

Work & energy

Name & form

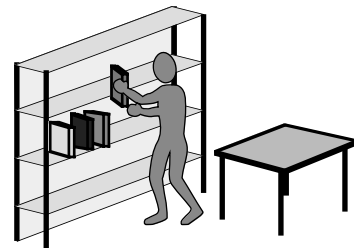
Where necessary take the Earth's gravitational field to be 10 N/kg

Make a note of your weight in Newtons in this space

- 1** How much work is done on a stack bricks when it is raised a vertical distance of 12 m by a crane? The total weight of the bricks is 2500 N.

[2]

- 2** How much work do you do on a book of weight 15 N when you pick it up from a table and put it back on a bookshelf? The table top is 0.7 m above the floor. The shelf is 1.6 m above the floor.

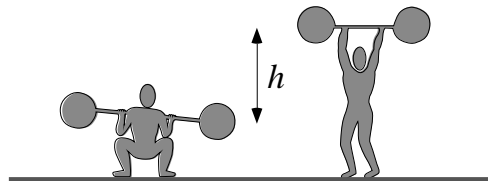


[4]

- 3** A lift full of people has a total weight of 7000 N.
How much work is done on the lift and passengers in raising it a vertical distance of 25 m?

[3]

- 4** How much work would you do on a set of weights of 400 N in lifting them from the ground as far above your head as you can stretch. You will have to measure the height, h , through which you could lift the weights.



[3]

- 5** How far can a book of mass 4 N be raised if 12J of work is done on it?

[3]

- 6** How high can a weight of 50 N be raised if 1000 Joules of work is done on it?

[3]

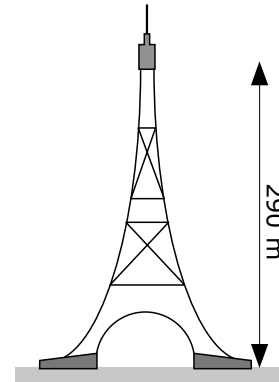
- 7** Each stone in the great pyramid at Giza has a weight of 72,000 N. The height of the pyramid is 145 m. Calculate how much work was done on the stone that is at the top of the pyramid.

_____ [3]

- 8** The observation platform at the top of the Eiffel Tower is approximately 290 m above the ground.

- (a) How much work must you do to climb to this level? Use your own weight for this calculation.

 _____ [2]



- (b) Would the amount of work done in climbing to the top be different if you stopped off for a rest from time to time? Explain your answer.

 _____ [2]

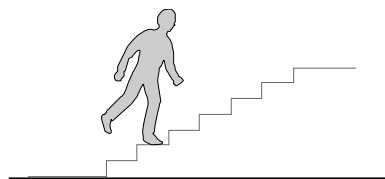
- (c) Would the amount of work be different if you ran up some of the stairs and walked up others? Explain your answer.

 _____ [2]

- (d) What is the source of energy on which you draw to do the work when you climb the tower, and what becomes of this energy when you have reached the top?

_____ [1]

- 9** Someone of weight 600N runs up a flight of stairs. There are 25 steps and each one is 20 cm deep.



- (a) The total vertical distance in metres through which he rises.

_____ [1]

- (b) The work he does in running up the stairs.

 _____ [2]

- (c) What is the energy transfer in this situation?

_____ [2]

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Homework

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1 The force required to push a laden supermarket trolley is 150 N. It is pushed around the supermarket for a total distance of 100 m.

(a) Calculate the work done on it.

_____ [3]
(b) List the energy transfers occurring as the trolley is pushed around the supermarket [2]

1	→	2	+	3 Thermal
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2 A man hauls a heavy trunk along a flat surface.

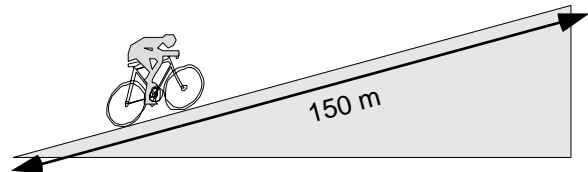
(a) If the force with which he drags it is 250N, how far will he have dragged it when he has done 1500 Joules of work on it?

_____ [3]
(b) What is the transfer of energy that occurs in this situation? [2]

1 Chemical	→	2	+	3
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3 A cyclist pedals up an incline 150m long. The force exerted by the cyclist's legs is 200 N.

(a) How much work is done by the cyclist in peddling up the whole incline?



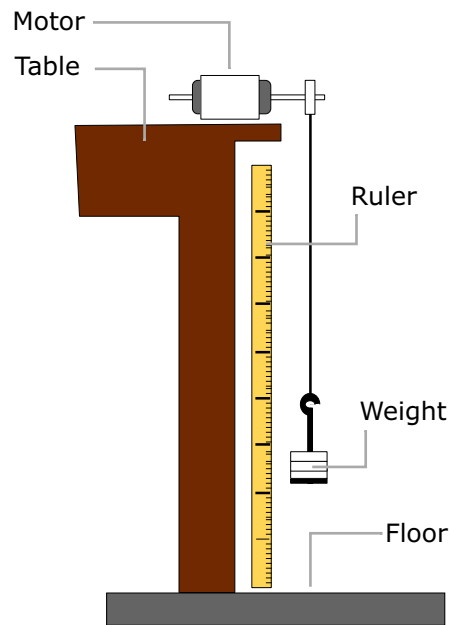
_____ [2]
(b) What is the source of energy that is used to get the cyclist to the top of the incline?

_____ [1]

(c) What becomes of this energy? Explain your answer.

_____ [2]

- 13** A small electric motor can raise a weight of 2 N through a vertical distance of 0.6 metres in 5 seconds.



- (a) How much work does the motor do on the weight in raising it through 0.6 m?

_____ [3]

- (b) What is the form of energy that is supplied to the motor?

_____ [1]

- (b) What becomes of this energy?

_____ [2]

- (c) The amount of energy supplied to the motor is much greater than the work done on the weight. Why?

_____ [2]