Formula book

General Mathematics v1.2

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Mensuration			
circumference of a circle	$C = 2\pi r$	**area of a circle**	$A = \pi r^2$
area of a parallelogram	$A = bh$	**area of a trapezium**	$A = \frac{1}{2}(a+b)h$
area of a triangle	$A = \frac{1}{2}bh$	**total surface area of a cone**	$S = \pi rs + \pi r^2$
total surface area of a cylinder	$S = 2\pi rh + 2\pi r^2$	**surface area of a sphere**	$S = 4\pi r^2$
volume of a cone	$V = \frac{1}{3}\pi r^2 h$	**volume of a cylinder**	$V = \pi r^2 h$
volume of a prism	$V = Ah$	**volume of a pyramid**	$V = \frac{1}{3}Ah$
volume of a sphere	$V = \frac{4}{3}\pi r^3$		
Heron's rule	$A = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{a+b+c}{2}$		
Earth geometry	$D = 111.2 \times$ angular distance	$D = 111.2\cos\theta \times$ angular distance	

Finance			
simple interest	$I = Pin$	**compound interest**	$A = P(1+i)^n$
effective annual rate of interest	$i_{\text{effective}} = \left(1 + \frac{i}{n}\right)^n - 1$	**dividend yield**	$\frac{\text{dividend}}{\text{share price}} \times 100$
price to earnings ratio (of a share)	$\text{P/E ratio} = \frac{\text{market price per share}}{\text{annual earnings per share}}$		
recurrence relation for reducing balance loans	$A_{n+1} = rA_n - R$	**recurrence relation for compound interest**	$A_{n+1} = rA_n$
recurrence relation for annuities	$A_{n+1} = rA_n + d$		
annuities	$A = M\left(\frac{(1+i)^n - 1}{i}\right)$	$A = M\left(\frac{1-(1+i)^{-n}}{i}\right)$	

Sequences	
arithmetic sequence	$t_n = t_1 + (n-1)d$
geometric sequence	$t_n = t_1 r^{(n-1)}$

Networks and matrices	
Euler's formula	$v + f - e = 2$

Trigonometry			
Pythagoras' theorem	$c^2 = a^2 + b^2$		
trigonometric ratios	$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$	$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$
cosine rule	$c^2 = a^2 + b^2 - 2ab\cos C$		
sine rule	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$		
area of a triangle	$\text{area} = \frac{1}{2}bc\sin A$		

Statistics	
mean	$\bar{x} = \frac{\sum x_i}{n}$
median	$\left(\frac{n+1}{2}\right)^{\text{th}}$ data value
least-squares line (slope)	$b = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sum(x_i - \bar{x})^2} = r\frac{s_y}{s_x}$
least-squares line (intercept)	$a = \bar{y} - b\bar{x}$
correlation coefficient (r)	$r = \frac{1}{n-1}\sum\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$
standard deviation	$s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$
outliers (identifying)	$Q_1 - 1.5 \times \text{IQR} \le x \le Q_3 + 1.5 \times \text{IQR}$