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	

Leave blank

General Certificate of Secondary Education
June 2007 / June 2008

SCIENCE / PHYSICS **SCYC/PHYC/P1.2**
ISA P1.2 Wind Turbines

ASSESSMENT and QUALIFICATIONS ALLIANCE

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

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

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

You may use a calculator.

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 wind turbines.

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

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

.....

.....

.....

.....

(2 marks)

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

.....

(1 mark)

3 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) What **range** of values was used for the **independent** variable?

The range was from ..... to .....

(1 mark)

(b) Was this a suitable range to choose?

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

Give a reason for your answer.

.....

.....

(1 mark)

4 Were any of the readings repeated?

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

Explain why the readings were or were not repeated.

.....

.....

(1 mark)

5 State **one** variable that it was important to keep the same in this investigation.

.....

(1 mark)

6 Explain **one** possible cause of error in this investigation.

.....

.....

(1 mark)

7 What did you find out from this investigation?

.....

.....

.....

.....

(2 marks)

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

.....

.....

(1 mark)

(b) Why would this improve the reliability?

.....

.....

(1 mark)

9 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)*

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.

'Windpower International' is a company that makes small wind turbines for private houses in remote areas. The company has been designing a new wind turbine and wanted to find out how the number of blades affects the turbine's efficiency.

Turbines with different numbers of blades were put into a wind tunnel and the efficiency of each one was measured.

The results are shown in the table.

Number of blades on turbine	% efficiency			
	Trial 1	Trial 2	Trial 3	Mean
2	35	37	36	
3	45	48	42	45
4	27	73	54	51
5	29	31	43	34
6	15	17	19	17

10 (a) Complete the table to show the mean % efficiency for the 2-blade turbine.

(1 mark)

(b) It is misleading to claim that the mean efficiency of the 5-blade turbine is 34%.

(i) Why is it misleading?

.....

.....

(1 mark)

(ii) What could have been done to produce a more accurate mean?

.....

.....

(1 mark)

(c) One **row** of results seems to be very unreliable.

(i) Which row of results appears to be the least reliable? .....
(1 mark)

Give a reason for your answer.

.....

.....
(1 mark)

(ii) Using ideas from your own investigation explain, with reasons, why this row of results might be very unreliable.

You should try to use some of the following terms in your answer.

accuracy precision reliability uncertainty validity variation

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.

.....

.....

.....

.....

.....

.....

.....

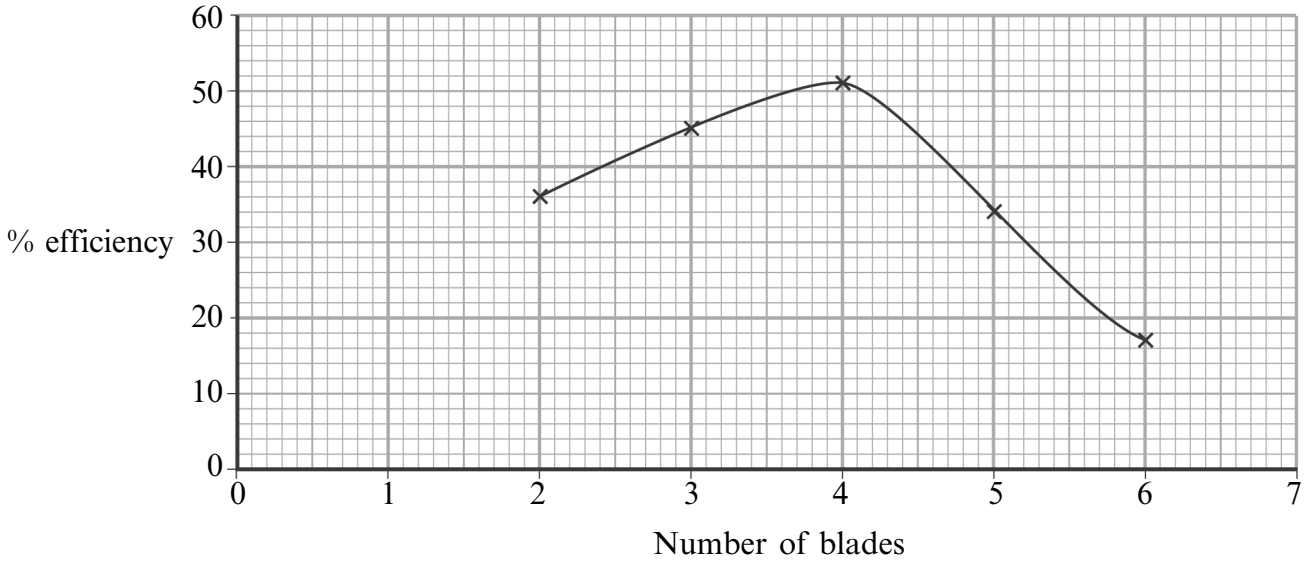
.....
(4 marks)

(iii) What should have been done when it was realised that this row of results was unreliable?

.....

.....
(1 mark)

11 'Windpower International' produced this graph of its results.



This is **not** the best type of graph to use with these results.

(a) Why is it wrong to use this type of graph with these results?

.....

.....

(1 mark)

(b) What type of graph should have been produced?

.....

.....

(1 mark)

(c) Describe how the % efficiency changes with the number of blades.

.....

.....

.....

.....

(2 marks)

(d) Would a conclusion based on these results be valid?

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

Explain your answer.

.....

.....

(1 mark)

12 'Windpower International' says, 'Science can prove that wind turbines are the best solution to our energy problem'.

Do you think that this is the sort of problem that science can solve?

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

Give a reason for your answer.

.....

.....

(1 mark)

16

END OF QUESTIONS

There are no questions printed on this page