

10.

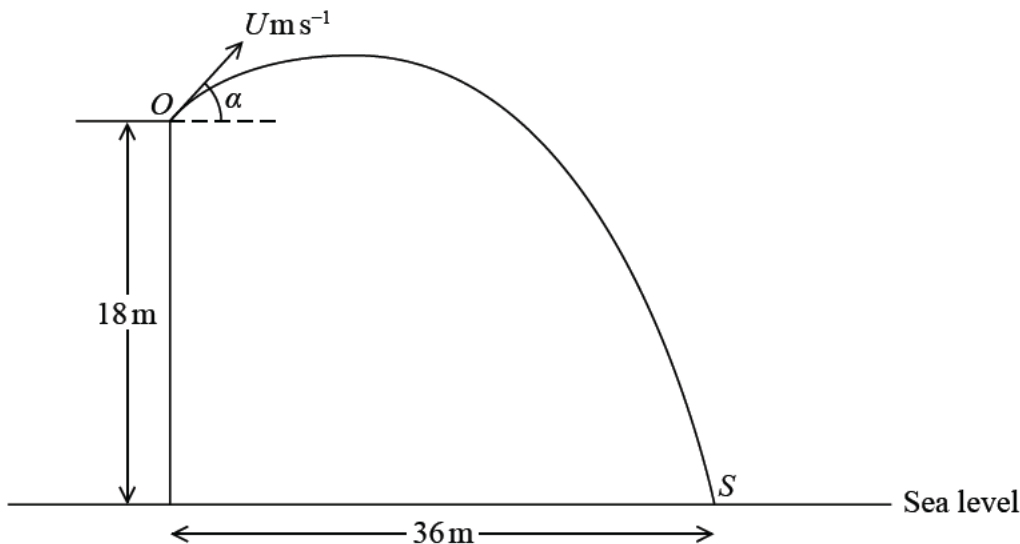


Figure 2

A boy throws a stone with speed $U \text{ m s}^{-1}$ from a point O at the top of a vertical cliff. The point O is 18 m above sea level.

The stone is thrown at an angle α above the horizontal, where $\tan \alpha = \frac{3}{4}$.

The stone hits the sea at the point S which is at a horizontal distance of 36 m from the foot of the cliff, as shown in Figure 2.

The stone is modelled as a particle moving freely under gravity with $g = 10 \text{ m s}^{-2}$

Find

(a) the value of U ,

(6)

(b) the speed of the stone when it is 10.8 m above sea level, giving your answer to 2 significant figures.

(5)

(c) Suggest two improvements that could be made to the model.

(2)