# Equations to recall and apply

## For GCSE (9-1) Combined Science A or GCSE (9-1) Physics A (Gateway Science), you will need to know these equations:

|  | **Mathematical learning outcomes Recall and apply**  | **Symbolic equation (optional)**  |
| --- | --- | --- |
|  | $$density = \frac{mass }{volume}$$ | $$ρ = \frac{m}{V}$$ |
|  | distance travelled $= speed × time$ | $$s = v t$$ |
|  | $$acceleration = \frac{change in velocity }{time}$$ | $$a = \frac{v-u}{t}$$ |
|  | $$kinetic energy = \frac{1}{2} × mass × (speed)^{2}$$ | $E =$$\frac{1}{2} m v^{2}$ |
|  | $$force = mass × acceleration$$ | $$F = m a$$ |
| **HT\*** | $$momentum = mass × velocity$$ | $$p = m v$$ |
|  | $work done = force × distance$ (along the line of action of the force) | $$W = F s$$ |
|  | $$power = \frac{work done }{time}$$ | $$P = \frac{W}{t}$$ |
|  | force exerted by a spring $= spring constant × extension$ | $$F = k x$$ |
|  | gravitational force $= mass × gravitational field strength$ | $$W = m g$$ |
|  | gravitational potential energy $= mass × gravitational field strength × height$ | $$E = m g h$$ |
|  | charge flow $= current × time$ | $$Q = I t$$ |
|  | potential difference $= current × resistance$ | $$V = I R$$ |
|  | energy transferred $= charge × potential difference$ | $$E = Q V$$ |
|  | power $= potential difference × current$ | $$P = V I$$ |
|  | power $= (current)^{2} × resistance$ | $$P = I^{2} R$$ |
|  | energy transferred $= power × time$ | $$E = P t$$ |
|  | wave speed $= frequency × wavelength$ | $$v = f λ$$ |
|  | $$efficiency = \frac{useful output energy transfer }{input energy transfer}$$ |  |

## For GCSE (9-1) Physics A (Gateway Science), you will also need to know these equations:

|  | **Mathematical learning outcomes Recall and apply**  | **Symbolic equation (optional)**  |
| --- | --- | --- |
|  | $$pressure = \frac{force normal to a surface }{area of that surface}$$ | $$p = \frac{F}{A}$$ |
|  | $moment of a force = force × distance$ (normal to direction of the force) | $$M = F d$$ |

\* **HT** indicates this equation is required for Higher Tier only



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