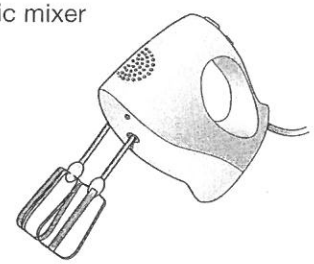
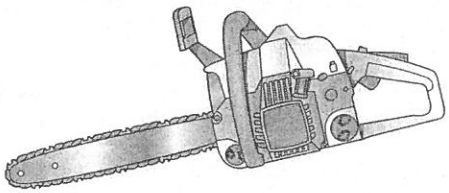
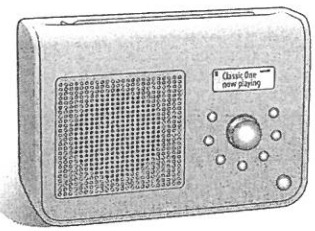
5.4 Energy efficiency

Science understanding

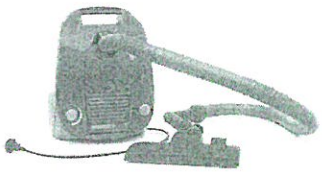
Logical/Mathematical Visual/Spatial

Many household devices convert electrical energy into other forms.

1 **Identify** the types of energy, both useful and wasted, that result from transformations by the following devices. The first example has been done for you.

Device	Useful energy produced	Wasted energy produced
(a) Electric mixer 	kinetic	heat, sound
(b) Chain saw 		
(c) Radio 		
(d) Treadmill 		
(e) Desk lamp 		

2 The following devices convert the electrical energy supplied into specific amounts of other forms of energy. Recalling that energy is conserved, **calculate** the missing values to complete the following energy conversions:

(a) 500 J ⟶ 

⟶ 150 J heat energy

⟶ 50 J sound energy

⟶ _____ J kinetic energy

(b) 500 J ⟶ 

⟶ _____ J heat energy

⟶ 50 J light energy

(c) 500 J ⟶ 

⟶ _____ J heat energy

⟶ 100 J light energy

⟶ 50 J sound energy

(d) 100 J ⟶ 

⟶ 70 J heat energy

⟶ _____ J light energy

3 The efficiency of the devices in the previous question can be calculated using the following equation:

$$\frac{\text{useful energy output (J)}}{\text{energy input (J)}} \times 100$$

(a) Use the equation above to **calculate** the efficiency of the toaster.

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(b) Assuming that light and sound are the useful forms of energy from a television, **calculate** the efficiency of the plasma television.

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(c) **State** whether the toaster or the television is more energy efficient.

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(d) **Justify** your answer above.

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