Experiment on Moments

Name

As a load moves from one side of a hanged beam to the other, the tensions in the strings supporting it change such that the sum of the moments at any point is always zero.

In this experiment you are expected to:

1. Determine forces acting on a metre rule with a moving load
2. Examine the relationship between these forces acting on the metre rule
3. Make a graph of the position of the moving load versus tension on each of the strings
4. Verify the mass of the moving load and the metre rule based on the graph

Procedure:

1. Determine each of the weight of the metre rule and the 200-g mass provided by hanging them on each of the spring balance provided.

Weight of metre rule at Spring Balance A = ______________________ *N*

Weight of metre rule at Spring Balance B = ______________________ *N*

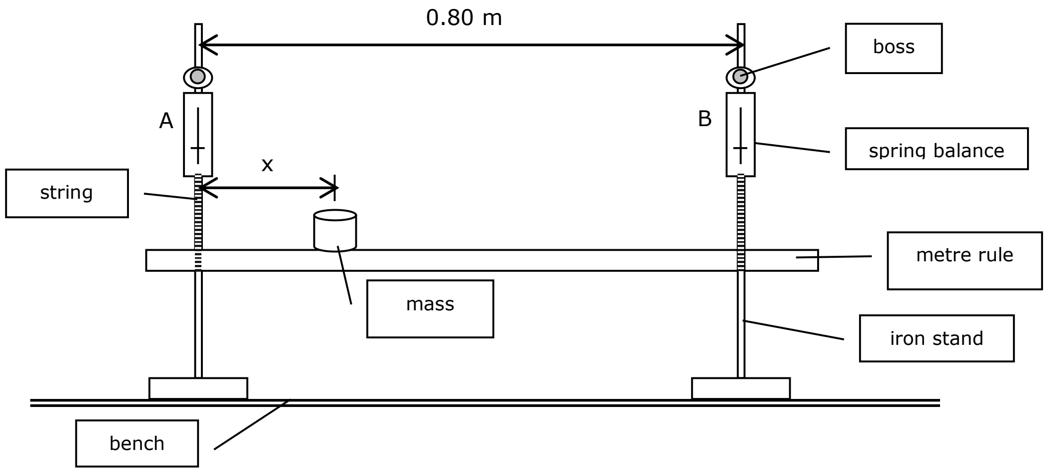
Average weight of metre rule, W = ______________________ N

Weight of 200-g mass at Spring Balance A = ______________________ *N*

Weight of 200-g mass at Spring Balance B = ______________________ *N*

Average weight of 200-g mass, M = ______________________ N

2. Set up the apparatus as shown.



3. Position the 200-g mass provided at x = 0.30 m and take note of the reading of both spring balances.

Spring Balance A, S_A = ________________ *N*

Spring Balance b, S_B = ________________ *N*

4. Determine the uncertainty in each of the readings in (3).

Uncertainty in A = __________________%

Uncertainty in B = __________________%

5. Repeat step (3) for different values of x. Make ten different sets of data and record these on a table below. The table should contain the values of ***x in m, S_A and S_B in N***.

6. Plot a graph of S_A (y-axis) versus x (x-axis). Find the best-fit line and determine the gradient and y-intercept of this graph. Include the units in your answer.

Gradient = ______________________________

Y-intercept = ______________________________

7. On the same grid, plot a graph of S_B (y-axis) versus x (x-axis). Find the best-fit line and determine the gradient and y-intercept of this graph. Include the units in your answer as well.

Gradient = ______________________________

Y-intercept = ______________________________

Analysis and Evaluation

8. The equation describing the relationship between S_B, M, x and W is shown by the formula

$$S_A = -\frac{M}{0.80}x + (0.5W + M)$$

Use your answers to (6) to determine the values of M and W. Include the units in your answer.

M = ______________________________

W = ______________________________

9. The equation describing the relationship between S_B, M, x and W is shown by the formula

$$S_B = \frac{M}{0.80}x + 0.5W$$

Use your answers to (7) to determine the values of M and W. Include the units in your answer.

M = ________________________________

W = _______________________________

10. Compare your answers to (1) to your answers to (8) and (9). What possible limitations in the experiment could have caused the differences? Name 2.

11. Cite 2 suggestions to improve the experiment.