

Work & Power

Mr. Skirbst

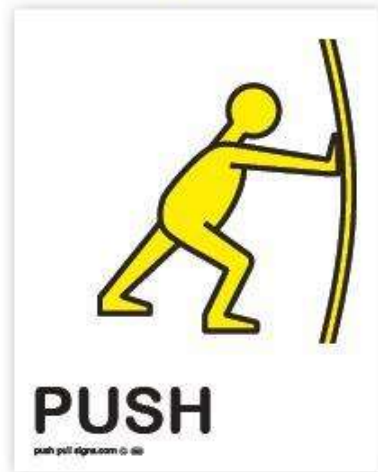
What is work?



Work

Work *is a force*
acting through a distance

pushes and pulls - forces and motion



Equation for Work

$$W = (F)(d)$$

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Work = force x distance

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Work = force x distance

(Joules) = (Newtons) (meters)

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done?

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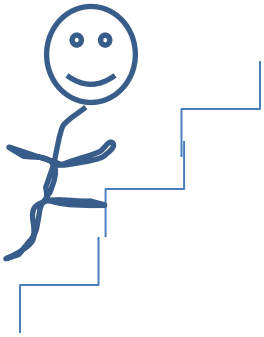
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Picture

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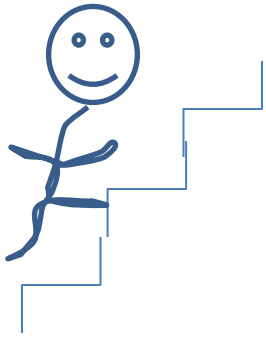
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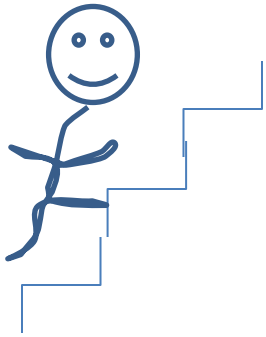


ToV

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done?

Picture



ToV

$$F = 500\text{N}$$

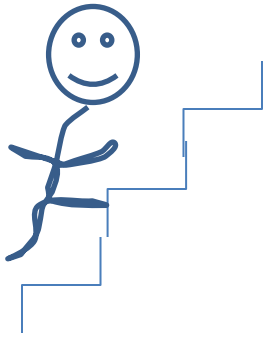
$$d = 5\text{m}$$

$$W = ?$$

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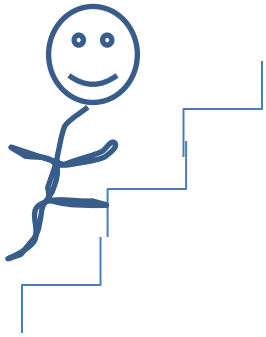
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Equation

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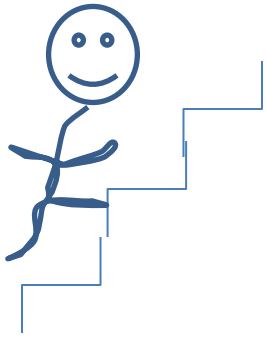
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$$W = Fd$$

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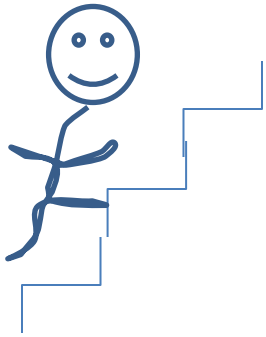
$$W = Fd$$

Plug-In

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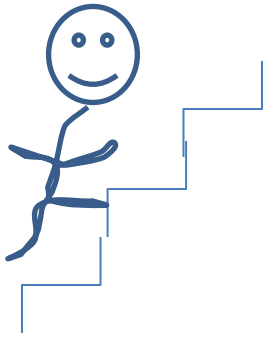
Plug-In

$$W = (500)(5)$$

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Equation

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Plug-In

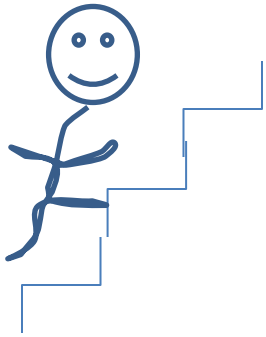
$$W = (500)(5)$$

Solution

Example:

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$$W = (500)(5)$$

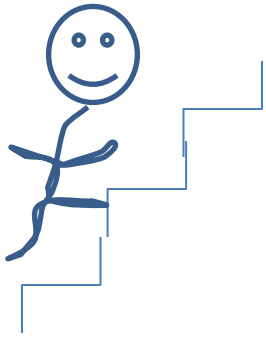
Solution

$$W = 2500 \text{ Nm}$$

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done?

