Pre-calculus Reference Sheet A

Exponents		
Exponential function	$f(x) = ab^x$, where $a \neq 0$	
$b^n b^m = b^{m+n}$	$\dfrac{b^m}{b^n} = b^{m-n}$	$(b^m)^n = b^{mn}$
$b^0 = 1$	$b^{-x} = \dfrac{1}{b^x}$	$b^{x/y} = \sqrt[y]{b^x}$

Logarithms			
Common log	$\log x = \log_{10} x$		$b^x = a$
Natural log	$\ln x = \log_e x$		$\log_b a = x$
Change of base	$\log_a x = \dfrac{\log_b x}{\log_b a}$, where $a, b \neq 0$		$\log_a a^x = x$

Imaginary numbers	
$i = \sqrt{-1}$	$i^2 = -1$

Interest					
Simple	$I = prt$	Compound	$A = P(1 + \dfrac{r}{n})^{nt}$	Continuously compounding	$A = Pe^{rt}$

Quadratics and parabolas			
Standard form	$f(x) = ax^2 + bx + c$	Vertex form	$f(x) = a(x - h)^2 + k$
Zeros (X-intercepts)	$(x, 0)$	Y-intercept	$(0, y)$
Quadratic formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}, a \neq 0$	Vertex	(h, k)

Trigonometry			
Pythagorean theorem	$a^2 + b^2 = c^2$	$\sin \theta$	$\dfrac{o}{h}$
Pythagorean identity	$\cos^2 \theta + \sin^2 \theta = 1$	$\cos \theta$	$\dfrac{a}{h}$
Law of sines	$\dfrac{\sin A}{a} = \dfrac{\sin B}{b} = \dfrac{\sin C}{c}$	$\tan \theta$	$\dfrac{o}{a}$
Law of cosines	$c^2 = a^2 + b^2 - 2ab \cos C$	$\tan \theta = \dfrac{\sin \theta}{\cos \theta}$	

Functions			
Addition	$(f + g)(x) = f(x) + g(x)$	Subtraction	$(f - g)(x) = f(x) - g(x)$
Multiplication	$(fg)(x) = f(x) \times g(x)$	Division	$\left(\dfrac{f}{g}\right)(x) = \dfrac{f(x)}{g(x)}$, where $g(x) \neq 0$

Lines			
Linear function	$f(x) = mx + b$	Slope	$m = \dfrac{y_2 - y_1}{x_2 - x_1}$
Distance formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	Midpoint of a line segment	$\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

Circles			
General equation of a circle	$r^2 = (x - h)^2 + (y - k)^2$	Circumference	$C = 2\pi r$
Area	$A = \pi r^2$	Degrees to radians	$360° = 2\pi$