Worksheet 2| Lower Secondary
Stage (6-8)
1st Semester | 2023-2024

Name: Key
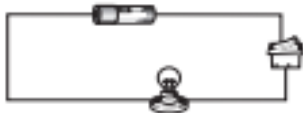
Subject: Physics -**Chapter 1: Energy**
Class: 6 CS

Objectives:
- Be able to construct energy transfer diagrams.
- Identify the input energy and the useful and dissipated energy in different systems.
- Calculate useful and dissipated (wasted) energy based on the law of conservation of energy.
- Be able to draw and analyze a Sankey diagram for different systems.

Question 1:

State the useful energy transformation that takes place in each case.

object	energy from	energy to
car	chemical	kinetic
light bulb	electrical	Light
wood-burning fire	chemical	Thermal
battery in a circuit	Chemical	electrical

Question 2:

Select the appropriate word from the list below to show the energy transfer taking place in each part of the hair dryer shown in the picture:
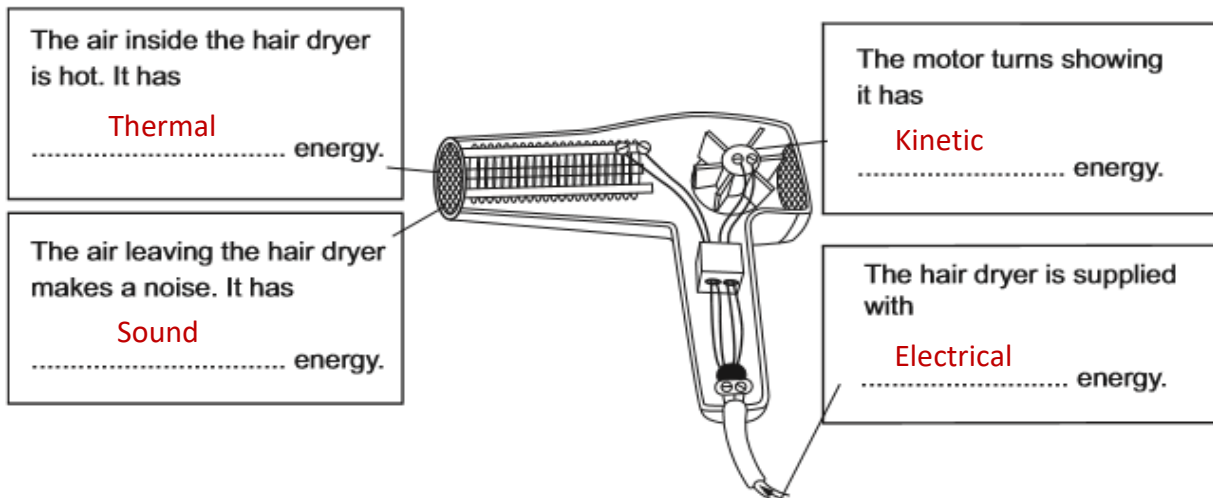
chemical   elastic potential   electrical

kinetic   nuclear   sound   thermal

The air inside the hair dryer is hot. It has

Thermal
.... energy.

The motor turns showing it has

Kinetic
.... energy.

The air leaving the hair dryer makes a noise. It has

Sound
.... energy.

The hair dryer is supplied with

Electrical
.... energy.

Question 3:

