Chapter 8. Work and Power

Contents:

New word list:

1.7.2 Work

Core	Supplement
1 Understand that mechanical or electrical work done is equal to the energy transferred	
2 Recall and use the equation for mechanical working $W = Fd = \Delta E$	

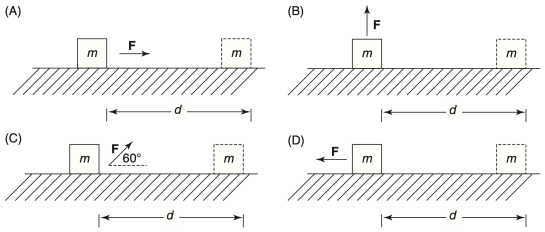
1.7.4 Power

Core	Supplement
1 Define power as work done per unit time and also as energy transferred per unit time; recall and use the equations (a) $P = \frac{W}{t}$ (b) $P = \frac{\Delta E}{t}$	

8.1 Work done & energy transfer

Throw a ball vertically upwards, how does its speed/energy change during the whole process? why does its energy change?

Work done by a force =

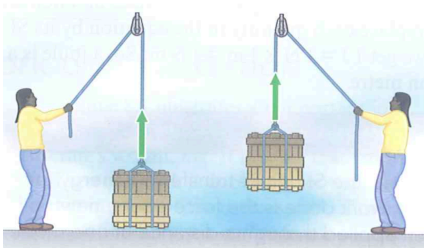


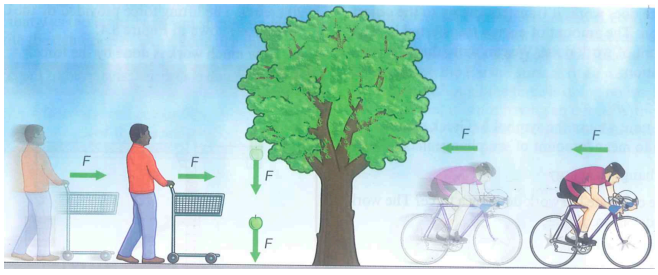
Equation:
(Italic W)

Unit:

To increase work:

How energy is transferred in the following cases?





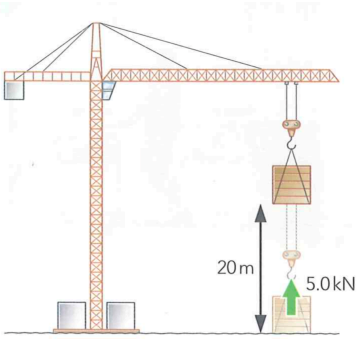
Work done =

Equation:

Exercise 8.1:

A crane lifts a crate upwards through a height of 20 meter. The lifting force provided by the crane is 5.0kN, as shown in the figure.

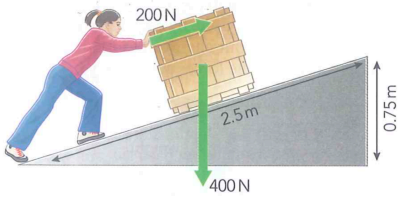
1. How much work is done by the force
2. How much energy is transferred by to the crate?



Exercise 8.2:

A girl can provide a maximum pushing force of 200N. To move a box weighing 400N onto a platform, she uses a plank as a ramp. As shown in the figure below.

1. How much work does she do in raising the box?
2. How much g.p.e does the box gain?

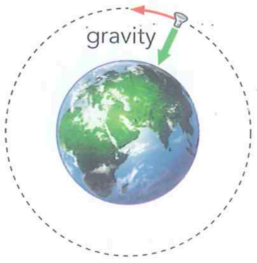


Exercise 8.3:

You drop a stone weighing 5.0 N from the top of a 50 m high cliff. What is the work done by the force of gravity?

Exercise 8.4:

A satellite orbits the Earth at a constant height and at a constant speed. The weight of the satellite at this height is 500 N. What is the work done by the force of gravity?



You sit still in a chair, draw a free body diagram and explain how much work do the forces done to you?

=> No work done

8.2 Power

How to describe **the rate** at which work is done?

Power=

Equation:

Unit:

The faster you work
The greater you power

To increase power:

Power in general:

Percentage efficiency:

Exercise 8.4:

A light bulb transfers 100J in 8.0s. What is its power?

Exercise 8.5:

A car of mass 800kg accelerates from rest to a speed of 25m/s in 10s. What is its power?

Exercise 8.6:

A man pushes a box with a force of 50N at a speed of 10m/s. What is its power?