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Name: .... ( ) Class: ....

ASSUMPTION ENGLISH SCHOOL
END OF YEAR EXAMINATION 2019

LOWER SECONDARY SCIENCE
BOOKLET A

ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
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LEVEL: Sec 2 Express **DATE:** 8 October 2019

CLASSES: Sec 2/1, 2/2, 2 NA (SBB) **DURATION:** 2 hours (For Booklets **A** and **B**)

Additional Materials provided: 1 sheet of OAS paper

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

Write your NAME, INDEX NUMBER and CLASS at the top of this page and on the OAS paper. **Shade your index number on the OAS** paper.

This paper consists of 3 sections.

Booklet **A**: Section A - Multiple-Choice Questions
Booklet **B**: Section B - Short Structured Questions
Section C - Long Structured Questions

SECTION A (30 marks)
Multiple-Choice Questions
There are 30 questions in this section. Answer **all** questions. For each question, there are four possible answers A, B, C and D. **Choose the correct answer and record your choice in soft or 2B pencil on the OAS paper provided. DO NOT fold or bend the OAS paper.**

The Periodic Table is found on the last page of Booklet **B**.

At the end of the examination, hand in your OAS paper, Booklets **A** and **B** separately.

SECTION A: MULTIPLE-CHOICE QUESTIONS [30 marks]

There are **thirty** questions in this section. 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 on the OAS paper in soft pencil.

1 Which separation techniques involve a change in state of matter?

I distillation
II evaporation to dryness
III filtration

A I and II only

B I and III only

C II and III only

D I, II and III

2 A mixture of coloured dyes is compared with other dyes using chromatography. The chromatogram is shown below.

Which dyes are present in the mixture?

A 1 and 2

B 1 and 3

C 2 and 3

D 2 and 4

3 What is the correct order of steps to obtain salt from a mixture of salt and pepper?

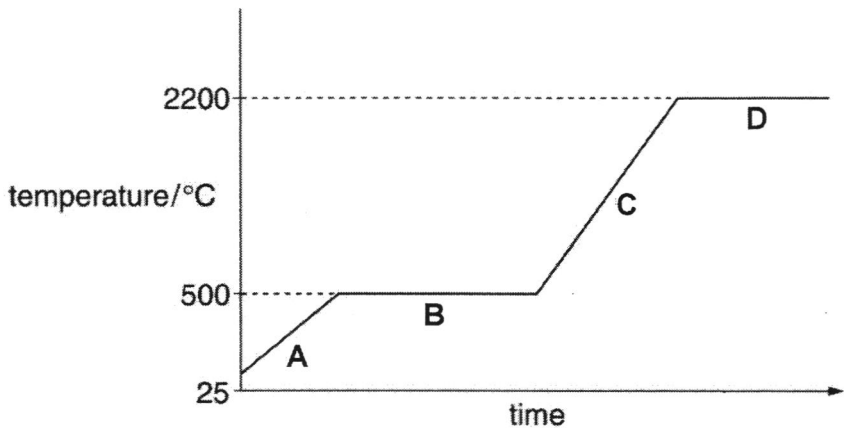
A dissolving → evaporation → filtration

B dissolving → filtration → evaporation

C evaporation → dissolving → filtration

D filtration → evaporation → dissolving

4 A solid metal is heated until it turns to vapour. The graph shows the temperature of the metal during the process.



Which part of the graph shows the melting of the metal?

5 A caffeine molecule is represented by $C_8H_{10}N_4O_2$. Which statement about caffeine is **not** correct?

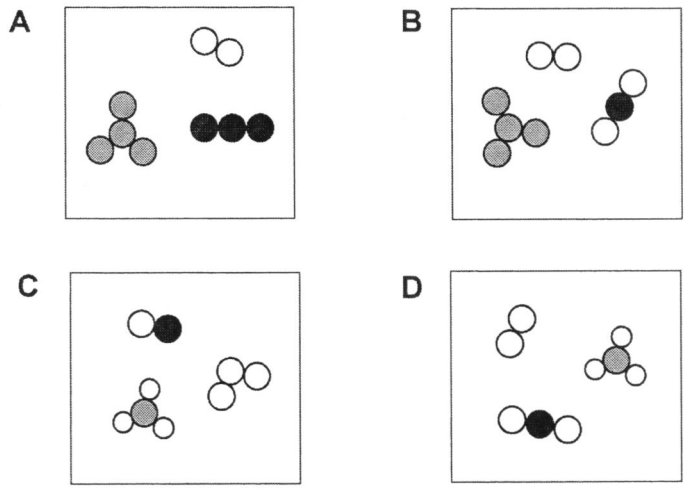
A Carbon and nitrogen atoms can be found in caffeine.

B The caffeine molecule is made of four types of atoms.

C There are 10 nitrogen atoms found in one molecule of caffeine.

D There are 48 atoms in two caffeine molecules.

6 Which diagram best represents a mixture of oxygen (O_2), ammonia (NH_3) and carbon dioxide (CO_2) gases?



7 What is the function of the xylem?

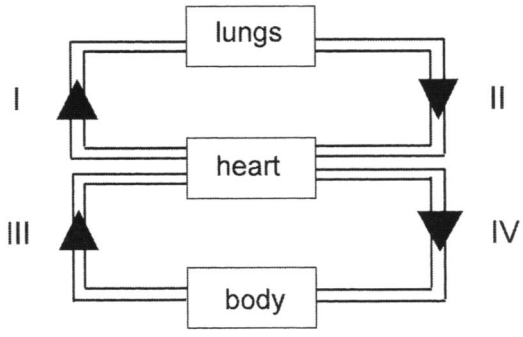
A transport food from leaves to other parts of the plant

B transport food from roots to leaves

C transport water and minerals from leaves to roots

D transport water and minerals from roots to leaves

8 The diagram shows blood vessels flowing through different parts of the body.



Which blood vessels are veins?

