

**Problem.** A circle is growing with a radius increasing at a rate of 3 cm/s. Find a function (of the radius  $r$ ) that gives the rate of change of the area of the circle.

**Solution.** The area of a circle is given by  $A = \pi r^2$ . Therefore, differentiating both sides with respect to  $t$  we get

$$\frac{dA}{dt} = 2\pi r \cdot \frac{dr}{dt}$$

We are given that  $\frac{dr}{dt} = 3$  cm/s. By substituting this in we get

$$\frac{dA}{dt} = 6\pi r$$