

# Mathematics Methods Units 1 and 2 Formula Sheet

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## Measurement

Circumference of circle, radius  $r$   
 $C = 2\pi r$

Arc length of circle, central angle  $\theta$   
 $l = r\theta$

Area of circle  
 $A = \pi r^2$

Area of sector  
 $A = \frac{1}{2}r^2\theta$

Area of segment  
 $A = \frac{1}{2}r^2(\theta - \sin\theta)$

## Trigonometry

$$\sin(-\theta) = -\sin\theta$$

$$\cos(-\theta) = \cos\theta$$

$$\tan(-\theta) = -\tan\theta$$

$$\sin\left(\theta + \frac{\pi}{2}\right) = \cos\theta$$

$$\cos\left(\theta - \frac{\pi}{2}\right) = \sin\theta$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\sin(\theta \pm \phi) = \sin\theta \cos\phi \pm \cos\theta \sin\phi$$

$$\cos(\theta \pm \phi) = \cos\theta \cos\phi \mp \sin\theta \sin\phi$$

$$\tan(\theta \pm \phi) = \frac{\tan\theta \pm \tan\phi}{1 \mp \tan\theta \tan\phi}$$

In any triangle  $ABC$

Sine rule

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Cosine rule

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Area

$$A = \frac{1}{2}ab \sin C$$

$$A = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{a+b+c}{2}$$

## Function

$$\text{If } ax^2 + bx + c = 0 \text{ then } x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

## Probability

$$P(\bar{A}) = 1 - P(A)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cap B) = P(A)P(B|A) = P(B)P(A|B)$$

## Sequences and series

Arithmetic

$$a + (a + d) + (a + 2d) + (a + 3d) + \dots$$

$$T_{n+1} = T_n + d, T_1 = a$$

$$T_n = a + (n-1)d$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

Geometric

$$a + ar + ar^2 + ar^3 + \dots$$

$$T_{n+1} = rT_n, T_1 = a$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$S_\infty = \frac{a}{1-r}, |r| < 1$$

## Differential calculus

$$\text{If } f(x) = y \text{ then } f'(x) = \frac{dy}{dx}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\text{If } f(x) = x^n \text{ then } f'(x) = nx^{n-1}$$