

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ recall every energy formula and its units
- ☐ describe energy changes, including wasted energy
- ☐ explain efficiency and energy audits
- ☐ round answers to the right number of significant figures

I DO

Key facts Learn these for the exam

Energy	Formula	Units
Work done	$E_w = Fd$	F in N, d in m
Kinetic	$E_k = \frac{1}{2}mv^2$	m in kg, v in m/s
Potential	$E_p = mgh$	$g = 9.8 \text{ N/kg}$, h in m
Heat	$E_h = cm\Delta T$	c in J/kg K, ΔT in °C
Electrical	$E_e = VIt$	V in volts, I in amps, t in s
Power	$P = E \div t$	watts (W)
Efficiency	$\eta = E_{\text{out}} \div E_{\text{in}}$	no units; $\times 100$ for %

Energy type	Description	Example
Kinetic	Energy of movement	A moving car
Potential	Stored because of height	Water in a dam
Heat (thermal)	Linked to temperature; often wasted	Friction, boilers
Electrical	Moving charges	Mains supply, batteries
Chemical	Stored in chemical bonds	Petrol, food, batteries

Energy changes, efficiency and audits

- Energy changes form but is never destroyed: a car engine turns chemical energy into kinetic energy (useful) and heat and sound (wasted).
- Efficiency compares useful energy out with total energy in. Improve it with insulation, lubrication and better design.
- An energy audit lists all the energy in and out of a system and identifies where it is wasted.

Remember

Give your final answer to the same number of significant figures as the least precise value in the question. Always show working and units.

A crate of mass 12.34 kg is lifted 8.55 m. Take $g = 9.8 \text{ N/kg}$.

Example Calculate its potential energy to the right number of significant figures.

Worked answer set out every step like this

$$E_p = mgh = 12.34 \times 9.8 \times 8.55 = 1033.97 \text{ J (no rounding yet)}$$

Significant figures: 12.34 (4), 9.8 (2), 8.55 (3); the least is 2

$E_p = 1000 \text{ J (1.0 kJ)}$ to 2 significant figures

YOU DO

Quick check Test yourself, then check the answers.

1 State the main useful and wasted energy for an electric kettle.

2 A motor uses 2000 J and gives 1500 J of kinetic energy. Calculate its efficiency.

3 Give two ways of improving the efficiency of a machine with moving parts.

4 State what an energy audit is used for.

Check and reflect

Mark your answers with the answer sheet. Which “I can” statement above still needs work? Look back at the notes for that topic on the site.
