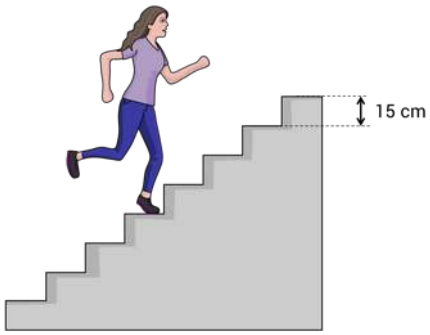
0 1

Late for an appointment, Gillian is running up a set of eight steps. As shown in the below diagram, each of the steps is 15 cm high.



0 1 . 1

Gillian has a mass of 60 kg. Calculate the increase in her gravitational potential energy store between the bottom and the top of the set of steps. Take g = 9.8 N/kg

Answer = _____ J

[3 marks]

0 1 . 2

Whilst running up the steps, she developed an average power of 250 W. How long did it take her to get from the bottom to the top of the steps?

Answer = _____ s

[2 marks]

0 2

The generator of a nuclear power station supplies 4.32×10^{13} J of electrical energy per day on average.

0 2 . 1

Calculate the average power output of the above generator.

Answer = _____ W

[4 marks]

0 2 . 2

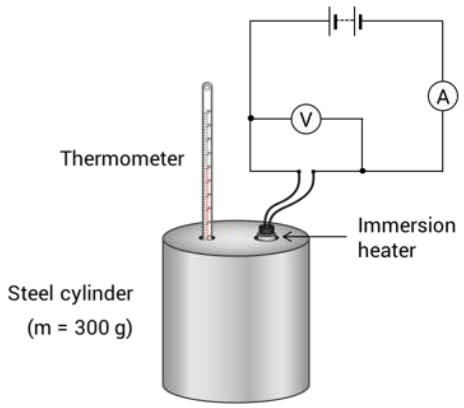
A developer is considering building a wind farm close to the nuclear power station. Each of its wind turbines would deliver an average power output of 2 MW.

How many such turbines would the wind farm require for its power output to equal that of the generator of the nuclear power station?

Number of wind turbines required = _____

[2 marks]

0 3 Alan is using the voltmeter-ammeter method to determine the specific heat capacity of a type of steel. The experimental setup used and data obtained are as shown below.



Initial temperature of steel, T_1 = 24 °C

Final temperature of steel, T_2 = 64 °C

Current, I = 2 A

Potential difference, V = 12 V

Heating time, t = 260 seconds

0 3 . 1 Write down one safety precaution which Alan should have taken in carrying out his experiment.

_____

[1 mark]

0 3 . 2 Use the above data to determine a value for the specific heat capacity of the steel used. Include an appropriate unit with your answer.

Specific heat capacity = _____ Unit: _____

[5 marks]

0 3 . 3 Alan discovers that the actual value of the specific heat capacity of the steel used is slightly smaller than that which calculated from the results of his experiment. Describe and explain one change which he could have made to the experiment to improve the accuracy of this value.

_____

_____

[2 marks]