

## Some Useful Mathematical Formulas

### Area-Volume

$C = 2 \pi r$	Circumference of a circle
$A = \pi r^2$	Area of a circle
$A = \frac{1}{2} b h$	Area of a triangle
$A = 4 \pi r^2$	Surface Area of a Cube
$V = \frac{4}{3} \pi r^3$	Voluma of a Cube
$V = \pi r^2 h$	Volume of a cylindir
$V = \frac{1}{3} \pi r^2 h$	Volume of a Cone
$A = \frac{1}{2}(b_1 + b_2).h$	Area of a Trapezoid
$A = b h$	Parallelogram

[h:height, b=base lenght  
(that it makes perpendicular angle wih the height)]

### Algebra

$$ax^2+bx+c=0 \rightarrow x = \frac{-b \pm \sqrt{(b^2-4ac)}}{2a}$$

$$x^2-y^2=(x-y).(x+y)$$

$$(x+y)^2 = x^2 + 2xy + y^2$$

$$(x-y)^2 = x^2 - 2xy + y^2$$

$$(x+y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$$

$$(x-y)^3 = x^3 - 3x^2y + 3xy^2 + y^3$$

$$X^m \cdot X^n = X^{(m+n)}$$

$$X^m / X^n = X^{(m-n)}$$

### Trigonometry

$$\tan \theta = \sin \theta / \cos \theta$$

$$\cot \theta = \cos \theta / \sin \theta$$

$$\sec \theta = 1 / \cos \theta \text{ (secant)}$$

$$\csc \theta = 1 / \sin \theta \text{ (cosecant)}$$

$$\cot \theta = 1 / \tan \theta \text{ (cotanjant)}$$

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

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

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

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

$$\tan (A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan (A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$\sin A + \sin B = 2 \sin \left( \frac{A+B}{2} \right) \cdot \cos \left( \frac{A-B}{2} \right)$$

$$\sin A - \sin B = 2 \cos \left( \frac{A+B}{2} \right) \cdot \sin \left( \frac{A-B}{2} \right)$$

$$\cos A + \cos B = 2 \cos \left( \frac{A+B}{2} \right) \cdot \cos \left( \frac{A-B}{2} \right)$$

$$\cos A - \cos B = 2 \sin \left( \frac{A+B}{2} \right) \cdot \sin \left( \frac{A-B}{2} \right)$$

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

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

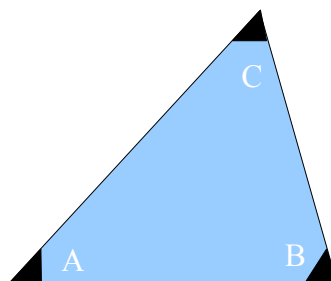
$$\csc^2 \theta = 1 + \cot^2 \theta$$

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

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

$$\sin (\theta/2) = \pm \sqrt{[(1-\cos \theta) / 2]}$$

$$\cos (\theta/2) = \pm \sqrt{[(1+\cos \theta) / 2]}$$



### Sinus

$$a / \sin A = b / \sin B = c / \sin C$$

### Cosinus Rule:

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

### Analitic Geome

$P_1(x_1, y_1)$  and  $P_2(x_2, y_2)$  and m:slope,

Distance,  $P_1P_2 = \sqrt{(x_1-x_2)^2 + (y_1-y_2)^2}$

Middle Point,  $x = (x_1+x_2) / 2, y = (y_1+y_2) / 2$

Slope,  $m = (y_2-y_1) / (x_2-x_1)$

Equation of the line,  $y = mx + b$

Parallel lines  $m_1=m_2$

Perpendicular lines  $m_1.m_2 = -1$

(a,b) center, r radius,

Equation of the circle :  $(x-a)^2+(y-b)^2 = r^2$

(0,0) center, (a,b) distances from the two extreme centers:

$$x^2/a^2 + y^2/b^2 = 1$$

### Derivative:

$$d / dx (c) = 0$$

$$d / dx (x) = 1$$

$$d / dx (x^m) = m.x^{m-1}$$

$$d / dx (u.v) = u'v + v'u$$

$$d / dx (u / v) = [u'v - v'u] / v^2$$

$$d / dx (\ln x) = 1 / x$$

$$d / dx (e^x) = e^x$$

$$d / dx (\sin \theta) = \cos \theta$$

$$d / dx (\cos \theta) = -\sin \theta$$