A

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

Level 3 Certificate/Extended Certificate

APPLIED SCIENCE

Unit 1 Key Concepts in Science

Section C – Physics

ASC1/P

Time allowed: 1 hour 30 minutes. You are advised to spend approximately 30 minutes on this section.

[Turn over]

At the top of page 1, write your surname and other names, your centre number, your candidate number and add your signature.

For this paper you must have:
- **a calculator**
- **the Formulae Sheet.**

INSTRUCTIONS

- Use black ink or black ball-point pen.
- Answer ALL questions in each section.
- You must answer the questions in the spaces provided. Do NOT write on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

[Turn over]

INFORMATION

- **You will be provided with a copy of the Formulae Sheet.**

- **There are three sections in this paper:**
  SECTION A – Biology
  SECTION B – Chemistry
  SECTION C – Physics.

- **The marks for questions are shown in brackets.**

- **The maximum mark for this paper is 60 and the maximum mark for this section is 20.**

ADVICE

- **Read each question carefully.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

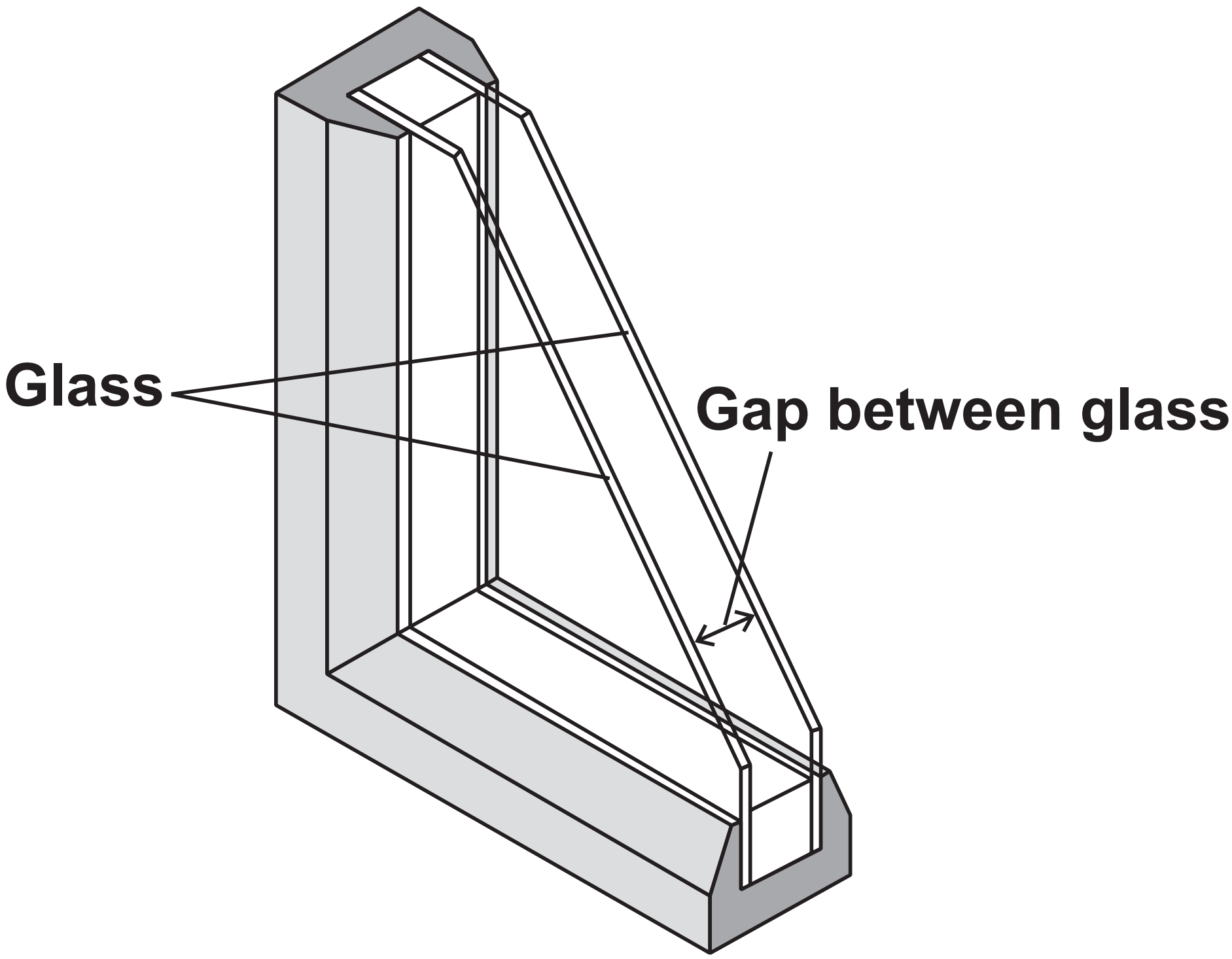
SECTION C – PHYSICS

Answer ALL the questions in this section.

0 1

FIGURE 1 shows the cross-section of a double-glazed window.

