The Pendulum

an Inquiry Activity

You have just graduated from college and are applying for a position at a well-known engineering company in your area. When you and the other applicants arrive for your interview you are placed in groups and given the following problem to solve:

SCENARIO: An amusement park owner has come to the company for help with an idea for a new ride. It involves attaching one to three people to a steel wire, lifting them, and letting them swing like a large pendulum. He wants to know whether the weight of the riders or the length of the pendulum will make a difference in the time it takes the pendulum to complete a swing.

Your assignment is to submit your individual packages - with all parts complete - as well as a final group report. Your group report must contain all of the following parts:

1. A cover page that includes a title, date, names of group members and at least one illustration.
2. Initial hypotheses on the effect of length and weight on a pendulum's swing.
3. A clear description of how you constructed your model and collected your data, preferably with a numbered, step-by-step procedure for your experiment.
4. Data charts containing the data collected and line graphs made using your data. Each graph must have a title and each axis must be labeled and numbered.
5. Conclusions based on and supported by the data collected.
6. Any additional observations or illustrations that will help the amusement park owner understand your report.

How does the MASS of a pendulum affect the speed of a pendulum (the number of swings a pendulum will make in a certain amount of time)?

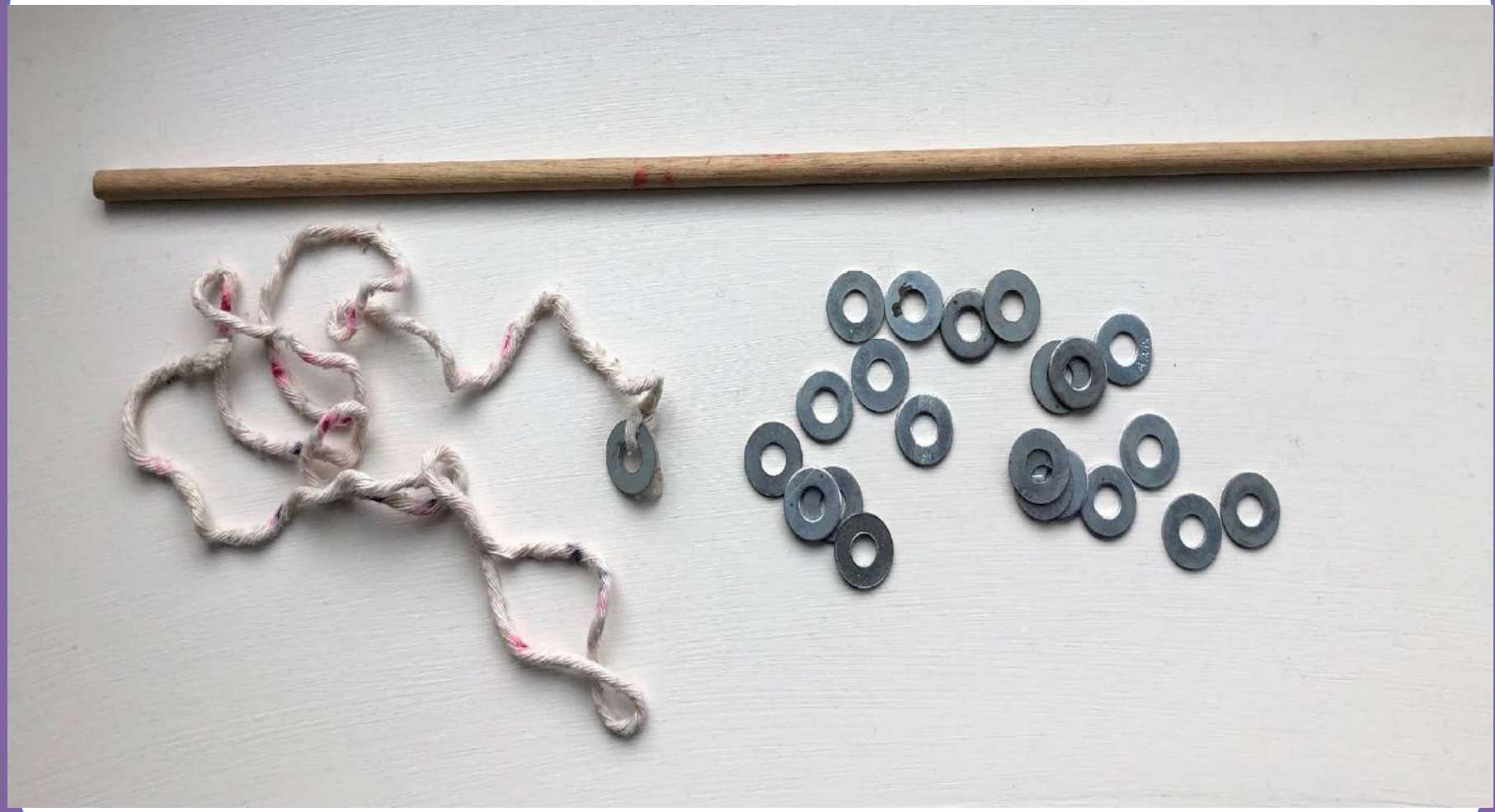
Why do you believe that a pendulum will make more, less or the same number of swings if the MASS increases (or decreases)?

