

聖嬰中學
HOLY INNOCENTS' HIGH SCHOOL

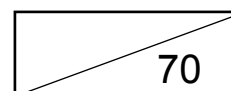


Candidate Name

Class

Index Number

END OF YEAR EXAMINATION 2023
SECONDARY 2
SCIENCE (Booklet B)



Date: 9th Oct 2023

Duration: 1h 45 min

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use paper clips, glue or correction tape/fluid.

For Examiner's Use	
Sect A	
Sect B	
Total	

Set by: Mrs Cynthia Chan

Vetted by: Ms Woo Wei Shan and Mr Damien Lee

*This document consists of **15** printed pages (including cover page and page 16 is a blank page)*

The Periodic Table of Elements

Group																		
1	2											13	14	15	16	17	18	
							1 H hydrogen 1											2 He helium 4
3 Li lithium 7	4 Be beryllium 9	Key proton (atomic) number atomic symbol name relative atomic mass										5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20	
11 Na sodium 23	12 Mg magnesium 24											13 Al/ aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl/ chlorine 35.5	18 Ar argon 40	
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl/ thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –	
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordiu m –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl/ flerovium –		116 Lv livermorium –			
lanthanoids		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymiu m 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175		
actinoids		89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendeleviu m –	102 No nobelium –	103 Lr lawrencium –		

Section A [40 marks]

Answer **all** questions in this section. Write your answer in the spaces provided.

- A1** Table A1.1 shows three substances and their corresponding pH values.

Table A1.1

substance	pH value	colour of solution with Universal Indicator
calcium chloride solution	7	
dilute sulfuric acid	2	
potassium hydroxide solution	13	

- (a) Complete Table A1.1 by filling in the three blank boxes [3]
- (b) State another test you would use to distinguish between sulfuric acid and a solution of potassium hydroxide. Describe the results for each.

test:.....

results with sulfuric acid:

.....

results with potassium:

.....

[3]

- A2** (a) Table A2.1 shows the soil pH ranges required by different crops for growth.

Table A2.1

crop	pH range
peanut	5.0-6.0
millet	6.0-6.5
sunflower	6.0-7.5
paprika	7.0-8.5
mango	5.5-6.0

A farmer plants mango and millet crops. Only the millet grows well.

- (i) Predict the pH of the soil.

..... [1]

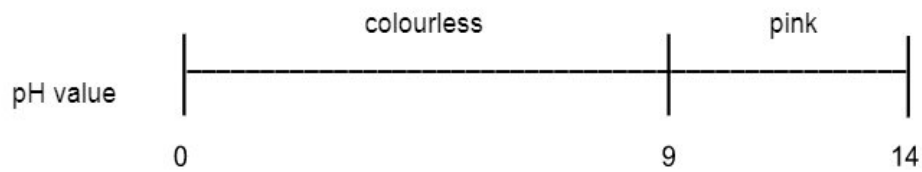
- (ii) Which other crop would most likely grow well in the same soil?

..... [1]

- (iii) Calcium oxide is used by farmers to remove acidity in soil. Name the type of reaction that takes place.

..... [1]

The colour of phenolphthalein in different pH values are shown below.



- (b) Suggest why phenolphthalein cannot be used to differentiate between the soil samples in Table A2.1.

.....

.....

..... [1]

- A3** A stone is thrown into the air. Fig A3.1 shows the path of the stone through the air.

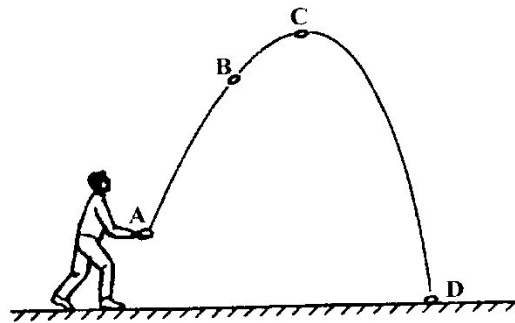


Fig A3.1

- (a) Calculate the weight of the stone given that the gravitational field strength, $g = 10 \text{ N/kg}$ and its mass is 5 g .

Weight =N [2]

- (b) (i) State the energy conversion as the ball travels from position A to D.

Position A to C:

Position C to D: [2]

- (ii) At which position is the gravitational potential energy of the stone greatest?