The diagram shows some electrical appliances:
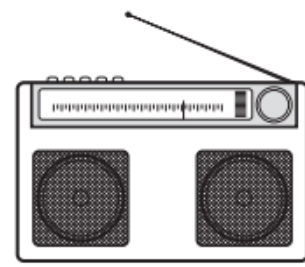
A   B   C   D
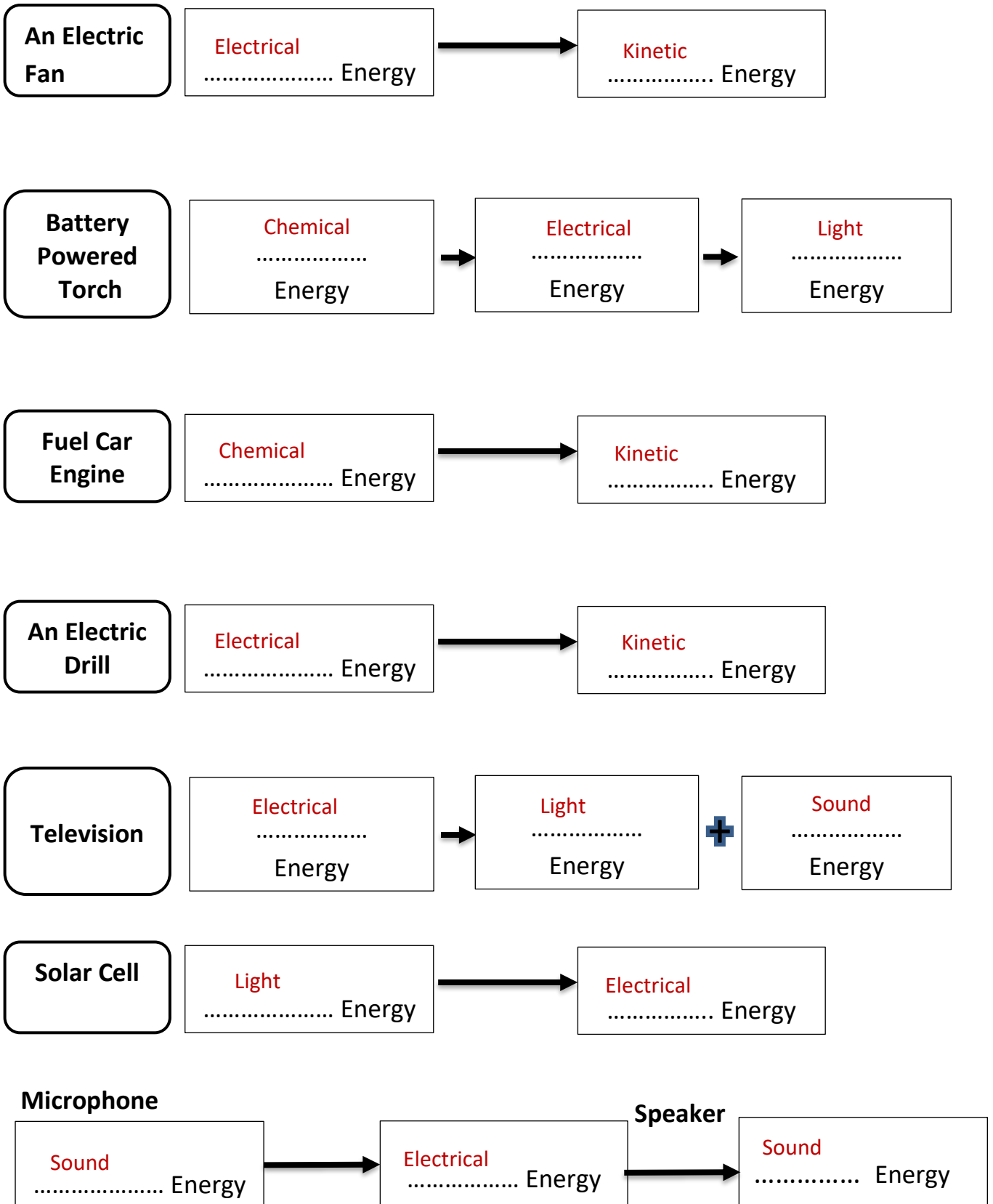
Write down the letter **of the appliance that is designed to:**

a) Transfer electrical energy to **thermal energy**?............. **B**..........

b) Transfer electrical energy to **kinetic energy**? ....**A**................

c) Transfer electrical energy to **sound energy**? ....**D**.............

d) Transfer electrical energy to **light energy**? ....**C**....................

