



**BEATTY SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2025
SECONDARY TWO G3**

CANDIDATE
NAME

CLASS

REGISTER
NUMBER

LOWER SECONDARY SCIENCE

6 October 2025

Setter: Ms Ain

Sections A, B and C: 2 hours

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

This Lower Secondary Science Paper consists of 3 sections – Sections A, B and C.

SECTION C (30 MARKS)

You are advised to spend no more than **90 minutes** on **Sections B and C**.

Write your name, class and register number on all the work you hand in.
You may use an HB pencil for any diagrams, graphs, tables or rough working.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.

Answer **all** questions in the spaces provided on the question paper.
A copy of the Periodic Table is printed on page 11.

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

For Examiner's Use	
C	30

Section C

Answer **all** the questions in this section in the spaces provided.

- 9 The Central Processing Unit (CPU) supports the main processes in a modern computer. In an experiment, the relationship between the current flowing through a CPU and the temperature of the CPU is investigated. Fig. 9.1 shows how the temperature varies with current.

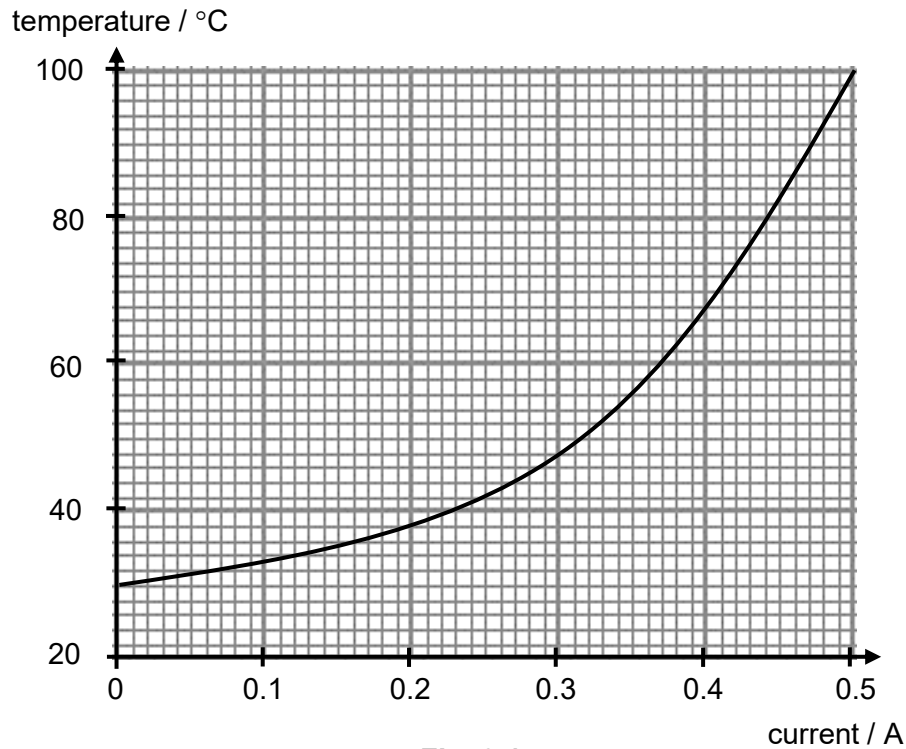


Fig. 9.1

Table 9.1 shows the current and power used by the CPU when different applications are used in a computer for varying durations.

Table 9.1

type of application	current / A	power / kW	duration / h
web browsing	0.16	0.962	1.0
playing music	0.22	1.55	0.5
gaming	0.35	2.78	2.0

Table 9.2 shows a comparison of electricity prices from different retailers in the Open Electricity Market (OEM).

Table 9.2

retailer	price per kWh / cents
Volt & Co.	29.62
PowerFlow	29.30
SunGrid	31.10

- (a) Using Fig. 9.1 and Table 9.1, state the temperature of the CPU when the computer is used for web browsing only.

..... [1]

- (b) A family has a subscription to the electricity retailer PowerFlow.

Using the information given in Table 9.1 and Table 9.2, calculate the total cost of electricity for running all three applications for their respective durations.

Show all your working clearly.

total cost = \$..... [3]

- (c) A heat sink is usually attached on top of the CPU to help it to cool down as shown in Fig. 9.2.

