9. $r_A : r_B \Rightarrow 2:5 \Rightarrow \frac{2}{5}$

Total volume $= \frac{1}{2}$ vol HBA $+ \frac{1}{2}$ vol HBB

(Note: vol of sphere $= \frac{4}{3}\pi r^3$)

a) $9975\pi = \left(\frac{2}{5}\right)^3 x + x$ (where x is volume of HBB)

$9975\pi = \frac{8}{125} x + x$

$9975\pi = \frac{133}{125} x$

$9375\pi = x$

Volume of HBA $= \left(\frac{2}{5}\right)^3 (9375\pi) = 600\pi$ m³

Volume of HBB $= 9375\pi$ m³

b) $\frac{1}{2}\left(\frac{4}{3}\pi r^3\right) = 600\pi$ (HBA)

$\left(\frac{3}{2}\right) \frac{2}{3}\pi r^3 = 600\pi \left(\frac{3}{2}\right)$

$r^3 = 600\pi \left(\frac{3}{2\pi}\right)$

$\sqrt[3]{r^3} = \sqrt[3]{900}$ $\Rightarrow$ $r \approx 9.65$ for HBA

$\frac{1}{2}\left(\frac{4}{3}\pi r^3\right) = 9375\pi$

$\frac{2}{3}\pi r^3 = 9375\pi$

$r^3 = 9375\pi \left(\frac{3}{2\pi}\right)$

$r^3 = 14062.5 \Rightarrow$ $r \approx 24.14$ for HBB

10.   Volume of half-ball $= \frac{1}{2}\left(\frac{4}{3}\pi r^3\right) = \frac{2}{3}\pi r^3$

$2250\pi = \frac{2}{3}\pi r^3$

$3375 = r^3$ $\Rightarrow$ $r = 15$

Volume of cylinder $= \pi r^2 h$

$2250\pi = \pi (15^2) h$

$2250\pi = 225\pi h$

$h = 10$

11. a) Vol of cone = $\dfrac{\pi r^2 h}{3}$

$8\pi = \dfrac{\pi r^2 \cdot 6}{3}$

$8 = 2r^2$

$r^2 = 4 \qquad \Rightarrow r = 2\,cm$

b) Vol of sphere: $\dfrac{4\pi r^3}{3} = 972\pi$

$r^3 = 972\left(\dfrac{3}{4}\right)$

$r^3 = 729 \qquad \Rightarrow \quad r = 9\,m$

c) Vol of cylinder: $\pi r^2 h = 300\pi$

$\pi r^2(12) = 300\pi$

$12 r^2 = 300$

$r^2 = 25 \quad \Rightarrow \quad r = 5\,cm$

d) Vol of sphere: $\dfrac{4}{3}\pi r^3 = 1764\pi$

$\dfrac{4}{3}r^3 = 1764$

$r^3 = 1323 \Rightarrow r = 10.98\,m$

12   Vol = Big cylinder + small cylinder + cone

$65\pi = \pi r^2(2) + \pi(1)^2(17-3) + \dfrac{\pi(1)^2 3}{3}$

$65\pi = 2\pi r^2 + 14\pi + \pi$

$65 = 2r^2 + 15$

$50 = 2r^2$

$25 = r^2$

$5 = r$

Test

Volumes

units

Squares, cubes, roots

Similarity ratios

missing lengths

5^2

$(3)^3$

13. The volume of ball A is triple that of ball B, whereas the volume of ball C is half that of ball A. Given that the three balls have a total volume of 8250 pi m^3, determine:

a) The volume of each ball

b) the radius of each ball