z

AQA

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.

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

[Turn over]

JUN22ASC1P01

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.**

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

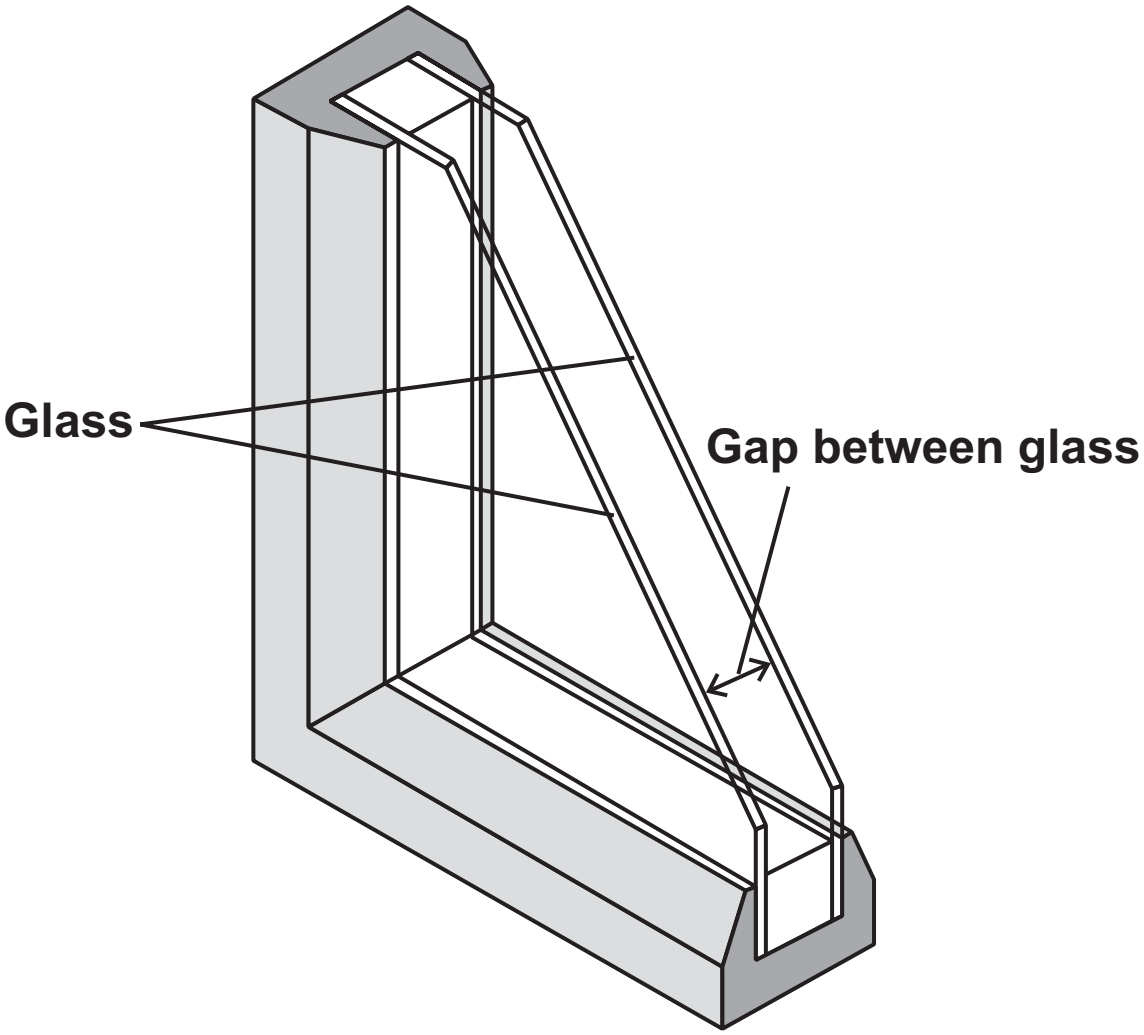
SECTION C – PHYSICS

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

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]

