Geylang Methodist School (Secondary)
End-of-Year Examination 2014

Candidate Name			
Class		Index Number	

LOWER SECONDARY SCIENCE

Sec 2 Express

Additional materials : Optical Answer Sheet
Writing Paper

2 hour

Setter : Miss Cheryl Dorothy Nonis
Miss Ng Huey Shin

7 October 2014

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.
Write in dark blue or black pen.
Write your name, class and register number on the answer sheet in the spaces provided.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
There are **20** questions in this section. Answer **all** questions. For each question, there are four possible answers, **A, B, C** or **D**. Choose the one you consider to be correct and record your choice in **soft pencil** on the Optical Answer Sheet provided.

Section B
Answer **all** questions in the spaces provided.

Section C
Answer all **three** questions. The first question is in the form either/or.
Write your answers on the writing papers provided.
Start each question on a **new** page of writing paper.

At the end of the examination, hand in your answer sheet to Section **A** separately.
Tie the writing papers to Section **C** separately from the question paper.
Sections **B** and **C** will be handed in separately.

For Examiner's Use	
Section **A**	/20
Section **B**	/50
Section **C**	/30
Total	/100

This document consists of **24** printed pages.

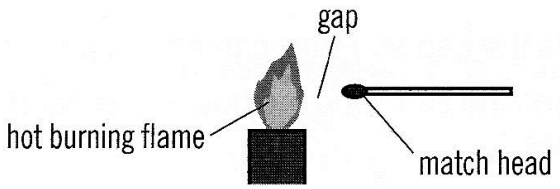
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Section A

1 Which of the following statements is **incorrect** about heat transfer?

A Heat transfer cannot take place in a vacuum.
B Convection cannot take place in solids.
C Solids are better conductors of heat compared to liquids and gases.
D Convection involves the movement of the medium itself during the process of heat transfer.

2 A match stick is brought close to an extremely hot flame in open air as shown in the diagram below. The match is not lit up because it does not get hot enough.



Which of the following is the best conclusion made from the observation?

A The match reflects heat away.
B The air does not conduct heat well to light up the match head.
C The flame is still not hot enough to cause the match to light up.
D There is no convection in the air to light up the match.

3 The table below shows how the speed of sound varies with substances of different densities.

substance	speed of sound in substance / ms^{-1}	density of substance / kgm^{-3}
air	330	1.29
oxygen	320	1.43
aluminium	5100	2710
iron	5000	7870
lead	1200	11300

From this information, what conclusion can you draw about the speed of sound?

A The speed increases as the density of the substance increases.
B The speed is greater in less dense substances.
C The speed is greater in metals than in gases.
D The speed is greatest in the densest metal.

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4 A force is applied to a rolling ball in the same direction as its motion.

What is a possible effect of the force?

I slows down the rolling ball
II speeds up the rolling ball
III stops the rolling ball
IV changes the direction of the rolling ball

A **II** only
B **II** and **IV** only
C **I** and **III** only
D All of the above

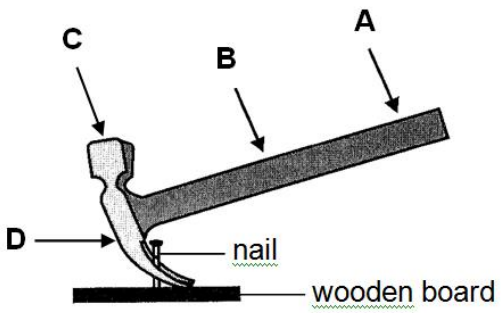
5 An object is taken into the outer space in a rocket.

As the rocket moves from Earth into outer space, which changes take place to the object?

	change in mass	change in height
A	no	no
B	no	yes
C	yes	no
D	yes	yes

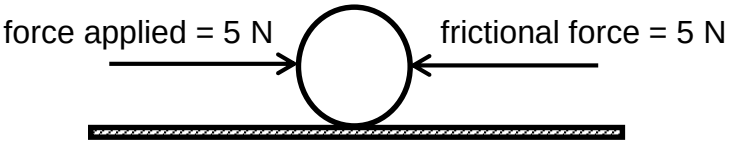
6 The diagram below shows a hammer being used to remove a nail from a wooden board.

At which position would you apply a force to pull the nail out of the board with the least possible effort?



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7 The diagram below shows two forces acting on a ball that is stationary at the same time, in opposite directions.



Which of the following statements about work done on the ball is correct?

A Work is done on the ball whenever there is a force applied on it.
B Work is done as the ball moves in the direction of the frictional force.
C There is no work done because the ball remains at rest.
D Work is done as the ball will move in the direction of the force applied.

8 In some power stations, water is stored in a reservoir behind a dam.

What type of energy is obtained from using water stored behind a dam?

A Tidal energy
B Geothermal energy
C Wave Energy
D Hydroelectric energy

9 In which of the following is a kilowatt-hour of electrical energy used?

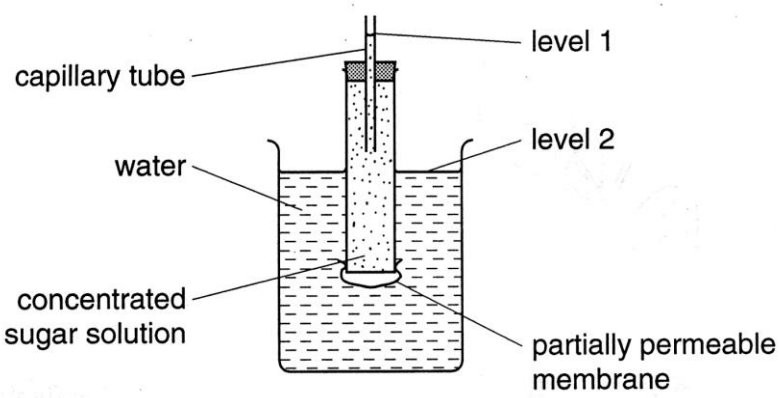
A A 50 W electric fan used for 2 hours.
B A 500 W computer used for 1 hour.
C A 3000 W heater is used for 20 minutes.
D Two 100 W lamps used for 30 minutes.

10 What is the possible result of replacing the fuse in an electrical appliance with one of a lower rating?

A The fuse will melt.
B Lesser current will flow through the appliance and will not cause overheating.
C More current will flow through the appliance and cause overheating.
D More protection is provided against a short circuit occurring.

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11 The diagram below shows the apparatus used to investigate osmosis.

