8 SCIENCE INVESTIGATION

The Pendulum

Name: ANSWER KEY

Form: _____

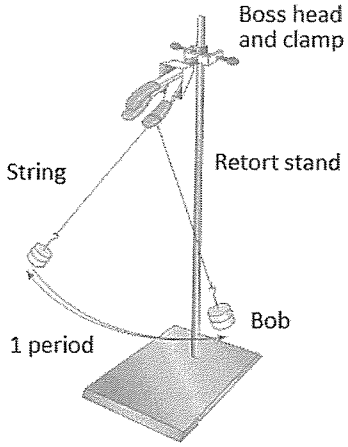
ANSWER KEY

Teacher: _____

Due date: _____

Background: A pendulum is a mass (called a bob) attached to a rod, chain or rope that swings back and forth repeatedly. One complete swing, back and forth is called a period. The frequency is the number of complete swings it makes every second.

Aim: To investigate the effect that either the length of the string or the mass of the bob on a pendulum has on the time it takes for 5 complete swings.



Tick the variable that your group has chosen to change.

The length of the string ☐

The mass of the bob ☐

Suggestions: measure how many seconds it takes for 5 complete swings and do this a number of times then take the average result. For example, have three trials in your results table then just graph the average times.

Clamp the base of your retort stand to the bench top to keep it stable.

Hypothesis (one sentence statement of what you think will happen): **(2 marks)**

eg. If (1) the mass of the bob is increased then the ~~period~~ time it takes for the pendulum to swing 5 times will be shorter. ~~than if the mass of~~ (1)

Independent variable: **(1 mark)**

eg. Either length of the string or mass of the bob

Dependent variable: **(1 mark)**

Time it takes for 5 swings

Two controlled variables: (2 marks)

eg. Height ~~period~~ bob is dropped from, length of string (if bob mass is changed), mass of bob (if length of string is changed)

Materials (detailed, how many of each item etc.): (2 marks)

eg Retort stand
boss head & clamp
string x 3 (10cm, 15cm, 20cm)
50g mass
clamp
stopwatch
ruler

Method (starting from step one, list the steps that were taken): (3 marks)

(1) The retort stand was clamped onto the bench.
(2) The bosshead and clamp was attached to the retort stand.

(1) for writing in past tense
(1) for writting step by step
(1) for including all the steps.

Results:

Table (show results taken from trials). **(3 marks)**

(1) (appropriate title)
Time it takes for pendulum to swing 5 times

mass of bob	Trial 1 (s)	Trial 2 (s)	Trial 3 (s)	Average (s)
50 g				
100 g				
150 g				

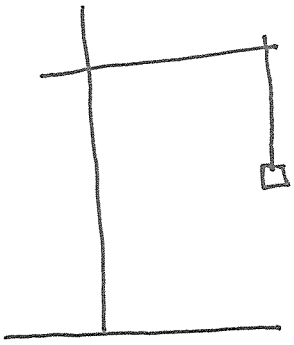
(1) for units of measurement

(1) for neat table drawn with ruler and in pencil

Diagram (scientific labelled diagram showing equipment set up). (2 marks)

(1) in pencil

(1) ... is labelled



etc.

Graph (show average trial results, draw on graph paper and attach). (5 marks)

Discussion (describe at least two mistakes/errors that occurred, explain how these affected the results and how they could be avoided next time): (3 marks)

Describe one mistake/error (1) (0.5)
Describe another mistake/error (0.5)

Explain how ↑ affected the results (1)

Explain how the mistakes/errors could be avoided next time (1)

length of string vs time (1)
or
mass of bob vs time

shows average results (1)

-1 mark for each missing part

(1) for correct labels on axis

time it takes for 5 swings of pendulum (s)

5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0

-1 mark - not connected up neatly

-1 mark for wrong type of graph - should be a line graph.

0 10 15 20

(1) appropriate scale

length of string (cm)
or
mass of bob (g)

(1) for correct units

(1) In pencil & with ruler

Conclusion (two sentence statement): **(2 marks)**

eg. The time it took for 5 swings of the pendulum ~~increase~~ was the longest (1) when the mass of the bob was increased. Therefore the hypothesis was proven. (1)

IMPORTANT INFORMATION

Plagiarism

- The experiment is to be done in your science group but your write-up and results are to be done individually.
- Plagiarising = instant zero on assignment and you will have to re-do it.

Presentation

- Neat writing (if you struggle with this, type your information).
- Correct spelling, grammar and full sentences.
- Clear, labeled diagrams using pencil.
- Assignment neatly stapled together with this sheet attached to the front.

Assessment policy

Have sick note/legitimate reason from parent = new negotiated due date.
Assignment not submitted on due date and no sick note from parents = -20% mark
Assignment not submitted on new negotiated due date = -40% mark
+ Letter home to parents
+ Must attend academic completion to complete assignment

OR

Submit assignment to student services before academic completion date and academic completion not necessary.

Academic completion not attended = zero on assignment + Saturday detention

If you know that you cannot submit your assignment on the due date, let your teacher know BEFORE the due date (email them if you are not in school) or just email them your assignment the night before.

MARKING KEY

Content	Description		Your mark
Hypothesis	If, then statement. Does not use 'I', 'we' etc.	1 1	
Independent Variable	Listed the independent variable.	1	
Dependent Variable	Listed the dependent variable.	1	
Controlled Variables	Listed two controlled variables.	2	
Materials	Listed all materials used. Is specific - has number of items used.	1 1	
Method	Is written in past tense. Is written in numbered step-by-step. Includes all the steps completed in experiment.	1 1 1	
Results table	Drawn neatly in pencil and using a ruler. Includes the headings and units of measurement. Includes all the data collected during the experiment.	1 1 1	
Scientific diagram	Is drawn neatly in pencil. Is labelled showing the pieces of equipment set up.	1 1	
Results graph	Drawn neatly in pencil and using a ruler. Has the correct variables on the axis. Is the correct type of graph. Has the units of measurement and headings on both axis. Has an appropriate title.	1 1 1 1 1	
Discussion	Describes at least two mistakes/errors that occurred. Explains how these mistakes/error have affected the results. Explains how these mistakes/errors could be avoided	1 1 1	
Conclusion	One sentence stating the result of the experiment. One sentence stating whether the hypothesis was proven or disproven.	1 1	
Presentation	Correct spelling, grammar, full sentences. Written neatly or typed up neatly.	1 1	
Total mark		28	

Mark as percentage %

Teacher's comments:

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