

**Pure Mathematics 30 Formula Sheet**

The following information may be useful in writing this examination.

For  $ax^2 + bx + c = 0$ ,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

For two points  $(x_1, y_1)$  and  $(x_2, y_2)$ ,

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

**Exponents, Logarithms,  
and Geometric Series**

$$A = P(1 + i)^n$$

$$\log_a(M \times N) = \log_a M + \log_a N$$

$$\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$$

$$\log_a M^n = n \log_a M$$

$$\log_b c = \frac{\log_a c}{\log_a b}$$

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

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

$$S_n = \frac{(rt_n - a)}{r - 1}, r \neq 1$$

**Statistics and Probability**

$$z = \frac{x - \mu}{\sigma}$$

$$P(k) = {}_n C_k p^k (1 - p)^{n-k}$$

**Permutations and Combinations**

$${}_n P_r = \frac{n!}{(n-r)!}$$

$${}_n C_r = \frac{n!}{(n-r)!r!}$$

In the expansion of  $(x + y)^n$ , the general term is  $t_{k+1} = {}_n C_k x^{n-k} y^k$ .

$n! = n(n-1)(n-2)\dots 3 \times 2 \times 1$ , where  $n \in N$  and  $0! = 1$

**Graphing Calculator Window Format**

$$x: [x_{\min}, x_{\max}, x_{\text{scl}}]$$

$$y: [y_{\min}, y_{\max}, y_{\text{scl}}]$$

**Trigonometry**

$$a = r\theta$$

$$\csc x = \frac{1}{\sin x} \quad \sec x = \frac{1}{\cos x}$$

$$\cot x = \frac{1}{\tan x}$$

$$\tan x = \frac{\sin x}{\cos x} \quad \cot x = \frac{\cos x}{\sin x}$$

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

$$1 + \tan^2 x = \sec^2 x$$

$$1 + \cot^2 x = \csc^2 x$$

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\sin(2A) = 2 \sin A \cos A$$

$$\cos(2A) = \cos^2 A - \sin^2 A$$

**Conics****General Form**

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

where  $A, C, D, E, F \in I$

**Standard Form**

$$(x - h)^2 + (y - k)^2 = r^2$$

$$\frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

$$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = \pm 1$$

$$y - k = a(x - h)^2$$

$$x - h = a(y - k)^2$$