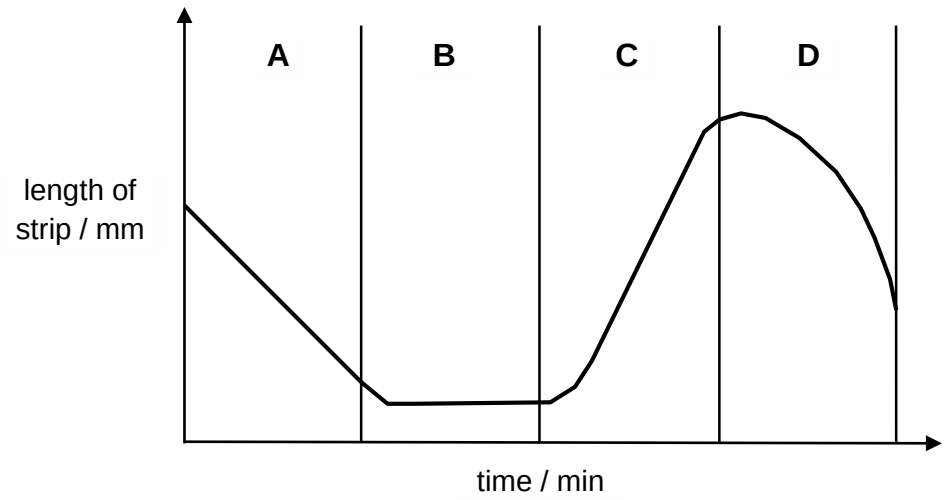


After four hours, which changes in levels will occur and which molecules will move across the membrane?

	level 1	level 2	molecules
A	fall	rise	sugar
B	fall	rise	water
C	rise	fall	sugar
D	rise	fall	water

12 A raw cucumber strip was placed in solutions of different concentrations. The length of the strip was measured regularly.

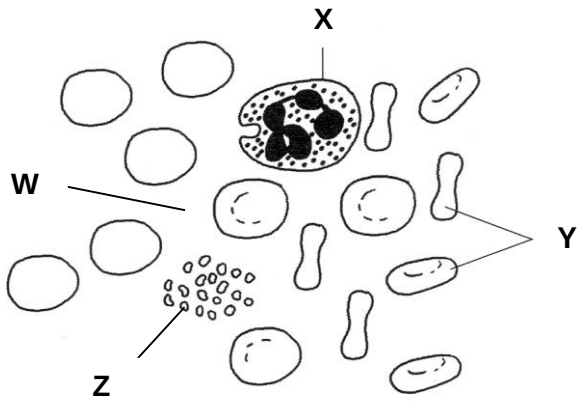
The graph below shows the length of the cucumber strip in solutions of different concentrations.



In which period of time was the cucumber strip in distilled water?

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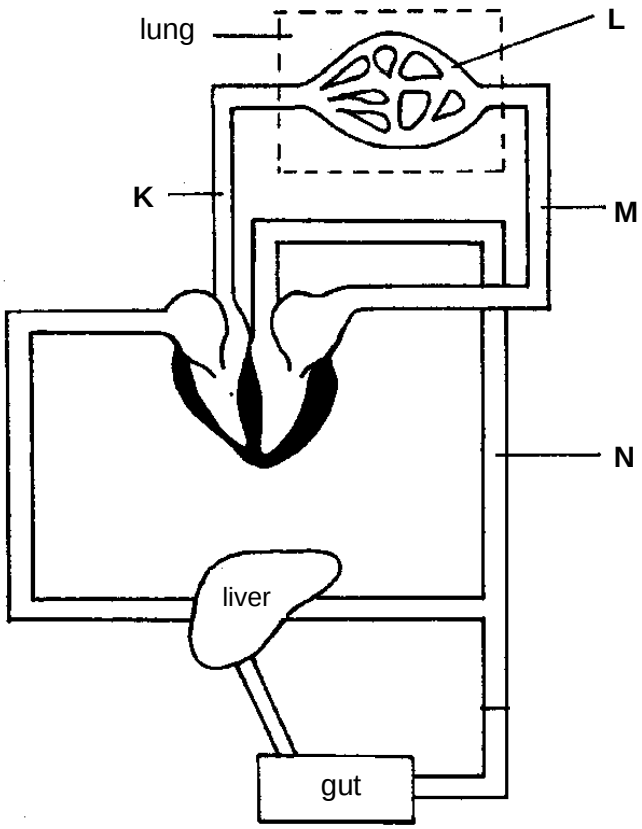
13 The photomicrograph below shows a blood smear.



Which labelled part(s) is/are involved in the transport of carbon dioxide towards the lungs?

A W only
B Y and Z only
C W and Y only
D X and Z only

14 The diagram below shows the blood circulatory system in a human body.

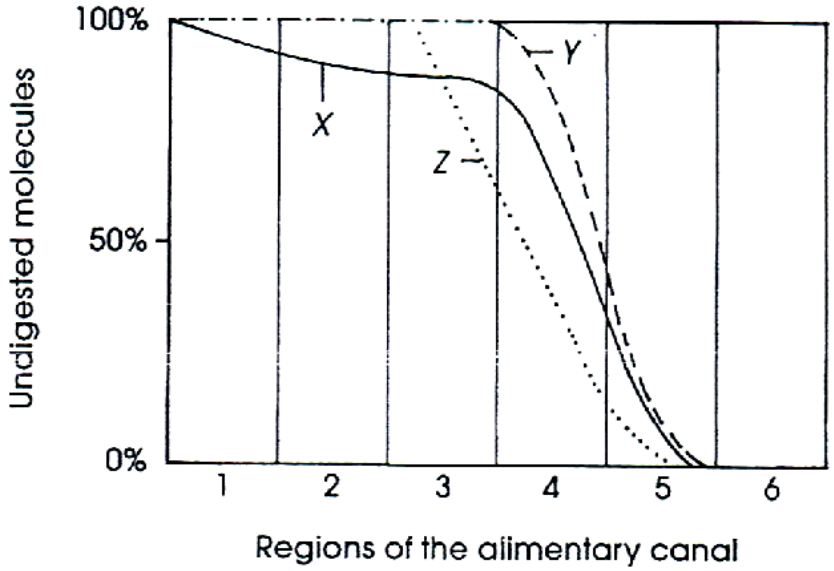


Arrange the blood vessels **K** – **N** in order of descending blood pressure.

A K, L, M, N
B L, N, M, K
C M, K, N, L
D N, K, L, M

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For Questions **15** and **16**, refer to the following graph which shows the extent to which starch, proteins and fats are digested chemically as food passes through the alimentary canal.



15 Which of the following shows the correct identities of regions 2 to 6 ?

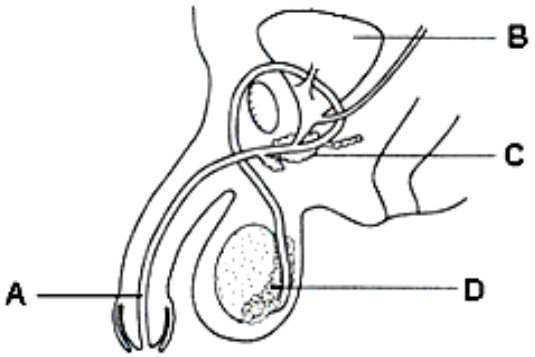
	region 2	region 3	region 4 and 5	region 6
A	oesophagus	stomach	large intestine	rectum
B	stomach	small intestine	colon	rectum
C	oesophagus	stomach	small intestine	colon
D	stomach	small intestine	large intestine	liver

