Knowledge

1. DC is current that always flows in the same direction
2. Watts (W)
3. Energy = power (W) x time (in seconds)
4.

Colour of wire	Voltage (V)	Function
Blue	O	Completes the circuit
Brown	230	Provides the pd
Green & yellow	0	Stops the casing becoming live in the event of a fault

5. The National Grid is a system of cables and transformers that transfers electrical power from power stations to consumers

6. Step up transformers increase the pd so that the current can be decreased

7. Less energy is lost in heating the wires

8. Power = Voltage X current (P=IV)

9. $P= I^2R$

10. Energy = charge x pd or E=QV

Application

1. 1.4kW = 1400W

   P=IV so I=P/V

   I = 1400W/230

   I = 6.1 Amps

2. Electrical power is transmitted via the national grid. From the power station, the potential difference is increased by a step up transformer. This makes the pd around 400000V so that the current can be low. The power is transmitted along cables and is stepped back down by a transformer before it goes into homes and businesses at 230V.

3. Step up transformers are used to increase the pd so that the current can be low but still transmit the same power. Low current is used because that way less energy is lost by heating of the wires.

4. 1800W x (20x 60)

e= 2,160,000J

E=pxt so t = e/p

Time = 2,160,000/1300

Time = 1661.5 seconds

In minutes = 1661.5/60 = 28 minutes

You can also just do: 1800/1300 x 20 = 28 minutes

5. Electrical demand varies over 24 hours because there are times of the day when a lot of people use electricity at once – e.g in a morning when people get up and get ready for work, in the evening when people get home from work and cook – and then there are times, e.g overnight, when much less is used.

6. $P = I^2R$

$I^2 = P/R$

$I^2 = 100/30$

$I^2 = 3.333$

$I = 1.83$ Amps

7. E = QV

E = 180 x 3.7

E = 666J

8. If you touch the live wire you get a shock because our body is 0V and therefore a large pd is produced and a current will flow through the body.

The charge that flows through an electric shower in 10 minutes is 18000 C. The shower has a power of 7.5 kW. Calculate the resistance of the heating element in the shower. Write down any equations you use.

Remember, the best strategy is to think what you can work out from the values given. Time and coulombs are in the Q=It equation, so you can figure out current.

9. Q=It

$I = Q/t$

$I = 18000/600$ (10 mins x 60)

$I = 30$ Amps

Now, you have current and power – what links those two and resistance?

$P = I^2R$ so $R = P/I^2$

$R = 7500/30$

$R = 250$ Ohms

Remember - make sure everything is in the right units!