10.

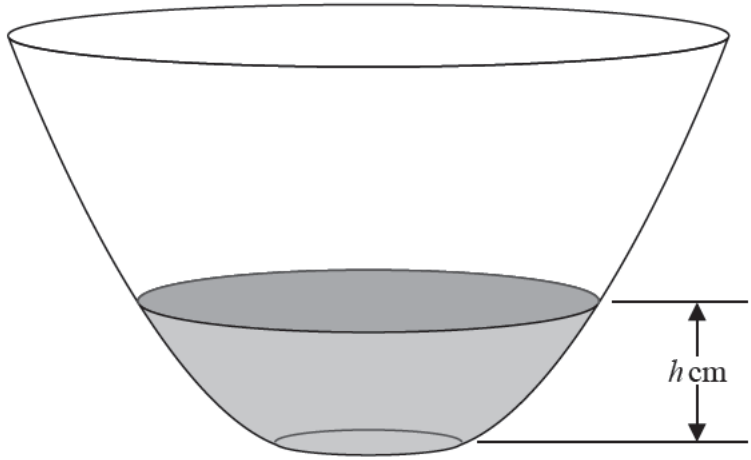

Figure 4

Figure 4 shows a bowl with a circular cross-section.

Initially the bowl is empty. Water begins to flow into the bowl.

At time t seconds after the water begins to flow into the bowl, the height of the water in the bowl is h cm.

The volume of water, V cm^3, in the bowl is modelled as

$$V = 4\pi h(h + 6) \qquad 0 \leqslant h \leqslant 25$$

The water flows into the bowl at a constant rate of 80π cm^3 s^{-1}

(a) Show that, according to the model, it takes 36 seconds to fill the bowl with water from empty to a height of 24 cm.

(1)

(b) Find, according to the model, the rate of change of the height of the water, in cm s^{-1}, when $t = 8$

(8)