Picture



ToV

$$F = 500\text{N}$$
$$d = 5\text{m}$$
$$W = ?$$

Equation

$$W = Fd$$

Plug-In

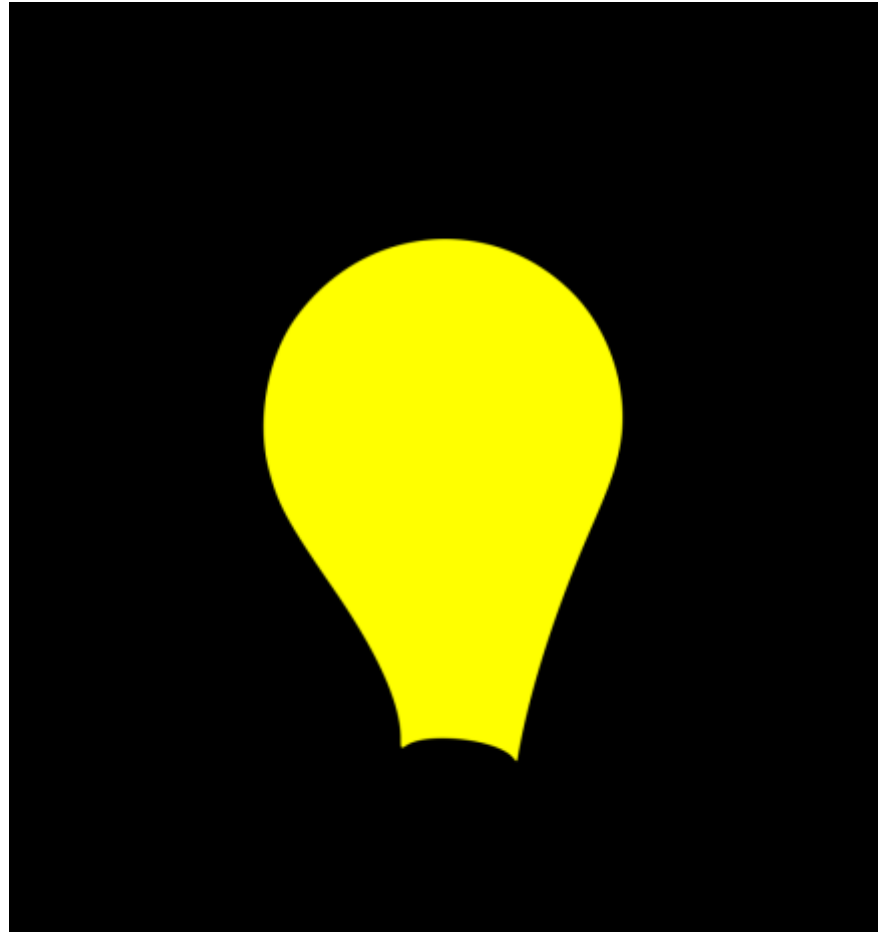
$$W = (500)(5)$$

Solution

$$W = 2500$$

Joules

What is power?



What is power?

Power is the rate
at which work is done



Equation for Power

$$P = W / t$$

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Power = work / time

Equation for Power

$$P = W / t$$

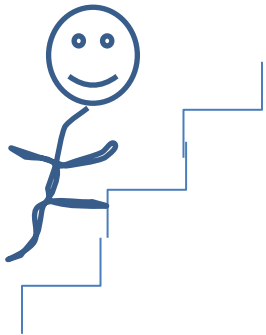
Power = work / time

(Watt) = (Joules) / (seconds)

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done? If climbed in 5 seconds, how powerful are they?

Picture



ToV

$$F = 500\text{N}$$
$$d = 5\text{m}$$
$$W = ?$$

Equation

$$W = Fd$$

Plug-In

$$W = (500)(5)$$

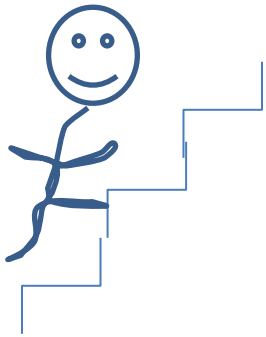
Solution

$$W = 2500 \text{ J}$$

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done? If climbed in 5 seconds, how powerful are they?

