

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature						Date					

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General Certificate of Secondary Education  
June 2008 / June 2009



**ADDITIONAL SCIENCE / PHYSICS**                      **ASCC/PHYC/P2.2**  
**ISA P2.2 Average Velocity of an Object Falling Through Air**

To be conducted before 4 May 2009  
For submission in May 2008 or May 2009 or May 2010

**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.

Did this candidate take part in the practical activity?	<b>YES / NO</b>
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Signature of teacher marking this ISA ..... Date .....

**SECTION 1**

These questions are about the investigation that **you** did.

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

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

.....  
.....  
.....  
.....

*(2 marks)*

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

.....  
*(1 mark)*

(b) (i) How many different values of this variable were used? .....  
*(1 mark)*

(ii) Was this a suitable number to use?

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

.....  
.....  
*(1 mark)*

**3** Did you get any anomalous results in your investigation?

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

Explain your answer. If you answered **Yes** you should clearly identify any results that you think are anomalous.

.....  
.....  
*(1 mark)*

4 Think about the variables that you measured in your investigation.

(a) Which **one** do you think was the cause of the biggest error?

Answer by completing the sentences below.

I think that the measurement of the ..... was the cause of the biggest error.

I think this because .....  
.....  
(2 marks)

(b) If you had the chance to repeat your investigation, what change would you make that might reduce this error?

.....  
.....  
(1 mark)

5 Look at **your** graph or bar chart of your results.

Use it to explain what you found out from your investigation.

I found out that .....  
.....  
.....  
.....  
(2 marks)

6 Someone suggests that your results are not reliable.

What could you do to check the **reliability** of your results?

.....  
.....  
(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)

## SECTION 2

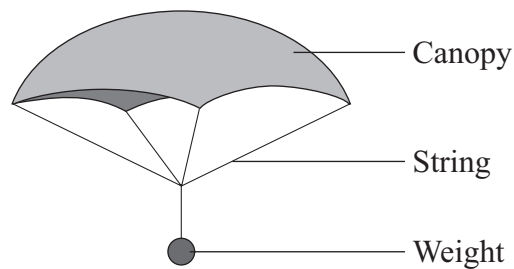
These questions are about an investigation that may be similar to the one that you did.

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

**8** A student investigated how to make the best parachute.

He cut a square of material and tied strings to it. He tied the bottom of the strings to a weight.

He wanted to find out what was the best size for the parachute canopy.



He dropped the parachute from a fixed height and measured the time it took to reach the ground.

(a) In this investigation, there are several variables that need to be kept the same.

(i) What name is given to variables that must be kept the same?

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

- |            |  |
|------------|--|
| Categoric  |  |
| Continuous |  |
| Control    |  |
| Ordered    |  |

*(1 mark)*

(ii) Name **two** variables that must be kept the same in this investigation.

1 .....

2 .....

*(2 marks)*



- (c) The student then increased the height of the drop. He found that this gave better results.

The table shows his results.

Area of canopy in $\text{cm}^2$	Time to reach ground in seconds			Mean time in seconds
25	2.4	2.7	2.5	
64	2.6	3.1	3.8	3.17
100	3.2	3.6	3.4	3.40
144	3.8	4.0	4.1	3.97
225	4.5	4.9	4.6	4.67

- (i) Complete the table to show the mean time for a canopy area of  $25 \text{ cm}^2$ .  
(1 mark)
- (ii) The student's teacher says that the mean values show too many significant figures.

Explain why the student should not give the mean value to three significant figures.

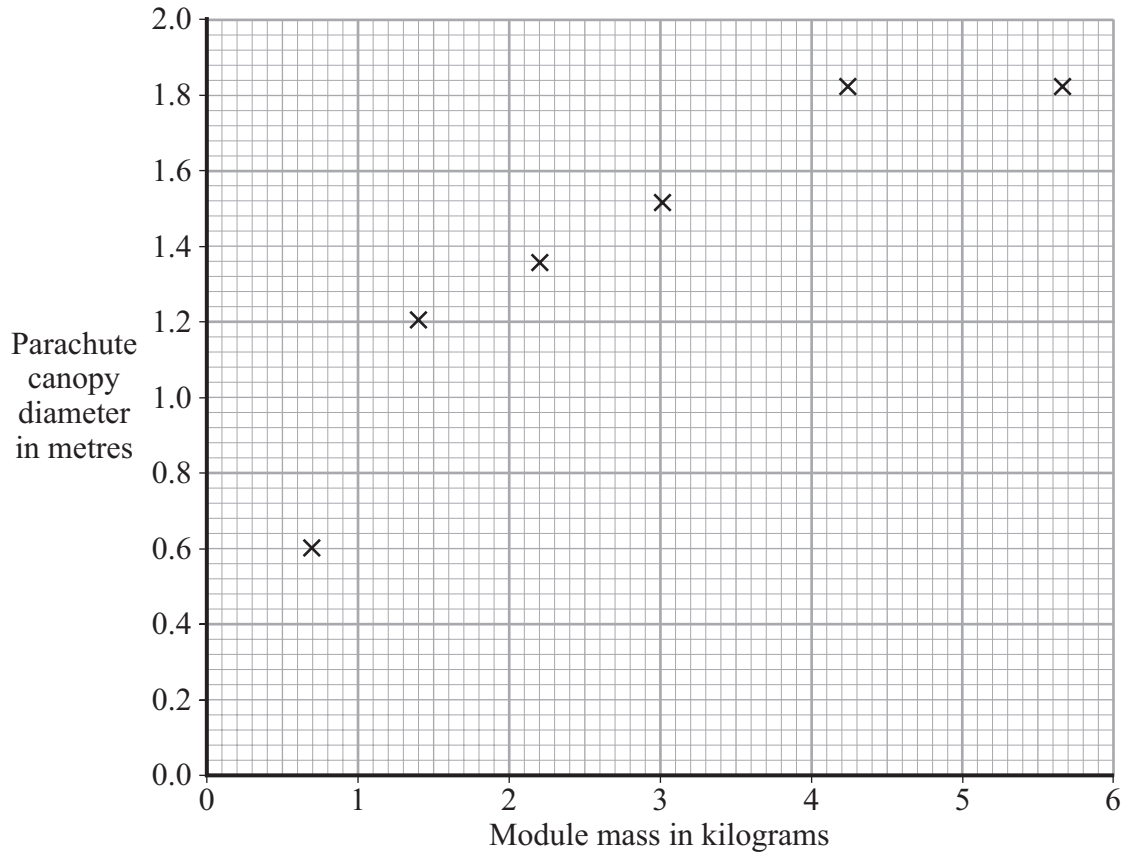
.....  
.....

(1 mark)

9 NASA (the American space agency) uses parachutes to land modules on various planets. It uses a different size of parachute canopy according to the mass of the module to be landed.

The graph shows the relationship between parachute canopy diameter and module mass.

(a) On the graph, draw in a curved line of best fit to show the relationship between parachute canopy diameter and module mass.



(1 mark)

(b) Describe in detail the relationship between parachute canopy diameter and module mass.

.....

.....

.....

.....

.....

.....

(3 marks)

Question 9 continues on the next page

- (c) Some people think that governments spend too much money on space research.

Which **one** of the following statements is true?

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

Science can tell us what the planets are made of,  
and whether they ought to be explored.

Science can tell us what the planets are made of,  
but not whether they ought to be explored.

Science cannot tell us what the planets are made of,  
but can tell us whether they ought to be explored.

Science cannot tell us what the planets are made of,  
nor whether they ought to be explored.

*(1 mark)*

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**END OF QUESTIONS**