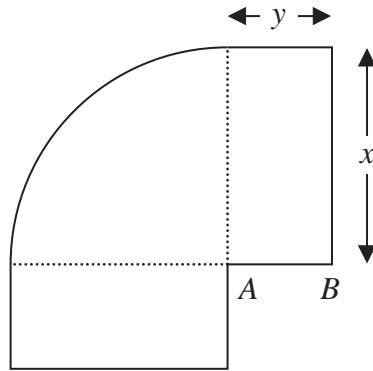**12.**

Figure 5

Figure 5 shows the plan view of the design for a swimming pool.

The pool is modelled as a quarter of a circle joined to two equal sized rectangles as shown.

Given that

- the quarter circle has radius x metres

- the rectangles each have length x metres and width y metres

- the total surface area of the swimming pool is $100 \, \text{m}^2$

(a) show that, according to the model, the perimeter P metres of the swimming pool is given by

$$P = 2x + \frac{200}{x}$$

(5)

(b) Use calculus to find the value of x for which P has a stationary value.

(4)

(c) Prove, by further calculus, that this value of x gives a minimum value for P

(2)

Access to the pool is by side AB shown in Figure 5.

Given that AB must be at least one metre,

(d) determine, according to the model, whether the swimming pool with the minimum perimeter would be suitable.

(2)