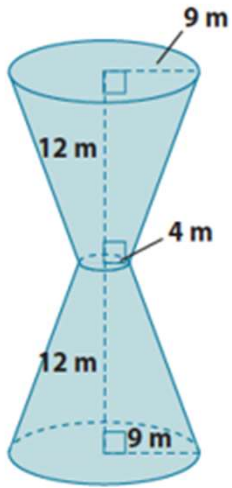


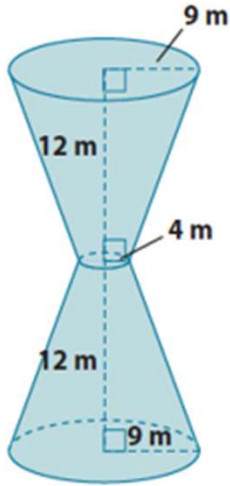
Volume of Composite Solids

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Let x m represent the height of the portion of the cone that has been removed.

$$\frac{4}{9} = \frac{x}{x + 12}$$

$$4(x + 12) = 9x$$

$$4x + 48 = 9x$$

$$48 = 5x$$

$$\frac{48}{5} = x$$

$$9.6 = x$$

The volume of the removed cone is

$$\begin{aligned} V &= \frac{1}{3}\pi(4)^2(9.6) \\ &= \frac{153.6}{3}\pi. \end{aligned}$$

The volume of the cone is

$$\begin{aligned} V &= \frac{1}{3}\pi(9)^2(21.6) \\ &= \frac{1749.6}{3}\pi. \end{aligned}$$

The volume of one truncated cone is

$$\begin{aligned} &\frac{1749.6}{3}\pi - \frac{153.6}{3}\pi \\ &= \left(\frac{1749.6}{3} - \frac{153.6}{3}\right)\pi \\ &= \frac{1596}{3}\pi = 532\pi. \end{aligned}$$

The volume of sand needed to fill the hourglass is 1064π m³.