A I and II

B I and III

C II and III

D II and IV

9 Where in the body is bile made?

A gall bladder

B liver

C pancreas

D small intestine

10 Which statement about digestion in the stomach is **not** true?

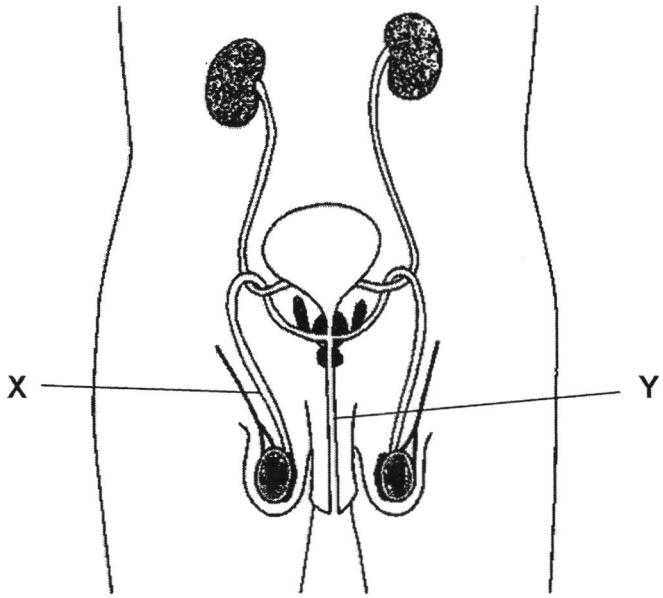
A Gastric juice is produced in the stomach.

B Proteins are completely digested in the stomach.

C The hydrochloric acid in stomach helps protease to work.

D The stomach muscles can contract and relax to physically break down food.

11 The diagram shows the male reproductive system.



What are the labelled structures?

	X	Y
A	sperm duct	testes
B	sperm duct	urethra
C	urethra	sperm duct
D	urethra	testes

12 How does the female contraceptive pill prevent pregnancy?

A The pill blocks the opening of the oviduct.

B The pill prevents the embryo from implanting on the uterus.

C The pill stops sperms from swimming up the uterus.

D The pill stops the ovary from releasing the ovum.

13 Which change will **not** occur for females during puberty?

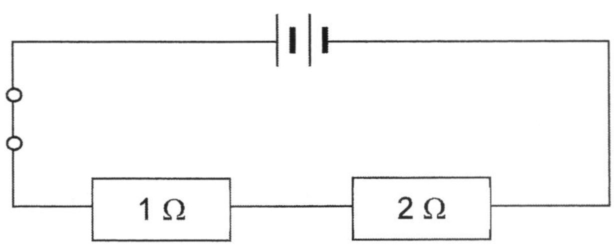
A enlarging of breasts

B enlarging of voice-box and deepening of voice

C start of menstrual cycle

D widening of hips

14 The diagram below shows a circuit with a current of 2 A flowing through the battery.



Which action would increase the current from the battery?

A adding a 1 Ω resistor in parallel to the 2 Ω resistor

B adding a light bulb in series with the circuit

C adding a variable resistor in series with the circuit

D removing one of the batteries from the circuit

15 Which effect cannot be caused by electrical currents?

A gravitational effect

B heating effect

C lighting effect

D magnetic effect

16 Which statement best describes the potential difference across an object?

A It is the amount of energy needed to move one unit of electric charge from one point to another.

B It is the rate of flow of electric charges.

C It is the ratio of current to voltage.

D It is the ratio of voltage to current.

17 The world record for a 100 m sprint is 9.58 s. What is the speed in km/h?

A 10.4 km/h

B 37.6 km/h

C 64.4 km/h

D 83.3 km/h

18 Which effect cannot be caused by a force?

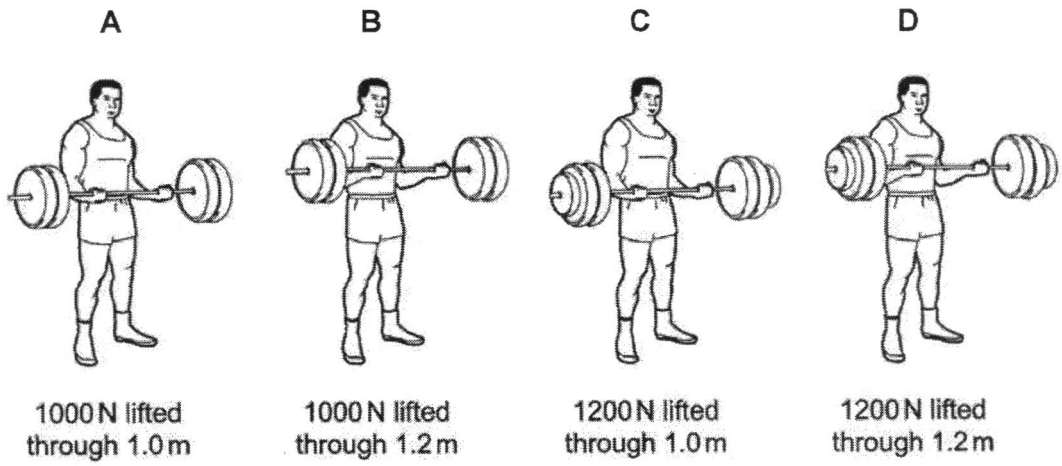
A changing the direction of an object

B changing the mass of an object

C changing the shape of an object

D stopping a moving object

19 A weightlifter lifts weights through different heights.



When does he do the most work?

20 A child drops a ball from a window and sees that it bounces back to a height lower than that of the window. Which statement best explains why this happens?

A The total energy is conserved as the ball has the same amount of gravitational potential energy at different heights.

B The total energy is conserved but some energy is converted into heat and sound.

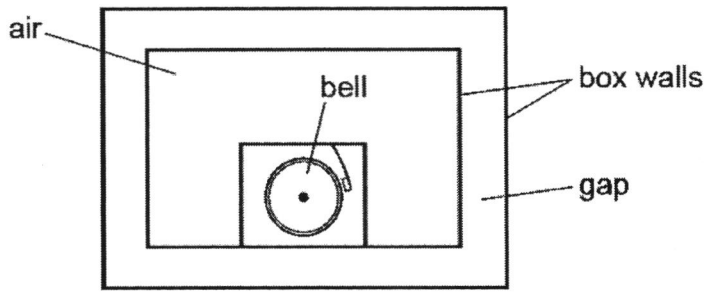
C The total energy is not conserved because some energy is converted into heat and sound.