16 What are the possible uses of the digested products of X, Y and Z?

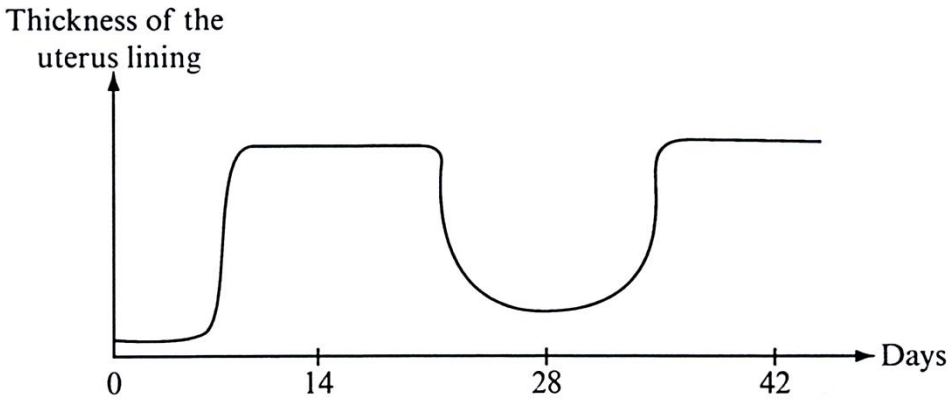
	X	Y	Z
A	for cellular respiration	production of insulating materials	production of new protoplasm
B	production of insulating materials	production of new protoplasm	for cellular respiration
C	for cellular respiration	production of enzymes	production of insulating material
D	production of insulating materials	production of enzymes	production of new protoplasm

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17 Which part of the male reproductive system provides the fluids that contain nutrients and enzymes to nourish and activate the sperms?



18 The graph below shows the change in thickness of the uterus lining of a female over a period of time.



On which day is she most likely to be able to produce a zygote?

A 6^{th} day
B 16^{th} day
C 24^{th} day
D 29^{th} day

19 Which of the following statements about abortion is **incorrect**?

A It is considered a surgical method.
B It is a method of preventing pregnancy.
C It may cause a lot of harmful effects to the female.
D It is the deliberate removal of the fetus from the uterus.

20 Which of the following is the best way to prevent the spread of the human immunodeficiency virus?

A not donating blood
B taking oral contraceptive pills
C taking a shower immediately after sexual intercourse
D using condoms during sexual intercourse

End of Section A

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Section B

Write all your answers in the spaces provided.

21 Fig. 21.1 shows the structure of the human ear.

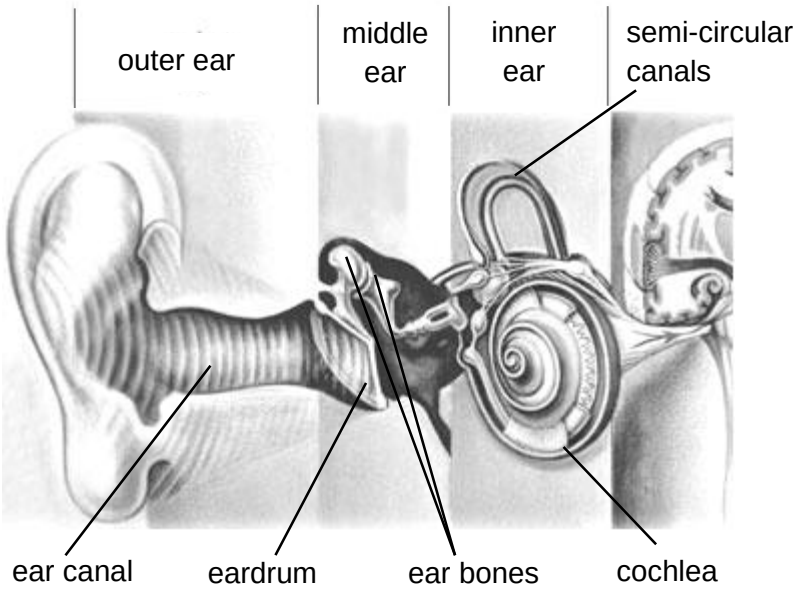


Fig. 21.1

(a) State which part of the ear takes sound waves and turns them into vibrations.

_____ [1]

(b) An acoustic trauma caused by a sudden loud noise such as an explosion or a sudden blast of loud music, can cause the eardrum to rupture.

(i) What determines the loudness of sound?

_____

_____ [1]

(ii) Explain what causes a sudden loud noise to rupture the eardrum.

_____

_____ [1]

[Total: 3 marks]

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22 An engineer is tasked to design a car park on the top floor of a building that can accommodate 10 cars.

(a) If each car has a mass of 1500 kg, calculate the weight of these 10 cars.

weight = _____ [2]

(b) If the material that the engineer uses to construct the car park can withstand a pressure of 500 Pa, calculate the minimum floor area of the car park be in order to withstand the weight of the 10 cars.

minimum area = _____ [2]

[Total: 4 marks]

23 Edmund found an old metal lamp in his storeroom and decided to check the wiring before plugging it into the power socket. He opened the plug and what he saw is shown in Fig. 23.1.

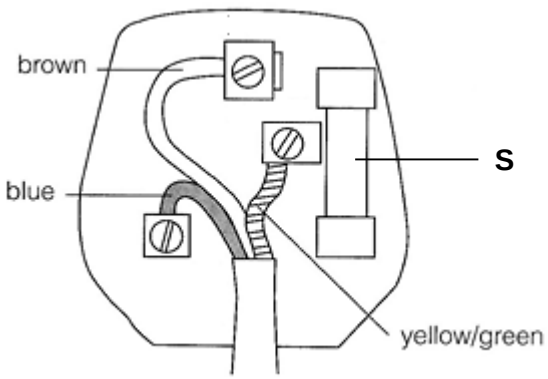


Fig. 23.1

(a) Identify component S.

_____ [1]

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(b) State two mistakes in the wiring of the plug in Fig. 23.1.

_____

_____

_____ [2]

(c) Explain what danger the wiring mentioned in **(b)** will pose to Edmund if he plugs the lamp into the power socket.

_____

_____ [1]

[Total: 4 marks]

24 Fig. 24.1 shows a transverse section of two blood vessels X and Y.

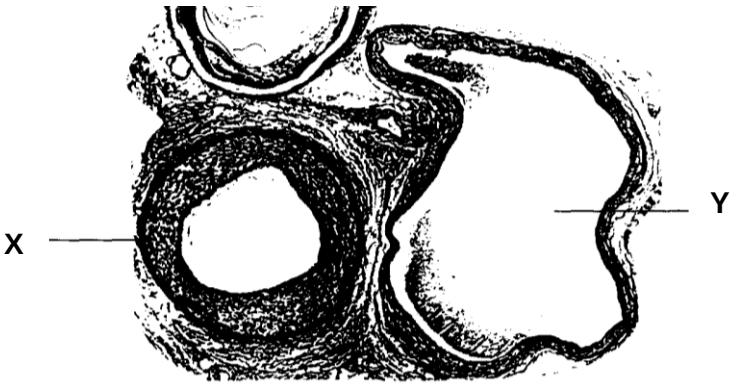


Fig. 24.1

(a) Identify the blood vessels labelled X and Y. Give a reason to support your answer.

Blood vessel X: _____

Blood vessel Y: _____

Reason: _____

_____ [2]

(b) Compare one difference in the blood transported by blood vessels labelled X and Y.