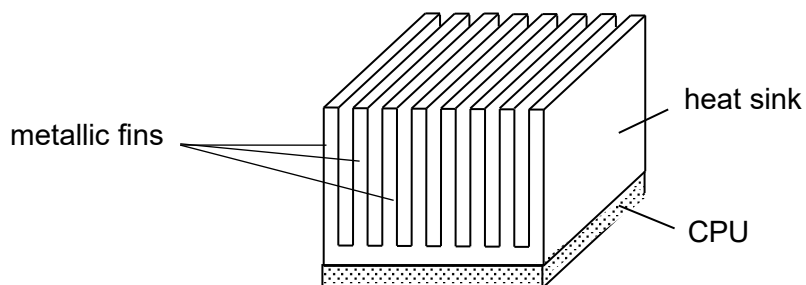


Fig. 9.2

The heat sink is mainly made of numerous metallic vertical fins.

Using your knowledge of heat transfer,

- (i) explain why the fins are made of metal;

.....

 [1]

- (ii) explain why numerous fins are used;

.....
.....
..... [1]

- (iii) explain why the heat sink is usually black in colour;

.....
.....
..... [1]

- (iv) explain why the heat sink is attached above, **not** below the CPU;

.....
.....
..... [1]

- (v) state and describe how thermal energy is transferred from the CPU to the heat sink.

.....
.....
.....
.....
..... [2]

[Total: 10]

- 10 (a) Fig. 10.1 shows a set-up where 20 cm^3 of acid and 10 drops of Universal Indicator are added to the beaker. The magnetic stirrer is switched on to ensure the mixture is thoroughly mixed throughout. Potassium hydroxide (KOH) solution from the burette is added dropwise to the beaker. Potassium nitrate (KNO_3) salt and one other product is produced in the chemical reaction.

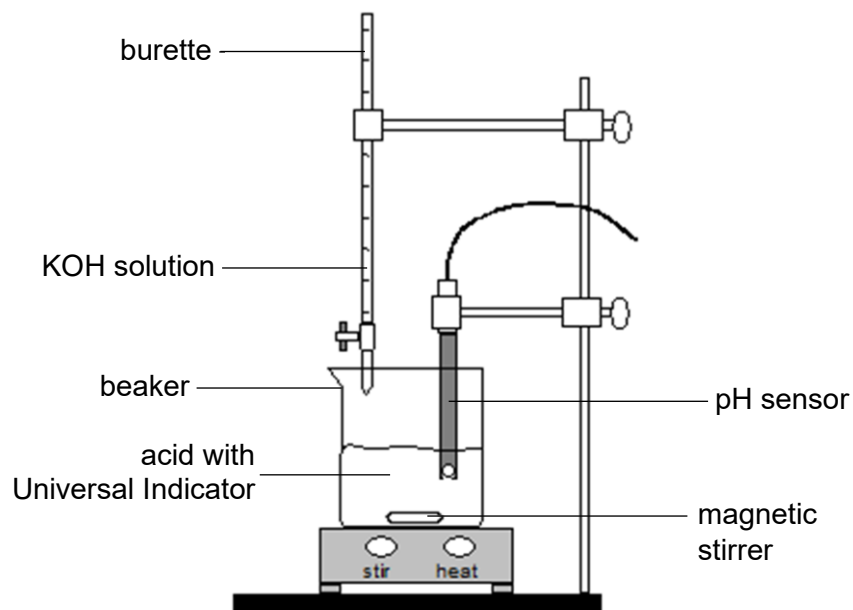


Fig. 10.1

Fig. 10.2 shows the results of pH measurements taken by the pH sensor at regular intervals as it monitors the mixture's pH value.

