

# Practical investigations

## 2 • Measuring forces

Questioning  
& PredictingProcessing  
& Analysing

### Purpose

To estimate and then measure the size of some common forces.

**Timing** 30 minutes

### Materials

- spring balance
- 10 slotted 50 g masses and base/hook
- selection of items found in the laboratory

### Procedure

- 1 Copy the table shown below into your workbook.  
If some of these items are not available, suggest an alternative but similar simple task.

Size of forces

Task	Estimate size of force required (N)	Measured force (N)
pulling a pencil case along a bench		
lifting a test tube rack		
lifting a laptop lid		
unzipping a laptop bag or pencil case		
lifting a 100 g mass		
lifting a 200 g mass		
lifting a 300 g mass		
dragging a 300 g mass along a bench top		

- 2 Estimate the size of each force and then measure for the situations above. Some possible set-ups are shown in Figure 7.1.17.  
Record all of your measurements in the table as you go.

- 5 Use your answer to question 4 to predict the size of the force needed to lift a 500 g mass. Test your prediction using masses and a spring balance.
- 6 Use your answers to questions 4 and 5 to predict the size of force needed to lift a 40 kg (or 40 000 g) girl into the air.

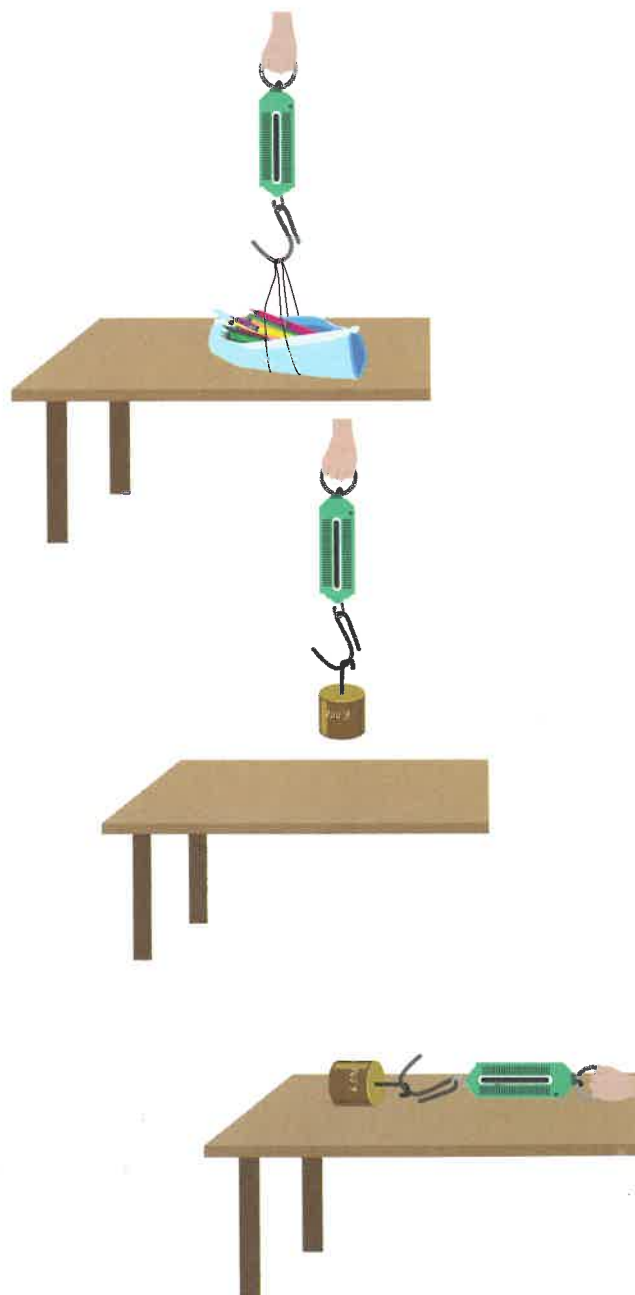


FIGURE 7.1.17

### Review

- 1 State whether you needed to use a larger force to lift the 300 g mass or the 100 g mass.
- 2 Propose why this is the case.
- 3 Why do you think you needed to use a larger force to lift the 300 g mass than to drag it along a bench top?
- 4 Look at the sizes of the forces needed to lift the 100 g, 200 g and 300 g masses. Can you propose a link between the size of the mass and the force needed to lift it?