D The total energy is not conserved due to friction with the ground.

21 A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder. What effect does this have on the size of vibration and on the frequency of the sound?

	size of vibration	frequency
A	larger	higher
B	larger	same
C	same	higher
D	same	same

22 The diagram below shows an electric bell enclosed in a box.



When the electric bell is switched on, the sound generated could not be heard. What could be in the gap?

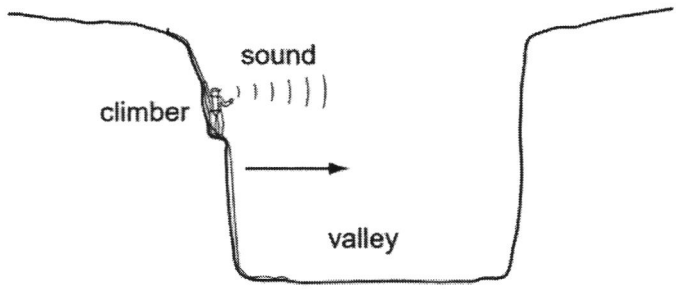
A air

B Styrofoam

C vacuum

D wood

23 To estimate the width of a valley, a climber starts a stopwatch as he shouts. He hears an echo from the opposite side of the valley after 1.0 s.



The sound travels at 340 m/s in air. What is the width of the valley?

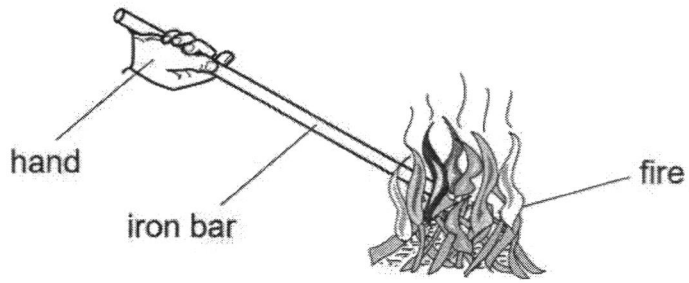
A 85 m

B 170 m

C 340 m

D 680 m

24 An iron bar is held with one end in a fire. The other end soon becomes too hot to hold.



How has the heat travelled along the iron bar?

A by conduction

B by convection

C by expansion

D by radiation

25 Two sheets of metal are joined together using metal rivets. The hot rivets are put through drilled holes and are then hammered over.

Why are the rivets made hot before putting into the holes?

A The heat from the rivet expands the hole.

B The rivet and the metal melt and fuse together.

C The rivets can fit into the hole more easily.

D The rivets can hold the sheets of metal tightly when cooled.

26 Which feature does **not** help keep a building cool?

A Buildings are made of concrete which are poor conductors of heat.

B Double-glazed windows reduce heat loss by conduction.

C The outside of buildings are painted white to reduce heat loss by conduction.

D The use of shiny glass windows help reflect heat radiation.

27 Which substances, when mixed together, produces a neutralisation reaction?

A acid and alkali
B acid and carbonate
C acid and metal
D alkali and metal

28 What are the products of respiration in green plants?

A glucose and carbon dioxide
B glucose and oxygen
C water and carbon dioxide
D water and oxygen

29 Which statement is true when a substance undergoes a physical change?

A It results in the formation of new substances.
B It involves the release of heat and light energy.
C The chemical properties of the substance do not change.
D The change is irreversible.

30 Which statement about decomposers is **not** true?

A Decomposers obtain energy from dead bodies.
B Decomposers return energy to the environment.
C Decomposers return nutrients to the environment.
D Decomposers work on both producers and consumers.

- End of Section A -

Name: .... (   )   Class: ....

ASSUMPTION ENGLISH SCHOOL
END OF YEAR EXAMINATION 2019

LOWER SECONDARY SCIENCE
BOOKLET B

ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL ASSUMPTION ENGLISH SCHOOL
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LEVEL: Sec 2 Express   **DATE:** 8 October 2019

CLASSES: Sec 2/1, 2/2, 2 NA (SBB)   **DURATION:** 2 hours (For Booklets **A** and **B**)

Additional Materials provided: NIL

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

Write your NAME, INDEX NUMBER and CLASS at the top of this page

This booklet consists of 2 sections.

SECTION B (40 marks)
Short Structured Questions
Answer **all** questions. Write your answers in the spaces provided on the question paper.

SECTION C (30 marks)
Long Structured Questions
Answer **all** questions. Write your answers in the spaces provided on the question paper.

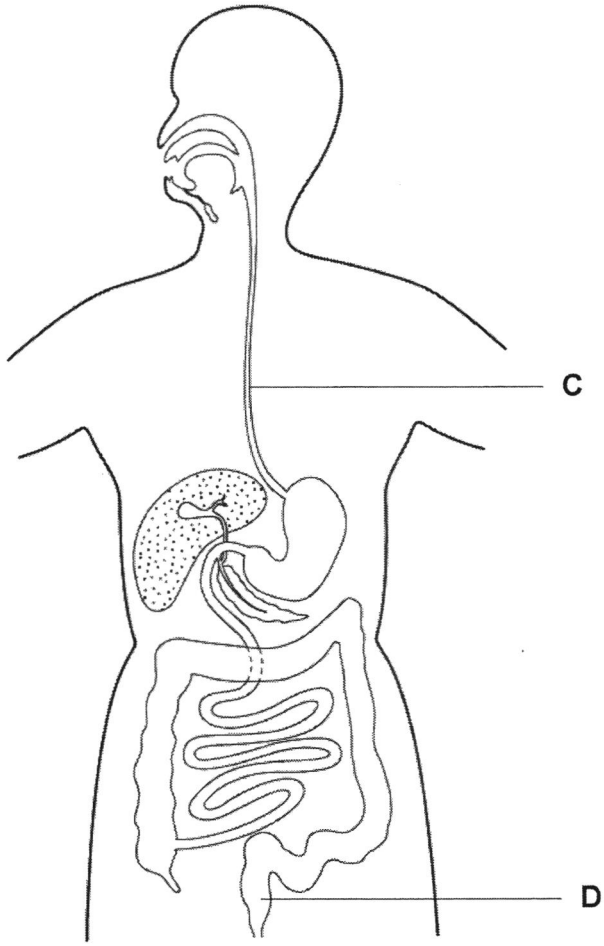
For Examiner's Use	
Section A	/30
Section B	/40
Section C	/30
Total	/100

At the end of the examination, hand in your OAS paper, Booklets **A** and **B** separately.