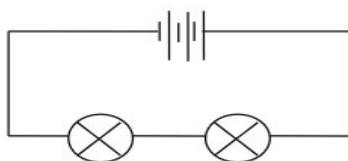
..... [1]

A4 The components in a circuit diagram can be represented by circuit symbols.

Table A4.1

component	circuit symbol
switch	
	
fixed resistor	

- (a) Complete Table A4.1 with appropriate symbols and names of the components. [3]
- (b) Darius set up a circuit of two identical bulbs as shown in the diagram below. Each cell supplies 3V. Darius would like to measure the current flow in the circuit.



Copy the diagram as shown above in the space below and add in an ammeter to show he should connect the ammeter in the circuit.

A5 The following apparatus was set up as shown in Fig A5.1.

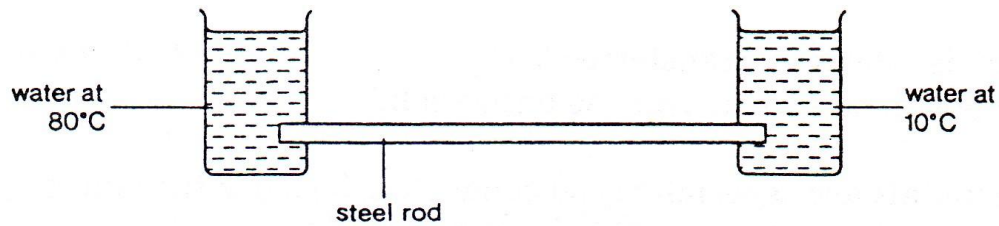


Fig A5.1

- (a) Draw an **arrow** on the steel rod to show the direction in which heat is passed along the rod. [1]
- (b) (i) State the heat transfer process that is happening along the rod. [1]

- (ii) Explain, in terms of particles, how heat is transferred along the rod [2]

 [2]
- (c) What colour container should be used to contain the hot water to speed up heat loss? Explain. [2]

 [2]

A6 A simple food chain is presented as shown below.

P 7500 kJ Q
 plants → bee → sparrow → hawk

- (a) How are the sparrow and hawk classified in this food chain? [1]

- (b) If only 10% of energy from food is passed on from one trophic level to the next, determine the amount of energy being transferred at P and Q. [2]
 P:kJ
 Q:kJ

(c) What is the total energy transferred from the sun to plants initially?

.....kJ

[1]

(d) State **two** ways how the energy is lost at each trophic level.

.....

.....

..... [2]

A7 Fig A7.1 shows part of the alimentary canal of the human digestive system.

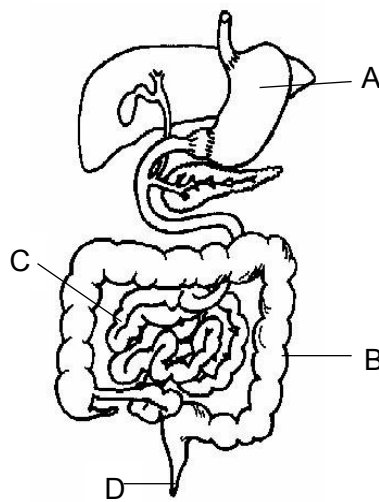


Fig A7.1

(a) Identify the organs labelled A, B, C and D.

A:

B:

C:

D:

[2]

(b) State the functions of A and B in the digestive system.

.....

.....

.....

..... [2]

- A8** Mary's menstruation starts on 3rd February. Fig A8.1 shows the change in the thickness of the lining of uterus wall over a period of 36 days, starting from the first day of her menstrual cycle.