FIGURE 1



The double-glazed window can be made from four different types of glass. The gap between the glass can be 12 mm, 16 mm or 20 mm.

TABLE 1 shows the U-values for different double-glazed windows made with different types of glass.

TABLE 1

Type of glass	U-value ($W\,m^{-2}\,°C^{-1}$)		
	12 mm gap between glass	16 mm gap between glass	20 mm gap between glass
W	2.9	2.7	2.8
X	2.7	2.6	2.6
Y	1.9	1.8	1.8
Z	1.6	1.5	1.5

[Turn over]

0 1 . 1

Which type of glass is the best insulator? [1 mark]

Tick (✓) ONE box.

- ☐ **W**
- ☐ **X**
- ☐ **Y**
- ☐ **Z**

0 1 . 2

How does the data in TABLE 1 show that the type of glass has more effect than the gap size on reducing heat transfer? [1 mark]

0 1 . 3

Suggest how the U-values would change if thicker glass was used.
[1 mark]

BLANK PAGE

[Turn over]

0 1 . 4

A double-glazed window made from glass Y with a 16 mm gap has an area of 1.1 m^2.

The temperature difference between the inside of the window and the outside of the window is 15 °C.

Calculate the heat energy transferred through the window in 1 second.
[1 mark]

Use data from TABLE 1 and the equation:

$$Q = UAt\Delta T$$

Heat energy transferred =

_____ J per second

[Turn over]

0 1 . 5

Give TWO benefits of fitting double-glazed windows. [2 marks]