SECTION B – SHORT STRUCTURED QUESTIONS (40 marks)

Answer **ALL** the questions in the spaces provided. For questions involving calculations, all workings and units must be shown clearly. For answers that are not exact, give your answers correct to 3 significant figures.

1 The diagram shows the human digestive system.



(a) Identify parts **C** and **D**.

C: ..... **D**: ..... [2]

(b) **(i)** Draw a labelled line on the diagram, marked '**X**', to indicate where fat digestion begins. [1]

(ii) State a word equation, including the enzyme involved, to show how fat is chemically digested to form its final products.

..... [1]

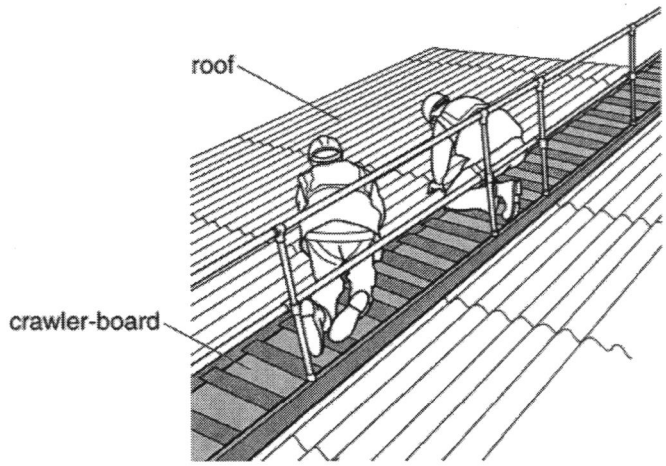
(c) Explain why food needs to be digested.

.....

.....

..... [2]

2 The diagram shows two men repairing a roof using a crawler-board.



(a) Explain why use of the crawler-board prevents the men from falling through the roof.

.....

.....

..... [2]

(b) The crawler-board has a weight of 400 N. The total weight of the two men is 1600 N. The area of the crawler-board in contact with the roof is 0.8 m^2. Calculate the pressure on the roof when the men are on the crawler-board.

pressure: ..... [3]

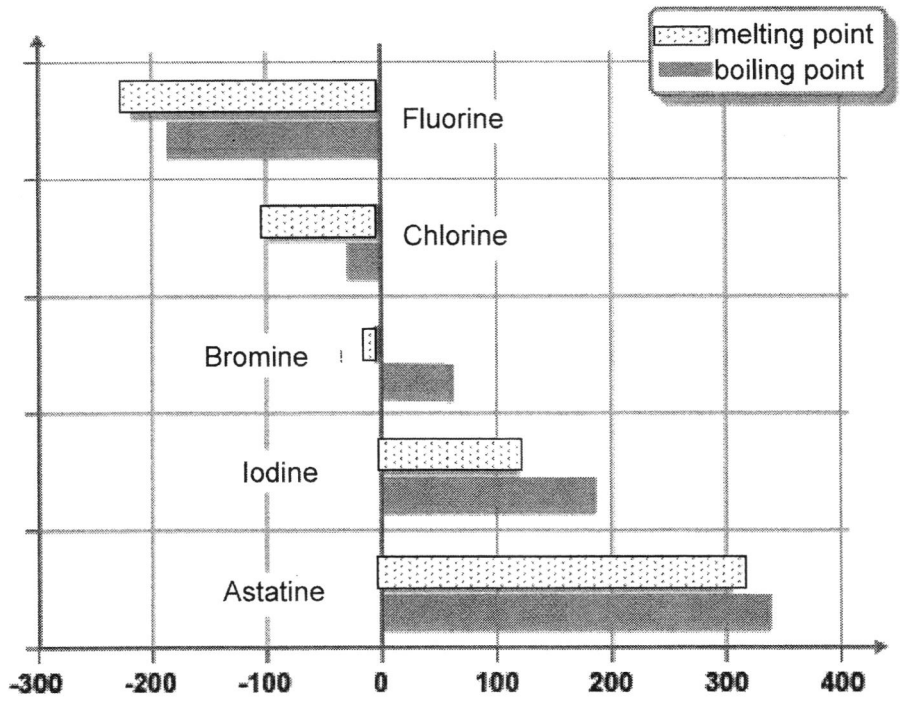
3 The Periodic Table consists of many elements. There is a vertical column of elements known as halogens in Group VII of the Periodic Table. These elements include fluorine, chlorine, bromine, iodine and astatine.

(a) Complete the table to show the number of subatomic particles found in atoms of fluorine and bromine.

element	number of protons	number of neutrons	number of electrons
fluorine	9		
bromine			35

[2]

(b) The melting point and boiling point of the elements in Group VII are shown in the graph below.



(i) Describe the changes in the melting and boiling point as the proton number increases.

.....

