**M1.** (a) current that is always in the same direction

**1**

(b) total resistance = 30 (Ω)

**1**

V = 0.4 × 30

**1**

12 (V)

**1**

*allow 12 (V) with no working shown for **3** marks*
*an answer of 8 (V) or 4 (V) gains **2** marks only*

(c) P = 0.4 × 12 = 4.8

**1**

5 (W)

**1**

*allow 5 (W) with no working shown for **2** marks*
*allow 4.8 (W) with no working shown for **1** mark*

**[6]**

**M2.** (a) (i) A

**1**

(ii) bar drawn with correct height

*ignore width of bar*

**1**

(b) (i) $E = P \times t$

2.4

*allow **1** mark for correct substitution*
*ie 1.2 × 2*
*provided no subsequent step shown*

**2**

(ii) 36 or their (b)(i) × 15 correctly calculated

**or**

their (b)(i) × 0.15 correctly calculated with an answer given in £

*allow **1** mark for correct substitution*
*ie 2.4 × 15*

***or***

*their (b)(i) × 15*
*allow **1** mark for correct substitution*
*provided no subsequent step shown*
*an answer £0.36 gains both marks*

**2**

**[6]**

**M3.** (a) fan

**1**

drill

**1**

washing machine

*four circled including correct three scores **1** mark*

*five circled scores zero*

**1**

(b) Appliances only transfer part of the energy usefully

**1**

The energy transferred by appliances makes the surroundings warmer

**1**

**[5]**

**M4.** (a) (i) temperature (increase) and time switched on are directly proportional

*accept the idea of equal increases in time giving equal increases in temperature*

*answers such as:*

- *as time increases, temperature increases*
- *positive correlation*
- *linear relationship*
- *temperature and time are proportional*

*score **1** mark*

**2**

(ii) any **one** from:

*"it" refers to the metal block*

- energy transfer (from the block) to the surroundings

*accept lost for transfer*

*accept air for surroundings*

- (some) energy used to warm the heater / thermometer (itself)

*accept takes time for heater to warm up*

- (metal) block is not insulated

**1**

(iii) 15 000

*allow **1** mark for correct substitution, ie 50 × 300 provided no subsequent step shown*

**2**

(b) lead

*reason only scores if lead is chosen*

**1**

needs least energy to raise temperature by 1°C

*accept needs less energy to heat it (by the same amount)*
*lowest specific heat capacity is insufficient*

**1**

**[7]**

**M5.** (a) (i) TV

**1**

(ii) hairdryer and sandwich toaster

*both required either order but no others*

**1**

(b) (i) 1.2

*allow **1** mark for correct substitution*

*ie 0.4 × 3 provided that no subsequent step is shown*

**2**

(ii) 18

*accept £0.18 for both marks*

**or**

their (b)(i) × 15 correctly calculated

*an answer 0.18 scores **1** mark*

*allow **1** mark for correct substitution*

*ie 1.2 or their (b)(i) × 15 provided that no subsequent step is shown*

**2**

**[6]**

**M6.** (a) £16.50

*allow **1** mark for correct substitution ie 110 × 15*
*an answer of 1650 gains **both** marks*
*an answer of 43.80 gains **both** marks*
*allow **1** mark for 292 × 15*

**2**

(b) 292

*allow **1** mark for correctly using the reading 53490 ie 53782 – 53490*
*accept £43.80 for both marks*

**2**

**[4]**

**M7.** (a) iron

**1**

hairdryer

**1**

kettle

**1**

*answers can be in any order*

(b) (i) **Y**

**1**

(ii) bar drawn with any height greater than **Y**

*ignore width of bar*

**1**

(c) (bigger volume) takes more time (to boil)

*accept explanation using data from graph*

**1**

(so) more energy transferred

*do **not** accept electricity for energy*

**1**

(and) this costs more money

*ignore reference to cost of water*

*wasting more money because heating more water than needed is insufficient*

**1**

**[8]**

**M8.** (a) solid

**1**

(b) decreased

*correct order only*

**1**

decreased

**1**

increased

**1**

(c) (i) A

*reason only scores if A chosen*

**1**

uses least / less energy (in 1 year)

*a comparison is required*

*accept uses least power*

*accept uses least kWh*

**1**

(ii) greater the volume the greater the energy it uses (in 1 year)

**1**

(iii) a very small number sampled

*accept only tested 3*

*accept insufficient evidence / data*

*allow not all fridges have the same efficiency **or** a correct description implying different efficiencies*

*only tested each fridge once is insufficient*

*there are lots of different makes is insufficient*

**1**

**[8]**

**M9.** (a) he may receive an electric shock

**or**

he may be electrocuted

**1**

if he touches the live wire

**1**

(b) 10 690 = I × 230

**1**

I = 10 690 / 230

**1**

46.478(260) (A)

**1**

46

**1**

*allow 46 (A) with no working shown for **4** marks*

(c) cost is higher

**1**

more energy is used (per second)

**1**

**[8]**