_____

_____ [1]

[Total: 3 marks]

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25 An experiment was carried out to investigate the effect of different concentrations of sugar solution on potato tissue. Fifty cubes of potato tissue of the same dimensions were cut and weighed. Ten cubes were placed in pure water and ten placed in each of four different concentrations of sugar solutions. The cubes were left for one hour, then removed from the solutions, dried carefully with blotting paper and reweighed.

Table 25.1 shows the results.

concentration of sugar solution g/100 cm^3	mean initial mass/g	mean final mass/g	mean change in mass/g	mean percentage change in mass/ % (2 s.f.)
0	2.23	2.42	+ 0.19	+ 8.5
5	2.31	2.41	+ 0.10	+ 4.4
10	2.18	2.20	+ 0.02	+ 0.8
20	2.27	2.18	- 0.09	- 4.1
40	2.39	2.20	- 0.19	- 7.9

Table 25.1

(a) **(i)** Using the graph paper given on page 13, plot a graph of the mean percentage change in mass against the concentration of sugar solution. [2]

(ii) Calculate the rate of change in mass by finding the gradient of the graph plotted. Show the working on the graph. [3]

(iii) Using the graph plotted, find the concentration of sugar solution at which there was no change in mass. Indicate this concentration on your graph. [1]

(b) From the results of the experiment, state what can be deduced about the cell membrane of the potato cells.

_____

_____ [1]

(c) Explain why the potato cubes in 5 g/100cm^3 sugar solution gained mass.

_____

_____

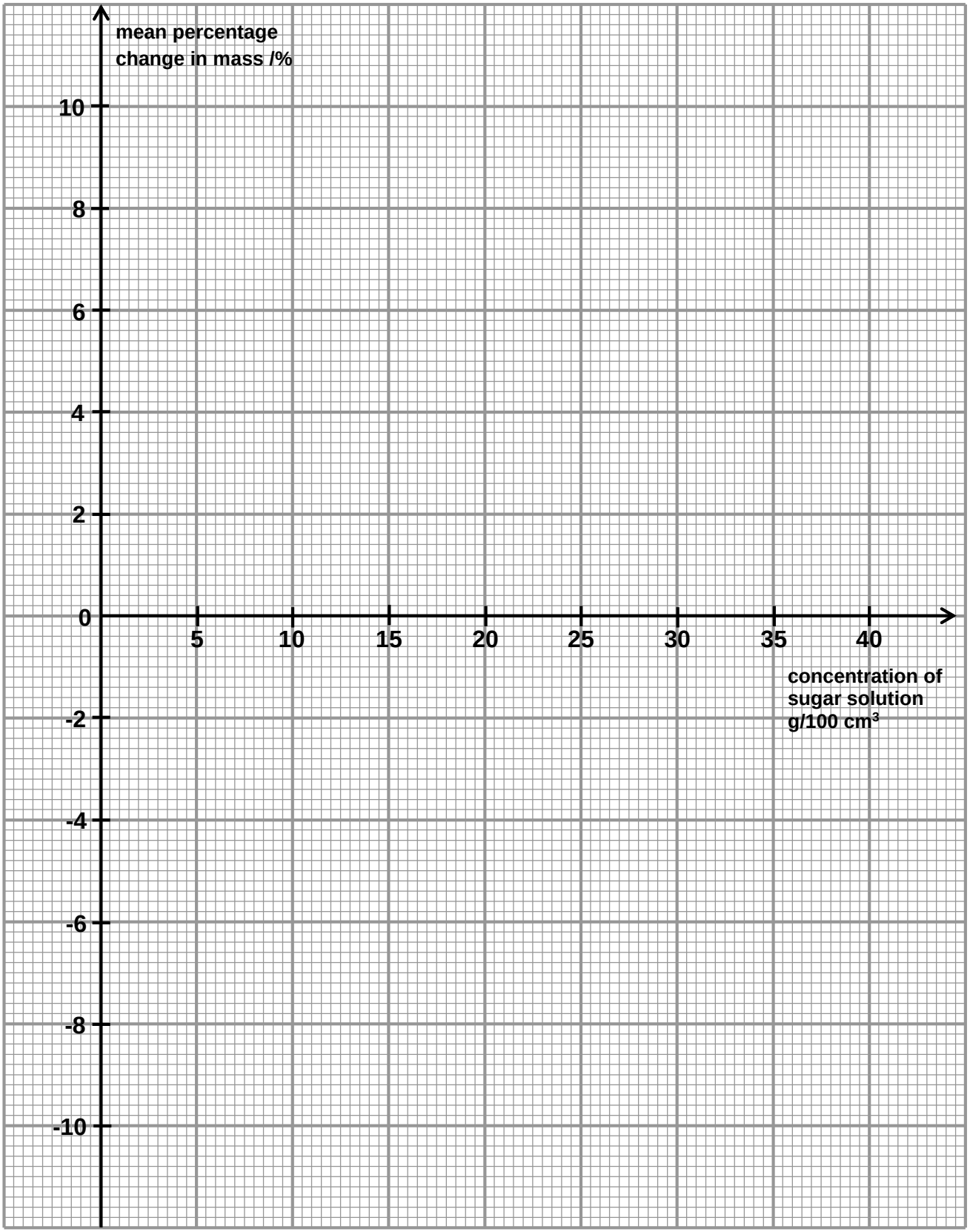
_____

_____

_____ [3]

[Total: 10 marks]

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rate of change in mass = gradient =

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26 Fig. 26.1 shows the McSpicy chicken burger that John had at McDonald for lunch.

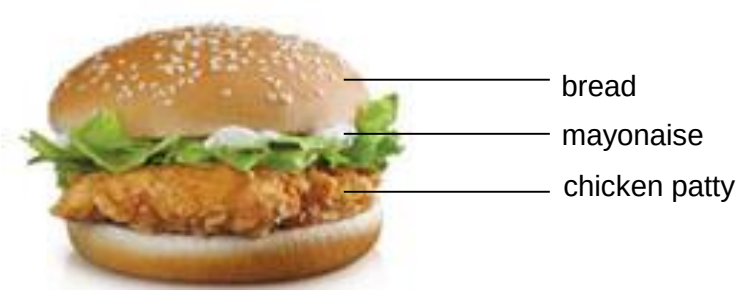


Fig. 26.1

Fill in Table 26.2 below to show how the chicken burger is chemically digested.

food	main nutrients in the food	location(s) of digestion	enzyme needed for digestion	end products of digestion
bread				maltose
	maltose			
chicken patty		stomach and small intestine		
Mayonnaise	fats			

Table 26.2

[6]

[Total: 6 marks]

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27 Fig. 27.1 below shows the female reproductive system.

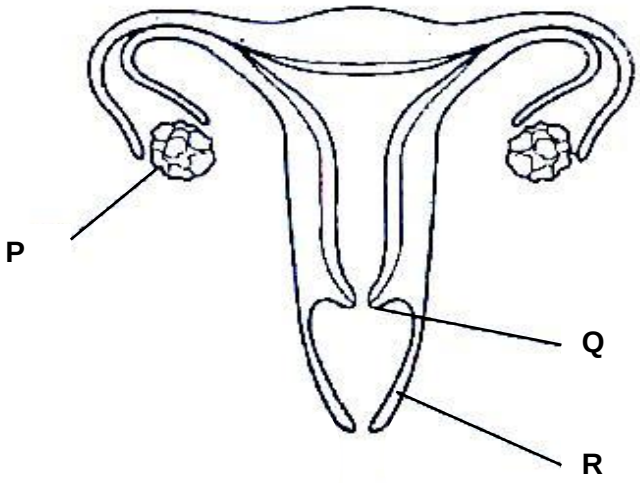


Fig. 27.1

(a) Label structures P, Q and R.

