Power

Extension Sheet

Power (in watts) = **work done** (in joules) / **time taken** (in seconds) or **Power** = **energy transferred** (in J) / **time taken** (in s)

1 watt = 1 joule per second

Example
A force of 100 N moves a distance of 5 m in 2 seconds.
a) What is the work done?
b) What is the power?

Answer
a) Work done = force × distance moved (see p. 107)
= 100 N × 5 m
= 500 J

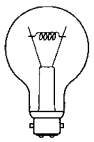
b) Power = work done / time taken = 500 J / 2 s = 250 W

Questions
For each question show all your working clearly.

1. A boy does 500 J of work in 10 seconds.
What is his power output?

2. A mother pushes a pram with a force of 30 N for a distance of 100 m in 50 s.
What is her power output?

3. An electric lamp is marked 60 W.
How much energy does it transfer
a) in 1 second?
b) in 100 seconds?
What are the energy transfers here?



4. An athlete runs a 100 m race in 10 s against a friction force (drag) of 100 N.
What is his power output?

5. A weightlifter lifts an object of mass 30 kg through a height of 2 m in 3 seconds.
a) What is the weight of the object?
(Hint: see p. 75.)
b) What is the work done on the object?
c) What is his power output?

6. A boy weighing 600 N runs up the stairs,
a) in 3 seconds, and then
b) in 4 seconds.
The vertical height of the stairs is 4 m.
What is his power output in each case?

7. A lift containing 6 people is raised through a height of 20 m in 10 s. The total weight of the lift and passengers is 6000 N.
What is the power of the lift motor,
a) in watts?
b) in kilowatts?

