



## Problem of the Week

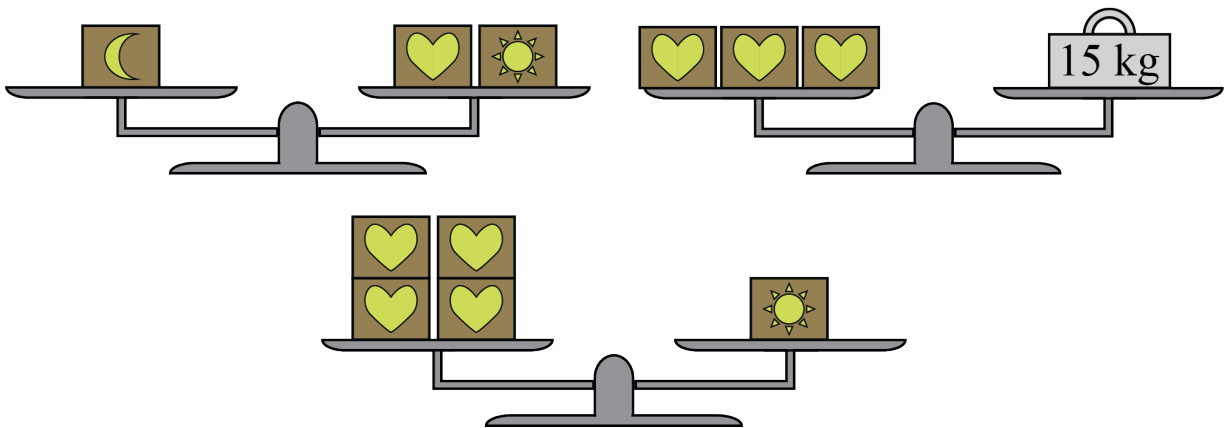
### Problem A and Solution

#### Balancing Act

#### Problem

James is in charge of sending out boxes from a distribution centre. The contents of the boxes are identified by shapes stamped on them: a heart, a moon, or a sun. All boxes with the same stamp have the same mass.

The following diagrams show what James observed when arranging some of the boxes and standard weights on a scale.



Given that each scale is balanced, determine the mass of each box.

#### Solution

From the diagrams we notice the following.

- One moon box has the same mass as the sum of the mass of a heart box and the mass of a sun box.
- Three heart boxes have a total mass of 15 kg.
- Four heart boxes have the same total mass as one sun box.

Since 3 heart boxes have a total mass of 15 kg, then the mass of 1 heart box must be  $\frac{1}{3}$  of 15 kg. Therefore, 1 heart box has a mass of 5 kg.

Since 4 heart boxes have the same mass as 1 sun box, then 1 sun box must have a mass of  $5 \times 4 = 20$  kg.

Since 1 moon box has the same mass as the sum of the mass of 1 heart box and the mass of 1 sun box, then 1 moon box must have a mass of  $20 + 5 = 25$  kg.

Therefore, 1 moon box has a mass of 25 kg, 1 heart box has a mass of 5 kg, and 1 sun box has a mass of 20 kg.