P: _____

Q: _____

R: _____ [3]

(b) State one function of structure R.

_____

_____ [1]

(c) The woman is infertile due to the blockage of her oviduct. Doctor recommends her to carry out in vitro fertilization. The medical team will extract her ovum out from her body and fertilise it with a sperm in a test tube.

On Fig. 27.1, label 'X' to show the place where the fertilized ovum should be implanted back into the woman.

[1]

[Total: 5 marks]

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28 Fig. 28.1 below shows a human male sex cell and a human female sex cell.

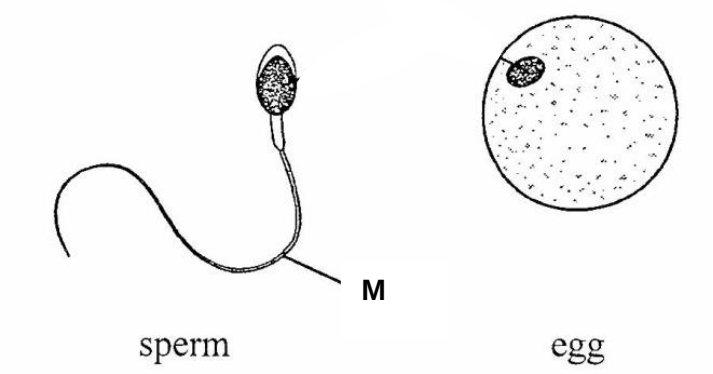


Fig. 28.1

(a) How does part M allow the male sex cell to behave differently from the female sex cell?

_____

_____ [1]

(b) State one similarity and one difference between the male and female sex cells **not** shown in the Fig. 28.1.

Similarity: _____

_____

_____

Difference: _____

_____

_____ [2]

[Total: 3 marks]

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29 Fig. 29.1 shows the calendar of 30 days in November. On 3rd November, a woman who has a 28-days menstrual cycle, starts to menstruate as marked by * on the calendar.

November						
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				

Fig. 29.1

(a) Describe what happens to the uterine lining between

(i) 3rd November and 7th November.

_____

_____

_____ [1]

(ii) 8th November and 16th November.

_____

_____

_____ [1]

(b) Explain why the change takes place in the uterine lining between 8th November and 16th November as mentioned in **(a) (ii)**.

_____

_____ [1]

(c) If fertilisation does not occur during this menstrual cycle, on which date would she expect to start menstruating again?

_____ [1]

[Total: 4 marks]

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30 John and Alice were married last month. As they are not ready for a child, they want to seek an effective birth control method for 3 years. They are considering the following methods:

- rhythm method
- intra-uterine device
- contraceptive pills
- tubal ligation

Some information about John and Alice are provided:

- John is running his own business.
- Alice is a manager of a big company.
- Both of them are extremely busy with their work.
- Both of them tend to be absent-minded.
- She is always under a lot of stress.

(a) Based on the information given above, which birth control method among the four methods would you recommend to them?

_____ [1]

(b) Explain why you recommend the method mentioned in **(a)**.

_____

_____ [1]

(c) Explain why the other methods were not recommended.

_____

_____

_____

_____

_____

_____

_____ [3]

[Total: 5 marks]

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31 Fig. 31.1 shows the number of cases of the sexually transmitted disease, AIDS, affecting people of different ages in a country in one year.

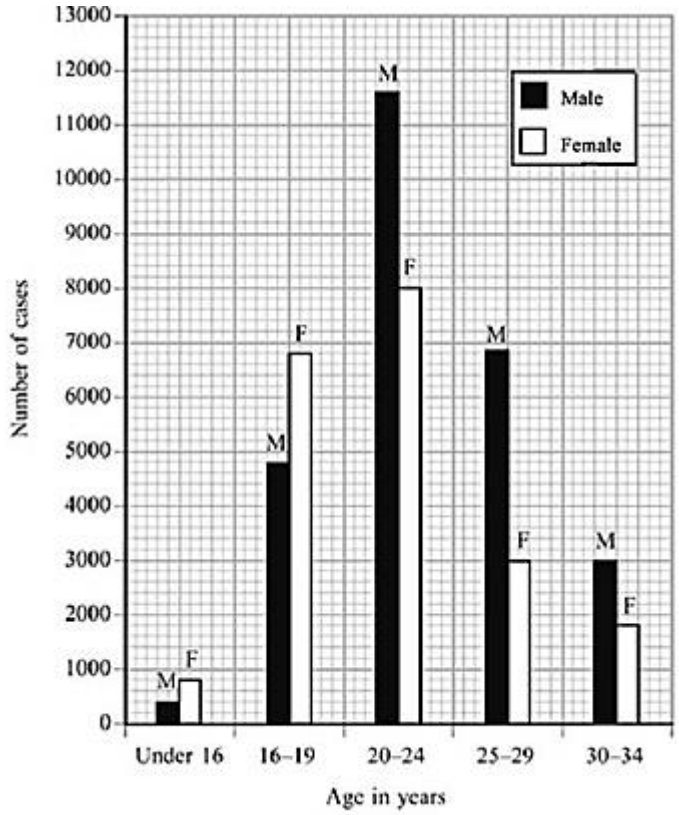


Fig. 31.1

(a) What do the letters AIDS stand for?

_____ [1]

(b) How many cases of the disease were there during the year in the 30 – 34 age group?

_____ [1]

(c) Which age group has the greatest number of cases of the disease in males and females? Suggest a reason for this.

_____

_____ [1]

[Total: 3 marks]

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Section C

Answer all **three** questions on the writing papers provided.
The first question is in the form of either/or and only **one** of the alternatives should be attempted.

EITHER

32 (a) Table 32.1 gives information about four different indicators.

indicator	colour at pH 1	pH at which colour changes	colour at pH 12
P	colourless	10	red
Q	red	3	yellow
R	blue	4	red
S	blue	6	colourless

Table 32.1

(i) Which indicators will give the same colour in soap which has a pH of 8.5? [1]

(ii) Nelson used a red litmus paper to test another substance X. The red litmus paper remained red. What can Nelson best conclude from this observation? [1]

(iii) Using only one of the indicators in the table, advise Nelson how he may be able to carry out another test to confirm the nature of substance X. [2]

(iv) Suggest the most accurate method to confirm the nature of substance X. Explain your answer. [2]

(b) An experiment was carried out as shown in Fig. 32.1 below.

