On a building site, water is stored in a container.

The container is a cone with diameter 180 cm at its widest point and height of 150 cm. A cross section of the cone is shown below.
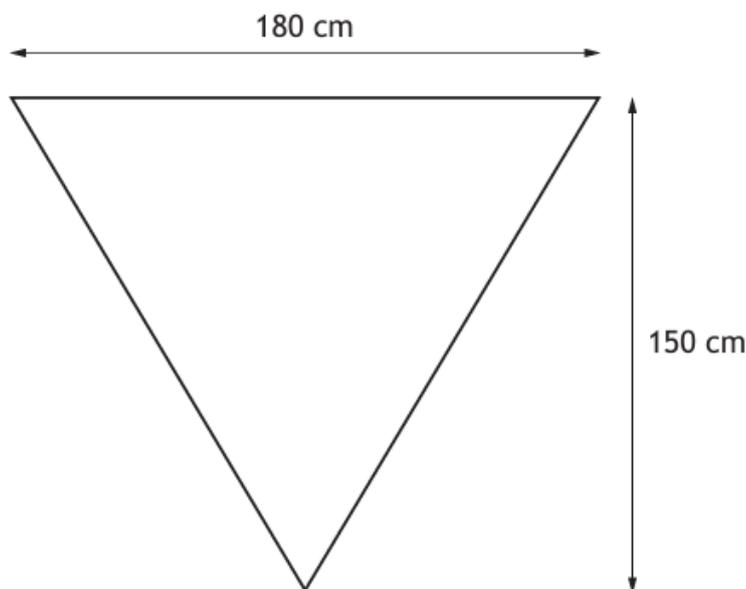
(a) Show that when the water level is at a height of h cm, $0 \le h \le 150$, the volume of water in the container can be written as

$$V = \frac{3\pi h^3}{25}.$$

[The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$.]   **1**

Water is pumped into the container at a constant rate of 10 litres per second.

(b) Find the rate at which the height is increasing when $h = 125$.   **5**

Answers:

(a)   Proof. First express r in terms of h. See marking scheme for details.

(b) $\frac{16}{9\pi}$ cm s^{-1} ($\approx$ 0.57 cm/s)