a) Using proper labelling lines, name and label the following structures on Fig. 3.1,

(i) where implantation occurs

(ii) where an ovum would be fertilised normally [2]

(b) How does the structure of **X** aid in its function?

.....

..... [1]

Fig. 3.2 shows the concentrations of two hormones, **F** and **G**, involved in a menstrual cycle.

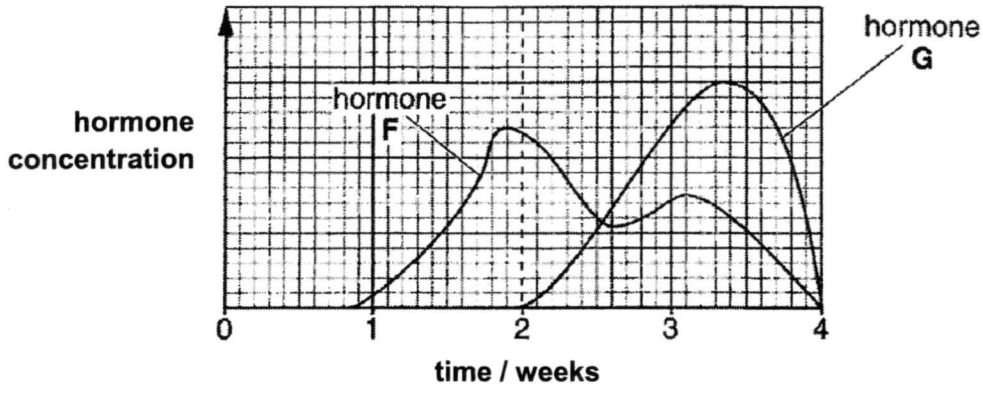


Fig. 3.2

(c) Name hormones **F** and **G**.

F _____

G _____ [1]

(d) Describe the event(s) that occur(s) in the first two weeks of the menstrual cycle.

_____

_____

_____

_____ [2]

(e) If a woman started her menstrual cycle on 6 May 2017, what is the date that she is most likely to ovulate?

_____

_____ [1]

[Total: 7]

B4 Sodium chloride is an important component of the blood. It helps in maintaining the osmotic pressure.

(a) **(i)** Describe how bonds are formed in sodium chloride.

[2]

(ii) Draw a 'dot and cross' diagram of sodium chloride. Show only the valence electrons.

[2]

(b) Natural sodium is comprised of three isotopes: ^{22}Na, ^{23}Na and ^{24}Na.

(i) What does the term, isotopes, mean?

[1]

(ii) Explain why ^{22}Na, ^{23}Na and ^{24}Na are considered as isotopes of sodium.

[4]

(c) Unlike sodium and chlorine, noble gases do not react to form compounds.

Explain why noble gases do not form compounds.

[2]

[Total: 11]

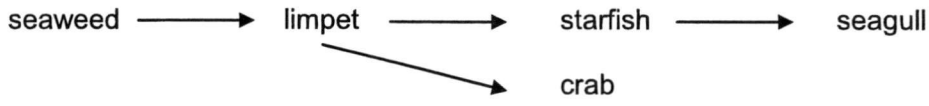
Section C

Answer **all** the questions.

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

C5 Two habitats of similar communities are shown in Fig. 5.1.

community A



community B

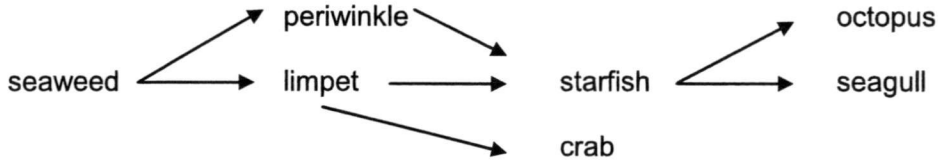


Fig. 5.1

(a) Name a secondary consumer from community **B**.

.....

[1]

(b) Write down a food chain with 3 trophic levels from community **B**.

.....

[1]

(c) Seaweed absorbs 500 kJ of energy from the sun and limpet obtains 45 kJ after consuming seaweed.

Calculate the percentage loss of energy from seaweed to limpet.

percentage loss of energy = ...

[2]

(d) In community **A**, there are 100 000 seaweed, 20 000 limpet, 2 000 starfish and 400 seagulls.

Draw a labelled pyramid of numbers for the food chain mentioned above.

[2]

(e) In May, there was a discharge of polluted waste water from a factory into both habitats, killing all limpets.

(i) Which organism will be most affected by the limpet deaths in both habitats? Give a reason for your answer.