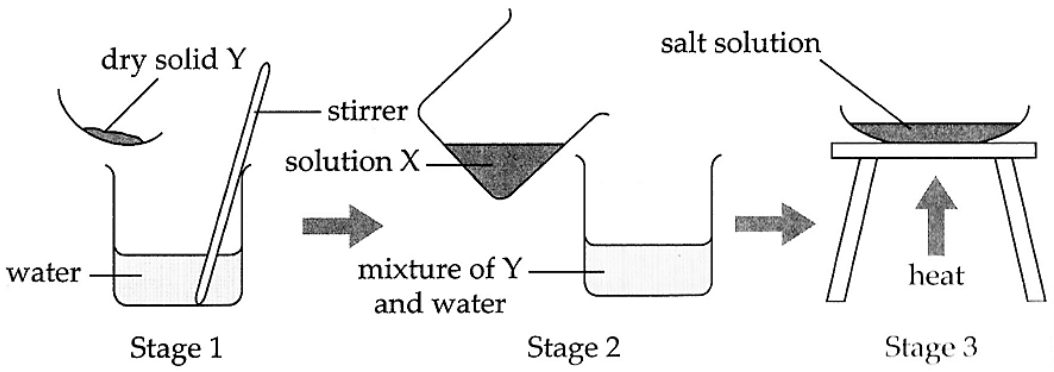


Fig. 32.1

Solutions X and Y have a pH of 3 and 9 respectively. At each stage, state and explain if a chemical or physical change is taking place. [4]

[Total: 10 marks]

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OR

32 **(a)** An acid is added to some magnesium at room temperature.

The experimental setup and observation is shown in Fig. 32.2 below.

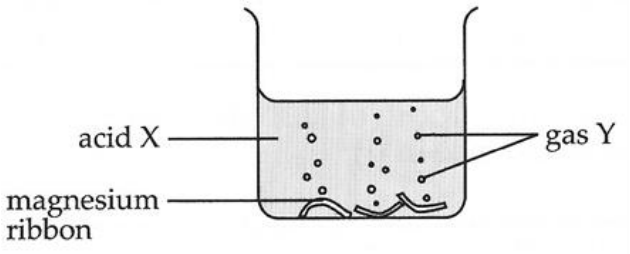


Fig. 32.2

Another experiment similar to Fig. 32.2 was setup. The same acid used in Fig. 32.2 was mixed with an unknown metal **S**.

The setup and observation is shown in Fig. 32.3 below.

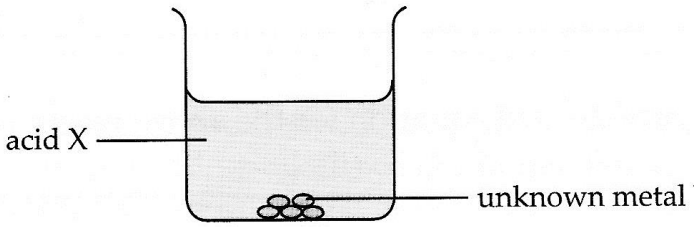


Fig. 32.3

(i) Write a general word equation for the reaction in Fig. 32.2. [1]

(ii) Describe a test that can be conducted to prove the identity of the gas produced in Fig. 32.2. [1]

(iii) How did the observations in Fig. 32.2 and Fig. 32.3 differ? [1]

(iv) Explain the difference in **(iii)**. [2]

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(b) Elsie conducted an experiment to investigate the neutralisation effect that two different alkalis would have on the same volume of citric acid.

Fig. 32.4 below shows the results of the experiment.

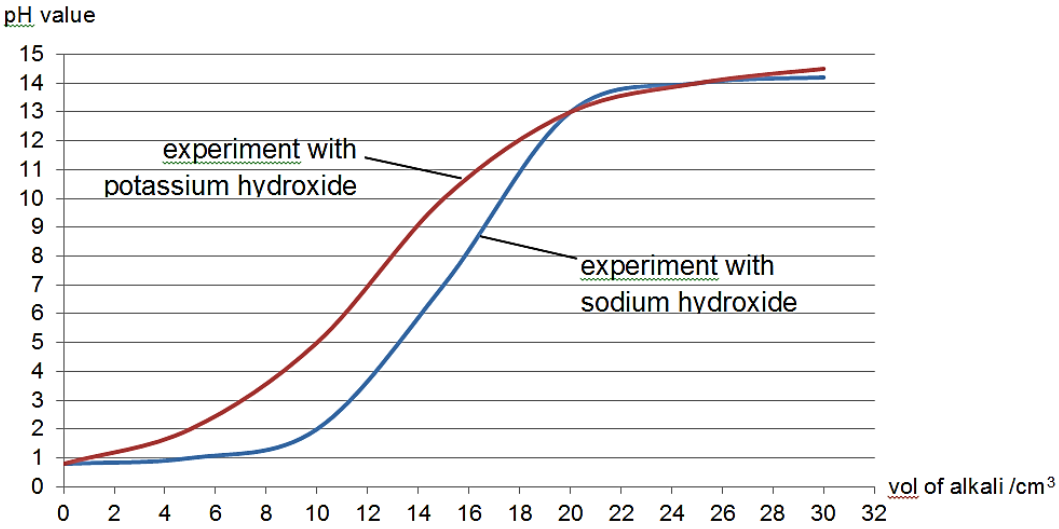


Fig. 32.4

(i) What is the minimum volume of each alkali required to neutralise the acid? [2]

(ii) What can Elsie conclude about the neutralising effects of the two alkalis on the citric acid? [1]

(iii) State with reason if this neutralisation effect is a physical or chemical change. [2]

[Total: 10 marks]

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33 Fig. 33.1 below shows what happens to solar energy from the sun as it enters into the Earth's atmosphere.

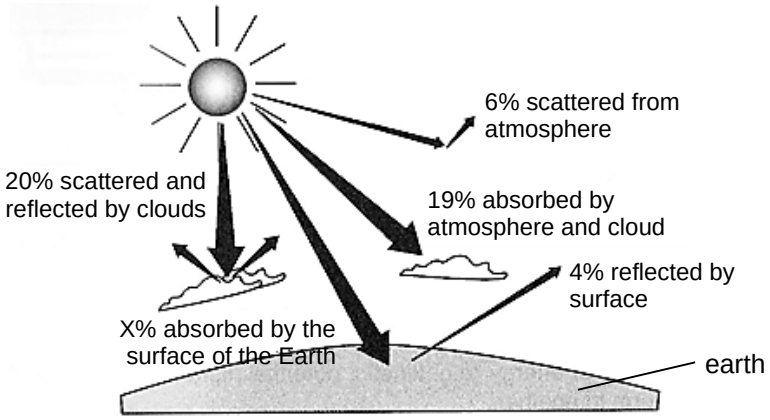


Fig. 33.1

(a) What percentage of solar energy is absorbed by the surface of the Earth? [1]

(b) From Fig. 33.1, how does the Earth's atmosphere protect the Earth from excessive solar energy from the Sun? [1]

(c) Solar energy is a renewable source of energy and can be harnessed in solar heating systems to provide hot water for a house.

Fig. 33.2 below shows such a system.

