Which equation would you use to calculate ...

weight?

Given ...
- mass
- gravitational field strength.

weight = mass × gravitational field strength

$$W = m\ g$$

- weight, N
- mass, kg
- gravitational field strength, m/s^2

Rearrange to find:

$m = W \div g$ $\quad$ $g = W \div m$

Which equation would you use to calculate ...

work done?

Given ...
- force
- distance.

work done = force × distance

$$W = Fs$$

- work done, J
- force, N
- distance, m

Rearrange to find:

$F = W \div s$ $\quad$ $s = W \div F$

Which equation would you use to calculate ...

force applied to a spring?

Given ...
- spring constant
- extension.

force applied to a spring = extension × spring constant

$$F = e\ k$$

- force applied to spring, N
- extension, m
- spring constant, N/m

Rearrange to find:

$e = F \div k$ $\quad$ $k = F \div e$

Which equation would you use to calculate ...

distance?

Given ...
- speed
- time.

$$\text{distance} = \text{speed} \times \text{time}$$

$$s = v\,t$$

- distance, m
- speed, m/s
- time, s

Rearrange to find:

$v = s \div t$ $\quad$ $t = s \div v$

Which equation would you use to calculate ...

acceleration?

Given ...
- change in velocity
- time taken.

$$\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$$

$$a = \frac{\Delta v}{t}$$

- acceleration, m/s^2
- change in velocity, m/s
- time taken, s

Rearrange to find:

$\Delta v = a \times t$ $\quad$ $t = \Delta v \div a$

Which equation would you use to calculate ...

resultant force?

Given ...
- mass
- acceleration.

$$\text{resultant force} = \text{mass} \times \text{acceleration}$$

$$F = m\,a$$

- resultant force, N
- mass, kg
- acceleration, m/s^2

Rearrange to find:

$m = F \div a$ $\quad$ $a = F \div m$

Which equation would you use to calculate ...

momentum?

Given ...
- mass
- velocity.

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$p = m\,v$$

- momentum, kg m/s
- mass, kg
- velocity, m/s

Rearrange to find:

$m = p \div v$ $\quad$ $v = p \div m$

Which equation would you use to calculate ...

kinetic energy?

$$\text{kinetic energy} = 0.5 \times \text{mass} \times (\text{speed})^2$$

$$E_k = \frac{1}{2} m\,v^2$$

- kinetic energy, J
- mass, kg
- speed, m/s

Which equation would you use to calculate ...

gravitational potential energy (GPE)?

$$\text{GPE} = \text{mass} \times \text{gravitational field strength} \times \text{height}$$

$$E_p = m\,g\,h$$

- gravitational potential energy, J
- mass, kg
- gravitational field strength, N/kg
- height, m

Which equation would you use to calculate ...

power?

Given ...
- energy transferred
- time.

$$\text{power} = \frac{\text{energy transferred}}{\text{time}}$$

$$P = \frac{\mathrm{E}}{\mathrm{t}}$$

- power, W
- energy transferred, J
- time, s

Rearrange to find:

$E = P \times t$ $\quad$ $t = E \div P$

Which equation would you use to calculate ...

power?

Given ...
- work done
- time.

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$P = \frac{W}{t}$$

- power, W
- work done, J
- time, s

Rearrange to find:

$W = P \times t$ $\quad$ $t = W \div P$

Which equation would you use to calculate ...

efficiency?

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

or

$$\text{efficiency} = \frac{\text{useful power output}}{\text{total power input}}$$

Which equation would you use to calculate ...

wave speed?

Given ...
- frequency
- wavelength.

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$v = f\lambda$$

- wave speed, m/s
- frequency, Hz
- wavelength, m

Rearrange to find:

$f = v \div \lambda$ $\lambda = v \div f$

Which equation would you use to calculate ...

charge flow?

Given ...
- current
- time.

$$\text{charge flow} = \text{current} \times \text{time}$$

$$Q = I\,t$$

- charge flow, C
- current, A
- time, s

Rearrange to find:

$I = Q \div t$ $t = Q \div I$

Which equation would you use to calculate ...

potential difference?