1 _____

_____

2 _____

_____

_____

6

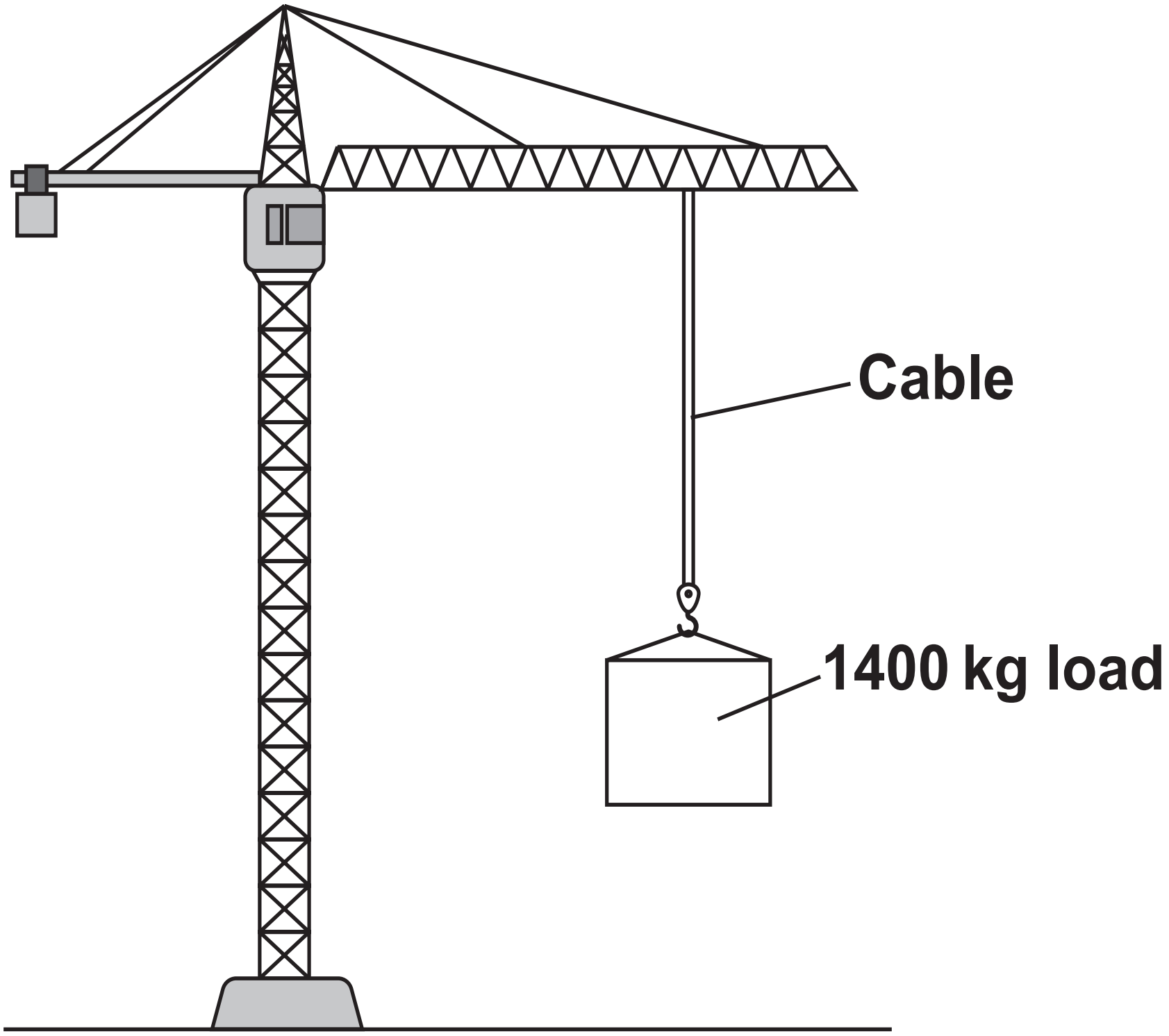
BLANK PAGE

[Turn over]

0 2

FIGURE 2 shows a crane lifting a 1400 kg load.

FIGURE 2



0 2 . 1

The crane lifts the load at a CONSTANT velocity of 0.75m s^{-1}.

Calculate the momentum of the load.
[2 marks]

Give the unit.

Use the Formulae Sheet.

Momentum of the

load = _____ Unit _____

[Turn over]

0 2 . 2

The load gains 176 000 J of gravitational potential energy when it is lifted for 20 seconds.

Calculate the power of the crane.

[1 mark]

Use the Formulae Sheet.

Power of the crane = _____ W

0 2 . 3

The load is lifted at a CONSTANT velocity.

How does the tension force in the cable compare with the weight of the load?

[1 mark]

_____

_____

_____

[Turn over]

0 2 . 4

Explain what will happen to the load if the tension in the cable increases. [2 marks]

6

0 3

A student measured the resistance of a thermistor at different temperatures.