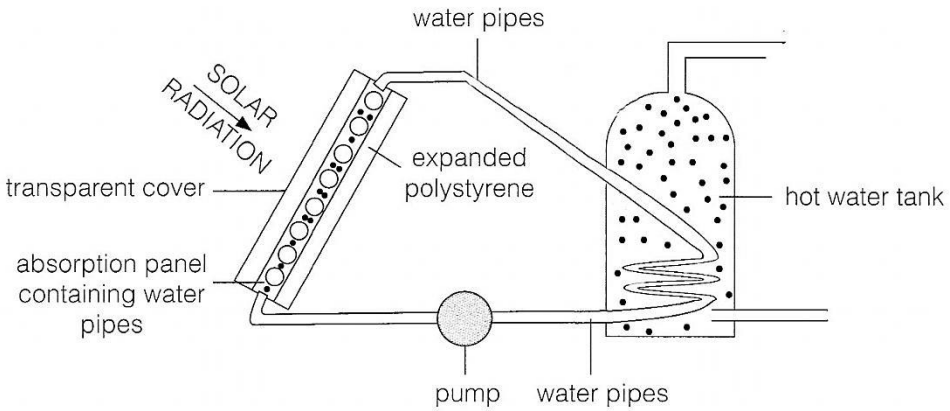


Fig. 33.2

(i) State what is meant by the terms 'a renewable source of energy'. [1]

(ii) Suggest a colour for the absorption panel to be painted. Explain your choice. [2]

(iii) Explain why there is a polystyrene backing board under the water pipes. [2]

(iv) Explain how water in the water tank gets heated by the solar heating system. [3]

[Total: 10 marks]

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34 **(a)** Fig. 34.1 shows red blood cells.

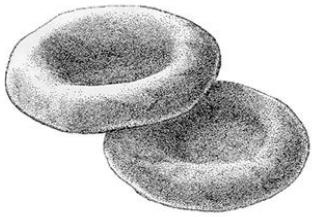


Fig. 34.1

Explain how a red blood cell is adapted to its function. [3]

(b) Explain the meaning of “double circulation”. [2]

(c) Andy had his gall bladder surgically removed.

(i) The gall bladder stored a secretion by the liver. [2]
Name and describe the role of this secretion.

(ii) After the surgery, suggest the class of food Andy should avoid. [1]

(d) Distinguish between the terms “chemical digestion” and “physical digestion”. [2]

[Total: 10 marks]

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Geylang Methodist School (Secondary)
End-of-Year Examination 2014

Candidate Name **MARKING SCHEME**

Class _____ Index Number _____

LOWER SECONDARY SCIENCE

Sec 2 Express

Additional materials : Optical Answer Sheet
Writing Paper

2 hour

Setter : Miss Cheryl Dorothy Nonis
Miss Ng Huey Shin

7 October 2014

Section A [20 marks]

1	**A**	11	**D**
2	**B**	12	**C**
3	**C**	13	**A**
4	**A**	14	**D**
5	**B**	15	**C**
6	**A**	16	**C**
7	**C**	17	**C**
8	**D**	18	**B**
9	**C**	19	**B**
10	**A**	20	**D**

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Section B [50 marks]

Question No.			Answers	Marks
21	(a)		Eardrum (middle ear not accepted – too vague)	1
	(b)	(i)	Loudness of sound is determined by the size of vibrations.	1
		(ii)	For a sudden loud noise, there will be a sudden increase in the size of vibrations of the eardrum, causing it to rupture.	1
22	(a)		Mass of 1 car = 1500 kg Mass of 10 cars = 15000 kg Weight of 10 cars = 15000 x 10 = 150000 N	1
	(b)		P = F / A 500 = 150000 / A A = 300 m^2	1 1
23	(a)		Component S is a fuse.	1
	(b)		The live wire is connected to the earth pin. OR The earth wire is connected to the live pin. OR The live wire is not connected to the fuse. OR The earth wire is connected to the fuse.	1
	(c)		When he plugs the lamp into the power socket the metal casing of the lamp will be live. When he touches the lamp, he will get an electric shock.	1 1
24	(a)		Blood vessel X: artery (both must be correct to get 1 mark) Blood vessel Y: vein Reason: • The wall of X is thicker and more muscular than Y. OR • The wall of Y is thinner and less muscular than X.	1 1
	(b)		• Blood in vessel X travels at a high pressure while blood in vessel Y travels at a low pressure. OR • Blood in vessel X travels fast while blood in vessel Y travels slow and smoothly. OR • Blood in vessel X contains more nutrients and oxygen except for pulmonary artery whereas blood in vessel Y contains more wastes and carbon dioxide except for pulmonary vein.	1
25	(a)	(i)	correct plots best fit line * refer to the graph at the back	1 1
		(ii)	triangle and 2 coordinates gradient formula answer in 3 sig. fig. rate of change in mass = gradient = - 0.407 (+/- 10%)	1 1 1
		(iii)	16 g/100cm^3 (based on the answer from the student's graph)	1
	(b)		Cell membrane is partially permeable which allows only certain substances to pass through.	1
	(c)		5 g/100cm^3 sugar solution has a higher water potential than the cell sap of the potato cells. Water moved from the sugar solution into the potato cells by osmosis. Potato cells become turgid and increase in mass.	1 1 1

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26

food	main nutrients in the food	location(s) of digestion	enzyme needed for digestion	end products of digestion
bread	**starch**	**mouth and small intestine**	**amylase**	*maltose*
	maltose	**small intestine**	**maltase**	**glucose**
chicken patty	**proteins**	*stomach and small intestine*	**protease**	**polypeptide / simple protein molecule**
Mayonnaise	*fats*	**small intestine**	**lipase**	**fatty acids and glycerol**

½ mark per correct ans

27	**(a)**	P – ovary Q – cervix R – vagina	1 1 1
	(b)	• Serves as the site for discharge of menses (broken uterine lining, blood tissue and unfertilized egg) during menstruation. • Serves as the site for deposition of semen during sexual intercourse. OR • Serves as birth canal for the labor of baby after pregnancy.	1
	(c)	label X at uterine lining (not uterus)	1
28	**(a)**	Part M allows the sperm to swim actively while egg cannot swim due to absence of part M.	1
	(b)	Similarity: • Sperm and egg are required in fertilization. OR • Sperm and egg has 23 chromosomes in their nucleus. Difference: • Sperm is smaller size than egg. OR • Sperm is released in large amount (in millions) while egg is released 1 or a few per menstrual cycle. OR • Sperm is produced by testes while egg is by ovaries. OR • Sperm is motile while egg is immotile. OR • Sperm may carry X or Y chromosome while egg only carries X chromosome.	1 1
29	**(a)** **(i)**	Uterine lining break down and shed out from the uterus during this period which is menstruation period.	1
	(ii)	Uterine lining repairs and thickens after menstruation.	1
	(b)	It thickens in order to prepare the uterine lining for implantation of embryo.	1
	(c)	1st December	1

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30	**(a)**	intra-uterine device	1
	(b)	IUD is an effective method that can last for a long period and most importantly it is just a temporary method.	1
	(c)	Rhythm method: not suitable as Alice is always under a lot of stress. This may affect her menstrual cycle. Contraceptive pills: They are busy and absent-minded. Alice may forget to take the pills. Tubal ligation: They just want to prevent pregnancy for 3 years, not forever.	1 1 1
31	**(a)**	Acquired Immune Deficiency Syndrome	1
	(b)	3000 + 1800 = 4800 cases	1
	(c)	20 – 24 age group pre martial sex between dates / more sexually active age group or casual sex	1 1

