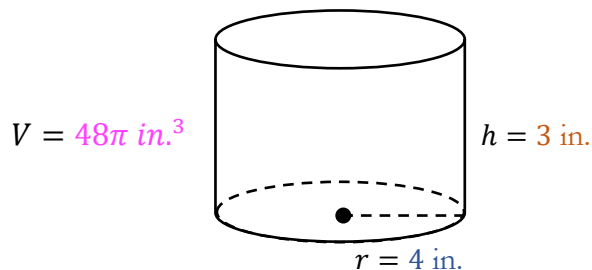
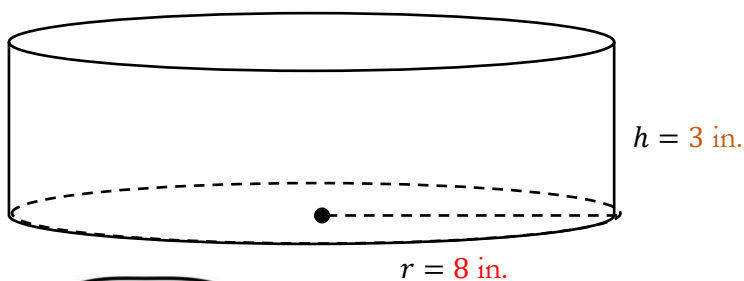


What happens to the volume of a cylinder with radius 4 in. and height 3 in. when you scale the radius?



Damien's "Double the Radius" Method



If I double the radius, I have a new radius of 8 in.

Let me calculate the volume with the new radius.

If I divide the new volume by the original, I see that doubling the radius causes the volume to be four times the original!

$$V = \pi r^2 h$$

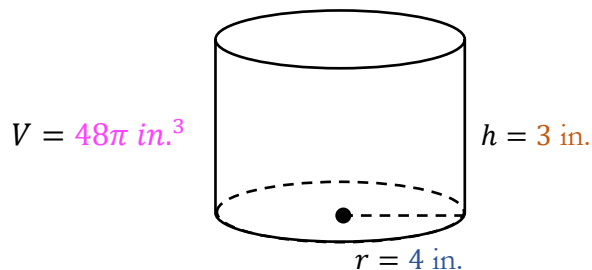
$$V = \pi(8)^2(3)$$

$$V = 192\pi \text{ in.}^3$$

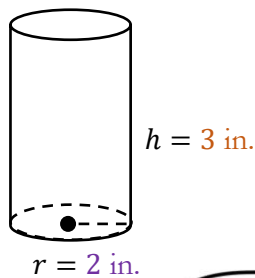
$$\frac{192\pi}{48\pi} = 4$$



What happens to the volume of a cylinder with radius 4 in. and height 3 in. when you scale the radius?



Sydney's "Halve the Radius" Method



$$V = \pi r^2 h$$

$$V = \pi(2)^2(3)$$

$$V = 12\pi \text{ in.}^3$$

$$\frac{12\pi}{48\pi} = \frac{1}{4}$$

If I halve the height, I have a new radius of 2 in.

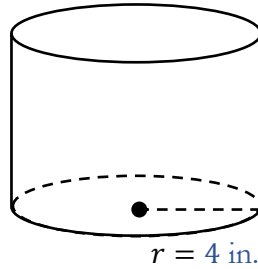
Let me calculate the volume with the new radius.

If I divide the new volume by the original, I see that halving the radius makes the volume $\frac{1}{4}$ the volume of the original!

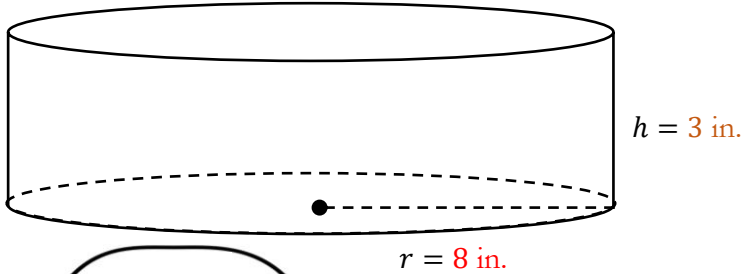


What happens to the volume of a cylinder with radius 4 in. and height 3 in. when you scale the radius?

$$V = 48\pi \text{ in.}^3$$



Damien's "Double the Radius" Method



If I double the radius, I have a new radius of 8 in.

Let me calculate the volume with the new radius.

If I divide the new volume by the original, I see that doubling the radius causes the volume to be four times the original!

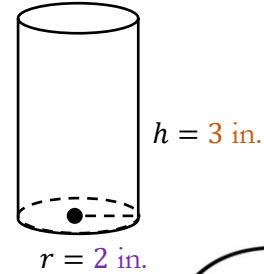
$$V = \pi r^2 h$$

$$V = \pi(8)^2(3)$$

$$V = 192\pi \text{ in.}^3$$

$$\frac{192\pi}{48\pi} = 4$$

Sydney's "Halve the Radius" Method



If I halve the height, I have a new radius of 2 in.

Let me calculate the volume with the new radius.

If I divide the new volume by the original, I see that halving the radius makes the volume $\frac{1}{4}$ the volume of the original!

$$V = \pi r^2 h$$

$$V = \pi(2)^2(3)$$

$$V = 12\pi \text{ in.}^3$$

$$\frac{12\pi}{48\pi} = \frac{1}{4}$$



V.4: Scale Cylinder Radius

1) What are the similarities and differences between Damien and Sydney's methods?

| Similarities | Differences |
|--------------|-------------|
| | |

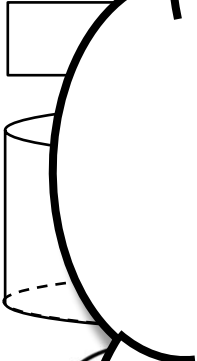
2) When you scale the height of a cylinder by some number, the volume is multiplied by that number. Why is that NOT true when you scale the radius?

3) If a cylinder has a radius of 3 in. and a volume of 11 in.^3 , what would the new volume be if the radius were scaled to 9 in. ?

4) What happens to the volume of a cylinder if you scale the radius by any number, x ?

What happens to the volume of a cylinder if the radius is doubled and the height is 3 in.

This was interesting to see the differences between making the radius bigger and making it smaller. When Damien doubled the radius, the volume was 4 times the original, but when I halved the radius, the volume was only $\frac{1}{4}$ the original.



Method

Let me calculate the volume with the new radius.

If I halve the radius, I have a new radius of 2 in.

Let me calculate the volume with the new radius.

If I divide the new volume by the original, I see that doubling the radius causes the volume to be four times the original!

$$\frac{192\pi}{48\pi} = 4$$

$$\frac{12\pi}{48\pi} = \frac{1}{4}$$

If I divide the new volume by the original, I see that halving the radius causes the volume to be $\frac{1}{4}$ the original!