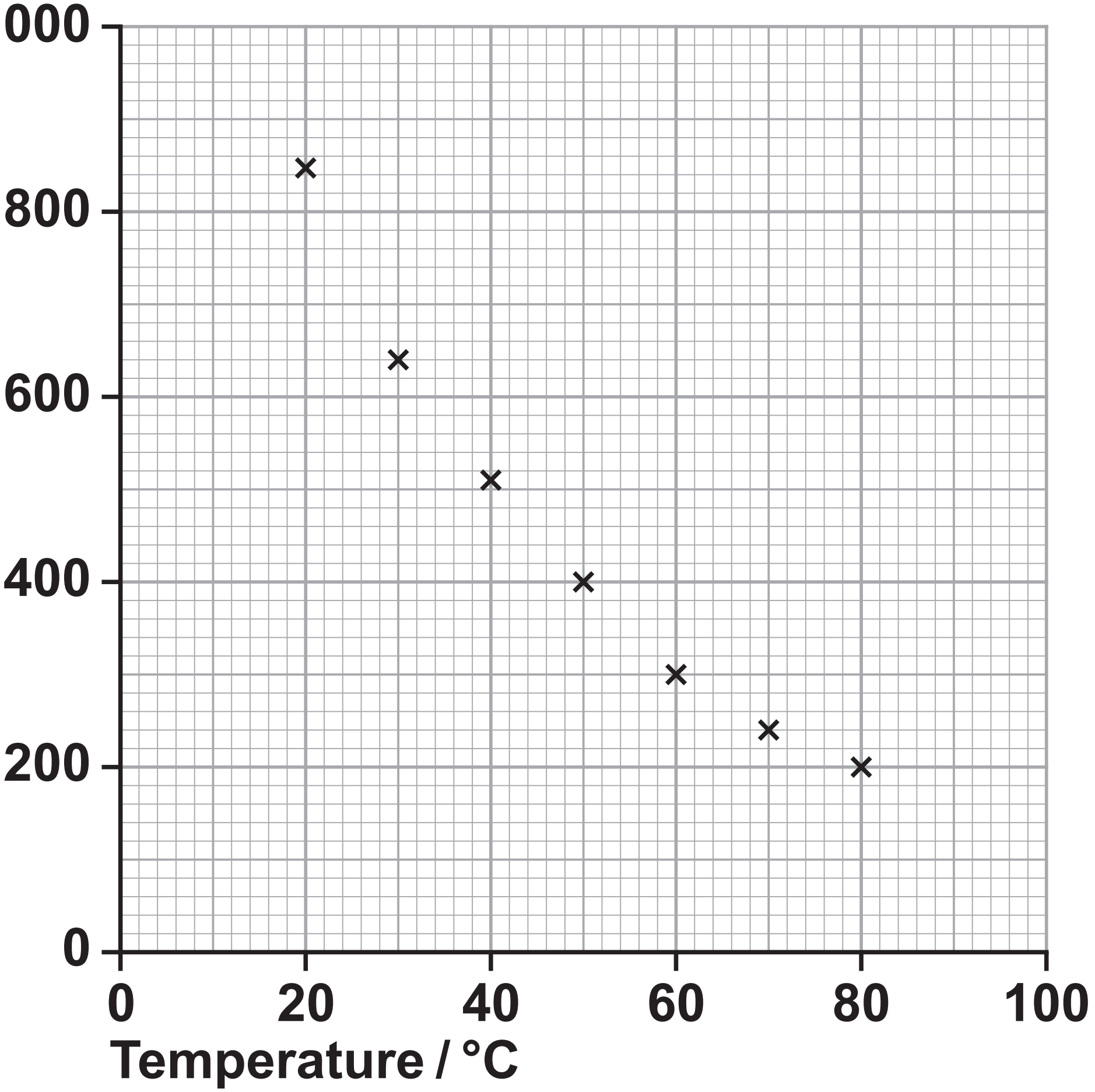
TABLE 2 shows the results.

TABLE 2

TEMPERATURE / °C	20	30	40	50	60	70	80
RESISTANCE / Ω	850	640	510	400	300	240	200

FIGURE 3 is a graph of the values from TABLE 2.

FIGURE 3



0 3 . 1

Draw a line of best fit on FIGURE 3.
[1 mark]

0 3 . 2

Describe the relationship between the resistance and temperature shown in FIGURE 3. [1 mark]

0 3 . 3

Explain why the resistance of the thermistor changes as the temperature changes.

Refer to electrons in your answer.