Picture



ToV

$$F = 500\text{N}$$

$$d = 5\text{m}$$

$$W = 2500\text{ J}$$

$$\mathbf{t = 5\text{ sec}}$$

$$\mathbf{P = ?}$$

Equation

$$W = Fd$$

Plug-In

$$W = (500)(5)$$

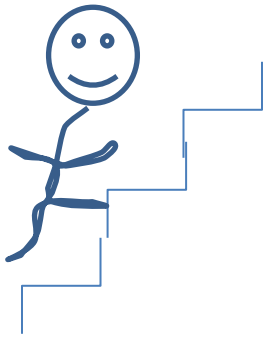
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$F = 500\text{N}$
 $d = 5\text{m}$
 $W = ?$
 $t = 5\text{ sec}$

Equation

$$W = Fd$$

$$\mathbf{P = W / t}$$

Plug-In

$$W = (500)(5)$$

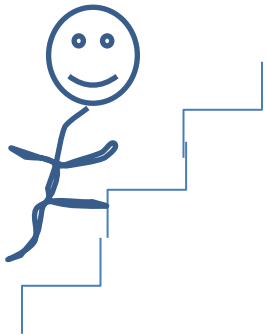
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$F = 500\text{N}$
 $d = 5\text{m}$
 $W = ?$
 $t = 5\text{ sec}$

Equation

$W = Fd$
 $P = W / t$

Plug-In

$W = (500)(5)$

Solution

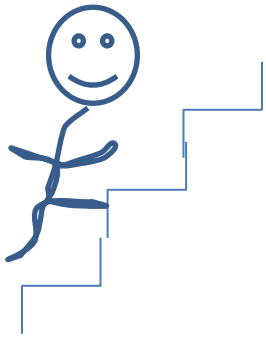
$W = 2500\text{ J}$

$$P = 2500 / 5$$

Example:

A student who weighs 500 N climbs a flight of stairs 5 m high. How much work is done? If climbed in 5 seconds, how powerful are they?

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$F = 500\text{N}$
 $d = 5\text{m}$
 $W = ?$
 $t = 5 \text{ sec}$