Question 4:

Identify the useful energy transformation taking place in each of the following devices:

An Electric Fan

| Electrical ………………… Energy | → | Kinetic ……………... Energy |

Battery Powered Torch

| Chemical ……………… Energy | → | Electrical ……………… Energy | → | Light ……………… Energy |

Fuel Car Engine

| Chemical ………………… Energy | → | Kinetic ……………... Energy |

An Electric Drill

| Electrical ………………… Energy | → | Kinetic ……………... Energy |

Television

| Electrical ……………… Energy | → | Light ……………… Energy | ✚ | Sound ……………… Energy |

Solar Cell

| Light ………………… Energy | → | Electrical ……………... Energy |

Microphone

| Sound ………………… Energy | → | Electrical ……………… Energy | → **Speaker** | Sound ………….. Energy |

Question 5 :

For the following devices, **identify the form** of Energy of the input energy and the produced useful and dissipated energy:

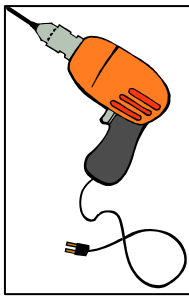*Chemical   Kinetic   Thermal   Sound   Electrical   Light*

Light bulb:

Input Energy: ___Electrical Energy _____

Produced Useful Energy: __Light Energy _____

Dissipated (Wasted) Energy: __Thermal Energy _____

Electric Drill:

Input Energy: ___Electrical Energy _____

Useful Energy: __Kinetic Energy _____

Dissipated (Wasted) Energy: _Thermal + Sound Energy ___

TV:

Input Energy: ___Electrical Energy _____

Useful Energy: _Sound Energy _____ + Light Energy __

Dissipated (Wasted) Energy: __Thermal Energy _

Electric Car engine:

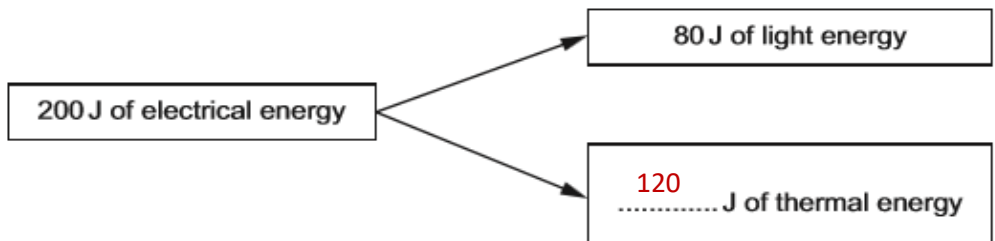Input Energy: ___Electrical Energy ___

Useful Energy: ___Kinetic Energy _____

Dissipated (Wasted) Energy: _Sound __+ __Thermal Energy _
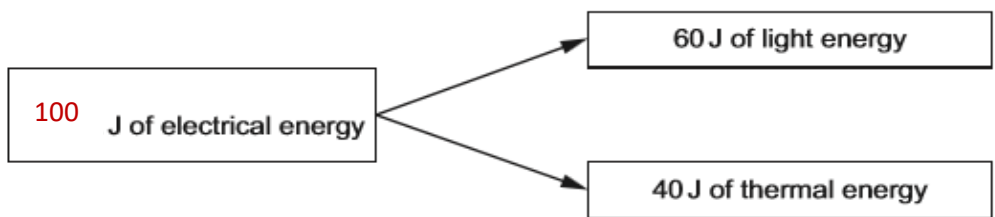
Question 6:

Energy is always conserved.