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

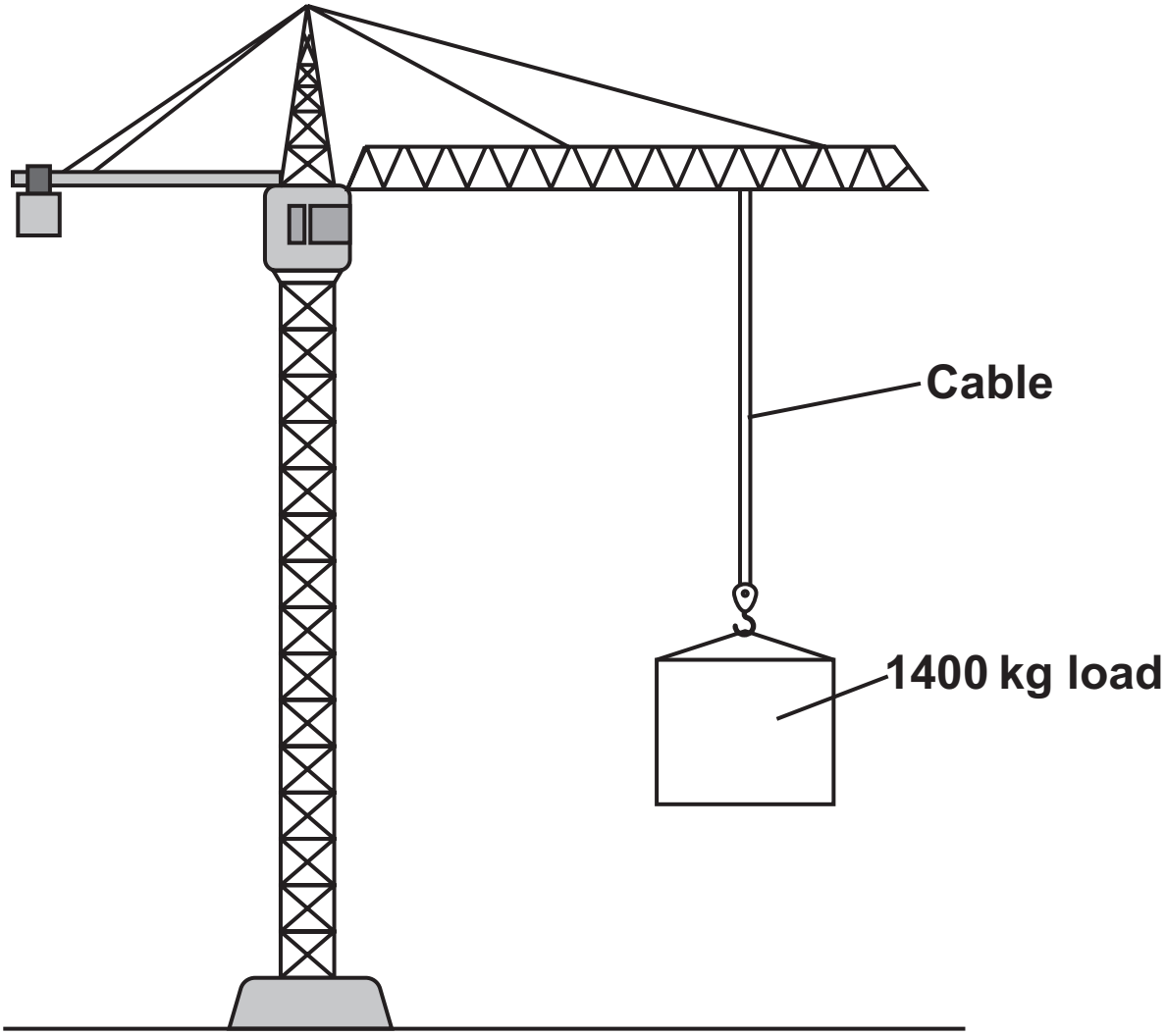
BLANK PAGE

[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 0.75 m 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]

_____

_____

_____

0 2 . 4

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

_____

_____

_____

_____

_____

_____

6

[Turn over]

0 3

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

TABLE 2 shows the results.

