

GRADE 8 | 2024

Energy and Forces

Natural Sciences

CAPS ALIGNED

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1. Types of Energy

- Kinetic energy: energy of moving objects
- Potential energy: stored energy (gravitational, elastic, chemical)
- Thermal energy: heat energy
- Light energy: radiant energy from the sun
- Sound energy: energy from vibrations
- Electrical energy: energy from moving charges
- Nuclear energy: energy stored in atomic nuclei

FORMULA: Kinetic Energy: $KE = \frac{1}{2} \times m \times v^2$

Gravitational Potential Energy: $GPE = m \times g \times h$
($g = 10 \text{ m/s}^2$ on Earth)

2. Conservation of Energy

KEY POINT: Energy cannot be created or destroyed - it can only be converted from one form to another.

EXAMPLE: Energy conversion

A ball dropped from a height:

GPE converts to KE as it falls.

At the bottom: KE is maximum, GPE is zero.

3. Forces

A force is a push or pull. Forces can change the speed, direction, or shape of an object.

- Contact forces: applied force, friction, normal force, tension, air resistance
- Non-contact forces: gravity, magnetism, electrostatic force

Gravity

Gravity is a force of attraction between masses. On Earth, $g = 10 \text{ m/s}^2$ (gravitational acceleration).

FORMULA: Weight = mass $\times$ g ($W = mg$)

Note: mass is in kg, weight is in Newtons (N)

Friction

Friction is a force that opposes motion. It acts between surfaces in contact.

- Friction can be reduced using lubricants, rollers, or smooth surfaces
- Friction is useful in brakes, gripping shoes, writing with a pen