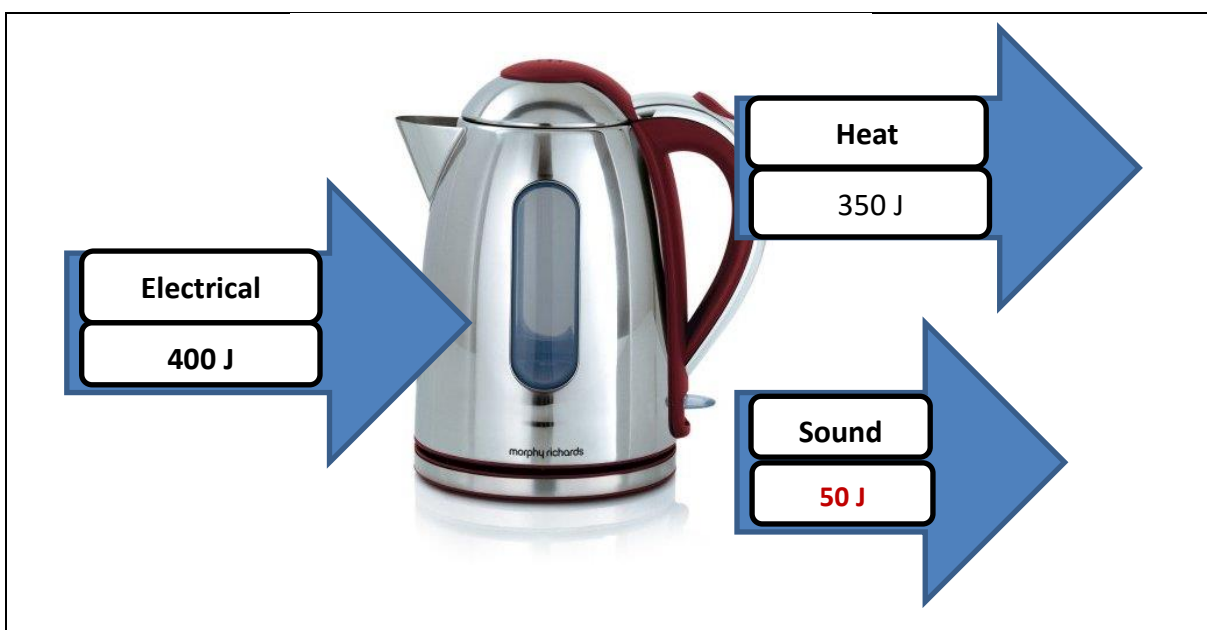Complete the energy diagrams to show that energy is conserved.

(a)

80 J of light energy

200 J of electrical energy

120 .... J of thermal energy

(b)

