# Formulas for national tests in mathematics level 1 and mathematics 1

## PREFIXES

| Symbol | T | G | M | k | h | da | d | c | m | µ | n | p |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | tera | giga | mega | kilo | hecto | deca | deci | centi | milli | micro | nano | pico |
| Power of ten | $10^{12}$ | $10^{9}$ | $10^{6}$ | $10^{3}$ | $10^{2}$ | $10^{1}$ | $10^{-1}$ | $10^{-2}$ | $10^{-3}$ | $10^{-6}$ | $10^{-9}$ | $10^{-12}$ |

## EXPONENTS

For all real numbers $x$ and $y$ and positive numbers $a$ and $b$

$$a^x a^y = a^{x+y} \qquad \frac{a^x}{a^y} = a^{x-y} \qquad \left(a^x\right)^y = a^{xy} \qquad a^{-x} = \frac{1}{a^x}$$

$$a^x b^x = (ab)^x \qquad \frac{a^x}{b^x} = \left(\frac{a}{b}\right)^x \qquad a^{\frac{1}{n}} = \sqrt[n]{a} \qquad a^0 = 1$$

## FUNCTIONS

**Straight line**

$$y = kx + m$$

$$k = \frac{y_2 - y_1}{x_2 - x_1}$$

$ax + by + c = 0$ where neither $a$ nor $b$ are zero

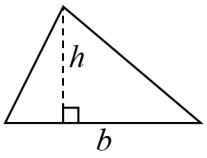
**Exponential function** $y = Ca^x$ where $a > 0$ and $a \neq 1$

**Power function** $y = Cx^a$

## GEOMETRY

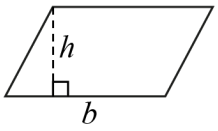
**Triangle**

$$A = \frac{bh}{2}$$



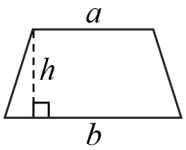

**Parallelogram**

$$A = bh$$




**Parallel trapezium**

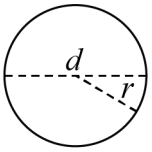
$$A = \frac{h(a+b)}{2}$$




**Circle**

$$A = \pi r^2 = \frac{\pi d^2}{4}$$

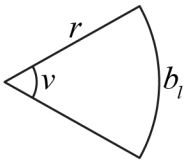
$$C = 2\pi r = \pi d$$




**Circle sector**

$$A = \frac{v}{360°} \cdot \pi r^2$$

$$b_l = \frac{v}{360°} \cdot 2\pi r$$



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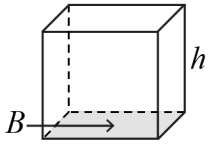
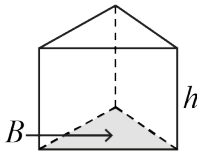
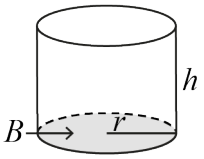
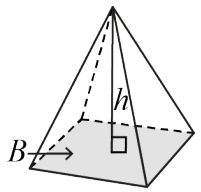
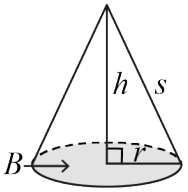
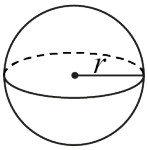
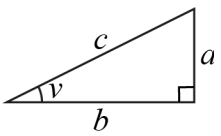
| | | |
|---|---|---|
| **Cuboid** | $V = Bh$ |  |
| **Prism** | $V = Bh$ |  |
| **Cylinder**<br>Right circular cylinder | $V = Bh$<br>Lateral surface area<br>$A_L = 2\pi rh$ |  |
| **Pyramid** | $V = \frac{Bh}{3}$ |  |
| **Cone**<br>Right circular cone | $V = \frac{Bh}{3}$<br>Lateral surface area<br>$A_L = \pi rs$ |  |
| **Sphere** | $V = \frac{4\pi r^3}{3}$<br>$A = 4\pi r^2$ |  |
| **Scale** | area scale factor = (length scale factor)$^2$<br>volume scale factor = (length scale factor)$^3$ | |

For a right-angled triangle with sides $a$, $b$ and $c$

**Pythagoras's theorem** $a^2 + b^2 = c^2$




**Trigonometry** $\sin v = \frac{a}{c}$ $\cos v = \frac{b}{c}$ $\tan v = \frac{a}{b}$

## VECTORS

For the vectors $\vec{u} = \left(a_x, a_y\right)$ and $\vec{v} = \left(b_x, b_y\right)$ and the scalar $s$

$\vec{u} + \vec{v} = \left(a_x + b_x, a_y + b_y\right)$ $\vec{u} - \vec{v} = \left(a_x - b_x, a_y - b_y\right)$

$s \cdot \vec{u} = \left(sa_x, sa_y\right)$ $\left|\vec{u}\right| = \sqrt{a_x^2 + a_y^2}$



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