..... [1]

(ii) Identify the physical states of the five halogens at room temperature (25 °C) by listing the halogens in the table below.

solid	liquid	gas

[2]

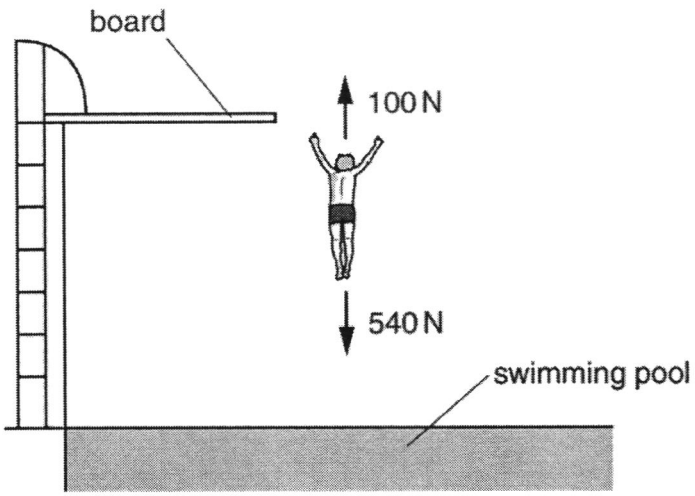
(iii) Using the kinetic particle theory, describe the arrangement and movement of solid particles. Illustrate with a diagram of the particles in the box below.

.....

.....

..... [3]

4 A boy steps off a high board into a swimming pool. The diagram shows the forces acting on the boy at one point in his fall. The gravitational field strength is 10 N/kg.



(a) **(i)** State the cause of the two different forces.

cause of 100 N force: .....

cause of 540 N force: ..... [2]

(ii) Hence, calculate the mass of the boy.

mass: ..... [1]

(b) Complete the boxes to show the energy conversion as the boy is falling towards the water.

	→		+	
energy		energy		energy

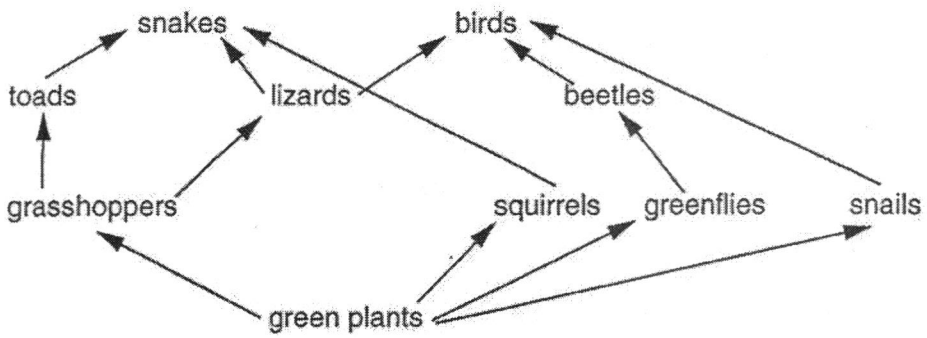
[1]

(c) Loud splashes were made when the boy falls into the water. Describe how the sound reaches a life guard who is standing beside the swimming pool.

.....

..... [1]

5 The diagram shows a food web.



(a) Name two primary consumers in this food web.

..... [1]

(b) Green plants are able to trap energy through the process of photosynthesis. State the word equation, including the conditions, for photosynthesis.

..... [2]

(c) The diagram shows the energy transfer through one of the food chains.

(i) Calculate the percentage of energy transferred from the squirrels to the snakes.

percentage: ..... [1]

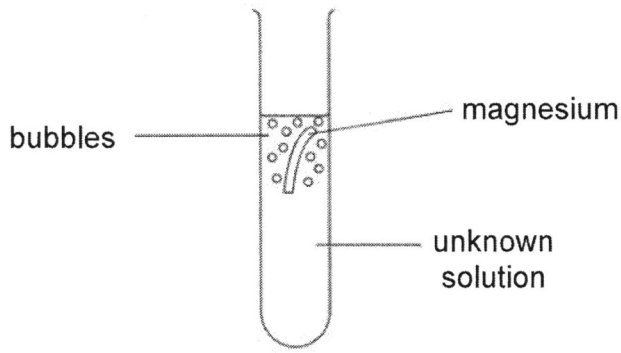
(ii) Explain how most of the energy is lost to the environment.

.....

.....

..... [2]

6 A piece of magnesium was dropped into an unknown solution as shown.



Gas bubbles were formed and the gas extinguished a lighted splint with a 'pop' sound.

(a) Name the gas formed.

..... [1]

(b) A few drops of Universal Indicator was dropped into the unknown solution. Describe and explain the colour that will be observed.

.....

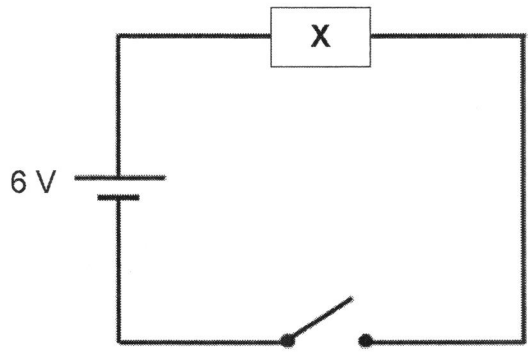
..... [2]

(c) A soluble salt was formed in the reaction and remained dissolved in the unknown solution. Suggest how a dry solid sample of the salt can be obtained from the solution.

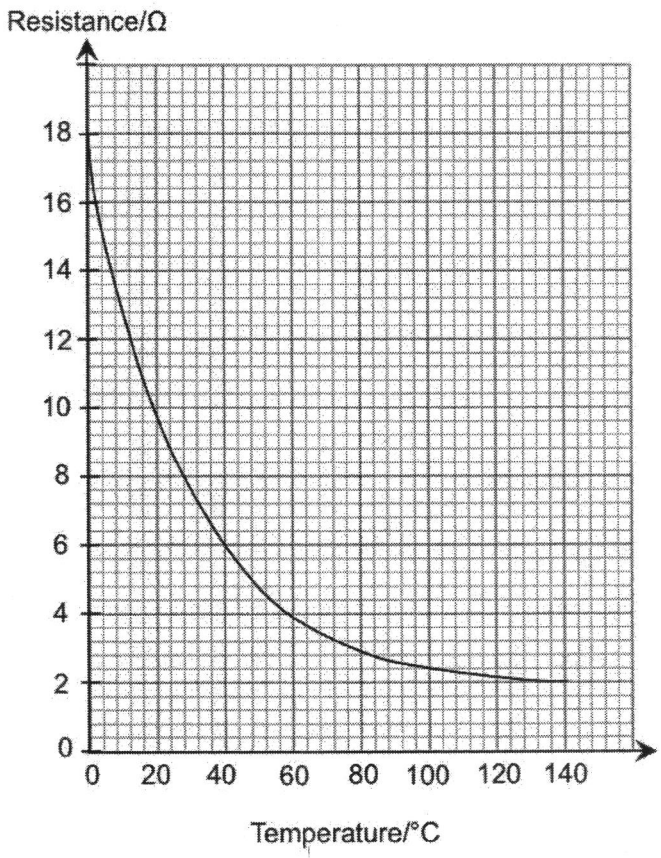
.....