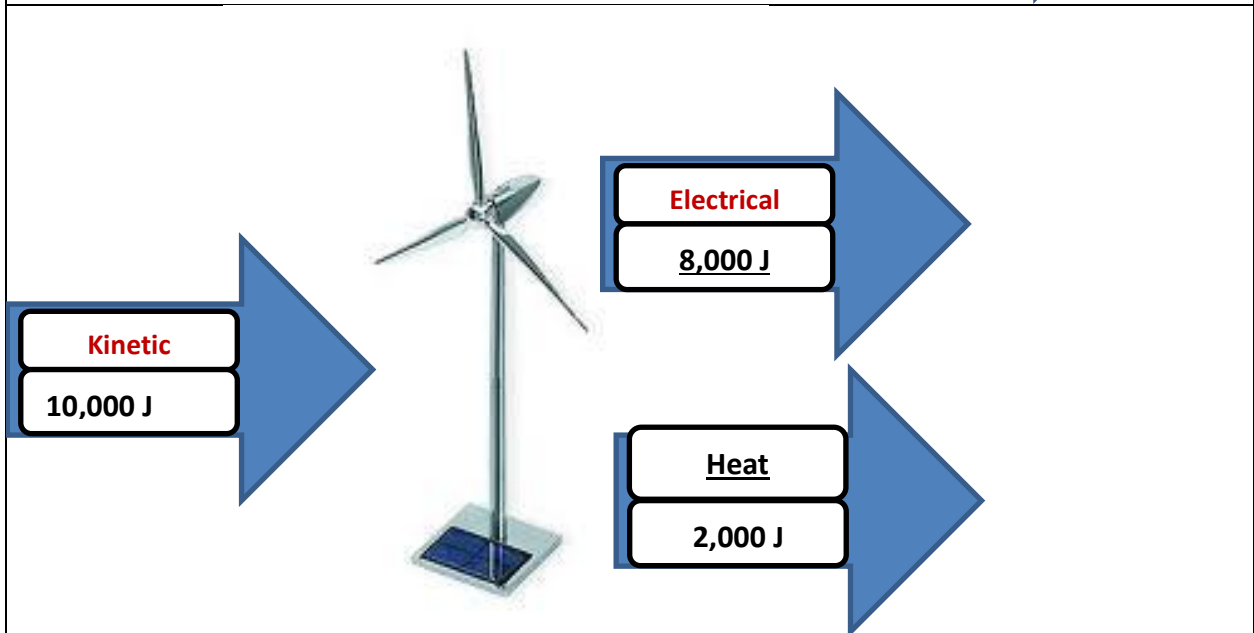60 J of light energy
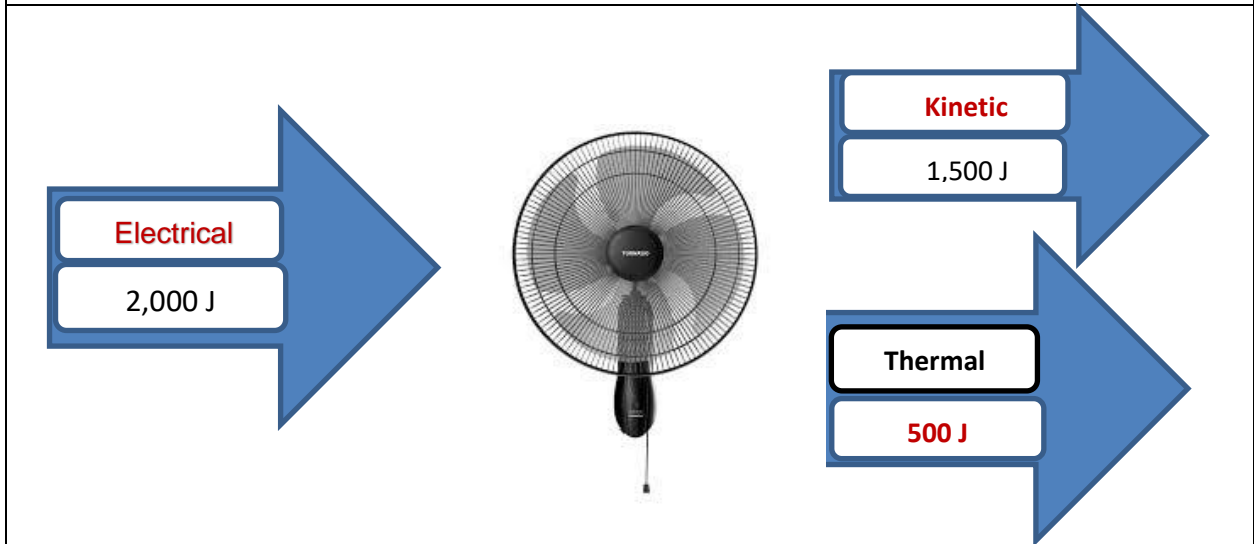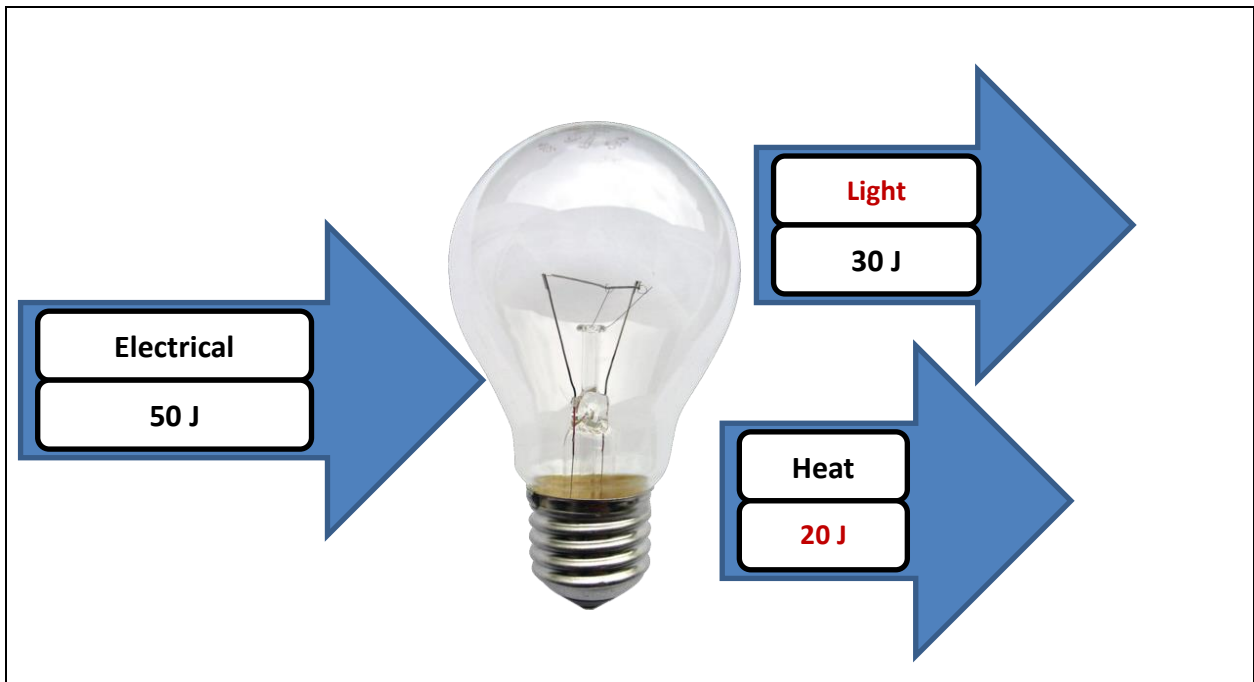
100 J of electrical energy

