6. Water is dripping onto a surface, forming a puddle.

In a model

- the shape of the puddle is a circle
- the radius, r cm, of the circle is increasing at a constant rate of $2\,\text{cm}\,\text{s}^{-1}$

Using the model,

(a) show that

$$\frac{\mathrm{d}A}{\mathrm{d}t} = 4\pi r$$

(2)

(b) find the rate of increase of the area of the circle, when the radius of the circle is 10 cm.
Give your answer in $\text{cm}^2\,\text{s}^{-1}$ to the nearest integer.

(1)

(c) Explain how the model could be refined.

(1)