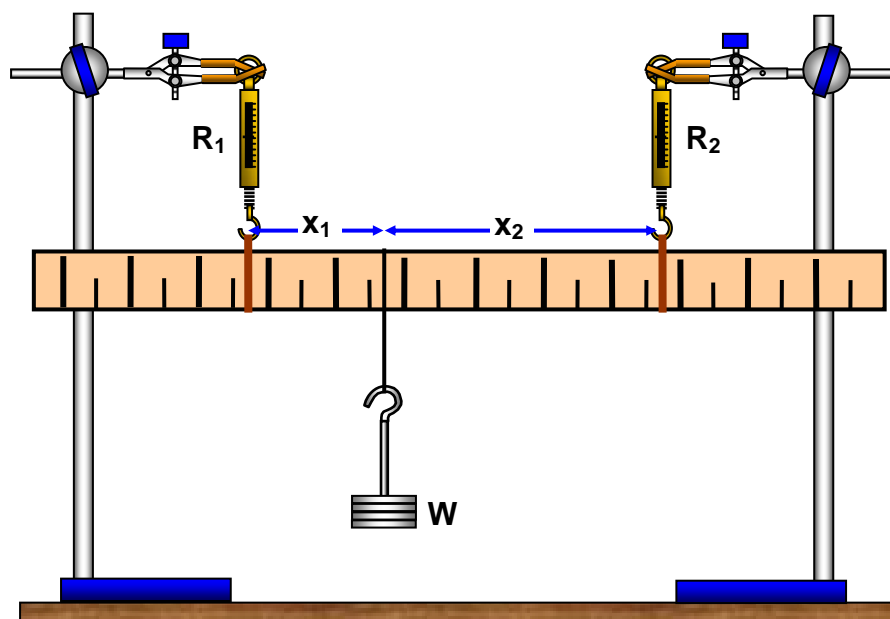


TAP 203- 3 Forces on a bridge

Use the conditions for equilibrium to predict the forces acting on a bridge structure.

Apparatus required:

- ✓ 2 laboratory stands
- ✓ 2 newton meters
- ✓ metre rule
- ✓ 2 sets of 1 – 10 N weights
- ✓ string



Conditions for equilibrium: $W = R_1 + R_2$ and $R_1 x_1 = R_2 x_2$

Part one

Suspend a 3 N weight from the metre rule as shown.

Set $x_1 = 0.2$ m and $x_2 = 0.6$ m

Ignoring the weight of the metre rule:

$$3 \text{ N} = R_1 + R_2 \quad \text{and} \quad 0.2 R_1 = 0.6 R_2$$

Therefore, $R_1 = 3 R_2$ and so $4 R_2 = 3 \text{ N}$

$$R_2 = 0.75 \text{ N} \quad \text{and} \quad R_1 = 2.25 \text{ N}$$

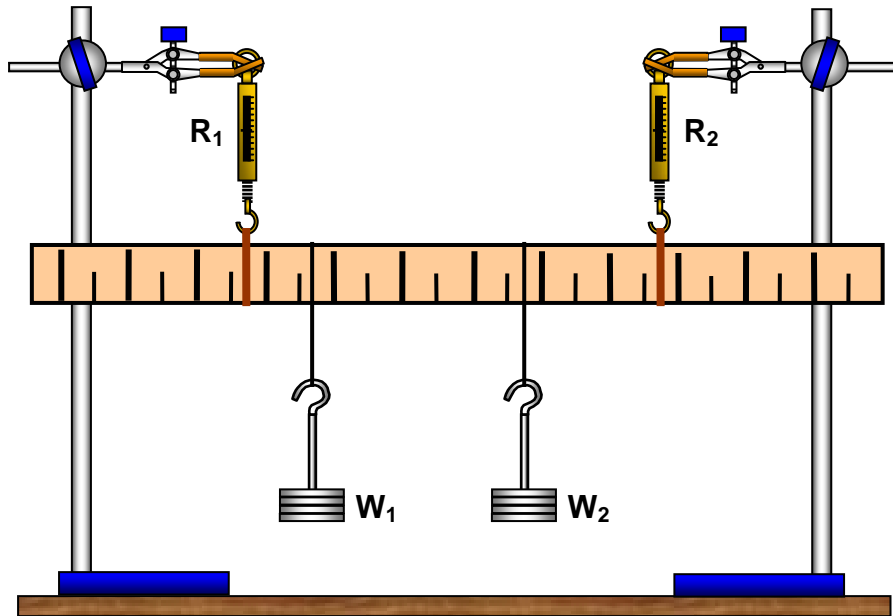
Set up the apparatus to see if your value agrees with the experimental value.

Change the weight to 5 N and move it to a new position.

Recalculate the expected forces on the newton meters and compare with the experimental value.

Part two

Take two weights and place them as shown. Calculate the expected force on the newton meters and compare with your experimental value.



Do you think your experimental results confirm the calculations? Give reasons for your answer.