

Energy Ledger Lab

Track what enters, changes, and stays in a system.

GRADE 7 • TEKS 7.5

7.5 "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, and matter can move from place to place. In a closed or fully described system, account for all the energy or matter: total input equals all outputs, and total matter stays the same.

WORKED EXAMPLE

A mini wind turbine receives 60 J of energy. The shaded $\frac{3}{5}$ is useful electrical energy. How much useful energy does it make?

useful energy 

1. Useful fraction = $\frac{3}{5}$.

2. $60 \div 5 = 12$ J per part.

3. $12 \times 3 = 36$ J.

Answer: 36 J of useful electrical energy

PRACTICE 4 problems

- 1** A hand warmer releases 74 J. Of this, 51 J warms hands. How much energy goes to the air?

ANSWER _____

- 2** A sealed compost bin has 96 g of matter. Of that matter, 28 g is now gas inside the bin. All other matter is solid or liquid. How much matter is solid or liquid?

ANSWER _____

- 3** A toy car battery provides 85 J. The motor uses 47 J for motion. The rest becomes heat. How much heat energy is produced?

ANSWER _____

- 4** A closed terrarium has a mass of 125 g. Then 19 g of water moves from the soil to the air. What is the terrarium's total mass?

ANSWER _____

APPLY IT Show your work

- 1** During a game tournament, a headset battery supplies 900 J. It sends 360 J out as sound and light. All remaining energy becomes heat. How much heat energy is produced?

WORK SPACE

ANSWER _____

- 2** A robotics team measures energy from a robot's battery. The robot takes 640 J from the battery. Use the table to find the energy that becomes heat.

ROBOT ENERGY OUTPUTS

Output	Energy
Wheels	248 J
LEDs	72 J

ANSWER _____

CHALLENGE One step up

A sealed classroom ecosystem contains 420 g of water. At one moment, $\frac{3}{7}$ of the water is in gravel and $\frac{1}{5}$ is in plants. The rest is in the air and open water. How many grams are in the air and open water? Show how the total water is conserved.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A hand warmer releases 74 J. Of this, 51 J warms hands. How much energy goes to the air?	23 J
2	A sealed compost bin has 96 g of matter. Of that matter, 28 g is now gas inside the bin. All other matter is solid or liquid. How much matter is solid or liquid?	68 g
3	A toy car battery provides 85 J. The motor uses 47 J for motion. The rest becomes heat. How much heat energy is produced?	38 J
4	A closed terrarium has a mass of 125 g. Then 19 g of water moves from the soil to the air. What is the terrarium's total mass?	125 g

PART 2 • APPLY IT

1. **540 J** Subtract the sound-and-light output from the battery input: $900 - 360 = 540$ J.
2. **320 J** The wheels and LEDs use $248 + 72 = 320$ J. Subtract this from 640 J: $640 - 320 = 320$ J of heat.

CHALLENGE

156 g; 3/7 of 420 g is 180 g, and 1/5 of 420 g is 84 g. Since $180 \text{ g} + 84 \text{ g} + 156 \text{ g} = 420 \text{ g}$, all the water is accounted for.

Accept correct calculations with units. For the challenge, accept equivalent fraction work and a conservation statement showing that all parts total 420 g.