Given ...
- current
- resistance.

$$\text{potential difference} = \text{current} \times \text{resistance}$$

$$V = I\,R$$

- potential difference, in volts, V
- current, in amps, A
- resistance, in ohms, Ω

Rearrange to find:

$I = V \div R$ $R = V \div I$

Which equation would you use to calculate ...

power?

Given ...
- potential difference
- current.

$$\text{power} = \text{potential difference} \times \text{current}$$

$$P = V\ I$$

- power, W
- potential difference, V
- current, A

Rearrange to find:

$V = P \div I$ $\quad$ $I = P \div V$

Which equation would you use to calculate ...

power?

Given ...
- current
- resistance.

$$\text{power} = (\text{current})^2 \times \text{resistance}$$

$$P = I^2\ R$$

- power, W
- current, A
- resistance, Ω

Rearrange to find:

$I^2 = P \div R$ $\quad$ $R = P \div I^2$

Which equation would you use to calculate ...

energy transferred?

Given ...
- charge flow
- potential difference.

$$\text{energy transferred} = \text{charge flow} \times \text{potential difference}$$

$$E = Q\ V$$

- energy transferred, J
- charge flow, C
- potential difference, V

Rearrange to find:

$Q = E \div V$ $\quad$ $V = E \div Q$

Which equation would you use to calculate ...

density?

Given ...
- mass
- volume.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

$$\rho = \frac{m}{V}$$

- density, kg/m^3
- mass, kg
- volume, m^3

Rearrange to find:

$m = \rho \times V$ $\quad$ $V = m \div \rho$

Which equation would you use to calculate ...

pressure?

Given ...
- force
- area.

Physics only

$$\text{pressure} = \frac{\text{force normal to a surface}}{\text{area of that surface}}$$

$$P = \frac{F}{A}$$

- pressure, N/m^2
- force, N
- area, m^2

Rearrange to find:

$F = A \times P$ $\quad$ $A = F \div P$

Which equation would you use to calculate ...

the moment of a force?

Given ...
- force
- distance.

Physics only

$$\text{moment of a force} = \text{force} \times \text{distance}$$

$$M = F\,d$$

- moment of a force, Nm
- force, N
- distance, m

(NB: Distance, d, is the perpendicular distance from the pivot to the line of action of the force, in metres, m.)

Equation summary sheet

1	Weight	
2	Work done	
3	Force	
4	Distance	
5	Force applied to a spring	
6	Kinetic energy	
7	Mass (related to kinetic energy)	
8	Velocity (related to kinetic energy)	
9	Gravitational potential energy	
10	Mass (related to GPE)	
11	Height (related to GPE)	
12	Energy transferred (2 equations)	
13	Power	
14	Efficiency	
15	Efficiency in %	
16	Efficiency (electricity)	
17	Potential difference (voltage)	
18	Current (2 equations)	

19	**Resistance**	
20	**Charge flow**	
21	**Power (electricity) (2 equations)**	
22	**Distance travelled**	
23	**Speed**	
24	**Acceleration**	
25	**Resultant force**	
26	**Wave speed**	
27	**Density**	

28		**$Ee = 0.5\ ke^2$** elastic potential energy (J) = 0.5 x spring constant(N/m) x extention^2(m)
29		**E= mL** E (J) = Mass (kg) x specific latent heat (J/kg)
30		**$\Delta E = mc\Delta\theta$** change in thermal energy (J) = mass (kg) x specific heat capacity (J/kg °C) x temperature change (°C)

Teaching notes

The resource consists of a set of cards and an equation summary sheet for students to fill in.

The cards can be cut out, folded in half and laminated to produce a set.

They could be used as flashcards – show students the question and ask them to recall the equation needed to solve it.

The cards could also be tied together into sets and used as reference tool for students or as example questions.

The summary sheet could be kept in students notes for them to fill in as they encounter equations during the course. It could be used as a revision challenge to help recall of the equations.