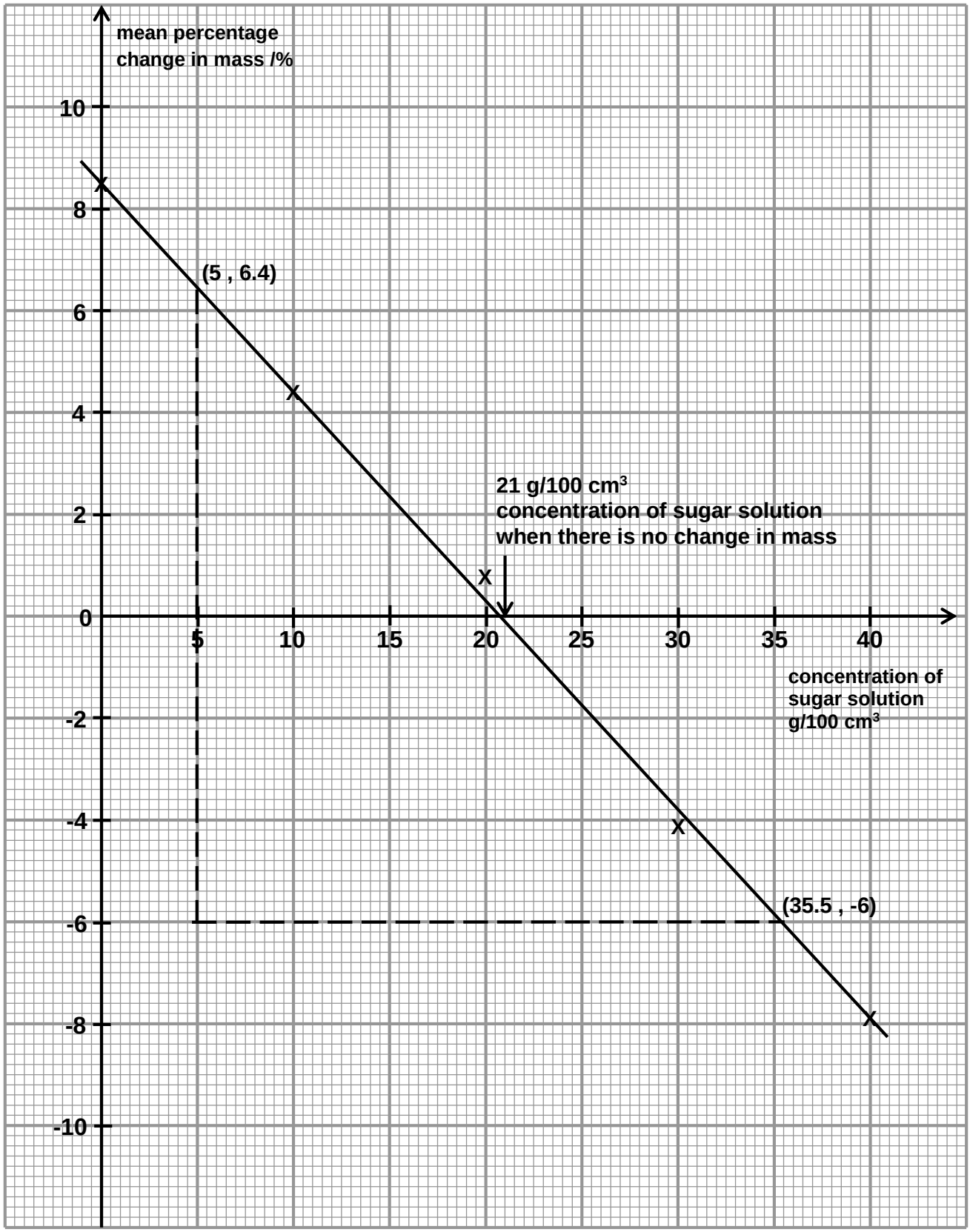
Section C [30 marks]

Question No.			Answers	Marks
E 32	**(a)**	**(i)**	Indicators P and S.	1
		(ii)	Substance X is either acidic or neutral in nature.	1
		(iii)	He can use indicator S to confirm the nature of substance X. If substance X is acidic, indicator S will remain blue in colour. If substance X is neutral, indicator S will turn colourless.	1 1
		(iv)	He can use Universal Indicator / pH meter to confirm the nature of substance X. Using these indicators he can determine the pH value substance X.	1 1
	(b)		Stage 1: physical change because solid Y is being dissolved in water. No new products are formed. Stage 2: chemical change because an acid is being added to an alkali (neutralization). This will produce new substances which is a salt and water. Stage 3: physical change because the salt solution is being evaporated. No new products are formed.	1 1 1 1
O 32	**(a)**	**(i)**	Metal + acid → salt + hydrogen gas	1
		(ii)	A lighted splinter can be inserted into the gas. If the gas is hydrogen gas, the flame will be extinguished with a pop sound.	1
		(iii)	No gas was produced in Fig. 30.3.	1
		(iv)	The metal did not react with the acid to produce hydrogen gas. Not all metals will react with acids.	1 1
	(b)	**(i)**	Vol. of potassium hydroxide needed = 12 cm^3 Vol. of sodium hydroxide needed = 15 cm^3	1 1
		(ii)	A smaller amount of potassium hydroxide is needed to neutralize a fixed amount of acid compared to sodium hydroxide.	1
		(iii)	This is a chemical change. During neutralization, new substances are formed. They are salt and water.	1 1

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33	**(a)**		100 – (20 + 6 + 19 + 4) = 51%	1
	(b)		The Earth's atmosphere absorbs some of the solar energy and scatters some of the solar energy.	1
	(c)	**(i)**	• Energy sources that are infinite. OR • Renewable sources of energy are energy that can be sustained. OR • Energy sources that are of unlimited supply and enable us to use these sources continuously.	1
		(ii)	Colour: Black Black surfaces are good absorbers of heat. Thus the water in the water pipes can be heated more quickly.	1 1
		(iii)	The polystyrene board is an insulator/ poor conductor of heat. Thus it helps to prevent heat from the water and the water pipes from being lost to the surroundings by conduction.	1 1
		(iv)	Water at the bottom of the water tank gets heated up first, becomes less dense and rises. Cooler water at the top of the tank that is denser, sinks. This sets up a convection current in the water tank that will heat up the water.	1 1 1
34	**(a)**		• Red blood cells have haemoglobin that binds to oxygen readily and loosely. • Red blood cells have circular, biconcave disc-shape that increases the surface area to volume ratio for faster diffusion of oxygen. • Red blood cells have no nucleus, thus having more space to contain more haemoglobin so that they can transport more oxygen.	1 1 1
	(b)		• Blood circulates in two paths, one from the heart to the lungs and back. • Another from the heart to the all parts of the body and back. • Hence every time blood flows around the entire body once, it passes through the heart twice.	1 1
	(c)	**(i)**	Bile emulsify fats/ break down large fats drops into smaller droplets for faster digestion by lipase.	1 1
		(ii)	Reduce fatty food	1
	(d)		• Chemical digestion is the breakdown of food into simpler substances by enzymes using chemical reactions. • Physical digestion is the breakdown of food into smaller pieces using forces and mechanical action without enzymes involving.	1 1

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rate of change in mass = gradient = $\frac{-6-6.4}{35.5-5} = \frac{-12.4}{30.5} = -0.407$ (3 sig. fig.)

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