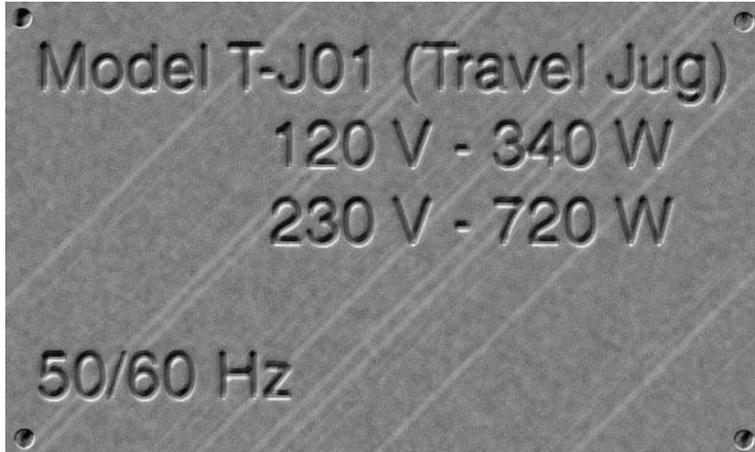


## TAP 106- 4: Power of appliances

### Travelling kettle

Kasim has to travel abroad as part of his work. Knowing that not all hotels provide a 'Welcome Tray' he buys a travel kettle so he can always make coffee for himself. The kettle is marked:



On the package is written: 'Takes less than 4 minutes to boil on 230 V and 7 minutes on 120 V'

1. Explain the meaning of the power rating: 720 W
2. Why would boiling some water in the kettle in New York (power supply: 120 V) take longer than in Belfast (power supply: 230 V).
3. Calculate the current through the element on each setting.
4. After his trip to New York, Kasim forgets to switch over the voltage setting to 230 V. Why might the kettle be damaged by leaving it at the 120 V setting?
5. Suggest a suitable fuse value to use in the plug to protect the kettle from overheating.

### Practical advice

You may wish to change the name of the traveller or the countries he / she visits to suit your students.

### Alternative approaches

Bring in travelling appliances, look at the rating plates and discuss the need for different settings. Ask how this is accomplished. Ask what differences one may notice using the appliances.

### **Answers and worked solutions**

1. 720 J of energy is delivered per second to the kettle to heat the water and surroundings.
2. The water will take longer to heat up in New York since the energy is transferred more slowly.
3. 230 V setting you get 3.1 A; 120 V setting you get 2.8 A
4. Almost double the pd across the element will result in double the current, leading to 4 times the power and serious overheating which will damage the insulation.
5. 5 A fuse will stop too high a current flowing.

### **External references**

This activity is taken from Advancing Physics Chapter 2, 110S