40 J of thermal energy

Question 7:

For each example of an energy transfer, fill in the missing boxes with the **energy type** and the **amount** of **energy** it takes up.

Heat

350 J

Electrical

400 J

Sound

50 J

Electrical

50 J

Light

30 J

Heat

20 J

Electrical

2,000 J

Kinetic

1,500 J

Thermal

500 J

Kinetic

10,000 J

Electrical

8,000 J

Heat

2,000 J

Question 8: This diagram shows a ball rolling from A to G.

Study the diagram and answer the following questions:
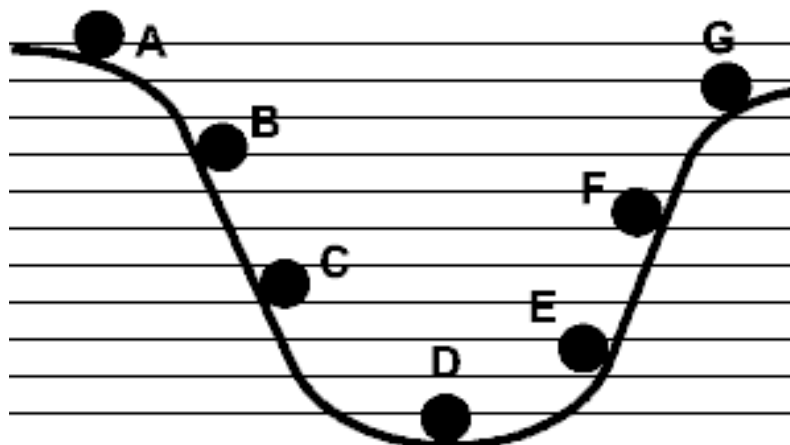
a) Which letter shows the ball when it has the maximum kinetic energy? __**D**__.

b) Which letter shows the ball when it has the maximum gravitational potential

energy? ___**A**___.

c) Which letter shows the ball when it has the least gravitational potential energy?