How does the LENGTH of a pendulum affect the speed of a pendulum (the number of swings a pendulum will make in a certain amount of time)?

Why do you believe that a pendulum will make more, less or the same number of swings if the LENGTH increases (or decreases)?

How does the ANGLE OF RELEASE of a pendulum affect the speed of a pendulum (the number of swings a pendulum will make in a certain amount of time)?

Why do you believe that a pendulum will make more, less or the same number of swings if the ANGLE OF RELEASE increases (or decreases)?



CHANGING MASS: Length =_____ Angle of Release =_____

# OF WASHERS	TRIAL #1 (swings)	TRIAL #2 (swings)	TRIAL #3 (swings)	AVERAGE (swings)

CHANGING LENGTH: Mass =_____ Angle of Release =_____

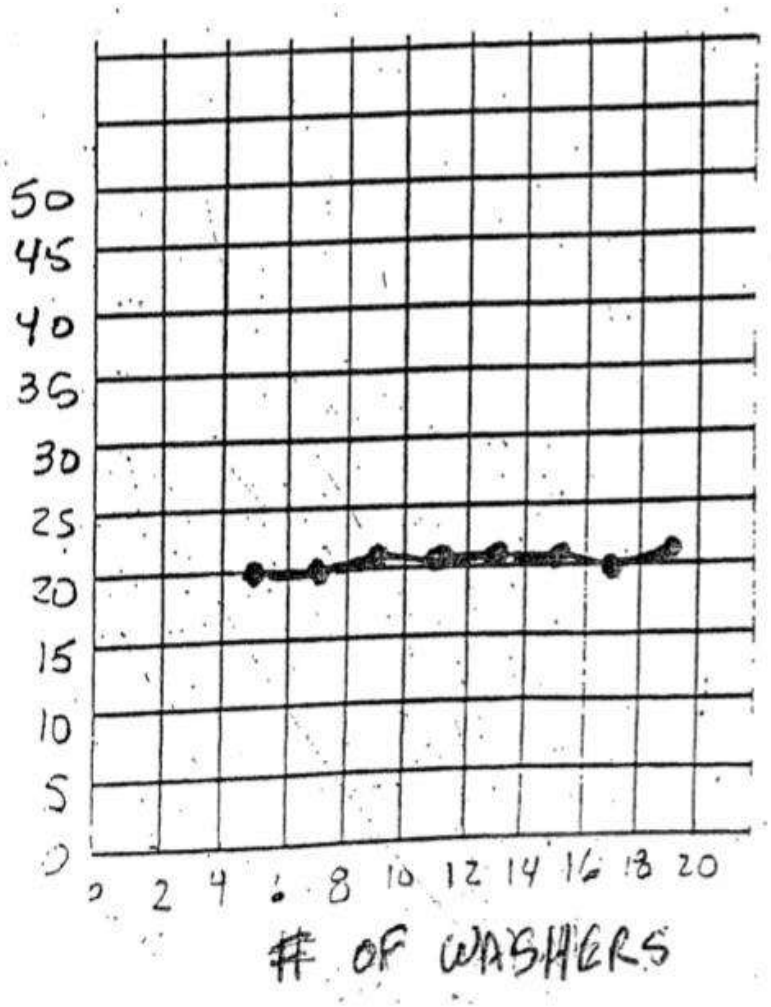
LENGTH (centimeters)	TRIAL #1 (swings)	TRIAL #2 (swings)	TRIAL #3 (swings)	AVERAGE (swings)

