

## PRE-CALCULUS GRADE 12 FORMULA PAGE

The following information may be useful when writing this examination.

### Trigonometry

$$a = r\theta$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

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

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

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

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

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

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\tan(\alpha + \beta) = \frac{\tan \alpha + \tan \beta}{1 - \tan \alpha \tan \beta}$$

$$\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

$$= 2 \cos^2 \theta - 1$$

$$= 1 - 2 \sin^2 \theta$$

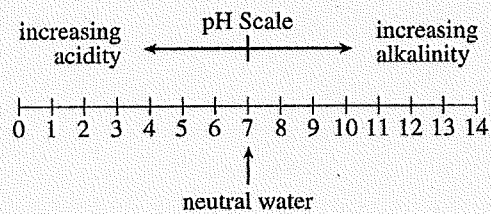
$$\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

### Algebra

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

### Logarithms

In chemistry, the pH scale measures the acidity ( $0 < 7$ ), alkalinity ( $7 > 14$ ), and neutrality (7) of a solution. It is a logarithmic scale in base 10. Thus, a solution of pH of 9 is 10 times more alkaline than a solution of pH of 8.



### Permutations and Combinations

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

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

In the expansion of  $(a + b)^n$ ,  
the general term is

$$t_{k+1} = {}_n C_k a^{n-k} b^k$$

$$A = A_0 \left(1 + \frac{r}{n}\right)^{nt}$$

$$A = A_0 (r)^{\frac{t}{c}}$$

$$A = A_0 \left(\frac{1}{2}\right)^{\frac{t}{c}}$$