..... [1]

7 The diagram shows a circuit with a component **X**.



The resistance of component **X** changes with temperature as shown in the graph below.



(a) State the resistance of component **X** when the temperature is 40 °C.

..... [1]

(b) The current can be adjusted by changing the temperature of component **X** from 40 °C. Suggest and explain the temperature component **X** should be in order to double the current of the circuit.

.....

.....

..... [2]

(c) Redraw the circuit and add two instruments to show how the current and the potential difference across component **X** can be measured.

[2]

(d) In another experiment, a fixed resistor of 3.5 Ω has a current of 2 A passing through it. Calculate the potential difference across the fixed resistor.

potential difference: ..... [1]

SECTION C – LONG STRUCTURED QUESTIONS (30 marks)

Answer **ALL** the questions in the spaces provided. For questions involving calculations, all workings and units must be shown clearly. For answers that are not exact, give your answers correct to 3 significant figures.

1 **(a)** Describe what is meant by *menstruation*.

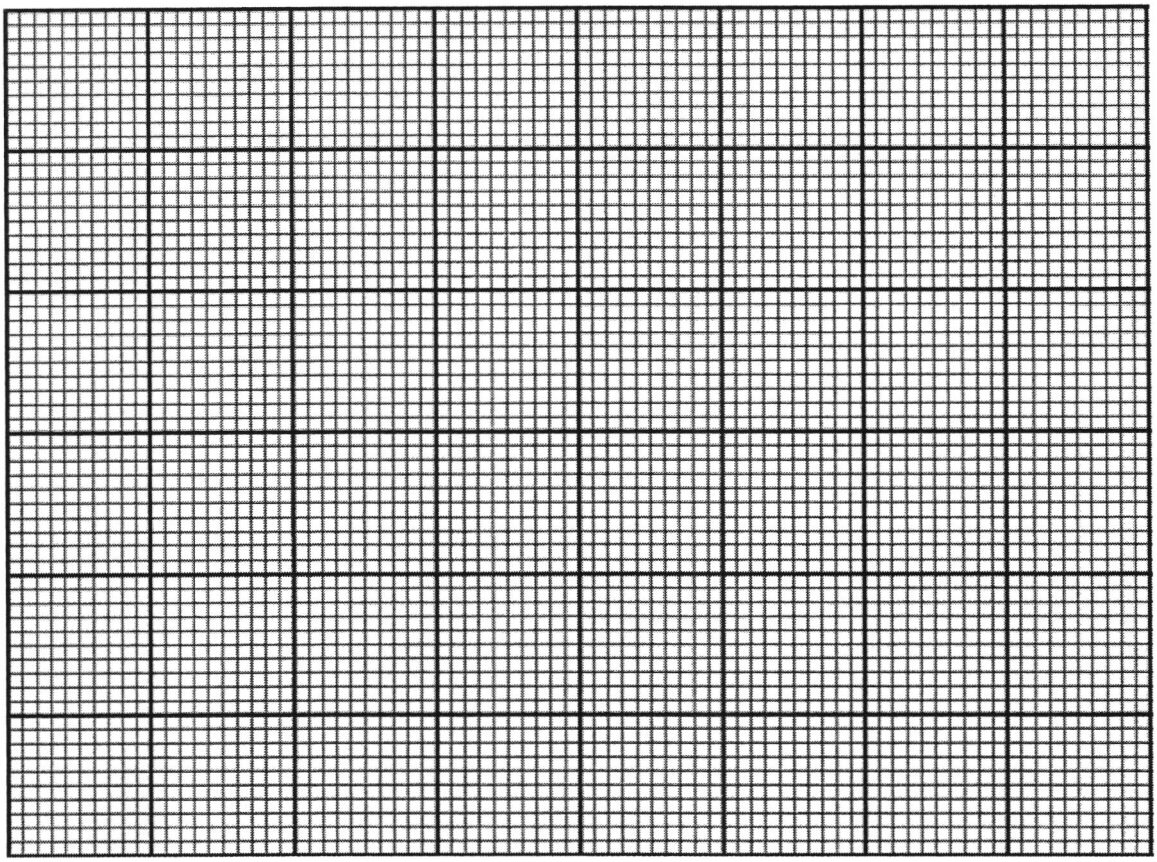
.....

..... [1]

(b) The table shows the probability of a woman becoming pregnant after sexual intercourse, during a menstrual cycle.

day of menstrual cycle	probability of becoming pregnant / %
0	0
4	2
8	14
12	54
14	58
16	30
20	10
24	4
28	2

(i) Plot a graph of *probability of becoming pregnant* against *day of menstrual cycle* using the data in the table. Draw a best-fit curve.



[4]

(ii) From the graph, state the **three** days which the woman has the highest probability of becoming pregnant. Explain why the woman has the highest probability of becoming pregnant during these days.

.....

.....

.....

..... [2]

(iii) A woman uses the information in the table to avoid becoming pregnant. She abstains from sexual intercourse from day 10 to day 15 of each menstrual cycle. Comment on the reliability of this method of contraception.

.....

