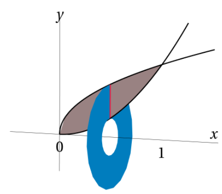
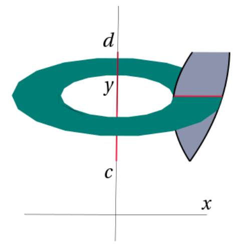
Math1080

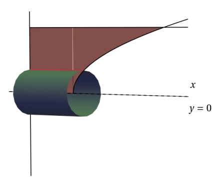
Unit 1 Formula reference sheet

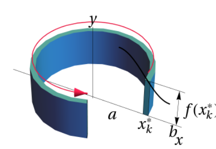
Note: Let $f(x)$ and $g(y)$ represent the area between 2 functions where appropriate.

Velocity	$F(b) - F(a) = \int_a^b f(x)\,dx$	$\Longrightarrow$	$v(t) = v(0) + \int_0^t a(x)\,dx$	
Disk/Washer πr^2	$x-$axis, $y=0$	$\int_a^b \pi\left(R^2 - r^2\right)dx$	$y-$axis, $x=0$	$\int_c^d \pi\left(R^2 - r^2\right)dy$
	$y=c$	$\int_a^b \pi\left((R-c)^2 - (r-c)^2\right)dx$	$x=c$	$\int_c^d \pi\left((R-c)^2 - (r-c)^2\right)dy$
Shell method $2\pi r \cdot h$	$x-$axis, $y=0$	$\int_c^d 2\pi y \cdot g(y)\,dy$	$y-$axis, $x=0$	$\int_a^b 2\pi x \cdot f(x)\,dx$
	$c<a$, $y=c$	$\int_c^d 2\pi(y-c)\cdot g(y)\,dy$	$c<a$, $x=c$	$\int_a^b 2\pi(x-c)\cdot g(x)\,dx$
	$b<c$, $y=c$	$\int_c^d 2\pi(c-y)\cdot g(y)\,dy$	$b<c$, $x=c$	$\int_a^b 2\pi(c-x)\cdot g(x)\,dx$









Arc length $\sqrt{\left(\frac{dx}{dx}\right)^2 + \left(\frac{dy}{dx}\right)^2}$	$L = \int_a^b \sqrt{1 + [f'(x)]^2}\,dx$
Surface area $2\pi r \cdot h$	$S = \int_a^b 2\pi f(x)\sqrt{1 + [f'(x)]^2}\,dx$
Mass $\rho \cdot d$	$m = \int_a^b \rho\,dx$
Work $F \cdot d$	$W = \int_a^b F(x)\,dx$
Chain with load	$W = \int_0^L \rho g(L-y)\,dy + mgL$
Pumping	$W = \int_a^b \rho g A(y)(h-y)\,dy$
Force-on-dam	$F = \int_0^a \rho g \underbrace{(a-y)}_{\text{depth}}\underbrace{w(y)}_{\text{width}}\,dy$