

Name _____

Class _____

Date _____

By the end of this worksheet I can...

- ☐ describe energy conversions in a system and draw an energy audit
- ☐ calculate kinetic, potential, electrical and heat energy
- ☐ calculate power, work done and efficiency
- ☐ explain ways of reducing energy losses
- ☐ solve multi-stage energy problems involving efficiency and losses at each stage

I DO**Worked example** Read how a full-mark answer is built

The lift motor uses 95 kJ of electrical energy to raise the car ($E_p = 76\,440\text{ J}$).

1 Calculate the efficiency of the lift. (2 marks)**Full-mark answer** each ✓ is one mark

$\eta = \text{useful energy out} \div \text{energy in}$ ✓ $= 76\,440 \div 95\,000 = 0.80$ or 80% ✓.

Why marks are not awarded

" $\eta = 95\,000 \div 76\,440 = 1.24$ "

0 marks: values upside down. Efficiency can't be more than 1 (100%).

WE DO**Guided practice** Use the starters and word bank to help you

A lift raises a 650 kg car through 12 m.

2 Calculate the potential energy gained by the car. (2 marks)**Sentence starters**

One ... is ..., which means ...

Another ... is ..., so ...

Word bank

Tip: 2 marks = 2 separate, developed points.

YOU DO

On your own No notes. Check your answers afterwards.

3 Quick check: tick one box for each.

- a) Kinetic energy depends on...
☐ Height ☐ Mass and velocity ☐ Current and time ☐ Temperature
- b) The unit of power is...
☐ Watt ☐ Newton ☐ Joule ☐ Volt
- c) Unwanted energy in a gearbox is mainly lost as...
☐ Light ☐ Chemical energy ☐ Potential energy ☐ Heat and sound
- d) A 24 V, 0.42 A device runs for 7.5 hours. Which time value must be used?
☐ 27 000 ☐ 450 ☐ 7.5 ☐ 0.125

4 Key terms: write the letter of the matching description next to each term.

1. Work done	___	A $P = E \div t$
2. Potential energy	___	B $E = \frac{1}{2} m v^2$
3. Kinetic energy	___	C $E = m \times g \times h$ ($g = 9.8$)
4. Electrical energy	___	D $E = V \times I \times t$ (t in seconds)
5. Heat energy	___	E $E = c \times m \times \Delta T$
6. Power	___	F $E = F \times d$

An e-bike and rider have a total mass of 110 kg and travel at 7 m/s.

5 Calculate the kinetic energy. (2 marks)

A kettle element is rated at 2.2 kW.

6 Calculate the energy used in 3 minutes. (2 marks)

1.5 kg of water is heated from 15 °C to 100 °C. Specific heat capacity of water = 4180 J/kg °C.

7 Calculate the heat energy needed. (2 marks)

Check and reflect

Mark your answers with the answer sheet. Go back to the checklist on the site and re-rate each “I can” statement above. Which one still needs work?