__**D**____.

d) Which letter shows the ball when it has the least kinetic energy?

____**A**___.

Note: at any of the points, the total energy of the ball is the same and equals to:

Gravitational potential energy (GPE) + Kinetic Energy
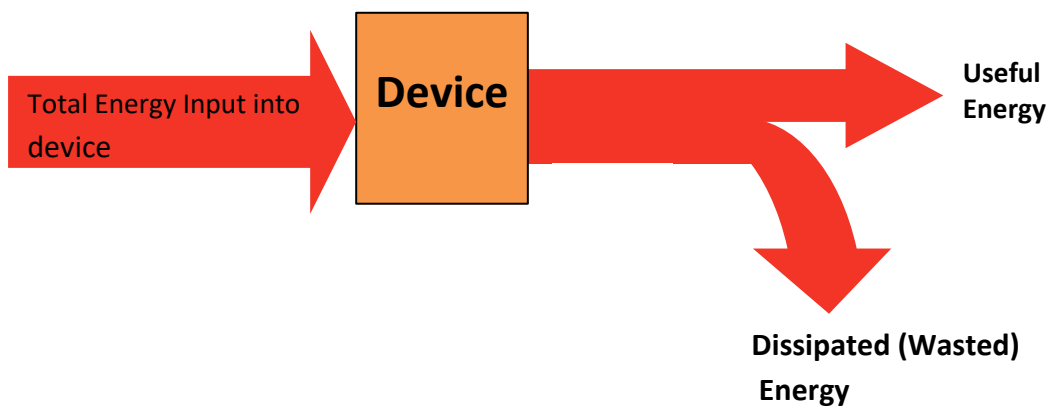
Question 9:

A Sankey diagram represents the energy transfer through a device.

Knowing that energy **cannot be created or destroyed**, energy input must equal the total energy output:

