

$$6. \quad V = k(R-r)r^2 = (kR - kr)r^2 = kRr^2 - kr^3$$

MAXIMIZE  $V$

$$\frac{dV}{dr} = 2kRr - 3kr^2$$

$$2kRr - 3kr^2 = 0$$

$$\frac{2kRr}{k} - \frac{3kr^2}{k} = \frac{0}{k}$$

$$2Rr - 3r^2 = 0$$

$$r(2R - 3r) = 0$$

$$\cancel{r=0} \quad 2R - 3r = 0$$

$$2R = 3r$$

$$\frac{2}{3}R = r$$

	$r=0$	$r = \frac{2}{3}R$	$r=R$	$r=\infty$
TEST CASES		$r = \frac{1}{3}R$	$r=R$	
		$2Rr - 3r^2$	$2Rr - 3r^2$	
		$2R(\frac{1}{3}R) - 3(\frac{1}{3}R)^2$	$2R(R) - 3(R)^2$	
		$\frac{2}{3}R^2 - \frac{1}{3}R^2$	$2R^2 - 3R^2$	
		$\frac{1}{3}R^2$ (MAX)	$-1R^2$	

MAX OCCURS AT  $r = \frac{2}{3}R$