

Energy Balance Lab

Track energy and matter through systems.

GRADE 8 • TEKS 8.5

8.5 "Recurring themes and concepts. The student understands that recurring themes and concepts provide a framework for making connections across disciplines..."

NAME _____

DATE _____

ACCOUNT FOR EVERY PART

Energy can change form, but it is not created or destroyed. For a system, energy in equals energy transferred out plus energy stored. In a closed system, matter is conserved even when it changes location or form.

WORKED EXAMPLE

A toy car receives 50 J of energy. The bar has 5 equal parts, and 3 parts become motion. The rest becomes thermal energy. How much thermal energy is transferred?

motion energy



1. Each part is $50 \text{ J} / 5 = 10 \text{ J}$.
2. Motion uses $3 \times 10 \text{ J} = 30 \text{ J}$.
3. Thermal energy is $50 \text{ J} - 30 \text{ J} = 20 \text{ J}$.

Answer: 20 J of thermal energy

PRACTICE 4 problems

- 1** A device receives 72 J of energy. It transfers 29 J as useful motion. The rest is thermal energy. Find the thermal energy.

ANSWER _____

- 2** A closed container holds 180 g of material. A gas inside has a mass of 37 g. The rest is liquid. Find the liquid's mass.

ANSWER _____

- 3** A battery transfers 96 J. A motor gets 41 J, and thermal energy gets 55 J. Does this show energy conservation? Write an equation.

ANSWER _____

- 4** A light system receives 120 J. It transfers 35 J as light and 50 J as thermal energy. The rest becomes sound. Find the sound energy.

ANSWER _____

APPLY IT Show your work

- 1** During a game, a phone receives 300 J from its battery. Its screen and processor use 165 J, and it transfers 90 J as thermal energy. The rest becomes sound. How much energy becomes sound?

WORK SPACE

ANSWER _____

- 2** A sealed aquatic model has 860 g of material. Its gravel and plants have a mass of 645 g, and the rest is water. What is the mass of the water?

WORK SPACE

ANSWER _____

CHALLENGE One step up

An insulated device receives x J of energy. It transfers 54 J as motion, 81 J as thermal energy, and 15 J as sound. It also stores 30 J. Find x and explain why your equation shows energy conservation.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A device receives 72 J of energy. It transfers 29 J as useful motion. The rest is thermal energy. Find the thermal energy.	43 J
2	A closed container holds 180 g of material. A gas inside has a mass of 37 g. The rest is liquid. Find the liquid's mass.	143 g
3	A battery transfers 96 J. A motor gets 41 J, and thermal energy gets 55 J. Does this show energy conservation? Write an equation.	Yes; $41\text{ J} + 55\text{ J} = 96\text{ J}$.
4	A light system receives 120 J. It transfers 35 J as light and 50 J as thermal energy. The rest becomes sound. Find the sound energy.	35 J

PART 2 • APPLY IT

- 45 J** Add the known transfers: $165\text{ J} + 90\text{ J} = 255\text{ J}$. Subtract from 300 J: $300\text{ J} - 255\text{ J} = 45\text{ J}$.
- 215 g** Matter is conserved in the sealed model. Subtract 645 g from 860 g.

CHALLENGE

$x = 180\text{ J}$; $54\text{ J} + 81\text{ J} + 15\text{ J} + 30\text{ J} = 180\text{ J}$, so all transferred and stored energy equals the input.

Accept equivalent addition equations and correctly labeled units. For the challenge, accept any explanation stating that the input equals the total of all energy transfers and stored energy.