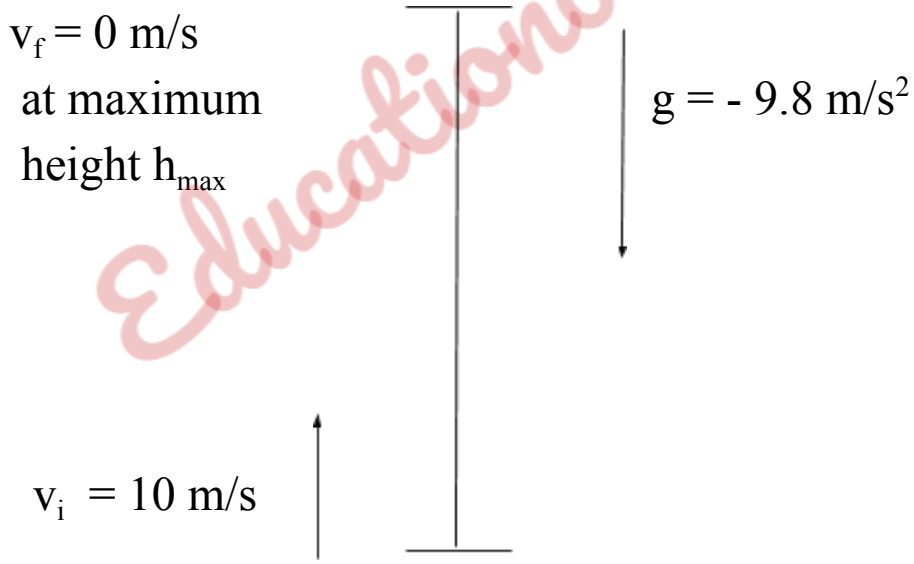
A rock is thrown upwards with an initial velocity of 10 m/s. What is the maximum height reached by the rock?



Given:

Initial velocity: $v_i = 10$ m/s

Acceleration in this case is the acceleration due to gravity in the downward direction: $g = -9.8$ m/s^2

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Velocity vector is in upward direction. Acceleration vector is in downward direction. Since direction of acceleration opposes the direction of motion (velocity) of the rock, velocity keeps decreasing and becomes zero at a certain height, the maximum height reached by the rock. At this point the rock reverses direction and starts to fall to the ground.

Hence the final velocity of the rock is $v_f = 0$ m/s.

Determine: maximum height reached by the rock h_{max}.

Use equation of motion:

$$v_f^2 = v_i^2 + 2gh_{max} \text{ ----------(1)}$$

Substituting for v_f, v_i and g in (1):

$$0^2 = 10^2 + 2(-9.8)h_{max}$$

$$\mathbf{h_{max} = -100 / -19.6 = 5.1\ m}$$

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