_____

_____

_____

_____ [2]

(ii) Compare, with reasons, the impact of the waste water discharge on communities **A** and **B**.

_____

_____

_____

_____ [2]

[Total: 10]

C6 Fig 6.1 shows a longitudinal section of a heart in a person who has just suffered a mild heart attack.

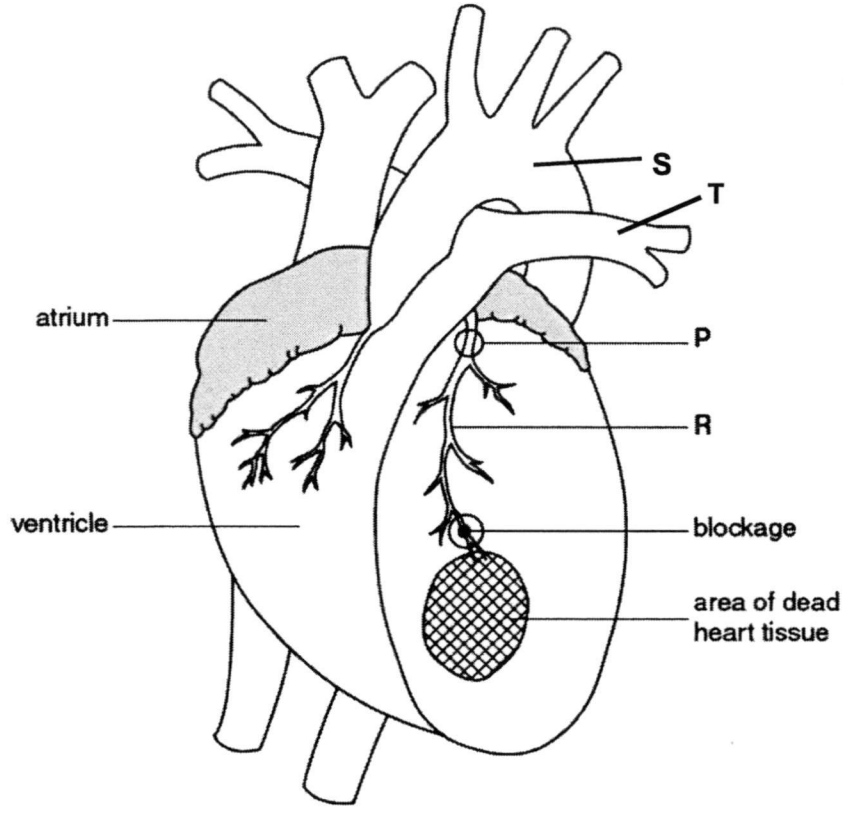


Fig 6.1

(a) Name blood vessels **S**and **T**.

S _____

T _____ [2]

(b) Describe how the blockage in vessel **R** occurred and its effect on the heart.

_____

_____

_____

_____ [2]

(c) Suggest and explain why a blockage at point **P** on Fig. 6.1 is likely to cause more serious consequences than a blockage at point **R**.

[2]

(d) During a detailed scan, it was discovered that the person's median septum was not fully developed.

Describe the consequence of this defect and a symptom that the person may suffer from.

[2]

(e) The person went through a surgery to minimise the blockage in vessel **R**. After the surgery, samples of his blood were tested and the blood tests revealed that there was a high number of white blood cells and platelets.

Explain why such high numbers of white blood cells and platelets were in his blood.

[2]

[Total: 10]

C7 The element hydrogen is placed on its own in the Periodic Table. However some chemists think that hydrogen should be placed above lithium in Group I.

(a) **(i)** Using your knowledge of hydrogen and lithium, write down one similarity and one difference between the two elements.

similarity: .....

.....

difference: .....

..... [2]

(ii) Draw a 'dot and cross' diagram of the compound formed when hydrogen combines with oxygen. Show the outermost electrons only.

[2]

(iii) Draw a 'dot and cross' diagram of the compound formed when lithium combines with oxygen. Show all the electrons.

[2]

(iv) Write the chemical formulae of compounds formed in **(a)(ii)** and **(a)(iii)**.

(a)(ii) .....

(a)(iii) ..... [2]

(b) Rewrite each statement by changing the number(s) in each statement to the correct number.

(i) The first shell in an atom can hold a maximum of eight electrons.

.....

