

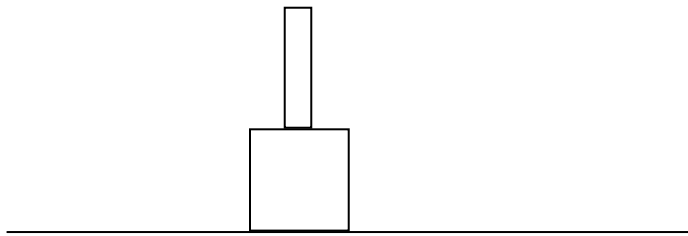
## Preparation for Problem Solving I

Before beginning problem solving (word problems) it is necessary to develop some basic skills to be applied to the analysis of problems. First of all, one must be able to read the statement of a problem and translate it into symbols and pictures. These exercises are designed to develop these skills.

### Words to Pictures

Sketch a diagram to represent each situation described.

Example: A rectangular block is placed with its smallest side on top of a cube.



(1) A ladder is leaned against a wall so that its top is twice as far from the floor as its bottom is from the wall.

(2) A chair is tipped back on its rear legs so that they make an angle  $\theta$  with respect to the floor.

(3) A rectangle has a length that is twice its width.

(4) A small ball is resting on top of a large box that is sitting on a table.

(5) Three blocks are stacked on an inclined plane with the smallest block in the middle and the largest block on top.

(6) Two train stations are located 200 miles apart. One train leaves station A heading toward station B at the same time a second train leaves station B heading toward station A. The two trains pass each other 50 miles from station A.

(7) A 10-kg block and a 5-kg block are joined by a string that passes over a pulley hung from the ceiling. The 5-kg block is hanging lower than the 10-kg block.

(8) A flat board is sitting on top of a rectangular box. A second box is resting on top of the board.

### Words to Algebra

Assign a symbol to represent each quantity. Convert the sentence into an algebraic expression (equation).

Example: the density of an object is defined to be its mass divided by its volume.

Let  $\rho$  = density,  $m$  = mass, and  $V$  = volume,

then  $\rho = m/V$ .

- (1) The temperature expressed in kelvin is 273.15 greater than the temperature expressed in degrees celsius.
- (2) The average of three distances is the sum of the distances divided by three.
- (3) The distance traveled by a car moving at a constant speed is the product of its speed and the time of travel.
- (4) The area of a triangle is one-half the product of its base and its height.
- (5) Object A is five times as long as object B.
- (6) If Mary were 30 pounds heavier she would be twice as heavy as Eric.
- (7) An object starts from rest and travels a certain distance in a straight line with a constant acceleration. The time this takes is the square root of the quantity twice the distance divided by the acceleration.
- (8) The friction force acting on a block sliding down an incline is one-tenth of the weight of the block.
- (9) If the length of block 1 were tripled it would be equal to half the length of block 2.
- (10) The length of a rectangle is eight inches more than triple its width.