..... [1]

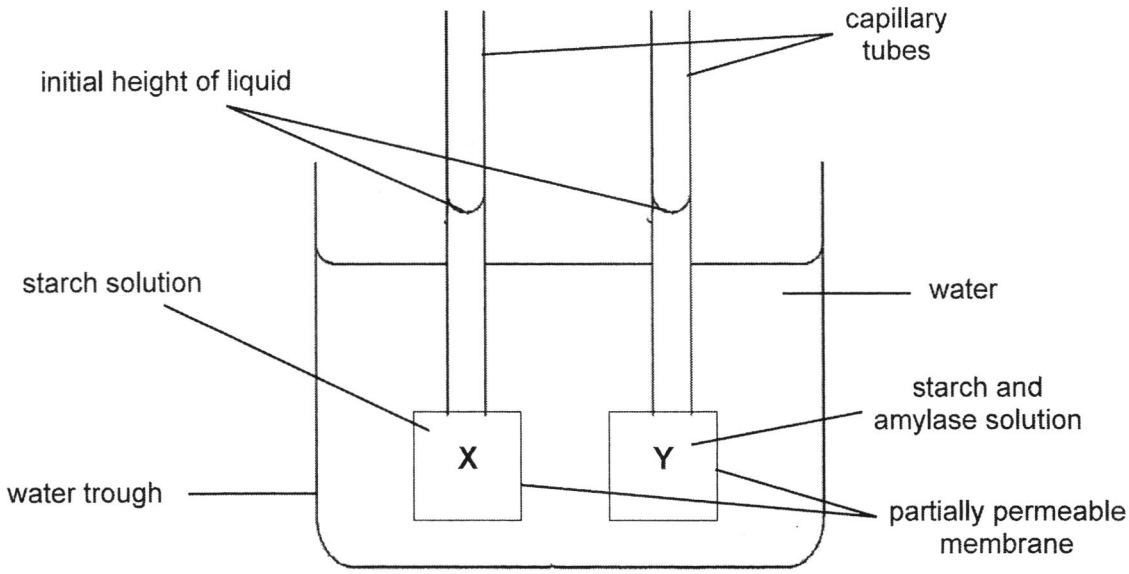
(iv) Describe a permanent birth control method for the woman to prevent pregnancy. Explain how pregnancy is prevented.

.....

.....

..... [2]

2 The figure shows an experimental setup with two containers, **X** and **Y** in a water trough. Container **X** is filled with a solution of starch while container **Y** is filled with a solution of starch and amylase. Each container is made up of a partially permeable membrane.



(a) Define *osmosis*.

.....

.....

.....

..... [2]

(b) State and explain what would happen to the height of the liquid level in the capillary tube of container **X**.

.....

.....

.....

.....

.....

..... [3]

(c) Yellow iodine solution is added to the water trough. Iodine is a small molecule and will only turn blue-black in the presence of starch. State and explain the colours observed in the different parts of the experimental set-up.

container **X**: .....

.....

.....

.....

container **Y**: .....

.....

.....

.....

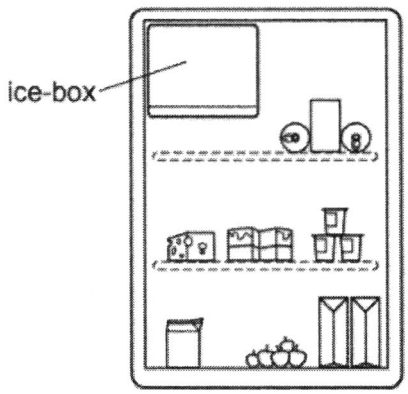
water in trough: .....

.....

.....

..... [5]

3 **(a)** The diagram shows the inside of a refrigerator.



Using the concepts of heat transfer, explain why the ice-box is found at the top of the refrigerator.

.....

.....

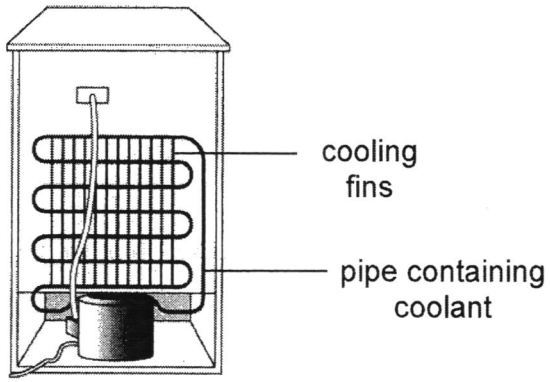
.....

.....

.....

..... [3]

(b) The diagram shows the back of the refrigerator.



(i) Explain why the cooling fins are painted black.

.....

..... [1]

(ii) Three of the cooling fins are damaged and removed. Explain how the rate of cooling is affected.

.....

..... [1]

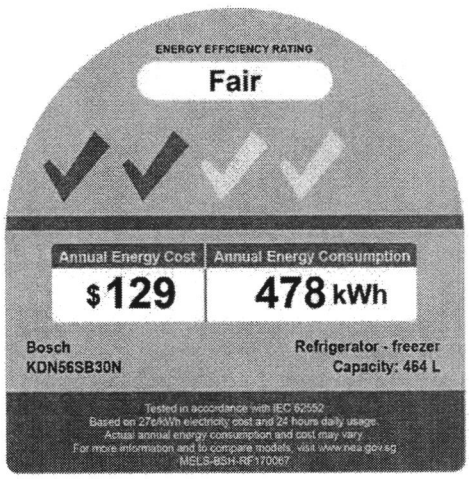
(iii) The coolant in the pipes was initially in gaseous state when the coolant first exits the refrigerator. Using the kinetic particle theory model, describe how the coolant forms a liquid when it passes through the cooling fins and re-enters the refrigerator.

.....

.....

..... [2]

(c) The diagram below shows the energy consumption of the refrigerator.



