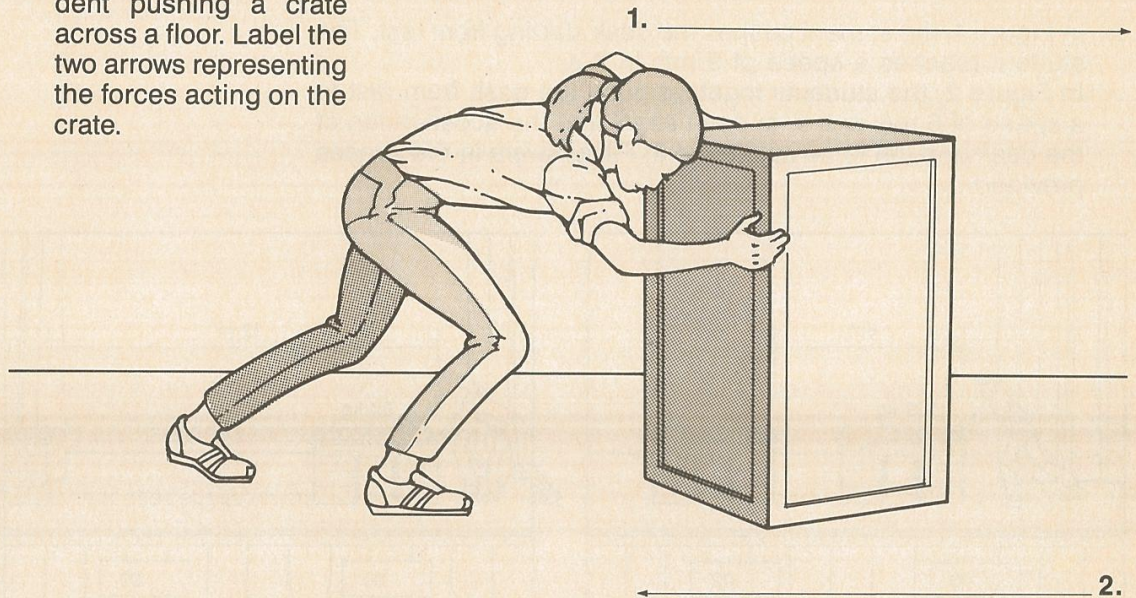


BALANCED AND UNBALANCED FORCES

- A. The sketch shows a student pushing a crate across a floor. Label the two arrows representing the forces acting on the crate.



- B. Each of the following statements describes what happens as the student applies a force on the crate. For each statement write either **BALANCED** or **UNBALANCED** in the space at the right to describe the forces acting on the crate at that point.

3. The student, at first, is unable to budge the crate from a resting position. 3. _____
4. As the student pushes harder the crate finally begins to move. 4. _____
5. The student keeps pushing the crate with increasing force and the crate moves faster and faster. 5. _____
6. Finally the student uses just enough force to keep the crate moving at a steady pace. 6. _____

- C. Complete the following sentences:

7. When unbalanced forces act on an object that is moving, there is a change in _____ or/and _____.
8. When unbalanced forces act on an object that is at rest, the object _____.

ACCELERATION AND PAIRS OF FORCES

- A. In Figure 1, the student pushes the desk starting from rest. The student reaches a speed of 3 m/s in 2 s. In Figure 2, the students together push the desk from rest to a speed of 6 m/s in 2 s. In each case, find the acceleration of the desk and the force applied to it. Fill answers in the spaces provided.

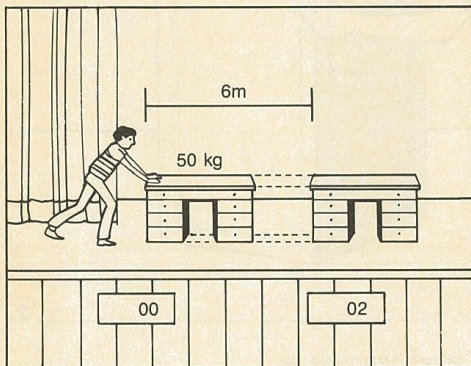


Figure 1.

$$\begin{aligned} \text{Acceleration} &= \frac{\text{m/s} - 0 \text{ m/s}}{\text{_____ s}} \\ &= \text{_____ m/s/s} \end{aligned}$$

$$\begin{aligned} \text{Force} &= m \times a \\ &= 50 \text{ kg} \times \text{_____ m/s/s} \\ &= \text{_____ N} \end{aligned}$$

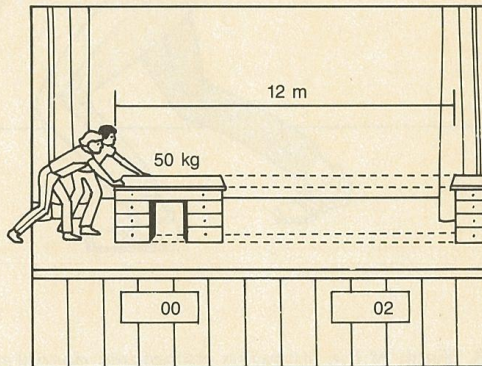


Figure 2.

$$\begin{aligned} \text{Acceleration} &= \frac{\text{m/s} - 0 \text{ m/s}}{\text{_____ s}} \\ &= \text{_____ m/s/s} \end{aligned}$$

$$\begin{aligned} \text{Force} &= m \times a \\ &= 50 \text{ kg} \times \text{_____ m/s/s} \\ &= \text{_____ N} \end{aligned}$$

- B. Forces always act in pairs. Describe the pairs of forces in the pictures above. _____