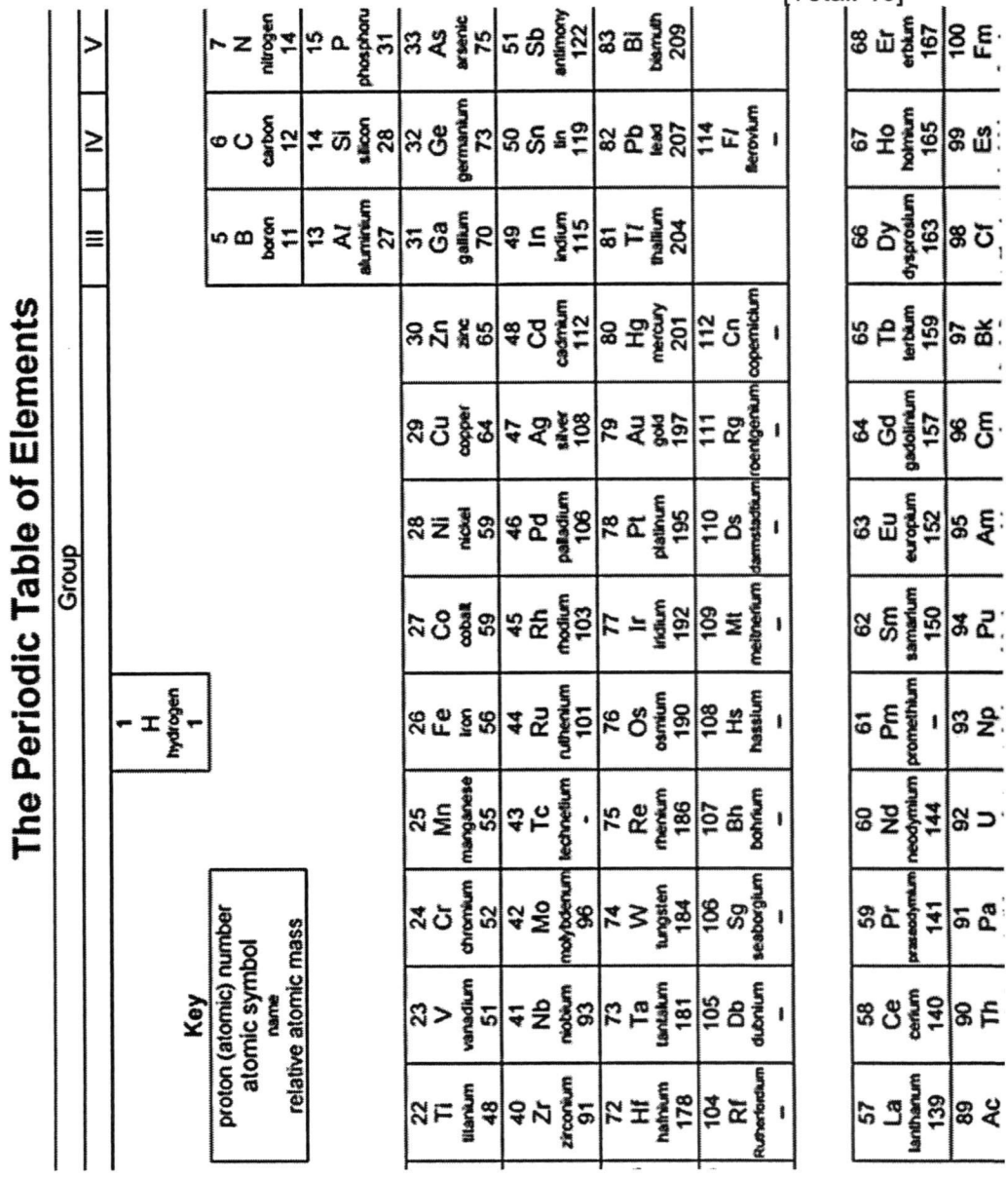
.....

(ii) Oxygen has an atomic number of 8. Therefore there are 8 electrons in the outer shell of its atom.

.....

..... [2]

[Total: 10]



2017Zhonghua Secondary School
2E ScienceMYE Answers

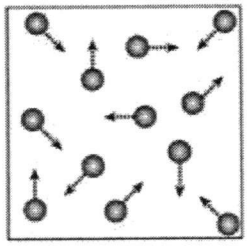
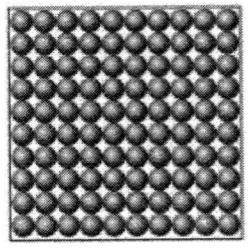
Section A

