

Energy forms, changes and sources

Grade 6 science (Year 7 · Class 6) · Worksheet

Name: _____ Date: _____ Class: _____

These problems train you to name the forms of energy, follow energy chains, calculate wasted energy and useful percentages, and compare renewable and non-renewable sources. They move from naming forms to multi-step calculations and decisions.

The worksheet suits Grade 6, Year 7 and Class 6 students following NGSS middle school energy topics or similar curricula.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS3

Problem 1 Name the form (easy)

Name the main form of energy in each case.

1. A cricket ball flying towards the wicket.
2. A cup of hot soup.
3. The Sun shining on a window.
4. Current flowing in a phone cable.
5. A bowl of rice before it is eaten.

Problem 2 Joules (easy)

1. Name the SI unit of energy and give its symbol.
2. Convert 2.5 kJ into joules.
3. Convert 4000 J into kilojoules.

Problem 3 Renewable or not? (easy)

Sort these sources into renewable and non-renewable: coal, wind, biogas, natural gas, sunlight, oil.

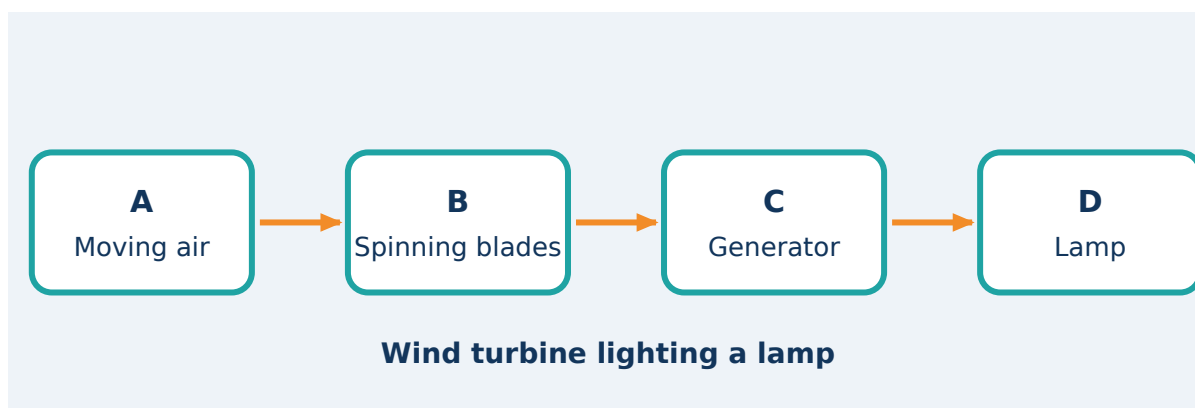
Problem 4 A battery fan (easy)

Wanjiru uses a battery-powered hand fan on a hot day in Nairobi.

1. Name the form of energy stored in the battery.
2. Name the form of energy in the wires.
3. Name the main useful form of energy given out by the fan blades.

Problem 5 Wind turbine chain (easy)

The figure shows the stages of a wind turbine that lights a lamp.



Stages of a wind turbine that lights a lamp.

1. Name the main form of energy at stage A.
2. Name the form at stage B.
3. Name the form at stage C.
4. Name the useful form given out by the lamp at stage D.

Problem 6 Law of conservation (easy)

Aarav says: "My torch battery is flat, so the energy has disappeared."

1. State the law of conservation of energy.
2. Explain where the energy of the battery went.

Problem 7 Wasted energy of a lamp (medium)

A filament lamp in a classroom in Pune takes in 60 J of electrical energy every second and gives out 6 J of light.

1. Calculate the wasted energy each second.
2. Name the form of the wasted energy.

Problem 8 Useful percentage (medium)

A filament lamp transforms 100 J of electrical energy into 10 J of light. An LED lamp transforms 10 J into 8 J of light.

1. Calculate the useful percentage of each lamp.
2. State which lamp wastes less energy.

Problem 9 Comparing appliances (medium)

The table shows the energy in and the useful energy out for three devices.

Device	Energy in (J)	Useful energy out (J)
Electric kettle	1000	900
Phone charger	50	40
Small motor	200	150

1. Calculate the wasted energy of each device.
2. Calculate the useful percentage of each device.
3. State which device is the most efficient.

Problem 10 More kinetic energy (medium)

Compare the kinetic energy in each pair.

1. A cyclist moving at 5 m/s and the same cyclist moving at 10 m/s.
2. A loaded truck and a bicycle, both moving at 5 m/s.