Equation

$W = Fd$
 $P = W / t$

Plug-In

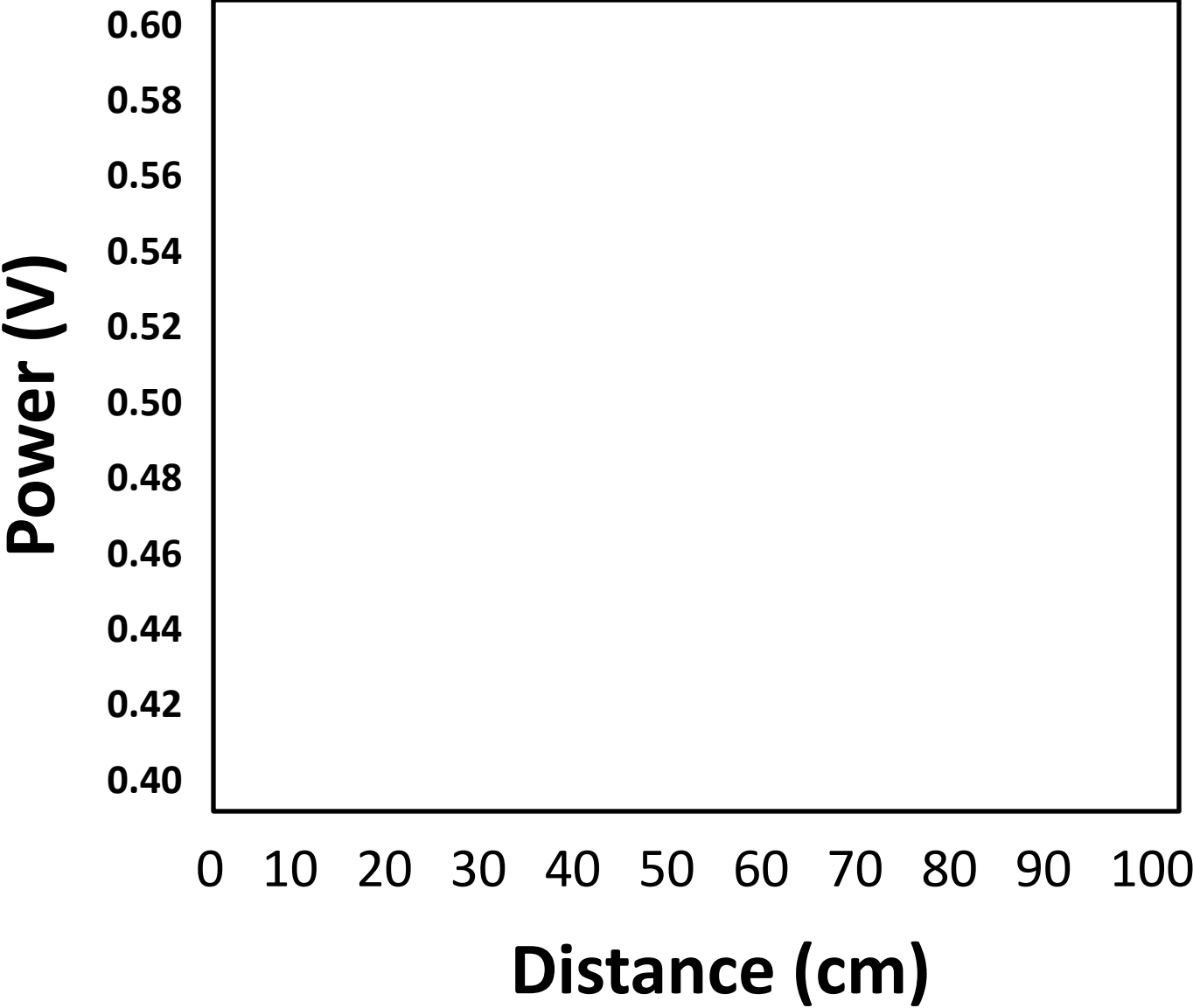
$W = (500)(5)$
 $P = 2500 / 5$

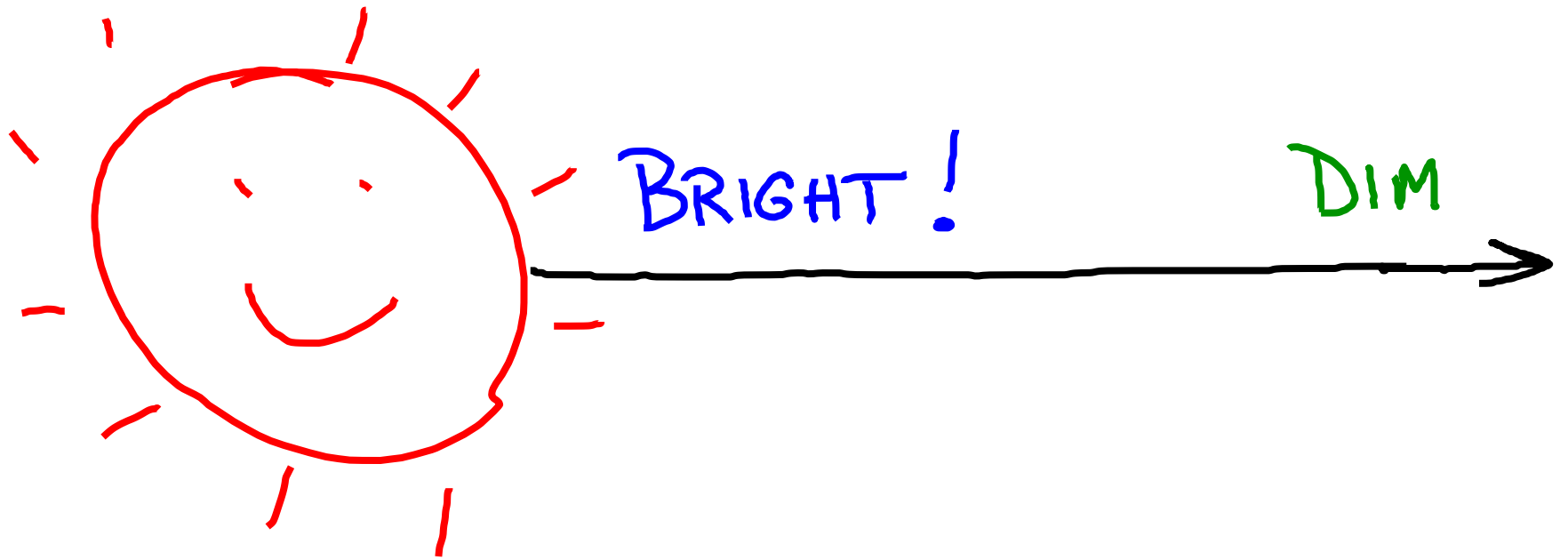
Solution

$W = 2500 \text{ J}$

$P = 500 \text{ Watts}$

Distance and Power





BRIGHT!

DIM

Lab Activity

Convert your weight (force) from
pounds to *Newtons*:

$$(\# \text{ pounds}) \times 4.5 = \# \text{ Newtons}$$

(Ex. 100 lbs x 4.5 = 450 Newtons)