Let height of the cliff be = H (in meters)

Time taken by the stone when dropped from the top of the cliff to strike the water surface = t_1 (in seconds)

Thus, using $S = ut + ½ gt^2$ we obtain

$H = ½ g t_1^2$ (as stone is dropped so, initial velocity u = 0)

or $t_1 = (2H/g)^{1/2}$ ...(1)

Now when the stone strikes the surface of water the sound of splash takes time to be heard

Assuming time difference between striking water surface and sound of splash being heard = t_2

or $t_2 = H/v$ (where v = velocity of sound) ...(2)

But $t_1 + t_2 = 3.5$ seconds ...(3)

Incorporating (1) and (2) in (3) we obtain

$(2H/g)^{1/2} + H/v = 3.5$

Speed of sound = v = 330m/s, so

$(2H/g)^{1/2} + H/330 = 3.5$

$(0.2H)^{1/2} + H/330 = 3.5$

To make this equation appear in quadratic form assume $H^{1/2} = X$

Thus $(0.2)^{1/2} X^2 + H/330 = 3.5$

or $330 (0.2)^{1/2} X + X^2 = 3.5 * 330$

or $X^2 + 330 (0.2)^{1/2} X – 1155 = 0$

or using roots of the equation as $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Here, $b = 330 (0.2)^{1/2}$, a = 1 and c = -1155

Thus $X = [\ 330 (0.2)^{1/2} \pm (330^2 * 0.2 + 4*1155)^{1/2}\ ] / 2$

or X = (147.58 - 162.48) / 2

or X = -7.45

Thus $H = X^2 =$ 55.50 m

Hence height of the cliff = 55.50 meters.