$$Total\ input\ energy = useful\ energy\ delivered + energy\ wasted$$

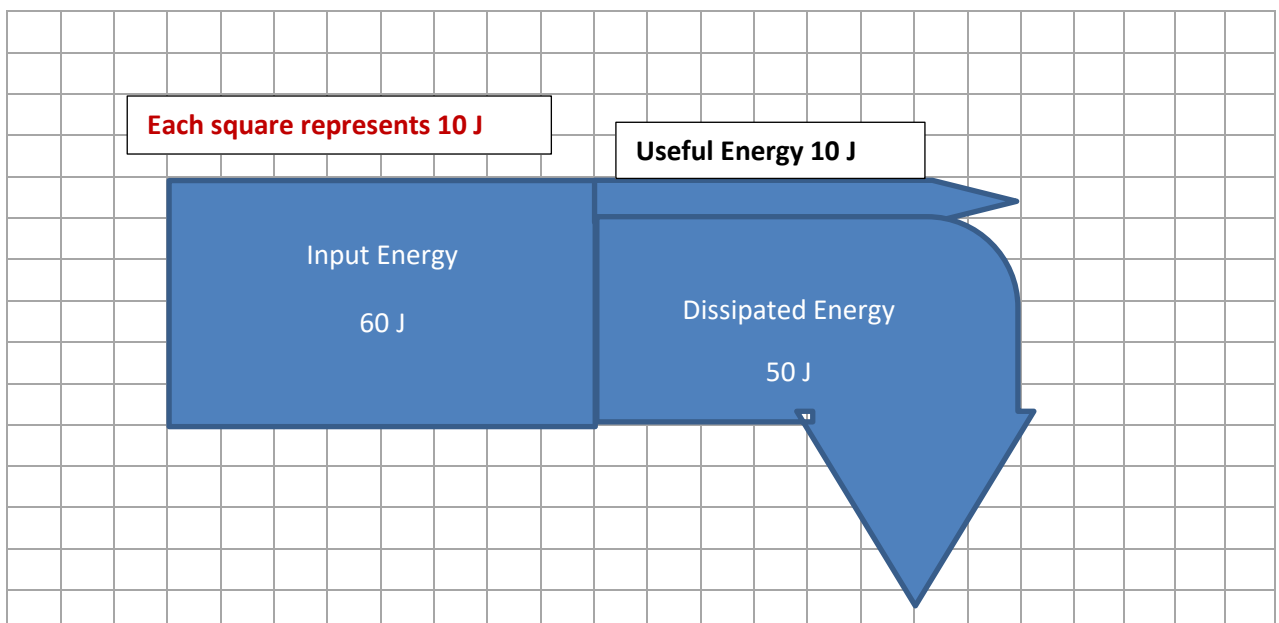A Sankey diagram shows this:
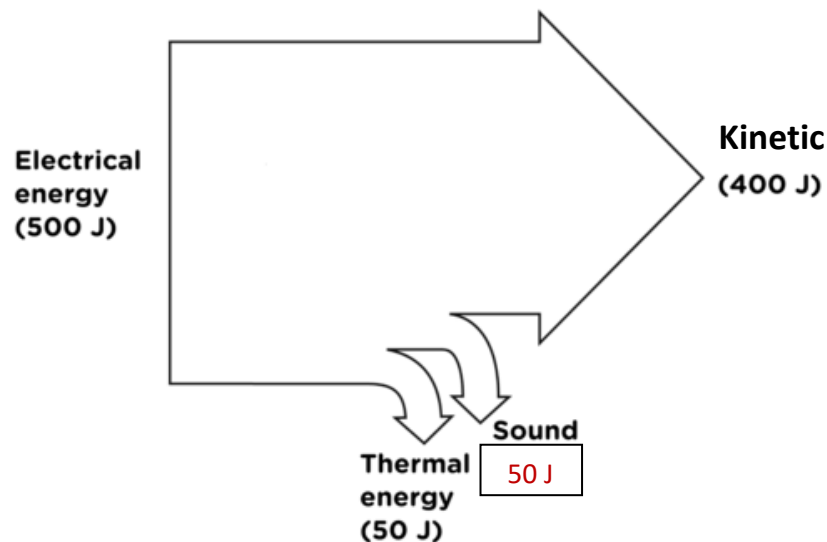   Note: the **width** of the arrows demonstrates the **amount** of energy.

Draw your own Sankey diagram for a 60 J Light bulb given that:

Total input energy =60 J
Useful (light) energy = 10 J
Dissipated (heat) energy = 50 J

Use the squares below as a guide for drawing your arrows.

Question 10: The following **Sankey diagram** shows the energy transfer in an electric device.

Study the Sankey diagram shown above, and answer the following questions accordingly:

a. What is the **useful form/ forms of energy** produced by this device?

_____Kinetic Energy_____.

b. What is the amount of **useful energy** produced? Include the Unit.

_____400 J_____.

c. What is the **dissipated (wasted) form/ forms of energy** produced by this device?

__Sound and Thermal Energy _____.

d. Calculate the amount of **sound energy** produced by this device.

_500 – 400 – 50 = 50 J ____.

e. What is the total amount of **dissipated (wasted) energy** produced by this device?

_____100 J_____.

f. What is the **input** energy for this device? ____Electrical Energy ____.

g. Think of a device that this Sankey diagram may represent.

_____ Electric Drill/ Cake mixer _____.

h. Is this device efficient or inefficient? Explain your answer.

This device is efficient. It produces more useful energy than wasted.