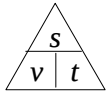
FORCES AND MOTION

1. Average speed $= \dfrac{\text{Total distance travelled}}{\text{Time taken}}$

$v = \dfrac{s}{t}$ $\quad s = vt$ $\quad t = \dfrac{s}{v}$



2. Acceleration, $a = \dfrac{v-u}{t}$

3. a. $v = u + at$ b. $s = \left(\dfrac{u+v}{2}\right)t$

c. $s = ut + \dfrac{1}{2}at^2$ d. $v^2 = u^2 + 2as$

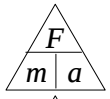
e. Average speed = $\dfrac{u+v}{2}$

4. Momentum $= mv$

5. a. Change of momentum $= mv - mu$

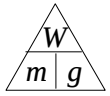
b. Impulse $= Ft = mv - mu$

6. a. $F = \dfrac{mv-mu}{t}$



b. Resultant force, $F = ma$

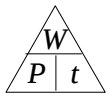
7. a. Weight of object, $W = mg$



b. Gravitational field strength, $g = \dfrac{W}{m}$

8. Work done, $W = Fs$

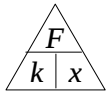
9. Power, $P = \dfrac{W}{t}$



10. a. Kinetic energy = $\dfrac{1}{2}mv^2$

b. Potential energy = mgh

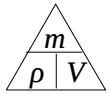
11. a. Hooke's law: $F = kx$



b. Elastic potential energy = $\dfrac{1}{2}Fx = \dfrac{1}{2}kx^2$

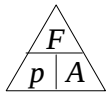
FORCES AND PRESSURE

12. a. Density, $\rho = \dfrac{m}{V}$



b. Mass, $m = \rho V$

c. Volume, $V = \dfrac{m}{\rho}$



13. a. Pressure, $p = \dfrac{F}{A}$ b. Force, $F = pA$

14. Pressure in a liquid, $p = h\rho g$

15. Archimedes' Principle

Buoyant force = weight of liquid displaced = ρVg

16. Law of flotation

Weight of object = Buoyant force

$mg = \rho Vg$

17. Pascal's principle: $\dfrac{F_1}{A_1} = \dfrac{F_2}{A_2}$

HEAT

18. Temperature, $\theta = \left(\dfrac{X_\theta - X_{\text{ais}}}{X_{\text{stim}} - X_{\text{ais}}}\right) \times 100^\circ\text{C}$

19. Heat absorbed or heat released, $Q = mc\theta$

20. Latent heat, $Q = ml$

21. Absolute temperature, $T\ \text{K} = \theta\ ^\circ\text{C} + 273$

22. a. Boyle's law : $p_1V_1 = p_2V_2$

b. Pressure law : $\dfrac{p_1}{T_1} = \dfrac{p_2}{T_2}$

c. Charles' law : $\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}$

LIGHT

23. Focal length of curved mirror, $f = \dfrac{r}{2}$

24. a. Refractive index, $n = \dfrac{\sin i}{\sin r}$

b. Refractive index, $n = \dfrac{1}{\sin c}$

c. Refractive index, $n = \dfrac{\text{Real depth}}{\text{Apparent depth}}$

d. Refractive index,

$n = \dfrac{\text{Speed of light in vacuum}}{\text{Speed of light in medium}}$

25. Power of a lens, $P = \dfrac{1}{f}$

26. Lens formula: $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$

27. Linear magnification, $m = \dfrac{\text{Height of object}}{\text{Height of image}} = \dfrac{v}{u}$

28. Astronomical telescope

a. Magnifying power of telescope, $M = \dfrac{f_o}{f_e}$

b. Distance between lenses = $f_o + f_e$

WAVES

29. Frequency, $f = \frac{1}{T}$

30. Wave speed, $v = f\lambda$

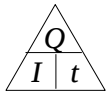
31. Young's double slit experiment

Separation of fringes, $x = \frac{\lambda D}{a}$ $\lambda = \frac{ax}{D}$

ELECTRICITY

32. a. Charge, $Q = It$

b. Current, $I = \frac{Q}{t}$



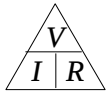
33. Potential difference or voltage, $V = \frac{W}{Q}$

34. Energy transferred, $W = QV$

35. a. Resistance, $R = \frac{V}{I}$

b. Potential difference or voltage, $V = IR$

c. Current, $I = \frac{V}{R}$



36. Resistors in SERIES:

a. $R = R_1 + R_2 + R_3$

b. same current flows in each resistor

c. p.d. across a resistor $\propto R$

37. Resistors in PARALLEL:

a. $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

b. same p.d. across the resistors

c. current in a resistor $\propto \frac{1}{R}$

38. a. Energy, $W = IVt$

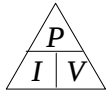
b. Energy, $W = I^2Rt$

c. Energy, $W = \frac{V^2}{R}t$

39. a. Power, $P = \frac{W}{t}$ b. Energy, $W = Pt$

40. a. Power, $P = IV$

b. Power, $P = I^2R$

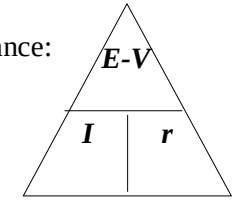


c. Power, $P = \frac{V^2}{R}$

41. For battery with internal resistance:

a. EMF, $E = V + Ir$

b. $E = I(R + r)$



ELECTROMAGNETISM

42. Transformer

a. $\frac{V_S}{V_P} = \frac{N_S}{N_P}$ b. $I_S V_S = I_P V_P$

c. Efficiency = $\frac{\text{Output power}}{\text{Input power}} \times 100\%$

Efficiency = $\frac{I_S V_S}{I_P V_P} \times 100\ \%$

43. Transmission of electricity

a. Power transmitted, $P = IV$

b. Power dissipated, $P = I^2R$

RADIOACTIVITY

44. Einstein's equation : $E = mc^2$

Physical Quantity	*Symbol*	Unit
Speed / Velocity	v	m s^{-1}
Distance / Displacement	s, d	m
Time	t	s
Acceleration	a	m s^{-2}
Momentum	p	kg m s^{-1} , N s
Force	F	N
Impulse	Ft	N s
Weight	W	N
Work done	W	J
Energy	E	J
Power	P	J s^{-1},W
Density	ρ	kg m^{-3}
Volume	V	m^3
Extension of spring	x, e	cm, m
Force constant	k	N cm^{-1} , N m^{-1}
Pressure	P	Pa
Area	A	m^2
Temperature in celsius	θ	^oC
Heat	Q	J
Specific heat capacity	c	J kg^{-1} $^oC^{-1}$

Specific latent heat	l	J kg^{-1}
Absolute temperature	T	K
Focal length	f	mm, cm, m
Radius of curvature	r	mm, cm, m
Angle of incidence	i	degree (^{o})
Angle of refraction	r	degree (^{o})
Refractive index	n	–
Critical angle	c	degree (^{o})
Power of a lens	P	dioptre (D)
Object distance	u	cm, m
Image distance	v	cm, m
Period	T	s
Frequency	f	Hz
Wavelength	λ	cm, m
Electric charge	Q	C
Current	I	A
Potential difference	V	V
Resistance	R	Ω
Electrical energy	W	J
Electrical power	P	W
Electromotive force (emf)	E	V
Internal resistance	r	Ω
Peak voltage	V_o	V
Charge of an electron	e	C
Speed of light	c	m s^{-1}