TABLE 2

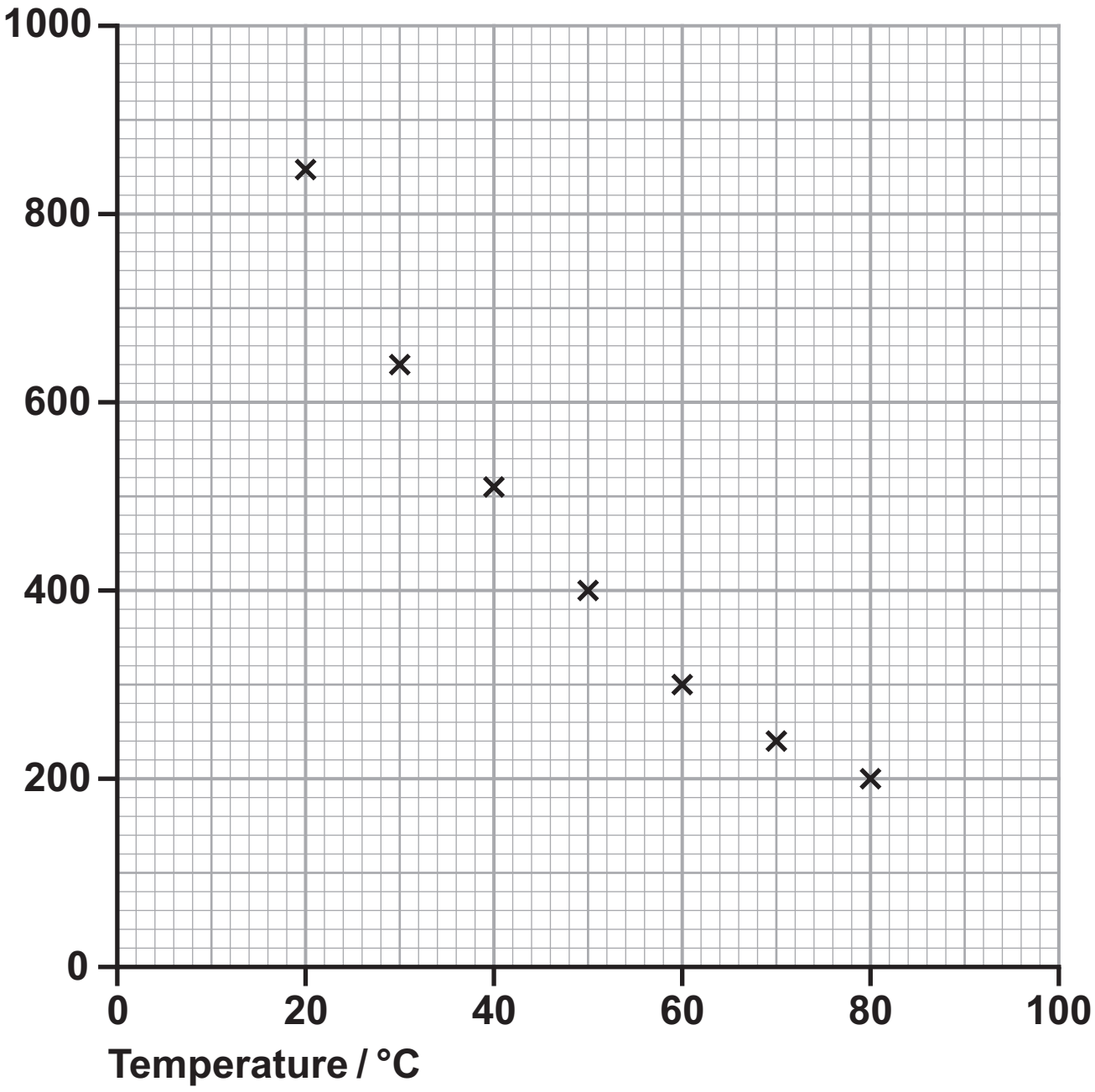
TEMPERATURE / °C	20	30	40	50	60	70	80
RESISTANCE / Ω	850	640	510	400	300	240	200

BLANK PAGE

[Turn over]

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]

_____

_____

_____

[Turn over]

0 3 . 3

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

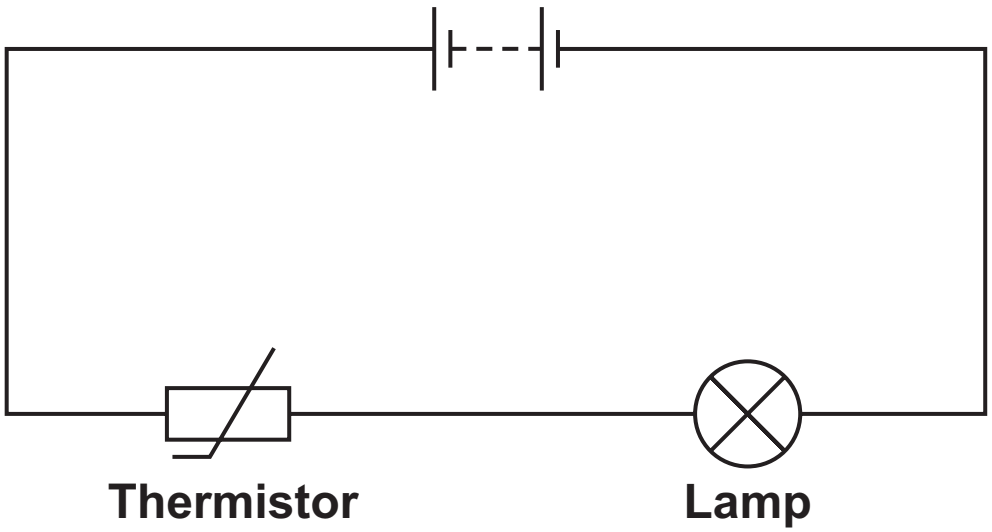
Refer to electrons in your answer. [2 marks]

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 14.

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

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	