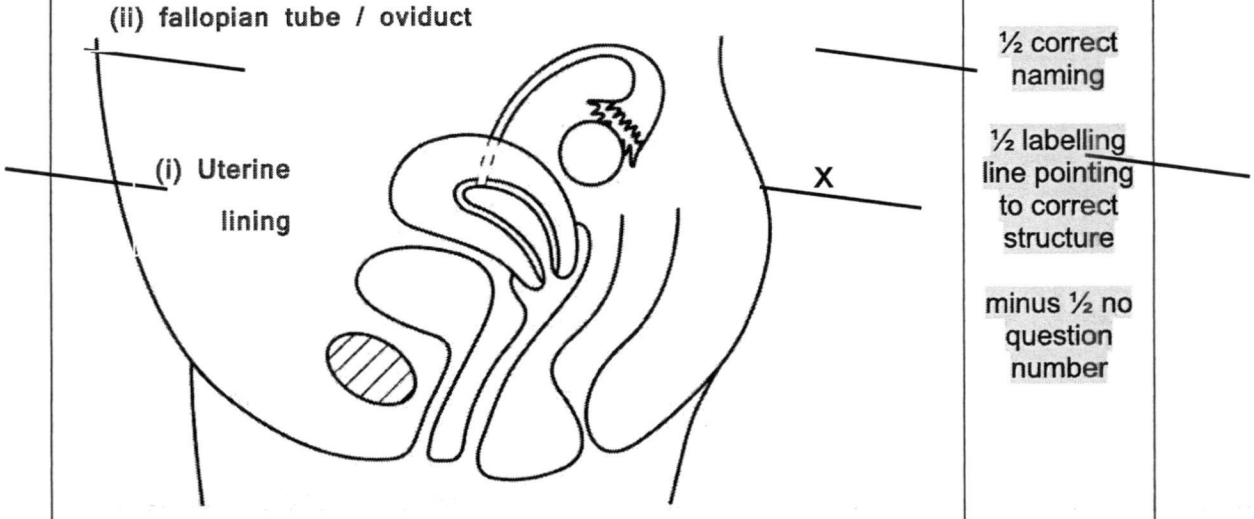
1	**D**	6	**B**	11	**A**	16	**B**	21	**A**	26	**A**
2	**A**	7	**D**	12	**C**	17	**A**	22	**D**	27	**B**
3	**B**	8	**D**	13	**A**	18	**C**	23	**A**	28	**B**
4	**D**	9	**C**	14	**C**	19	**C**	24	**D**	29	**D**
5	**A**	10	**D**	15	**D**	20	**D**	25	**A**	30	**D**

Section B

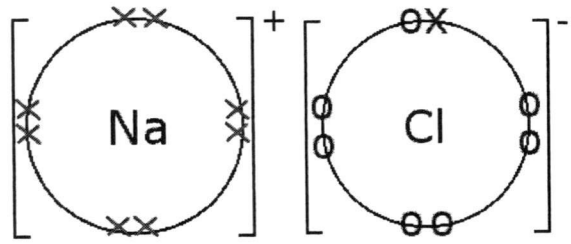
<table>
<tr><th>Qn</th><th>Answer</th><th>Marks</th></tr>
<tr><td>B1a</td><td>
<table>
<tr><th></th><th>helium gas</th><th>water</th><th>iron</th></tr>
<tr><td>arrangement of particles</td><td><u>No regular pattern; [½]</u>

<u>particles are very far apart from each other [½]</u></td><td>No regular pattern; particles are relatively close together</td><td><u>Regular pattern;[½]</u>

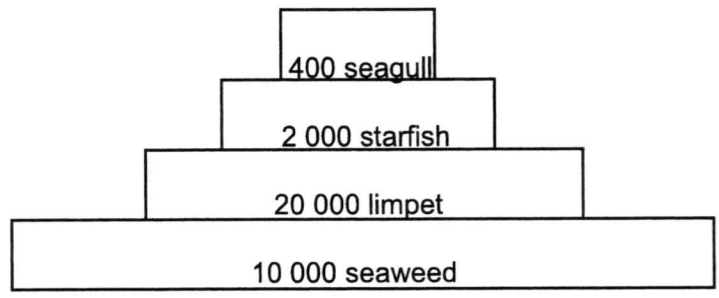
<u>particles are very close together [½]</u></td></tr>
<tr><td>forces of attraction between particles</td><td><u>Weakest force</u></td><td>Strongbut weaker than solid</td><td><u>Strongest force</u> (must compare strength)</td></tr>
<tr><td>movement of particles</td><td>Particles move freely and randomly in all directions at high speeds.</td><td><u>Particles slide across each other</u></td><td><u>Particles vibrate in fixed positions</u></td></tr>
</table>
</td><td>5</td></tr>
<tr><td>B1b</td><td>Helium
 
iron
  </td><td>1 each</td></tr>
</table>

Qn	Answers	Marks
2(a)	Diffusion is the net movement of particles from a higher to a lower concentration	1
2(b)	Strip E Immersed in solution with lowest water potential compared to cell sap of potato	1 1
2(c)	Heat up the glucose solution/ Increase the temperature of the glucose solution	1
3(a)		½ correct naming ½ labelling line pointing to correct structure minus ½ no question number
3(b)	funnel-like opening to allow the ovum to enter fallopian tube easily	1
3(c)	**F** – oestrogen **G** – progesterone (spelling error– minus ½)	½ ½
3(d)	1st week – shedding of uterine lining / discharge of blood/ menstruation occurs 2nd week –repair & thickening of uterine lining andmatured egg is released from ovary / ovulation	1 1
3(e)	19th May 2017	1