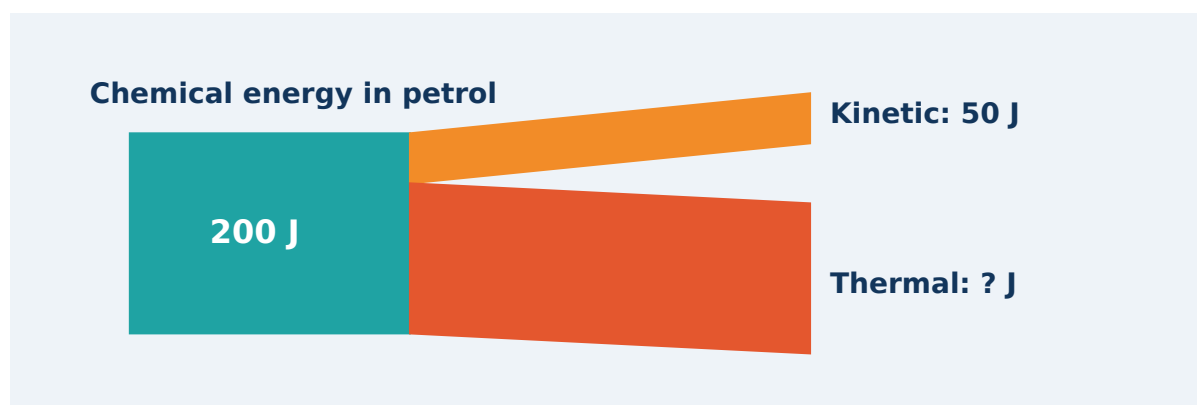
Problem 11 Bicycle dynamo (medium)

On a night ride in Kampala, Hina notices that her bicycle lamp gets brighter when she pedals faster.

1. Write the energy chain from her muscles to the lamp.
2. Explain why the lamp is brighter at higher speed.

Problem 12 Motorbike engine (medium)

The figure shows the energy flow in a motorbike engine.



Energy flow in a motorbike engine.

1. Calculate the thermal energy output.
2. Calculate the useful percentage of the engine.
3. Describe what happens to the thermal energy.

Problem 13 Sources of electricity (medium)

The table shows the electricity produced in one year by a small country.

Source	Energy produced (units)
Hydro	30
Wind	15
Solar	5
Coal	35

Source	Energy produced (units)
Natural gas	15

1. Calculate the total energy produced.
2. Calculate the percentage that comes from renewable sources.
3. Name one non-renewable source in the table.

Problem 14 Spot the error (medium)

Diego writes: "A solar panel makes energy from nothing."

1. Explain what is wrong.
2. Write a correct statement.

Problem 15 Solar charger (medium)

A small solar charger receives 20 J of light energy every second and delivers 4 J of electrical energy every second.

1. Calculate its useful percentage.
2. Calculate the electrical energy it delivers in 60 s.

Problem 16 Two-stage chain (hard)

In a power station, 100 J of chemical energy in coal produces 40 J of electrical energy. An LED lamp then turns 80 % of the electrical energy into light.

1. Calculate the light energy produced.
2. Calculate the overall useful percentage from coal to light.
3. Calculate the total energy that ends up as thermal energy.

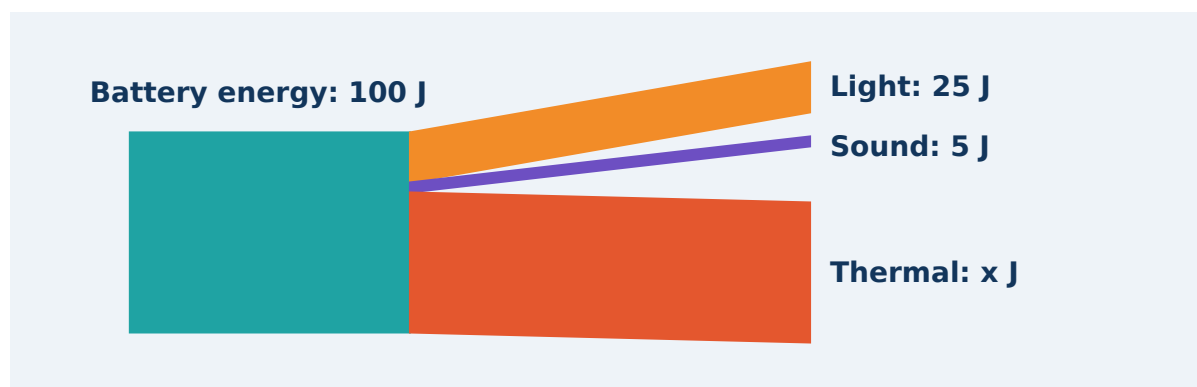
Problem 17 Saving energy with LEDs (hard)

A filament lamp and an LED lamp both give out 6 J of light each second. The filament lamp takes in 60 J each second, the LED lamp 7.5 J each second.

1. Calculate the useful percentage of the LED lamp.
2. Calculate the energy each lamp takes in during one hour (3600 s) in kilojoules.
3. Calculate the energy saved in one hour by using the LED lamp.

Problem 18 Missing energy in a phone (hard)

The figure shows how a phone transforms 100 J of battery energy.



Energy flow in a phone in use.

1. Calculate the thermal energy x .
2. Calculate the percentage of the battery energy that becomes useful light and sound.
3. Explain why the phone feels warm.

Problem 19 Power for a farm (hard)

A farming community in Uganda needs electricity for lamps and a water pump. Sunshine lasts about 6 hours per day. A diesel generator needs fuel that must be bought and carried to the village. Wind is weak most of the year.

1. Recommend one energy source and give two reasons.
2. Suggest how the community can have light at night with your choice.

Problem 20 Food energy on a ride (hard)

One banana stores 400 kJ of chemical energy. Aarav's muscles transform 25 % of the food energy into kinetic energy for cycling, and the rest into thermal energy.

1. Calculate the kinetic energy produced from one banana.
2. Calculate the thermal energy produced.
3. Calculate how many bananas Aarav needs for 500 kJ of kinetic energy.