| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Surname | | | | | Other Names | | | | | | |
| Centre Number | | | | | | Candidate Number | | | | | |
| Title of your own investigation if different | | | | | | | | | | | |
| Are the results and tables presented with this work your own? | | | | | | | YES / NO | | | | |
| Candidate Signature | | | | | | Date | | | | | |

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General Certificate of Secondary Education
June 2007 / June 2008

ASSESSMENT and QUALIFICATIONS ALLIANCE

**SCIENCE / PHYSICS** **SCYC/PHYC/P1.1**
**ISA P1.1 Thermal Insulation**

To be conducted between 1 September 2006 and 4 May 2008
For submission in May 2007 or May 2008

**For this paper you must have:**
- results tables and charts or graphs from your own investigation.

You may use a calculator.

| For Teacher's Use | |
|---|---|
| Section | Mark |
| 1 | |
| 2 | |
| **Total** (max 34) | |

Time allowed: 45 minutes

**Instructions**
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**
- The maximum mark for this paper is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

Signature of teacher marking this ISA ..... Date .....

LEAVE MARGIN BLANK

## SECTION 1

These questions are about the investigation that you carried out on thermal insulation.

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

**1** What were you trying to find out in your investigation?

.....

.....

.....

.....

*(2 marks)*

**2** Now look at a results table. Your teacher will tell you which results table to use. Put a tick (✓) in the box next to the results table that you are using.

Own results ☐ Group results ☐ Class results ☐

(a) In your investigation, which was the **independent** variable (the variable that was deliberately changed)?

.....

.....

*(1 mark)*

(b) How many different values of this variable were used? .....

Was this a suitable number?

Draw a ring around your answer. **Yes / No**

Write down the reason for your answer.

.....

.....

*(1 mark)*

**3** In your investigation, you used at least one measuring instrument.

(a) Name **one** measuring instrument that you used.

.....

*(1 mark)*

(b) You could have used a measuring instrument with a smaller scale division.

What effect would this have had on your results?

.....

.....

*(1 mark)*

**4** In your investigation:

(a) state **one** variable that it was important to keep the same;

.....

*(1 mark)*

(b) explain why it was important to keep this variable the same.

.....

.....

*(1 mark)*

**5** What did you find out from this investigation?

.....

.....

.....

.....

*(2 marks)*

**6** (a) Explain how you could improve the **reliability** of the data.

.....

.....

*(1 mark)*

(b) Why would this improve the reliability?

.....

.....

*(1 mark)*

**7** Make sure that **your** results tables, and charts or graphs are handed in with this paper. You will be awarded up to 6 marks for these.

*(6 marks)*

**18**

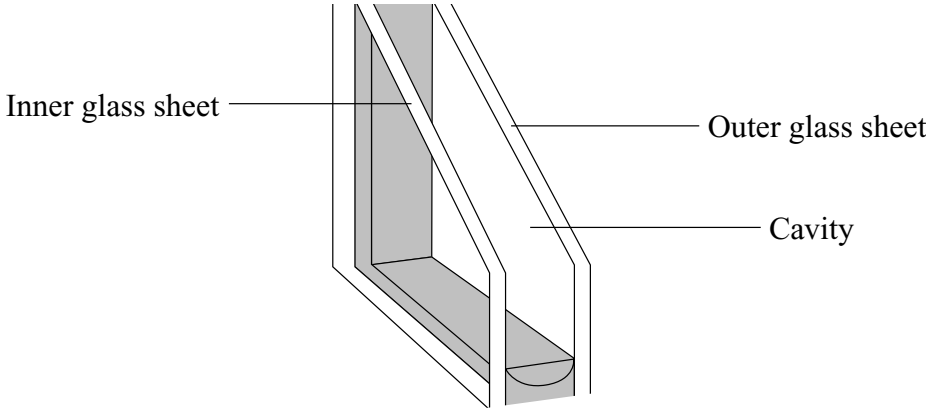
LEAVE MARGIN BLANK

## SECTION 2

These questions are about an investigation that may be similar to the one you carried out.

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

The 'Summerdaze Double-glazing Company' makes windows.
The windows can be made using various types of glass and with different cavity widths between the two sheets of glass.




The company's brochure contains the following information.

**Table 1**

**U-values for our windows**
The lower the U-value, the less heat is lost.

| Type of glass | Cavity width | | |
|---|---|---|---|
| | 12 mm | 16 mm | 20 mm |
| Magiglass | 2.9 | 2.7 | 2.8 |
| Supaglass | 4.7 | 2.6 | 2.6 |
| Wondaglass | 1.9 | 1.7 | 1.8 |
| Optoglass | 1.6 | 1.5 | 1.5 |

Note that the heat lost per day may vary according to the part of the country that you live in.
All glass sheets are 4 mm thick.

**8** There is one anomalous result in the table.
Draw a ring around this result.

*(1 mark)*

**9** Which type of glass is the best insulator?

.....

*(1 mark)*

**10** Using these results, which has more effect on reducing heat loss?

Draw a ring around your answer. **Type of glass / Cavity width**

Write down the reason for your answer.

.....

.....

*(1 mark)*

**11** 'Summerdaze' wants to display the U-values for the 12 mm cavity as a graph or a chart.

(a) What sort of graph or chart should be used?

Put a tick (✓) in the box next to your choice.

Bar chart ☐

Line graph ☐

Pie chart ☐

Scattergram ☐

*(1 mark)*

(b) Explain the reason for your choice.

.....

.....

*(1 mark)*

**12** The heat lost per day may vary according to the part of the country that you live in.
Suggest **one** reason for this.

.....

.....

*(1 mark)*

To help you with these questions, **Table 1** is reprinted on the opposite page.

**13** What would happen to the U-values if glass sheets thicker than 4 mm were used?

.....

.....

*(1 mark)*

**14** 'Summerdaze' state the following in their brochure.

> We recommend that you choose the widest possible cavity width. As you can see from our table, the wider the cavity, the less heat you lose. It might cost a bit more for a wider cavity, but it is well worth the extra cost.

(a) Do you think the statement 'it is well worth the extra cost' is true?

Draw a ring around your answer. **Yes / No**

Explain the reason for your answer by using data from **Table 1**.

*To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.*

.....

.....

.....

.....

.....

.....

.....

.....

.....

*(5 marks)*

(b) Why do you think that 'Summerdaze' made this statement?

.....

.....

*(1 mark)*

**Table 1**

**U-values for our windows**

The lower the U-value, the less heat is lost.

| Type of glass | Cavity width | | |
|---|---|---|---|
| | 12 mm | 16 mm | 20 mm |
| Magiglass | 2.9 | 2.7 | 2.8 |
| Supaglass | 4.7 | 2.6 | 2.6 |
| Wondaglass | 1.9 | 1.7 | 1.8 |
| Optoglass | 1.6 | 1.5 | 1.5 |

Note that the heat lost per day may vary according to the part of the country that you live in.
All glass sheets are 4 mm thick.

**15** Researchers from the 'Summerdaze' research department had to carry out an investigation to get these U-values. They did this by finding out how long it took for a room to cool down from a set temperature. They had to make several decisions in planning their investigation.

Using knowledge from your own investigation, answer the following questions about the 'Summerdaze' investigation.

They needed to measure several variables.
Fill in the boxes in **Table 2** to suggest what these might be.
Some have been done for you.

**Table 2**

| | |
|---|---|
| Independent variable | *temperature inside the room at the start* |
| Dependent variable | |
| Control variable 1 | *type of glass* |
| Control variable 2 | |
| Control variable 3 | |

*(3 marks)*

**END OF QUESTIONS**

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**There are no questions printed on this page**