# Edexcel Formula List



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# Introduction

As of January 2021, these are the formulas that students are expected to recall and use in the exam. There are other formulas which students may be expected to use but these are provided in the exam.

In formula lists, those which are shaded are required only for Physics, not Double Science.

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# Motion and Forces

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| distance | *s* | metre (m) |
| time | *t* | second (s) |
| speed, velocity | *v* | metres per second (m/s) |
| acceleration | *a* | metres per second squared ($m/s^2$) |
| mass | *m* or *M* | kilogram (kg) |
| force | *F* | newton (N) |
| weight | *W* | newton (N) |
| gravitational field strength | *g* | newtons per kilogram (N/kg)<br>(on Earth, $g = 10$ N/kg) |
| momentum | *p* | kilogram metres per second (kg m/s) |

| | | |
|---|---|---|
| distance | distance travelled (m) = average speed (m/s) × time (s) | $s = v \times t$ |
| acceleration | $\text{acceleration (m/s}^2\text{)} = \frac{\text{change in velocity (m/s)}}{\text{time taken (s)}}$ | $a = \frac{(v - u)}{t}$ |
| Newton's Second Law | force (N) = mass (m) × acceleration ($m/s^2$) | $F = m \times a$ |
| weight | weight (N) = mass (kg) × grav.field (N/kg) | $W = m \times g$ |
| momentum<br>**(HT only)** | momentum (kg m/s) = mass (kg) × velocity (m/s) | $p = m \times v$ |

# Energy

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| time | $t$ | second (s) |
| speed, velocity | $v$ | metres per second (m/s) |
| height | $h$ | metre (m) |
| gravitational field strength | $g$ | newtons per kilogram (N/kg)<br>(on Earth, g = 10 N/kg) |

| | | |
|---|---|---|
| GPE | change in GPE = mass × gravitational field strength × change in vertical height | $\Delta GPE = m \times g \times \Delta h$ |
| KE | kinetic energy = $\frac{1}{2}$ × mass × speed$^2$ | $KE = \frac{1}{2} \times m \times v^2$ |
| efficiency | efficiency = $\frac{\text{useful energy transferred } \textit{by} \text{ device (J)}}{\text{total energy supplied } \textit{to} \text{ device (J)}}$ | |

# Waves

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| distance | $x$ | metre (m) |
| time | $t$ | second (s) |
| speed, velocity | $v$ | metres per second (m/s) |
| frequency | $f$ | hertz (Hz) |
| wavelength | $\lambda$ *(lambda)* | metre (m) |

| | | |
|---|---|---|
| wave equation | velocity (m/s) = frequency (Hz) × wavelength (m) | $v = f \times \lambda$ |
| wave speed | wave speed (m/s) = $\frac{\text{distance (m)}}{\text{time (s)}}$ | $v = \frac{x}{t}$ |

# Forces and their effects

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| force | $F$ | newton (N) |
| distance | $d$ | metre (m) |
| work done | $E$ | joule (J) |
| time | $t$ | second (s) |
| power | $P$ | watt (W), or joules per second (J/s) |
| moment | | newton metre (Nm) |

| | | |
|---|---|---|
| work done | work done (J) = force (N) × distance (m) | $E = F \times d$ |
| power | power (W) = $\frac{\text{work done (J)}}{\text{time (s)}}$ | $P = \frac{E}{t}$ |
| moment | moment (Nm) = force (N) × distance normal to the direction of the force (m) | |

# Electricity

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| charge | $Q$ | coulomb (C) |
| potential difference, p.d. | $V$ | volt (V) |
| current | $I$ | ampere *or* amp (A) |
| resistance | $R$ | ohm (Ω) |
| time | $t$ | second (s) |
| energy | $E$ | joule (J) |
| power | $P$ | watt (W) or joules per second (J/s) |

| | | |
|---|---|---|
| energy | energy (J) = charge (C) × potential difference (V) | $E = Q \times V$ |
| charge | charge (C) = current (A) × time (s) | $Q = I \times t$ |
| Ohm's Law | potential difference (V) = current (A) × resistance (Ω) | $V = I \times R$ |
| power | power (W) = $\frac{\text{energy transferred (J)}}{\text{time (s)}}$ | $P = \frac{E}{t}$ |
| electrical power | power (W) = current (A) × potential difference (V) | $P = I \times V$ |
| electrical power | electrical power (W) = current (A) squared × resistance (Ω) | $P = I^2 \times R$ |

# Particles

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| mass | $m$ | kilogram (kg) |
| volume | $V$ | metres cubed ($m^3$) |
| density | $\rho$ *(rho)* | kilograms per metre cubed ($kg/m^3$) |

| | | |
|---|---|---|
| density | density ($kg/m^3$) = $\frac{\text{mass (kg)}}{\text{volume (}m^3\text{)}}$ | $\rho = \frac{m}{V}$ |

# Forces and Matter

| Variable | Symbol | Unit (abbreviation) |
|---|---|---|
| force | $F$ | newton (N) |
| area | $A$ | metres squared ($m^2$) |
| spring constant | $k$ | newtons per metre (N/m) |
| extension | $x$ | metre (m) |
| pressure | $p$ | pascals (Pa) *or* newtons per metre squared ($N/m^2$) |

| | | |
|---|---|---|
| Hooke's Law | force exerted on a spring (N) = spring constant (N/m) × extension (m) | $F = k \times x$ |
| pressure | pressure (Pa) = $\frac{\text{force normal to area (N)}}{\text{area of surface (m}^2\text{)}}$ | $p = \frac{F}{A}$ |

Sources:

**https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/Specification/GCSE_Physics_Spec.pdf**

**https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/Specification/GCSE_CombinedScience_Spec.pdf**