thickness of uterus lining

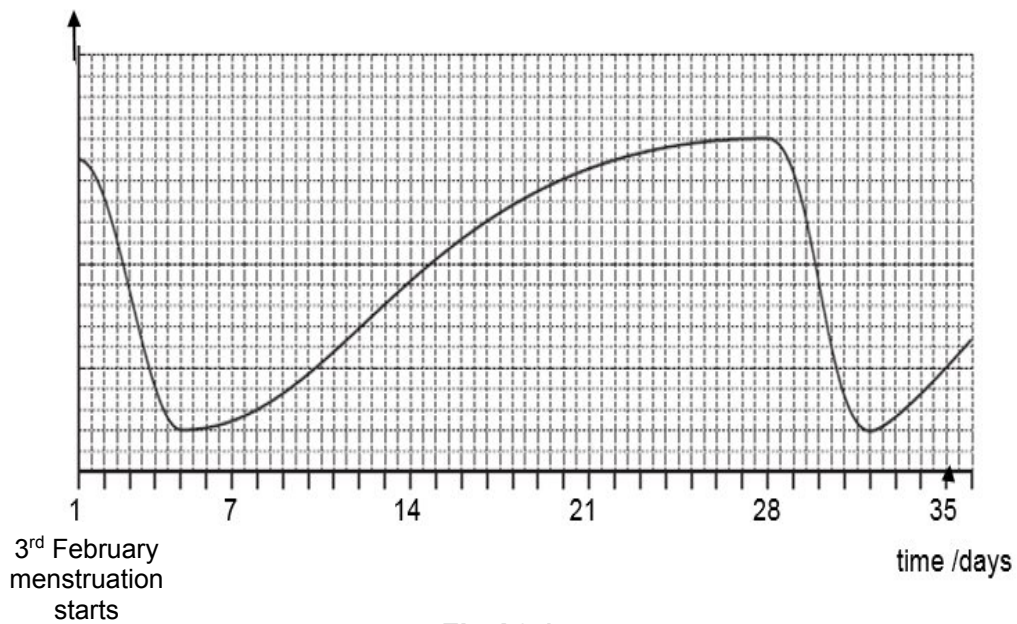


Fig A8.1

- (a) **Fig A8.2** shows the calendar of the month of February.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						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	

Fig A8.2

On Fig A8.2,

- (i) shade the days during which menstruation occurs. [1]
- (ii) circle the day of ovulation. [1]

(b) Describe what happens during ovulation.

.....

.....

.....

[1]

(c) If Mary has sexual intercourse on the 8th February, is the possibility high or low that she would be pregnant? Explain your answer.

.....

.....

.....

.....

[2]

Section B [30 marks]

Answer **all** questions in this section.
Write your answers in the spaces provided.

B1 Table B1.1 below describes four different types of changes.

Table B1.1

change	Description	physical change/ chemical change
A	Glucose is produced by green plant during photosynthesis.	
B	Sodium chloride is dissolved in a beaker of water. The solution is heated to dryness to obtain sodium chloride back.	
C	Copper(II) carbonate produces copper(II) oxide and a gas when it is heated strongly.	
D	Using electricity to coat a metal spoon with a thin layer of silver.	

(a) (i) Complete Table B1.1 by stating if each change is a **physical** or **chemical** change. [2]

(ii) From your answer in (a)(i), explain in detail why you have classified the change(s) as physical change(s).

.....

 [2]

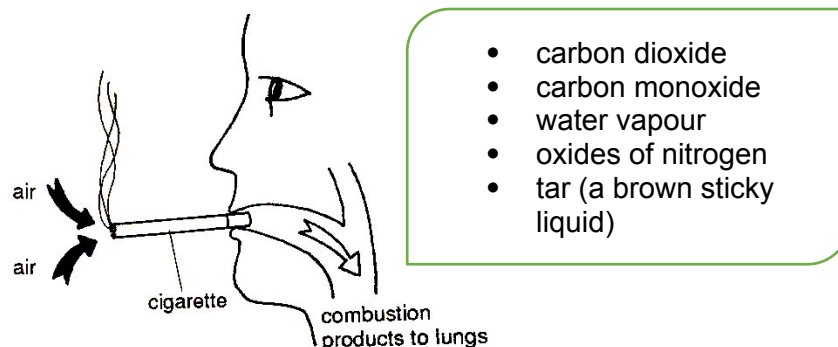
(iii) Write a word equation for any of the chemical changes in Table B1.1.

..... [1]

(iv) Name the process where electricity is used to coat a metal spoon with a layer of silver.

..... [1]

- (b) The diagram below shows the combustion of tobacco when a smoker inhales a burning cigarette. Some of the substances in the combustion products that enter the smoker's lungs are listed below:



- (i) Name one substance in the list which is **not** a pollutant.

..... [1]

- (ii) State an environmental effect of oxides of nitrogen when released into the atmosphere.

..... [1]

- (iii) Explain the hazardous effect of carbon monoxide on the health of smokers.

..... [2]

- B2** (a) Mr Lim has two electric kettles. The power rating of each kettle is as shown in Table B2.1.

Table B2.1

electrical kettle	power rating
A	2000 W
B	2400 W

- (i) Which kettle is able to boil water faster? Explain.

