IGCSE PHYSICS • EXERCISE SHEET

1.7 Energy, work and power

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

Objective

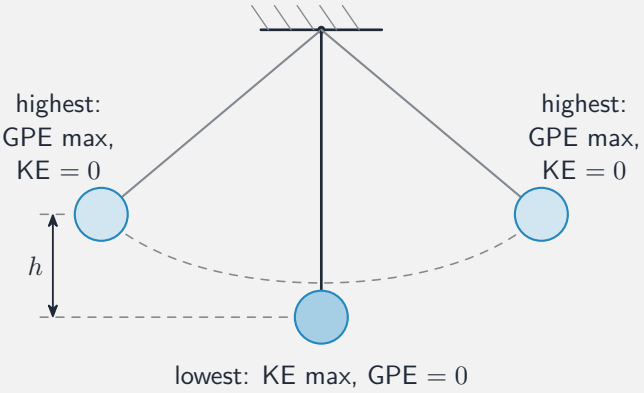
Build the skills to answer exam questions on **energy, work and power** 能量、功与功率—energy stores, E_k and ΔE_p, conservation of energy, $W = Fd$, $P = \dfrac{W}{t}$, and **efficiency** 效率.

You must be able to:

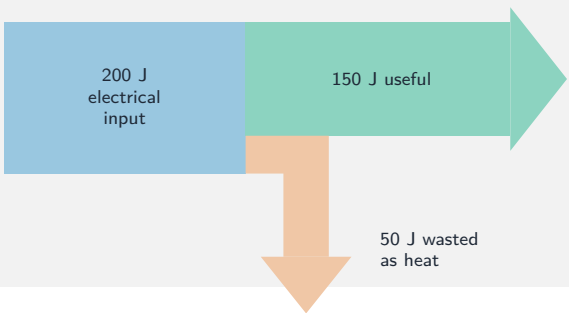
- use $E_k = \frac{1}{2}mv^2$ and $\Delta E_p = mg\Delta h$
- use conservation of energy ($E_p \rightarrow E_k$ for a falling object)
- use $W = Fd$, $P = \dfrac{W}{t}$ and the efficiency formula

1 Worked examples

Energy and efficiency



Energy moves between gravitational PE (top) and KE (bottom)



$$Efficiency = \frac{useful\ output}{total\ input} \times 100\%$$

Ball dropped 1.8 **m** ($g = 10$)**:** $v = \sqrt{2g\Delta h} = \sqrt{36} = 6.0$ m/s.

2 Practice

2.1 A 2.0 kg object moves at 3.0 m/s. Find its kinetic energy. [2]

2.2 A force of 25 N moves a box 4.0 m. Find the work done. [2]

3 Exam-style questions

3.1 A machine has an efficiency of 60%. For every 100 J of input energy, the useful output is: [1]

- **A** 40 J
- **B** 60 J
- **C** 100 J
- **D** 160 J

3.2 A crane lifts a 500 N load through a height of 12 m in 8.0 s.

(a) Find the work done. [2]

(b) Find the power. [2]

3.3 A motor is supplied with 400 J of electrical energy and does 260 J of useful work.

(a) Find the efficiency. [2]

(b) State what happens to the wasted energy. [1]

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4 Go further

You are now ready for the real exam questions on this subtopic. Open the **1.7 Energy, work and power** past-paper sheet in the Library, or try these in **Practice mode**:

- 0625/21 N25 —Q8 (efficiency)

Solutions

2.1 $E_k = \frac{1}{2}mv^2 = \frac{1}{2}(2.0)(3.0^2) = 9.0$ J.

2.2 $W = Fd = 25 \times 4.0 = 100$ J.

3.1 B. 60% of 100 J is 60 J.

3.2 (a) $W = Fd = 500 \times 12 = 6000$ J.
(b) $P = \dfrac{W}{t} = \dfrac{6000}{8.0} = 750$ W.

3.3 (a) efficiency $= \dfrac{260}{400} \times 100\% = 65\%$.
(b) it is transferred to the surroundings as heat (thermal energy).