SECTION 6

ASSESSMENT REFERENCE MATERIALS

Definitions and Formulas

ALGEBRA

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (a \neq 0)$$

Sum of an arithmetic series

$$S_n = \frac{n}{2}[2a + (n-1)d] = n\left(\frac{a + a_n}{2}\right)$$

Sum of a geometric series

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

Sum of an infinite geometric series

$$\sum_{n=0}^{\infty} ar^n = \frac{a}{1 - r}, |r| < 1$$

GEOMETRY

Arc length

$$s = r\theta$$

Volume of a right cone and a pyramid

$$V = \frac{1}{3}Bh$$

Surface area of a sphere

$$S = 4\pi r^2$$

Volume of a sphere

$$V = \frac{4}{3}\pi r^3$$

STATISTICS

Standard deviation of a sample mean = $\frac{\sigma}{\sqrt{n}}$

Sample variance = $\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n - 1}$

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

COORDINATE GEOMETRY

Distance formula

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

Midpoint formula

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Slope

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

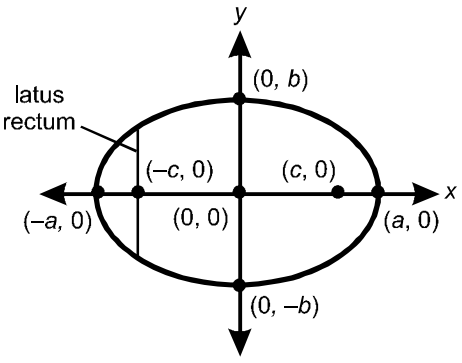
Eccentricity of a conic

$$e = \frac{c}{a}$$

Directrices of a conic

$$x = \pm\frac{a}{e} = \pm\frac{a^2}{c}$$

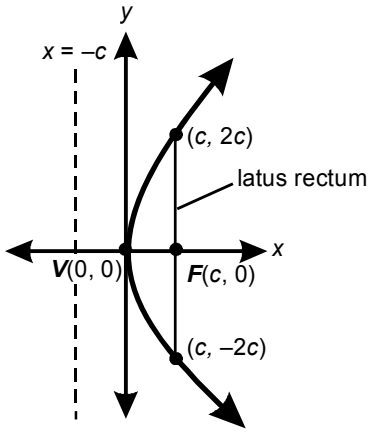
Ellipse



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

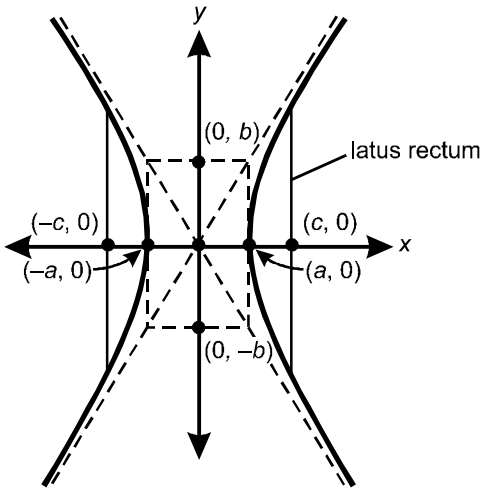
where $c^2 = a^2 - b^2$

Parabola



$$(y-k)^2 = 4c(x-h)$$

Hyperbola



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

where $b^2 = c^2 - a^2$

TRIGONOMETRY

$\sin(\theta_1 \pm \theta_2) = \sin\theta_1 \cos\theta_2 \pm \cos\theta_1 \sin\theta_2$

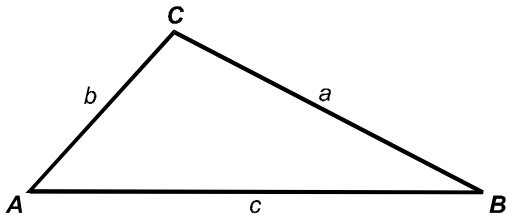
$\cos(\theta_1 \pm \theta_2) = \cos\theta_1 \cos\theta_2 \mp \sin\theta_1 \sin\theta_2$

$\tan(\theta_1 \pm \theta_2) = \dfrac{\tan\theta_1 \pm \tan\theta_2}{1 \mp \tan\theta_1 \tan\theta_2}$

$\sin\dfrac{\theta}{2} = \pm\sqrt{\dfrac{1-\cos\theta}{2}}$

$\cos\dfrac{\theta}{2} = \pm\sqrt{\dfrac{1+\cos\theta}{2}}$

$\tan\dfrac{\theta}{2} = \pm\sqrt{\dfrac{1-\cos\theta}{1+\cos\theta}}$



Law of sines

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

Law of cosines

$$c^2 = a^2 + b^2 - 2ab\cos C$$