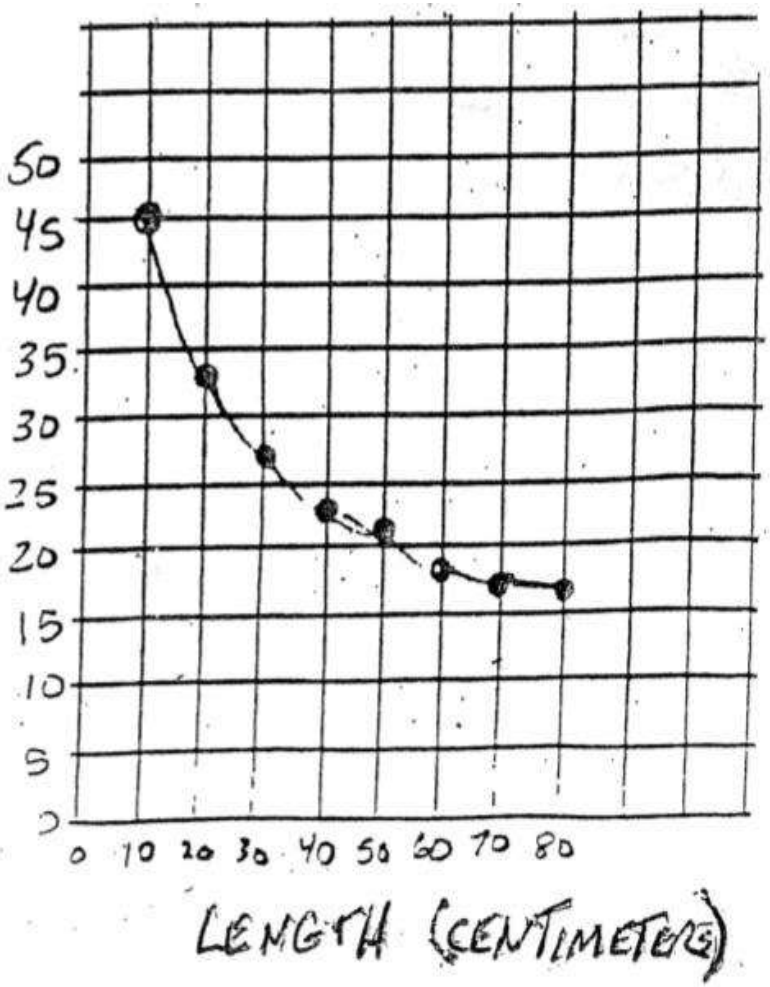
Pendulum 50 centimeters long

washers	cycles in 30 seconds
5	20
7	20
9	21
11	20.5
13	21
15	20.5
17	20
19	21

Pendulum with10 washers

length (centimeters)	cycles in 30 seconds
10	45
20	33
30	27
40	23
50	20.5
60	18.5
70	17
80	16.5


50
45
40
35
30
25
20
15
10
5
0
0 2 4 6 8 10 12 14 16 18 20
OF WASHERS


50
45
40
35
30
25
20
15
10
5
0
0 10 20 30 40 50 60 70 80
LENGTH (CENTIMETERS)

DIRECT and INVERSE RELATIONSHIPS

Possible Sources of Error

Ways to Improve Data Collection