[2 marks]

BLANK PAGE

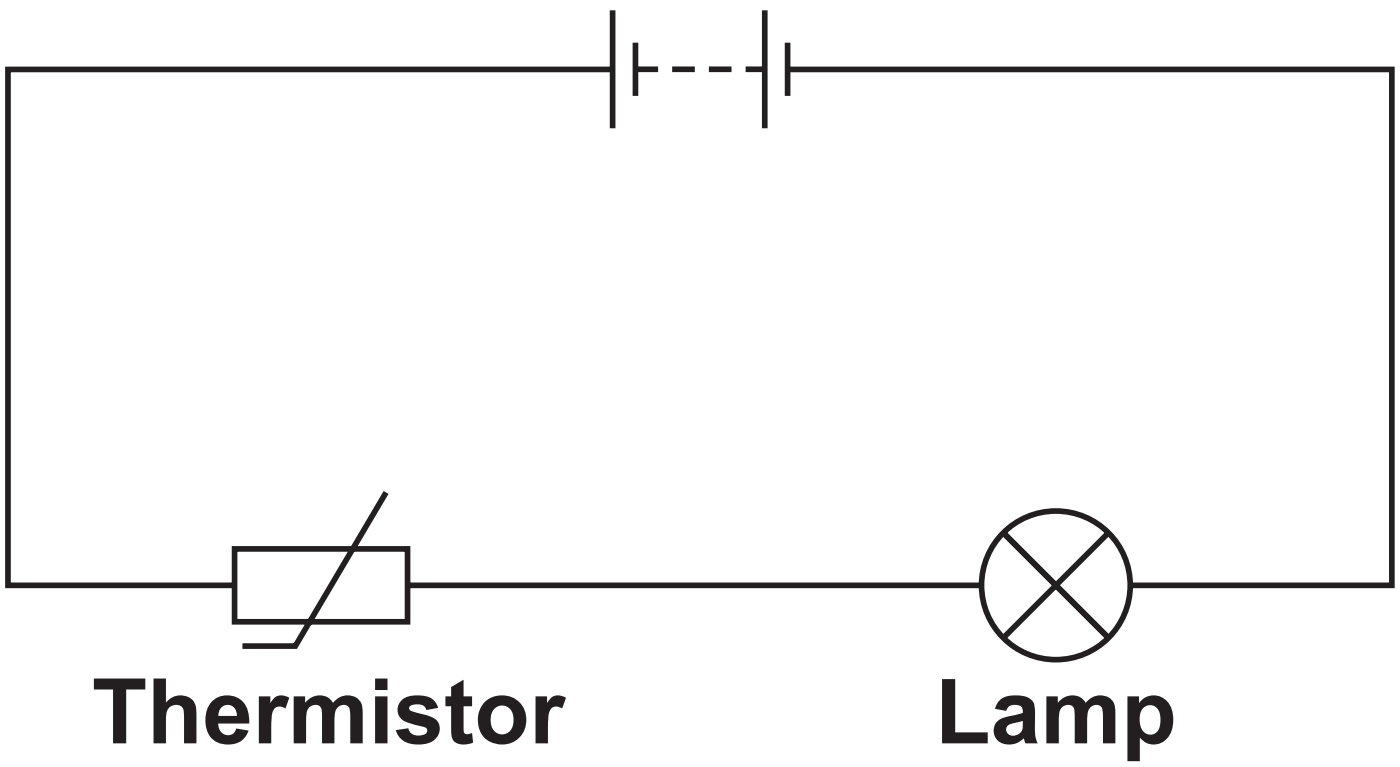
[Turn over]

0 3 . 4

The student builds a series circuit with the thermistor.

FIGURE 4 shows the circuit diagram.

FIGURE 4



The resistance of the lamp is 15 Ω when the temperature of the thermistor is 20 °C.

Calculate the total resistance of the circuit when the temperature of the thermistor is 20 °C. [1 mark]

Use the Formulae Sheet and data from TABLE 2 on page 21.

Total resistance of the circuit = _____ Ω

0 3 . 5

The brightness of the lamp increases as the temperature of the thermistor increases.

Explain why. [2 marks]

0 3 . 6

Give ONE use for a circuit that includes a thermistor. [1 mark]

8

END OF QUESTIONS

BLANK PAGE

Additional page, if required. Write the question numbers in the left-hand margin.

Additional page, if required. Write the question numbers in the left-hand margin.

Additional page, if required. Write the question numbers in the left-hand margin.

BLANK PAGE

For Examiner's Use	
Question	Mark
1	
2	
3	
TOTAL	