..... [2]

- (ii) The plug is attached to a small immersion heater as shown in Fig. B2.2. The heating element of the immersion heater is enclosed inside a metal tube.

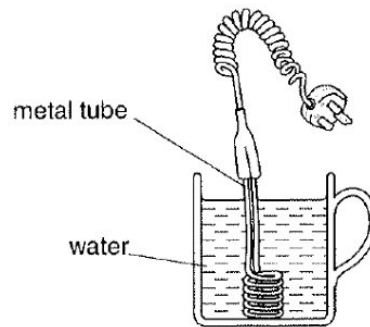


Fig. B2.2

Describe the heat transfer processes when the heating element is placed at the bottom of the kettle to boil the water.

.....

.....

.....

.....

.....

.....

[3]

- (b) One day, while using the electric kettle, there was a sudden power trip in Mr Lim's home.

Power trip occurs when too much current suddenly flow through the circuit. The circuit breaker will trip to shut off the circuit and prevent a fire.

- (i) Identify the safety feature that is present in the electrical 3 pin plug to prevent major electrical hazard.

.....

[1]

- (ii) Explain how the safety feature identified in (b)(i) works.

.....

.....

.....

[1]

- (c) Mr Lim compared the power rating and the amount of electrical consumption of the two kettles.

electrical appliance	power rating	usage time per day
electrical kettle A	2000 W	1 h
electrical kettle B	2400 W	1 h

- (i) Calculate the energy consumption of each kettle per day in kWh.

kettle A:kWh

kettle B:.....kWh [2]

- (ii) If the cost per unit of electricity used is 25 cents, calculate the cost of using kettle B for 30 days.

cost = \$..... [1]

- B3** (a) **Fig. B3.1** shows part of the human circulatory system. S, P, Q and R are blood vessels that carry blood.

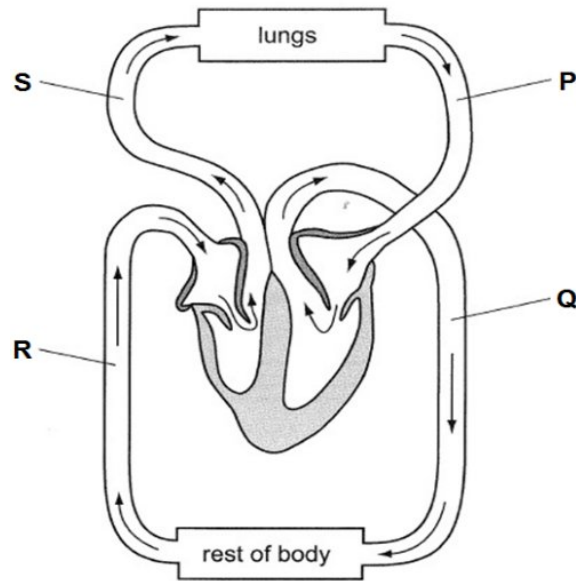


Fig. B3.1

- (i) Name the blood vessels labelled R and Q.

R:

Q: [2]

- (ii) Jack accidentally cuts his kneecap after a fall. Two components in the blood protect him from harm. One of the components is the white blood cell, which fight infection as bacteria may be entering through the cut.
Name the other component and state its function.

.....

.....

..... [2]

.....

- (b) An experiment was conducted to investigate the effect of temperature on the rate of salivary amylase (found in saliva), when added to starch.

In testing the presence of starch, we used iodine solution as an indicator, as shown below in the equation:

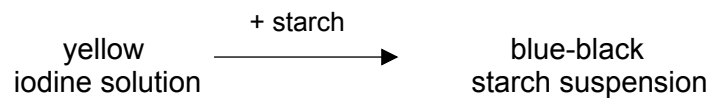


Table B3.2 below shows the results of the experiment.

Table B3.2

test-tube	/ °C	colour of iodine solution and starch	is starch present or absent?	is starch digested?
X	0	blue-black		no
Y	37	yellow	absent	
Z	100	blue-black	present	no

- (i) Complete Table B3.2. [1]

- (ii) Explain the absence of starch in test tube Y.

.....

 [2]

- (iii) Give the end product/s for the digestion of proteins and fats.

protein:

.....

fats:

..... [2]

- (c) It is not advisable to consume too much food containing starch. State a possible health issue that may result due to diets high in starch.

..... [1]

End of paper