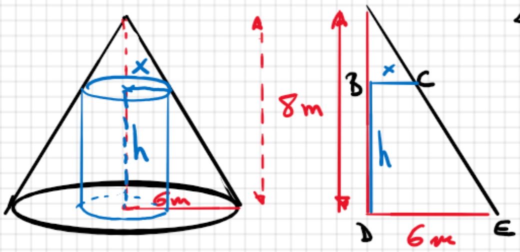
39



$\triangle ABC$ y $\triangle ADE$ son semejantes

$\triangle ABC$	$\triangle ADE$
x	6
$8-h$	8

$\Longrightarrow \dfrac{6}{x}=\dfrac{8}{8-h}$

$\Downarrow$

$48-6h=8x$

$\Downarrow$

$h=\dfrac{48-8x}{6}$

$V_{\text{CILINDRO}}=\pi x^2 h \Longrightarrow V(x)=\pi x^2\cdot\dfrac{48-8x}{6}=\dfrac{8\pi}{6}x^2(6-x)$

$V(x)=\dfrac{4\pi}{3}\left(6x^2-x^3\right)$ $\qquad$ $\text{Dom}\,V=[0,6]$

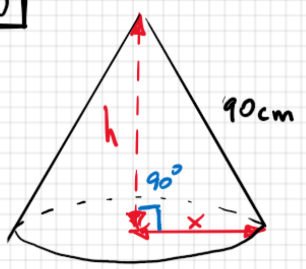
$V'(x)=\dfrac{4\pi}{3}\left(12x-3x^2\right)=0 \Longleftrightarrow 12x-3x^2 \Longleftrightarrow \begin{matrix} x=0 \\ x=4\end{matrix}$

SIGNO V' $\qquad$ $-$ $\quad$ 0 $\quad$ $+$ $\quad$ 4 $\quad$ $-$ $\quad$ 6

V alcanza su máximo en $x=4 \Longrightarrow$

$\Longrightarrow$ El radio del cilindro es 4 m

$\boxed{40}$



$90^2=x^2+h^2 \Longrightarrow h=\sqrt{8100-x^2}$

$V=\dfrac{1}{3}\pi x^2 h$

$V(x)=\dfrac{1}{3}\pi x^2\cdot\sqrt{8100-x^2}$ $\qquad$ $\text{Dom}\,V=[0,90]$

$V'(x)=\dfrac{2\pi}{3}x\sqrt{8100-x^2}-\dfrac{\pi}{3}x^2\dfrac{x}{\sqrt{8100-x^2}}$

$V'(x)=\dfrac{2\pi x\left(8100-x^2\right)-\pi x^3}{3\sqrt{8100-x^2}}=\dfrac{16200\pi x-3\pi x^3}{3\sqrt{8100-x^2}}$

$V'=0 \Longleftrightarrow 16200\pi x-3\pi x^3=0 \Longleftrightarrow \begin{cases} x=0 \\ 16200-3x^2=0 \Longleftrightarrow x^2=5400\end{cases}$

$x=\pm 30\sqrt{6}$

SIGNO V' $\qquad$ $+$ $\quad$ $-30\sqrt{6}$ $\quad$ $-$ $\quad$ 0 $\quad$ $+$ $\quad$ $30\sqrt{6}$ $\quad$ $-$ $\quad$ 90

En $x=30\sqrt{6}$ cm V alcanza su máximo. Por tanto, las longitudes de los catetos son

$x=30\sqrt{6}$ cm

$y=\sqrt{8100-5400}=\sqrt{2700}=30\sqrt{3}$