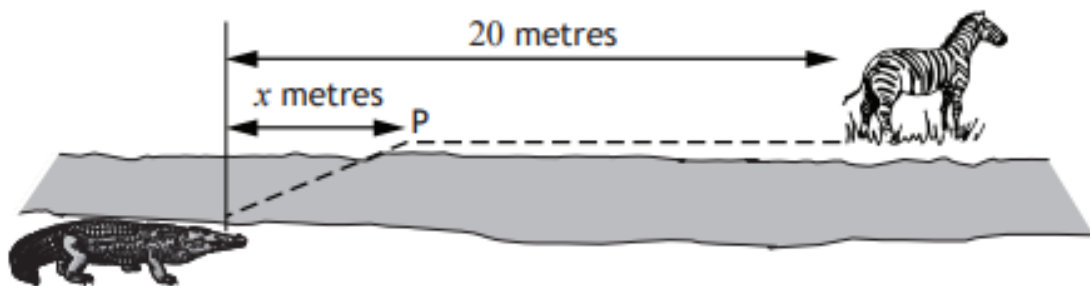


2015 P2 Q8

8. A crocodile is stalking prey located 20 metres further upstream on the opposite bank of a river.

Crocodiles travel at different speeds on land and in water.

The time taken for the crocodile to reach its prey can be minimised if it swims to a particular point, P, x metres upstream on the other side of the river as shown in the diagram.



The time taken, T , measured in tenths of a second, is given by

$$T(x) = 5\sqrt{36 + x^2} + 4(20 - x)$$

- (a) (i) Calculate the time taken if the crocodile does not travel on land.
 (ii) Calculate the time taken if the crocodile swims the shortest distance possible.
- (b) Between these two extremes there is one value of x which minimises the time taken. Find this value of x and hence calculate the minimum possible time.

Answers

- (a) (i) 10.4 or 104 (ii) 11 or 110
 (b) $x = 8$ $T = 9.8$ or 98