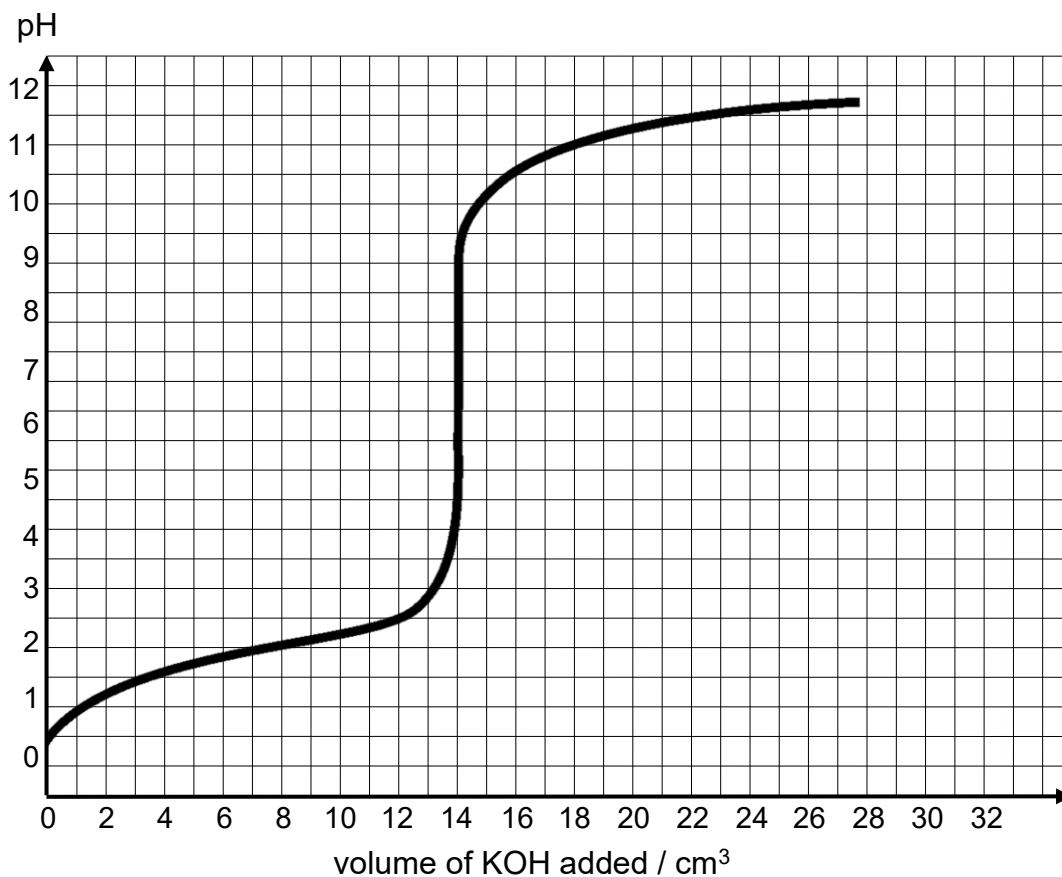


Fig. 10.2

- (i) Identify the acid used in the set-up.

..... [1]

- (ii) Write a word equation for the chemical reaction.

..... [1]

- (iii) State the volume of KOH solution that turns the mixture in the beaker green.

volume = ... cm³ [1]

- (iv) State the final colour of the mixture.

..... [1]

- (v) The experiment is repeated using the same concentration of acid and alkali as in the previous experiment, but this time using 30 cm³ of acid.

Calculate the volume of KOH solution that turns the mixture green. Show your working clearly.

volume = ... cm³ [1]

- (vi) Apart from Universal Indicator, Table 10.1 shows the colour changes of different indicators that could be used.

Table 10.1

indicator	pH range and colour of indicator		
methyl orange	< pH 3.1 red	pH 3.1 – 4.4 orange	> pH 4.5 yellow
phenolphthalein	< pH 8.3 colourless	pH 8.3 - 10 light pink	> pH 10 pink
bromothymol blue	< pH 6 yellow	pH 6 – 7.6 green	> pH 7.6 blue

Using Table 10.1, explain which indicator is best used to indicate the point of complete neutralisation between potassium hydroxide and the acid used.

.....
..... [1]

- (b) Ms Tan is the chief chemist at a water treatment plant. During routine maintenance, three storage containers of water treatment chemicals were accidentally damaged, and their contents spilled into separate collection trays.

She needs to identify each chemical quickly to ensure water treatment operations can continue safely.

The three chemicals that were stored separately are:

- tray **A** which contains zinc powder
- tray **B** which contains calcium carbonate
- tray **C** which contains sodium chloride

Ms Tan must test samples from each tray to confirm their identity before they can be safely disposed of or reused.

Suggest and describe an experiment that can be carried out in a school Science laboratory to identify these chemicals. In your answer, you should include the expected observations.

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..... [4]

[Total: 10]

- 11 (a)** A woman keeps track of her menstrual cycle using the calendar shown in Fig. 11.1. She has a regular 28-day menstrual cycle and has indicated the day on which she began menstruating in May with a circle.

May						
M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June						
M	T	W	T	F	S	S
						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. 11.1

- (i)** The woman uses the rhythm method to avoid becoming pregnant.

State the dates in June that she should abstain from sexual intercourse.

..... [1]

- (ii)** Explain why the period during which the woman should abstain from sexual intercourse in **(a)(i)** stretches across several days.

.....

.....

.....

..... [2]

- (b) Endometriosis is a condition which arises when cells from the uterine lining grow in the oviducts and implant around the ovaries, damaging the ovarian tissues.

