# Balance Challenge

## Goals

- Identify weights of blocks from relationships shown by level pan balances.
- Replace variables or a group of variables with their values.
- Understand that substituting for one or more variables with others of equal weight will not affect the balance.

## Questions to Ask

1. What is in the left pan of pan balance A? (1 cylinder and 2 cubes) How much do they weigh? (11 pounds)
2. What is in the right pan of B? (2 cylinders and 2 cubes) How much do they weigh? (14 pounds)
3. What do the left pan of A and the right pan of B have in common? (both have 1 cylinder and 2 cubes) What is different? (B has an extra cylinder.)
4. How can you use that information to figure out the weight of the extra cylinder? (Replace the 1 cylinder and 2 cubes with 11 pounds, then remove 11 pounds from both pans. The extra cylinder is $14 - 11$, or 3 pounds.)
5. What will you do after you know the weight of the cylinder? (Replace the cylinder in A with its weight in order to figure out the weight of the cube.)

## f.y.i.

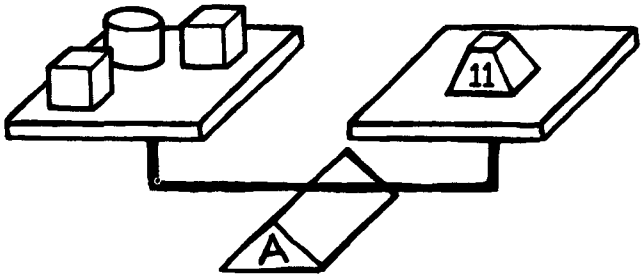
Once students have identified the group of blocks that are the same in two pans of two different balances, have them draw a circle around them. In this way, they can more easily see what is "extra" in one of the pans.

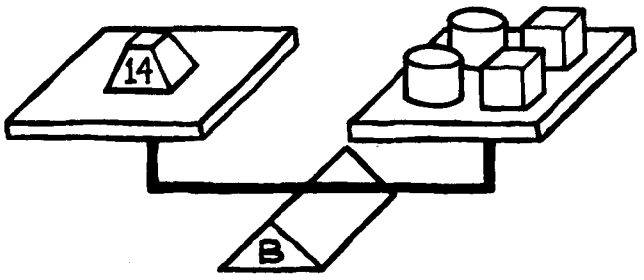
Some students may notice that in B there are two pairs of blocks with a cylinder and cube in each. Thus the weight of each pair is $14 \div 2$, or 7 pounds. The same pair of blocks in A can be replaced with 7 pounds. The weight of the "extra" cube in A can then be determined.

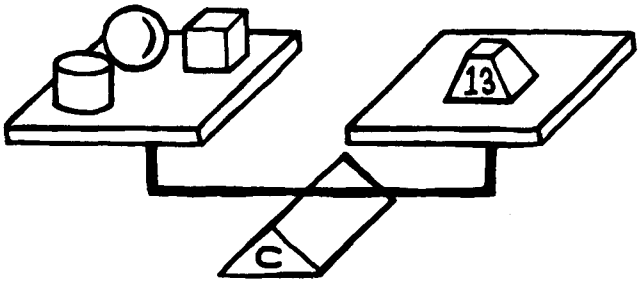
## Solutions

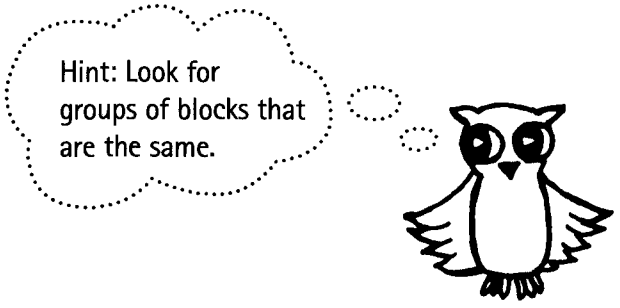
1. 6
2. 4
3. 3
4. Possible solution: All of the blocks in the left pan of A are contained in the right pan of B. Replace the cylinder and 2 cubes in B with 11 pounds. Remove 11 pounds from each pan. Then the extra cylinder in B is $14 - 11$, or 3 pounds. In B, replace each cylinder with 3 pounds. Remove 6 pounds from each pan. That leaves 2 cubes weighing $14 - 6$, or 8 pounds. Each cube is $8 \div 2$, or 4 pounds. Replace the cylinder in C with 3 pounds and the cube with 4 pounds. Then remove 7 pounds from each pan. The sphere weighs $13 - 7$, or 6 pounds.

# Balance Challenge 1




1. ◯ = _____ pounds

2. ▭ = _____ pounds

3. ⬭ = _____ pounds

4. How did you figure out the weights?

_____

_____

_____

_____

_____

_____

_____