WJEC Wales Physics GCSE

RP9: Moments

Practical Notes

Practical 9: Investigation of the principle of moments

Equipment
- Metre rule with a small hole in the centre
- 2x 100 g mass hangers
- 8x 100 g masses
- 2x loops of cotton
- Clamp stand, clamp and boss
- Optical pin and cork
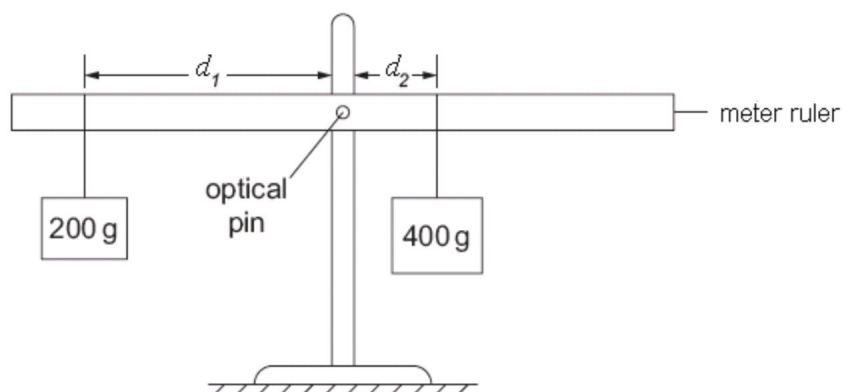- Small piece of plasticine

Diagram

Image: WJEC

Method
1. Set up the metre ruler on the clamp stand as shown in the diagram and attach pieces of plasticine as needed so that it is balanced horizontally.
2. Use one of the loops of cotton to hang 200 g at the 10 cm marking on the rule so that d_1 is 40 cm.
3. Use the other loop of cotton to hang 400 g on the other side. Adjust its position until the rule is balanced and record the distance d_2.
4. Repeat this process for d_1 = 30 cm and d_1 = 20 cm.
5. Move the 200 g mass to the 5 cm marking so d_1 = 45 cm and increase the mass on the other side to 600 g, positioning it so that the rule is balanced again. Record the distance d_2.
6. Repeat this for d_1 = 30 cm and d_1 = 15 cm.
7. Move the 200 g mass back to the 10 cm marking and increase the mass on the other side to 800 g, positioning it so that the rule is balanced again. Record the distance d_2.
8. Repeat this for d_1 = 20 cm.
9. Using the formula $moment = force \times perpendicular\ distance$, where 100 g corresponds to a force of 1 N, calculate the clockwise and anticlockwise moments for each mass.
10. Use these values to determine whether the **Principle of Moments** is satisfied.
    - **Principle of Moments:** In equilibrium (when the rule is balanced and stationary) the sum of the clockwise moments is equal to the sum of the anticlockwise moments.

Safety Precautions

- Take care when using the masses so that they do not fall and hurt someone.
- You may need additional weights or a G clamp to ensure that the clamp stand does not fall over.