Fig. 11.2 shows the results of the three-year study to compare the levels of successful fertilisation in couples in which the female was either normal or affected by endometriosis.

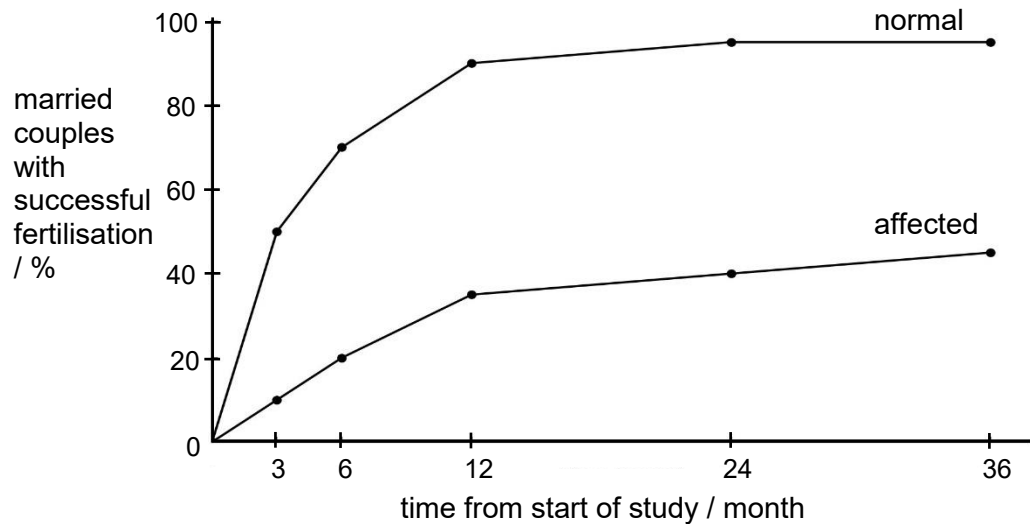


Fig. 11.2

With reference to Fig. 11.2, and the information given, describe and explain the effects of endometriosis on fertilisation.

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..... [2]

- (c) Fig. 11.3 shows how the foetus obtains nutrients and oxygen while exchanging carbon dioxide and waste with the mother.

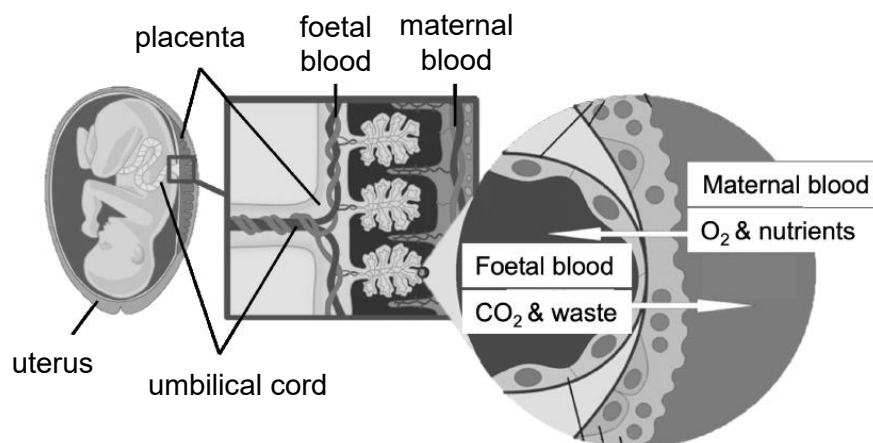


Fig. 11.3

- (i) Describe how carbohydrates are completely digested in the mother's digestive system.

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..... [2]

- (ii) With reference to Fig. 11.3, describe the movement of digested carbohydrates into foetal blood and waste products out of foetal blood to support foetal growth.

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..... [2]

- (iii) Explain why oxygen is essential for foetal growth and development.

.....

..... [1]

[Total: 10]

End of Section C

The Periodic Table of Elements

Group																		
1	2	1 H hydrogen 1											13	14	15	16	17	18
		Key proton (atomic) number atomic symbol name relative atomic mass																
3 Li lithium 7	4 Be beryllium 9																	
11 Na sodium 23	12 Mg magnesium 24	3	4	5	6	7	8	9	10	11	12							
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 —	
87 Fr francium —	88 Ra radium —	89–103 actinoids		104 Rf rutherfordium —	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

actinoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 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
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 mendelevium —	102 No nobelium —	103 Lr lawrencium —

