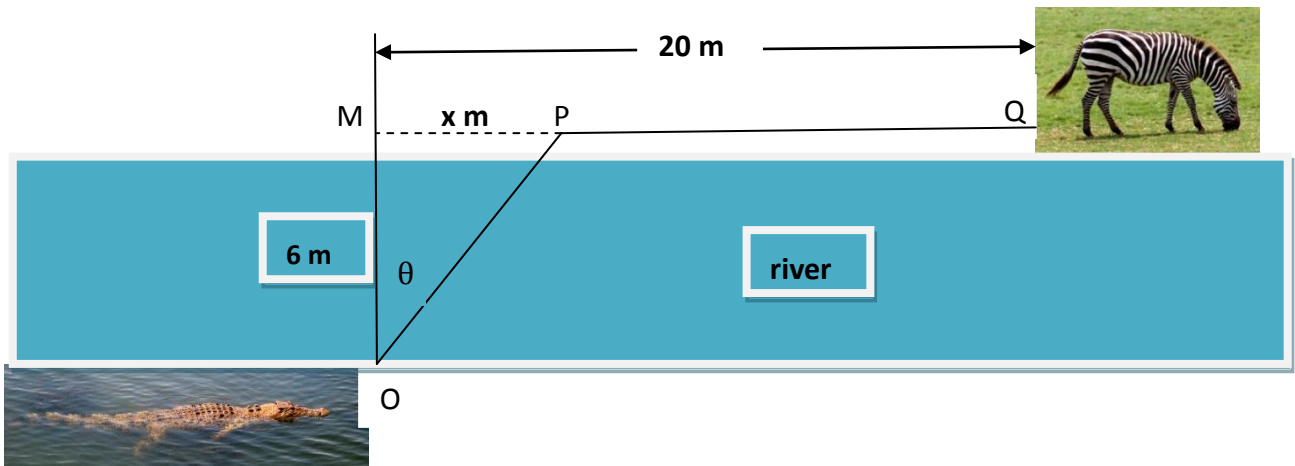


### Crocodile catching its prey



A crocodile is stalking a zebra 20 m downstream on the opposite bank of the river, which is 6 m wide. The crocodile travels 0.25 m/s on land and 0.2 m/s in water. Let  $T(x)$  be the time for the crocodile to reach the prey by swimming from point O to a particular point P, which is  $x$  m downstream on the other side of the river as shown in the diagram.

Find:

- (a)  $T(x)$  in terms of  $x$ .
- (b) (i) Calculate the time if the crocodile does not travel on land.  
(ii) Calculate the time if the crocodile swims the shortest time possible.
- (c) Use the function in (a), or otherwise, find the minimum time taken for the crocodile reach its prey.
- (d) let  $\angle MOP = \theta$   
Let  $t(\theta)$  be the time for the crocodile to reach the prey.  
Find  $t(\theta)$  and hence find the minimum time taken for the crocodile reach its prey.