determining weight of metre rule

A torque (?) in physics, also called a moment (of force) measures the tendency of a force to rotate an object about some axis (center). The magnitude of a torque is defined as the product of a force and the length of the lever arm (radius). Just as a force is a push or a pull, a torque can be thought of as a twist. The SI unit for torque is the Newton meter (N m). The symbol for torque is ?, the Greek letter tau. The principle of moments is:

f (1) x d (1) = f (2) x d (2)

Apparatus:

* Retort Stand [2]

* Meter Rule [1]

* Newton metre [2]

* String [1]

Illustration:

Variables:

Independent: Distance between the pivot and the metre rule

Dependent: Weight (Force of the metre rule on the Newton metre)

Constant: Apparatus, environment [temperature etc.].

Method/Procedure:

* Clamp the metre rule to one of the retort stands at the 1cm mark.

* Tie a loop on either sides of a string.

* Put one loop through the metre rule and the other loop to the Newton metre.

* To make sure the ruler is straight, measure the distance between the working table and the ruler on both the clamp stands and adjust the stands until the length between the ruler and the table is the same on both sides.

* Hook the Newton metre onto one of the retort stands.

* Tie the metre rule to it with the string.

* Tie the string, hooked on the Newton metre, onto a retort stand so that it is on the 0. 90cm mark.

* Now record the force shown on the metre rule.

* Repeat step 4-5 using different distances of 0. 85m, 0. 80m, 0. 75m, 0. 70m, 0. 65m, 0. 60m, 0. 55m, 0. 50m.

* To achieve better results, repeat the steps 4, 5 and 6 another time.

Results:

Raw Data Table-

Table of Weights according to the Different Lengths

Length(m)(+/- 0. 0001m)

Force(N) (+/-0. 001N)

Trial 1

Trial 2

0. 90

0. 75

0. 75

0. 85

0. 80

0. 80

0. 80

0. 85

0. 85

0. 75

0. 90

0. 90

0. 70

1. 00

0. 95

0. 65

1. 05

1. 00

0. 60

1. 15

1. 15

0. 55

1. 25

1. 25

0. 50

1. 30

1. 30

Processed Data-

Table of Readings using 1/d Formula

1/d (+/- 0. 01cm)

Average Force(+/- 0. 001N)

1. 11

0. 75

1. 18

0. 80

1. 25

0. 85

1. 33

0. 90

1. 43

0. 98

1. 54

1. 03

1. 67

1. 15

1. 82

1. 25

2. 00

1. 30

Formulae of Calculations in the above table:

Avg. Force = (Trial 1 Force + Trial 2 Force) correct to 3 s. f.

2

1/d= Self Explanatory correct to 3 s. f.

Graph:

Done Behind

Conclusion & Analysis:

From the experiment, I can conclude that the weight of the metre rule is 1. 61N. Also, force is inversely proportional to the distance from the pivot. From the graph, which is positive, we get the gradient as

Evaluation:

Errors:

* The mass of the string was not taken into account but would have affected overall results.

* The newton rule was not completely accurate. Thus, I should have used two and averaged the results.

* Parallax error could have occurred during measurements and readings.

Fair Test:

The pivot was kept at 1cm from the retort stand during all

the trials.

Safe Test:

There was no need for any safety equipment or precautions during the experiment.

0. 70

0. 75

0. 80

0. 85

0. 90

Distance (m) {ï¿½0. 01m

0. 900

0. 850

0. 800

0. 750

0. 700