

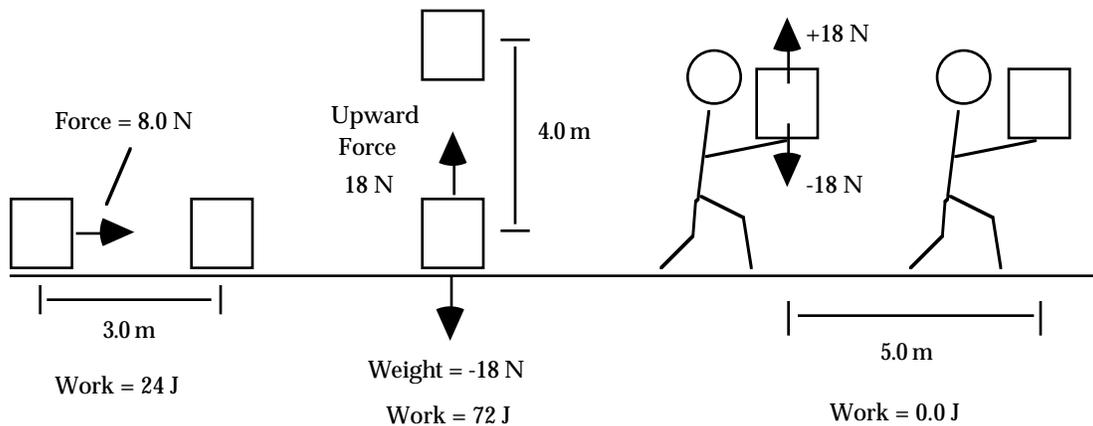
Force and Work : Notes/W.S.-40

If a force (F) moves an object through a distance (D), then we say that an amount of work (W) has been done on the object. Work is defined by the equation given below.

$$\text{Work} = \text{Force} \bullet \text{Distance}$$

The force must be in line with the motion. The units for work are joules (J). The force is in newtons (N). The distance is in meters (m).

Examples:



In the first example above, the box is pushed to the right with a force of +8.0 N at a constant speed, so the force of friction equals -8.0 N. The amount of work done equals 24 joules.

In the second example, a box with a weight of -18 N, is lifted up by an upward force of +18 N. The amount of work done against gravity is 72 J.

In the last example, the man carries the box horizontally, while exerting an upward force. No work is done because the lifting force is perpendicular to the direction of motion of the box.

Questions:

1) Fill in the blanks. Use $W = F \times D$.

<u>Force</u>	<u>Distance</u>	<u>Work</u>
<u>14 N</u>	<u>5.0 m</u>	-----
<u>2.6 N</u>	-----	<u>3.9 J</u>
-----	<u>35 cm</u>	<u>0.22 J</u>
<u>780 N</u>	-----	<u>37,000 J</u>

2) A box is pushed 3.5 m on a floor by a force of 6.0 N. Find the work done.

3) A box has a weight of 68 N. It is lifted to a height of 1.7 m. Find the work done.

4) A girl carries a book with a weight of 15 N, a horizontal distance of 5.0 m. Find the work done.

5) If 720 J of work is required to move a chair a distance of 2.5 m, against the force of friction, what is the force friction?

6) A boy rides his bike at a constant speed of 2.0 m/s for 30 seconds. The force of friction is 55 N. Find the work done.

7) A brick has a mass of 2.3 kg. Some bricks on the floor were lifted onto a table which is at a height of 0.90 m above the floor.

a) Find the work done in lifting one brick onto the table.

b) If 345 J of work was done, how many bricks were lifted onto the table?

Answers: 1) 70 J, 1.5 m, 0.63 N, 47.4 m, 2) 21 J, 3) 116 J, 4) 0.0 J, 5) 288 N, 6) 3300 J, 7) a) 20.3 J, b) 17.