

11 a
$$\frac{20 - h}{20} = \frac{r}{10}$$

$$\therefore 10(20 - h) = 20r$$

$$\therefore 200 - 10h = 20r$$

$$\therefore 20 - h = 2r$$

$$\therefore h = 20 - 2r$$

$$= 2(10 - r)$$

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

$$= 2\pi r^2(10 - r)$$

c Use CAS calculator to solve the equation $2\pi r^2(10 - r) = 500$, given that $0 < r < 10$.
 This gives $r = 3.49857 \dots$ or $r = 9.02244 \dots$
 When $r = 3.49857 \dots$, $h = 2(10 - 3.49857 \dots)$
 $= 13.00285 \dots$

When $r = 9.02244 \dots$, $h = 2(10 - 9.02244 \dots)$
 $= 1.95511 \dots$

Therefore the volume of the cylinder is 500 cm^3 when $r = 3.50$ and $h = 13.00$ or when $r = 9.02$ and $h = 1.96$, correct to two decimal places.