What happens to the volume of a cylinder with radius 4 in. and height 3 in. when you scale the height?
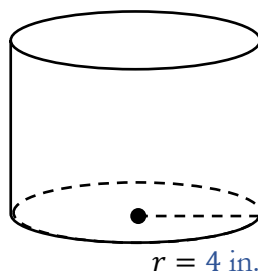
$V = 48\pi\ in.^3$ $h = 3$ in.

$r = 4$ in.

Damien's "Double the Height" Method

If I double the height, I have a new height of 6 in.

$h = 6$ in.

$r = 4$ in.

Let me calculate the volume with the new height.

$V = \pi r^2 h$

$V = \pi(4)^2(6)$

$V = 96\pi\ in.^3$

Doubling the height causes the new volume to be two times the original!
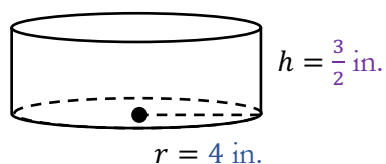
$\dfrac{96\pi}{48\pi} = 2$

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

$V = 48\pi \; in.^3$

$h = 3$ in.

$r = 4$ in.

Sydney's "Halve the Height" Method

$h = \frac{3}{2}$ in.

$r = 4$ in.
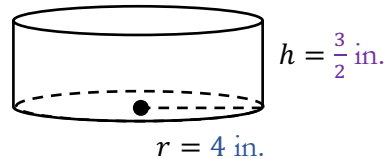
If I halve the height, I have a new height of 3/2 in.

$V = \pi r^2 h$

$V = \pi(4)^2 \left(\frac{3}{2}\right)$

$V = 24\pi \; in.^3$

$\dfrac{24\pi}{48\pi} = \dfrac{1}{2}$
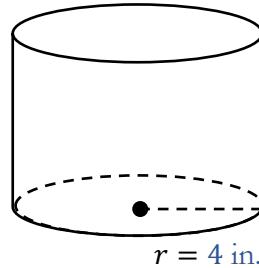
Let me calculate the volume with the new height.
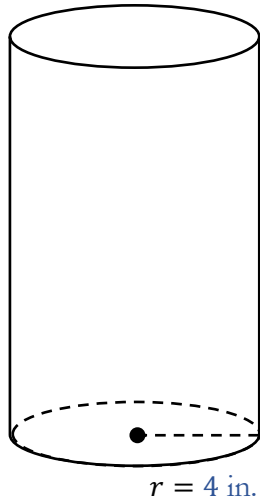
Halving the height makes the new volume ½ the original volume!

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

$V = 48\pi \ in.^3$

$h = 3$ in.

$r = 4$ in.

Damien's "Double the Height" Method	Sydney's "Halve the Height" Method

Damien's side:

If I double the height, I have a new height of 6 in.

$h = 6$ in.

$r = 4$ in.

Let me calculate the volume with the new height.

$V = \pi r^2 h$

$V = \pi(4)^2(6)$

$V = 96\pi \ in.^3$

Doubling the height causes the new volume to be two times the original!

$\dfrac{96\pi}{48\pi} = 2$

Sydney's side:

$h = \dfrac{3}{2}$ in.

$r = 4$ in.

If I halve the height, I have a new height of 3/2 in.

$V = \pi r^2 h$

$V = \pi(4)^2\left(\dfrac{3}{2}\right)$

$V = 24\pi \ in.^3$

Let me calculate the volume with the new height.

$\dfrac{24\pi}{48\pi} = \dfrac{1}{2}$

Halving the height makes the new volume ½ the original volume!

V.3: *Scaling the Height*

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

Similarities	Differences

2) If a cylinder has a height of $9\ in.$ and a volume of $18\ in.^3$, what would the new volume be if the height were scaled to $3\ in.$?

3) Explain what would happen to the volume of a cylinder if we multiplied the height by any number, x.

4) Is what you found in Question 3 always true for any figure? Explain.

**What happens to the volume of   wit   in.
when**

Damien's "D

If I double
height, I ha
new heigh
of 6 in.

Let me calculate
the volume
with the new
height.

me calculate
the volume
with the new
height.

$$\frac{96\pi}{48\pi} = 2$$

$$\frac{24\pi}{48\pi} = \frac{1}{2}$$

Doubling the
height causes
the new vol
to be two
the origin

Halving the
height makes
the new volume
½ the original
volume!

How cool! When I doubled the height, the volume doubled, and when Sydney halved the height, the volume halved. I wonder if this always works.