Kevin White

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Yeying Chen 9:00AM 11/8/2021

The Area of the Base & Sides

```
syms r h
Area_Base = pi*r^2
```

Area_Base = $\pi r^2$

```
Area_Side = (2*pi*r)*h
```

Area_Side = $2 \pi h r$

Total Area of Cylinder

```
Area_2vars = 2*Area_Base+Area_Side
```

Area_2vars = $2 \pi r^2 + 2 h \pi r$

Area in terms of R

```
Vol=pi*r^2*h
```

Vol = $\pi h r^2$

```
my_h=solve(Vol==1000,h)
```

my_h =

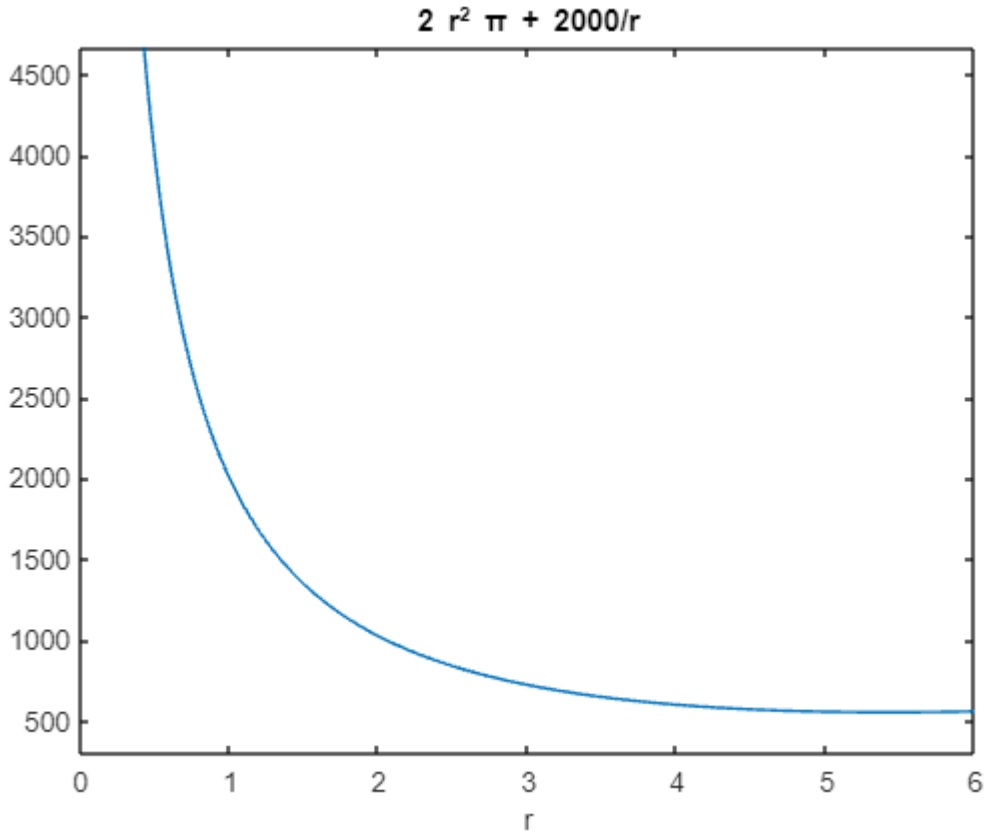
$$\frac{1000}{r^2 \pi}$$

```
Area=subs(Area_2vars,h,my_h)
```

Area =

$$2 \pi r^2 + \frac{2000}{r}$$

```
ezplot(Area, [0 6])
```




Step 6

```
assume(r, 'real')
assume(r>0)
A_prime=diff(Area,r)
```

A_prime =

$$4\pi r - \frac{2000}{r^2}$$

```
r_critical=solve(A_prime==0,r)
```

r_critical =

$$\left(\frac{500}{\pi}\right)^{1/3}$$

```
assume(r>r_critical)
simplify(A_prime>0)
```

ans = symtrue

```
radius=r_critical
```

radius =

$$\left(\frac{500}{\pi}\right)^{1/3}$$

```
height=subs(my_h,r,radius)
```

height =

$$\frac{1000}{\pi \left(\frac{500}{\pi}\right)^{2/3}}$$

```
subs(subs(Vol,r,radius),h,height)
```

ans = 1000

Area of full rectangle:

```
subs(subs(Vol,r,radius),h,height) + vpa(radius*radius*height)
```

ans = 1318.3098861837906715377675267 45

Area unised is:

```
vpa(radius*radius*height)
```

ans = 318.30988618379067153776752674503