

Chapter 10 – Quick Revision Sheet

Work and Energy



WORK — *Force that actually moves objects*

In physics, work happens only when a force pushes something through distance in its own direction, so pushing a wall or holding a heavy bag feels tiring but still counts as zero work scientifically. The relation $W = F \times s$ measures how strongly force converts effort into motion, and direction decides whether work becomes positive, negative, or zero.



DIRECTION RULE OF WORK

Whenever solving work questions, first compare force direction with displacement direction, because same direction creates positive work, opposite direction creates negative work, and sideways force creates zero work, making direction-check the fastest way to avoid losing marks in objective questions.



ENERGY — *The real power behind every action*

Energy simply means the ability of anything to create motion or change, which is why moving vehicles, stretched rubber bands, flowing water, sunlight, and even food inside your body all act as stored action-capacity measured in the same unit as work — the joule.



KINETIC ENERGY — *Motion makes energy grow fast*

Every moving object carries kinetic energy that increases sharply with speed because velocity appears as a square in $KE = \frac{1}{2}mv^2$, which explains why doubling speed increases impact energy four times and makes fast-moving vehicles far more dangerous than heavier slow ones.



POTENTIAL ENERGY — *Height stores future motion*

Whenever an object is lifted above ground, energy quietly gets stored inside it as position energy, meaning higher placement automatically increases its ability to do work later according to $PE = mgh$, which is why dams store enormous usable energy without moving at all.



MECHANICAL ENERGY

Objects like pendulums, roller coasters, and falling stones continuously exchange stored height energy and motion energy, showing that total mechanical energy remains the sum $KE + PE$ while the form keeps changing every moment during motion.



LAW OF CONSERVATION OF ENERGY

Energy never disappears from the universe but only transforms from one form into another, which is why falling objects convert height-energy into motion-energy and electric fans convert electrical energy into rotation while the total energy always stays constant.



POWER — *How fast work gets completed*

Power measures how quickly work is finished rather than how much work is done, so two students lifting the same school bag can perform equal work but the one finishing earlier produces greater power according to $P = W \div t$ measured in watts.



COMMERCIAL UNIT OF ENERGY

Instead of joules, homes measure electrical usage in kilowatt-hour, where 1 kWh equals 3.6×10^6 joules, and this single relation directly connects physics formulas with the “units” printed on real electricity bills — a favourite area for exam numericals.