

Work, energy and power · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; full Physics guide acquired (84 PDF pages). Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Mechanical Energy · 1.1

Reasoning

A motor can transfer some input energy to lifting and the rest to heating. Useful output is part of the total energy transfer. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Mechanical Energy · 2.1

Reasoning

Work done by a constant force parallel to displacement is force multiplied by distance. Kinetic energy depends on speed squared. Energy is conserved when all transfers and stores are included. power : Energy transferred per unit time; efficiency : Useful output divided by total input.

Mechanical Energy · 3.1

Reasoning

Define the system and useful output before calculating efficiency. Doubling speed quadruples kinetic energy at constant mass. Power describes transfer per time, not total energy. Measure a lifting height and load, time the lift, and record electrical input with suitable instruments. Repeat trials and account for heating or friction as transfers, not missing energy.

Mechanical Energy · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: a device receives 600 J and transfers 420 J usefully. Efficiency = useful output / total input. Efficiency = $420/600 = 0.70 = 70\%$. Over 3 s, useful power = useful energy/time = $420/3 = 140$ W.

Mechanical Energy · 4.2

Reasoning

A device receives 250 J and gives 150 J useful output. Find efficiency as a percentage.
Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Mechanical Energy · 5.1

Reasoning

Efficiency cannot exceed 100% for a properly defined energy balance. Energy dissipated by heating is still conserved. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Mechanical Energy · 5.2

Reasoning

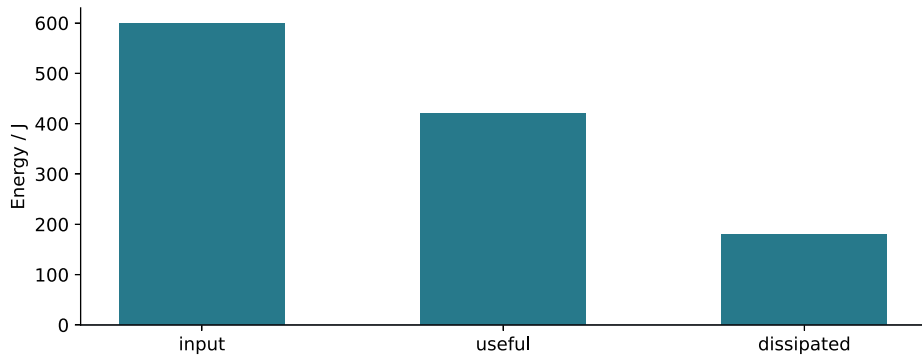
Dissipated energy is destroyed. This claim is false: Efficiency cannot exceed 100% for a properly defined energy balance. Energy dissipated by heating is still conserved.

Mechanical Energy · 5.3

Reasoning

Energy stores, work and efficiency: Define the system and useful output before calculating efficiency. Doubling speed quadruples kinetic energy at constant mass. Power describes transfer per time, not total energy.

Mechanical Energy · diagram



- Original teaching diagram: Energy stores, work and efficiency
- Use the labels and the stated model together.

Mechanical Energy · original transfer

Your turn

A fictional device receives 500 J in 4 s and delivers 300 J usefully. Find input power, useful power and efficiency; account for the remainder.

Mechanical Energy · transfer reasoning

Method and interpretation

Input power 125 W, useful power 75 W, efficiency 60%. The remaining 200 J goes to other transfers or stores. Define the task and system before calling energy useful.

Check yourself

- Explain power using the stated model.
- Explain efficiency using the stated model.
- Change one value in the original transfer; explain which assumption still matters.