(i) Calculate the cost of electricity in cents per kWh.

cost of electricity: ..... cents per kWh [1]

(ii) Calculate the power rating of the refrigerator in watts, assuming it is switched on throughout the year.

power: ..... W [2]

- End of Booklet B -

ASSUMPTION ENGLISH SCHOOL
Sec 2 Lower Secondary Science Marking Scheme
EOY Exam 2019

Section A (30 m)

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
A	D	B	B	C	D	D	C	B	B
Q11	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**	**Q17**	**Q18**	**Q19**	**Q20**
B	D	B	A	A	A	B	B	D	B
Q21	**Q22**	**Q23**	**Q24**	**Q25**	**Q26**	**Q27**	**Q28**	**Q29**	**Q30**
B	C	B	A	D	C	A	C	C	B

Section B (40 m)
minus one mark for entire paper for wrong/lack of units

1	a	C: oesophagus; D: rectum / large intestine;	2
	b i	X indicated at small intestine / duodenum (reject if line or x does not touch intestine)	1
	b ii	lipase fats → fatty acids + glycerol	1
	c	The nutrients in food are **large** molecules; They need to be **broken down into small** molecules; so that the nutrients can be absorbed by the **bloodstream/cells** 3 correct – 2 marks, 2 correct – 1 mark 0 to 1 correct – no marks	2
2	a	The weight/force of the men is spread out on the crawler-board; The crawler-board has a **larger area in contact** with the roof; There is a **lower pressure** on the roof; 3 points – 2 marks, 1 to 2 points – 1 mark	2
	b	total weight = 400 + 1600 = 2000 N; P = F/A = 2000 / 0.8 = 2500 N/m^2 or Pa (1m for formula of P = F/A if answer is wrong)	1 1 1
3	a	element: fluorine — number of protons: 9 — number of neutrons: **10** — number of electrons: **9** element: bromine — number of protons: **35** — number of neutrons: **45** — number of electrons: 35 every 2 correct – 1 mark	2

	b i	As the proton number increases, the melting and boiling point increases	1
	b ii	<table><tr><th>solid</th><th>liquid</th><th>gas</th></tr><tr><td>iodine astatine</td><td>bromine</td><td>fluorine chlorine</td></tr></table> 5 correct – 2 marks, 3 to 4 correct – 1 mark, 0 to 2 correct – no marks	2
	b iii	correct drawing, box must be **completely filled**; solid particles are **closely-packed** in an **orderly** arrangement; solid particles **vibrate** about a **fixed position**; For description, every 2 key points – 1 mark	1 1 1
4	a i	100N: air resistance / friction; 540N: gravitational attraction/weight;	1 1
	a ii	540 / 10 = 54 kg; (allow ECF from a i)	1
	b	gravitational potential energy to kinetic energy and heat energy	1
	c	the sound passes through the **air** by **vibrations** of the air particles	1
5	a	grasshoppers/squirrels/greenflies/snails; any 2 – 1 mark	1
	b	$\text{carbon dioxide + water} \xrightarrow[\text{chlorophyll}]{\text{light}} \text{glucose + oxygen}$ 1m for correct equation; 1m for conditions;	2
	c i	1820/18800 x 100% = 9.68%	1
	c ii	Some energy is lost as **heat** during **respiration**; Some energy is trapped in **faeces** and excretory products;	1 1
6	a	hydrogen	1
	b	red; the solution is an acid **or** pH is below 7;	1 1
	c	Evaporate the solution to dryness (accept idea of crystallization)	1
7	a	6 Ω	1
	b	76 °C (accept 80 °C); The resistance is halved, causing the current to double;	1 1
	c	add ammeter in series; add voltmeter in parallel to **X**;	1 1
	d	V = 3.5 x 2 = 7 V	1

Section C (30 marks)

1	a	Menstruation is the **discharge** of **tissues** of the **uterus** when an egg remains unfertilised.	1
	b i	correct axis labels and units; appropriate scale; correct plots; best-fit curve;	1 1 1 1
	b ii	The woman has the highest change of getting pregnant between days **13 to 15**. (based on graph); An **egg** is released during **ovulation**; The egg can be **fertilised** by the **sperm** during these days. 5 points – 2 marks, 2 to 4 points – 1 mark. 0 to 1 point – 0 mark	1 1
	b iii	The method is not reliable as lifestyle factors such as stress and illness can affect and change the duration of the menstrual cycle.	1
	b iv	The woman can undergo tubal ligation / cutting and tying of both oviducts; The eggs will not meet the sperm, hence fertilization cannot occur.	1 1
2	a	Osmosis is the **net** movement; of **water** molecules; from a region of higher water potential to a region of lower water potential; through a **partially permeable membrane**; every 2 correct – 1 m	2
	b	The height of the liquid level will rise. The water potential of the solution in container X is lower than that of the water in the trough. Water will **enter** the container by **osmosis**.	1 1 1
	c	Container **X** will turn blue-black; Iodine is a small molecule and can **diffuse through** the partially permeable **membrane** into **X** to react with starch; In container **Y**, the starch is already broken down into maltose by the action of amylase; hence the container will remain yellow; The starch in **X** will not exit from the container as it is a big molecule; hence the water in the trough will remain yellow; 6 points – 5 marks, 5 points – 4 marks, 3 to 4 points – 3 marks, 2 points – 2 marks, 1 point – 1 mark	5
3	a	The air surrounding the ice box cools and **contracts**; The **density** of the air **increases**; The cold air **sinks**; The less dense warm air at the bottom of the ice-box rises to get cooled. A **convection current** is set up to cool the entire fridge. 5 correct – 3 marks, 3 to 4 correct 2 marks, 1 to 2 correct – 1 mark	3
	b i	To increase the rate of heat **absorbed** from the refrigerator and **radiated** to the surroundings;	1
	b ii	The **rate** of cooling **decreases** + there is **less surface area** to lose heat.	1
	b iii	The coolant particles **loses** kinetic **energy**; and move **slower**; The particles **become closer** together; any 2 correct	2

	c i	cost of electricity = $129 / 478 = $0.270 per kWh = 27 cents per kWh	1
	c ii	478 kWh = 478 000 W power = 478 000 / (365 x 24) = 54.6 W correct working 1m; correct ans 1m;	2