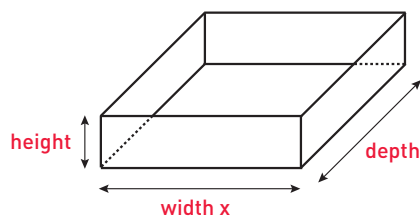


YOU & MATHS **The volume of a box** A box with a square base and no top is to be constructed so that it has a volume of 1000 cubic centimeters. Let x denote the width of the box, in centimeters as shown below.



- a. Express the height h in centimeters as a function of the width x .
- b. Solve $h(x) \geq x$ and interpret.

- a. The volume equals the product of the dimensions, so $1000 = h \cdot x \cdot x = hx^2$. Therefore $h = \frac{1000}{x^2}$.
- b. If $h(x) \geq x$, then $\frac{1000}{x^2} \geq x$, and so $\frac{1000 - x^3}{x^2} \geq 0$. This is verified only if the numerator is greater or equal to zero. Since its sign changes only for $1000 - x^3 = 0$, that is $x = 10$, and we know that $x \geq 0$, and if $0 \leq x < 10$ the expression $1000 - x^3$ is positive, then it must be $x \leq 10$. This means that the side of the box has to be less or equal than 10 cm.