

TAP 106- 3: Kinds of light bulb

People use electric light bulbs for many purposes, from a torch used to light up a path home, to aircraft searchlights. These lamps differ tremendously in the power they use.

1. All bulbs are stamped with two different values, for instance 36 W, 12 V. What do these numbers tell you?
2. You can also use these values to calculate the current through the bulb filament. The table below shows these values for five different bulbs. Use a suitable formula to calculate the missing values.

Bulb	Power / W	pd / V	Current / A
Headlamp	36	12	
Torch bulb	0.09	3	0.03
Filament bulb	100	230	
Flashlight bulb	4.5	9	0.5
Energy Saving bulb	24	230	

Fuse protection

3. Explain why appliances are protected by a fuse and explain how the fuse provides this protection.
4. The table shows the power rating and voltage as marked on a number of appliances. Calculate the operating current of each appliance. Suggest a suitable fuse value for each appliance choosing from the fuse values given.

Appliances	Power rating	pd / V	Operating current / A	Suggested fuse values choosing from 3 A; 13 A
Iron	1200 W	230		
Vacuum cleaner	900 W	230		
Headlamp	48 W	12		
Jug kettle	2.4 kW	230		
Radio	100 W	230		
Travel kettle	340 W	120		
Microwave cooker	1.4 kW	230		

Answers and worked solutions

1. Power in watts – rate of energy use; operating potential difference in volts, pd at which it is designed to work.

2.

Bulb	Power / W	pd / V	Current / A
Headlamp	36	12	3.0
Torch bulb	0.09	3	0.03
Filament bulb	100	230	0.43
Flashlight bulb	4.5	9	0.5
Energy Saving bulb	24	230	0.10

3. To prevent too much power passing through the cable, the fuse is to protect the cable not the appliance (the fuse melts).

4.

Appliances	power rating	pd / V	operating current / A	Suggested fuse values choosing from 3 A; 13 A
Iron	1200 W	230	5.2	13
Vacuum cleaner	900 W	230	3.9	13
Head lamp	48 W	12	4.0	13
Jug kettle	2.4 kW	230	10	13
Radio	100 W	230	0.43	3
Travel kettle	340 W	120	2.8	3
Microwave cooker	1.4 kW	230	6.1	13

External references

This activity is taken from Advancing Physics Chapter 2, 30S