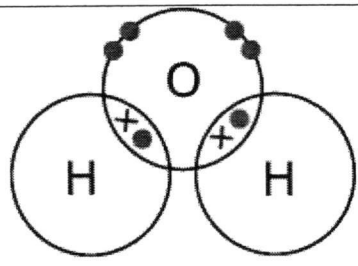
Qn	Answer	Marks
4(a) (i)	A sodium atom loses an electron to chlorine atom/ chlorine atom gains an electron from sodium atom	1

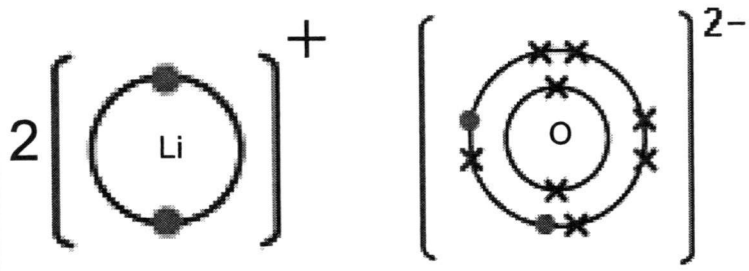
	The sodium ion and chloride ion formed are held by ionic bonds	1
4(a) (ii)		2 – no mistakes Deduct 1 mark for any mistakes (no charge, incomplete electron shells, etc)
4(b) (i)	Atoms of the same elements with same number of protons but different number of neutrons	1
4(b) (ii)	Number of protons = 11 Number of neutrons in ^{22}Na = 11 Number of neutrons in ^{23}Na = 12 Number of neutrons in ^{24}Na = 13	1 1 1 1
4(c)	Noble gases have a stable octet/ duplet electronic configuration They do not lose, gain or share electrons	1 1

Section C

Qn	Answer	Marks
5a	Starfish/crab	1
5b	Seaweed→limpet→crab	1
5c	500 – 45 = 455 kJ 455 / 500 x 100% = 91 %	1 1
5d		
5ei	The crabs will die / The seagulls will also die as they no longer have a food supply.	1 1
5eii	The starfish will not die in community B but will die in community A as they can feed on periwinkles in community B	1 1

	OR Only the crabs will die in community A and B, starfish only die in community A as they no longer have a food supply.	 1 1

Qn	Answers	Marks
6(a)	S – aorta T – pulmonary artery (spelling error – minus ½)	1 1
6(b)	deposit of fats or cholesterol on inner walls of arteries reduce flow of nutrients and oxygen to the heart muscles	1 1
6(c)	Blockage at P reduces blood flow to more heart muscles Greater area of heart muscles dying, causing heart to be unable to pump blood	1 1
6(d)	Mixing of oxygenated and deoxygenated blood Difficulty in breathing / shortness of breaths Weakness / Fatigue / Paleness	1 1 Any one
6(e)	Increased number of white blood cells to engulf and ingest pathogens during an infection Platelets to help in clotting of blood to minimise blood loss	1 1
7(a) (i)	**Similarities** Both atoms have 1 valence electron Both atoms can lose that 1 electron and form a + charge ion **Differences** Hydrogen is a non-metal while lithium is a metal or Hydrogen can form a + or – ion but lithium can only form an – ion. Hydrogen is a gas and lithium is a solid (any other suitable ones)	Max 1 Max 1
7(a) (ii)		2 – no mistakes Deduct 1 mark for any mistakes (no charge, incomplete electron shells, etc)

7(a) (iii)		2 – no mistakes Deduct 1 mark for any mistakes (no charge, incomplete electron shells, etc)
7(a) (iv)	H_2O Li_2O	1 1
7(b) (i)	The first shell in an atom can hold a maximum of **two** electrons OR The **second** shell in an atom can hold a maximum of eight electrons.	1
7(b) (ii)	Oxygen has an atomic number of 8. Therefore, there are **6** electrons in the outer shell of its atom.	1