

Energy

$$KE = 1/2mv^2$$

$$F = \Delta p / \Delta t$$

$$\Delta GPE = mg\Delta h$$

$$W = Fd = \Delta E$$

$$W = Fd$$

$$(\%) \text{ efficiency} = (\text{useful energy output}) / (\text{total energy input}) \times 100\%$$

$$(\%) \text{ efficiency} = (\text{useful power output}) / (\text{total power input}) \times 100\%$$

$$P = W / t$$

$$P = \Delta E / t$$

$$p = F / A$$

$$\Delta p = \rho g \Delta h$$

$$T (\text{in K}) = \theta (\text{in } ^\circ\text{C}) + 273$$

$$pV = \text{constant}$$

$$c = \Delta E / m\Delta\theta$$

Forces

$$\Delta p = \rho g \Delta h \text{ (liquid pressure)}$$

$$\text{Pressure} = \text{force} / \text{area}$$

$$W = m \times g$$

$$KE = 1/2mv^2$$

$$a = v - u / t$$

$$R.F = F.F - B.F$$

$$R.F \text{ or } F = m \times a$$

$$R.F \text{ or } F = m \times a = m \times (v - u / t) = mv - mu / t = \text{change in momentum} / t$$

$$F = \Delta \text{ momentum or } P / \Delta t$$

$$\text{impulse} = R.F \text{ or } F \times \Delta t$$

$$\text{impulse} = \text{change in momentum} / \text{change in time}$$

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2 \text{ (conservation of momentum)}$$

$$m_1u_1 + m_2u_2 = (m_1 + m_2) \times v \text{ (when objects stick together)}$$

Thermal physics

$$KE = 1/2mv^2$$

$$F = \Delta p / \Delta t$$

p is inversely proportional to V

$$W = Fd = \Delta E$$

$$p_1v_1 = p_2v_2$$

$$c = \Delta E / m\Delta\theta$$

specific heat capacity = change in thermal energy / mass x change in temperature

$$P = \Delta E / t$$

$$p = F / A$$

$$\Delta p = \rho g \Delta h$$

$$T (\text{in K}) = \theta (\text{in } ^\circ\text{C}) + 273$$

$$pV = \text{constant}$$

$$c = \Delta E / m\Delta\theta$$

waves

where n is the refractive index, V is speed of light

$$n = \sin(i) / \sin(r)$$

$$n = 1 / \sin(c)$$

$$n_2/n_1 = V_1/V_2 = \sin(i) / \sin(r)$$

$$n (\text{in air}) = 1$$

$$V (\text{in air}) = 3 \times 10^8$$

$$v = f \lambda$$

State the approximate range of frequencies audible to humans as 20Hz to 20000Hz

speed of sound in air is approximately 330–350m/s

Define ultrasound as sound with a frequency higher than 20kHz

Electrical quantities

potential difference is the work done by a unit charge passing through a component, measured between two points in volts (V)

electromotive force (e.m.f.) is the electrical work done by a source in moving a unit charge around a complete circuit measured in volts (V)

kilowatt-hour 1 kWh = 3.6×10^6 J (kWh) 1000 watts per one hour

resistance, the opposition of a component to the flow of electric current through it measured in ohms (Ω)

charge is measured in coulombs, where one coulomb is the charge on 6.24×10^{18} electrons

$$R_1/R_2 = V_1/V_2$$

$$R \text{ total} = R_1 \times R_2 = R_1 + R_2 \text{ or product/sum}$$

resistance is directly proportional to length (b)	the p.d. across an arrangement of parallel resistances is the same as the p.d. across one branch in the arrangement of the parallel resistances
resistance is inversely proportional to cross-sectional area	

the sum of the currents entering a junction in a parallel circuit is equal to the sum of the currents that leave the junction	the total p.d. across the components in a series circuit is equal to the sum of the individual p.d.s across each component
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Space Physics

$v = 2\pi r/T$ where r is the average radius of the orbit and T is the orbital period; recall and use this equation

one astronomical distances can be light-year is measured in light-years, where one light-year is the distance travelled in (the vacuum of) space by light in one year
to 9.5×10^{15} m

the diameter of the Milky Way is approximately 100000 light-years

$H_0 = v/d$ Define the Hubble constant H_0 as the ratio of the speed at which the galaxy is moving away from the Earth to its distance from the Earth

$d/v = 1/H_0$ represents an estimate for the age of the Universe

speed of light in a vacuum is 3×10^8

Electricity

$I = Q / t$

$emf = W/Q$

$pd = W/Q$

$R = V/I$

$P = IV$

$E = IVt$

$R_1/R_2 = V_1/V_2$

$R_{total} = R_1 \times R_2 = R_1 + R_2$ or product/sum

Motion

Density = Mass/ Volume

(constant) $S = \text{distance} / \text{time}$

$a = v-u / t$

D (while accelerating) = $v+u \times t$

$D = \text{area under the graph}$

$W = m \times g$

$R.F / F = m \times a$

$R.F = F.F - B.F$

Moment = force x perpendicular distance from the pivot

Pressure = force / area

(Liquid) pressure = Density x g x height

$X = L_{new} - L_{original}$

$F = k/x$, where k is the spring constant



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Not published yet.
Last updated 30th April, 2026.
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