Work

Def: Is accomplished when a force is applied to an object/person and the object/person moves in the direction of the force.

Holding is not an example of work because directional movement must be involved.

Formula:

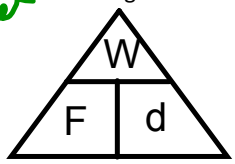
$W = F//d$

parallel to the line to travel

work ↑ force "EF"

↑ distance

Triangle:



Units:

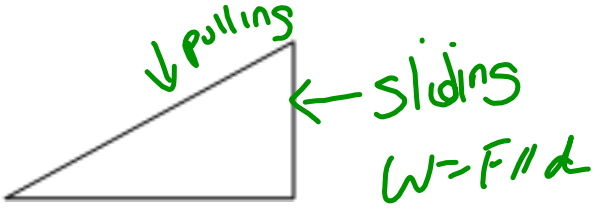
W= J F= N

d= m

Conversions:

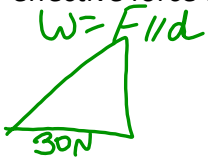
- cm - m ÷100
- km - m x 1000

- In a sliding or pulling question if they give you the force (hypotenuse), you need to find the effective force (direction) because the force (F) must be parallel to the direction travelling. Sometimes in word problem they don't use the term 'effective force', they just use the word 'force'.



Practice questions

1. What is the work done if a boy pushes a box with an effective force of 30 N over a distance of 3 m?



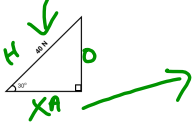
$30 \times 3 = 90\ J$

2. What work is accomplished when a man pushes a carriage up a hill with an effective force of 50 N over a distance of 1 km?

$50 \times 1000 = 50\,000\ J$

$W = Fd$

3. What is the work done when a girl drags her school bag across the pavement for 70 m with a force of 40 N at a 30° angle?



$\left(\cos 30 = \frac{x}{40}\right) \times 70 = 2000\ J$

4. What is the distance travelled if a girl walks for 20 minutes and uses 1 500 J of energy and exerts 20 N of force?

$d = \frac{W}{F} \quad \frac{1500}{20} = 85\ m$

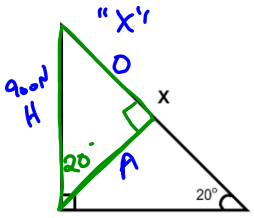
5. What is the force applied if a boy does 7 000 J of work while walking up a hill for 2 km?

$F = \frac{W}{d} \quad \frac{7000}{2000} = 4\ N$

6. What is the work done if a skier weighing 90 kg goes down a hill at a 20° angle for 30 km?

$90 \times 9.8 = 900\ N$

$W = Fd$



$\left(\sin 20 = \frac{x}{900}\right) \times 30\,000\ m$

$9\,000\,000\ J$

$9 \times 10^6\ J$