Answer on Question #51370, Physics, Mechanics | Kinematics | Dynamics

Task: A bolt is dropped from a bridge under construction, falling 95 m to the valley below the bridge. (a) How much time does it take to pass through the last 26 % of its fall? What is its speed (b) when it begins that last 26 % of its fall and (c) just before it reaches the ground?

Solution:

So 26% of 95 is 24.7m . But we need to know total time for the free-fall first.

So using our trusty old acceleration and distance equation where initial distance and initial velocity are both 0 .

$h= V_{0+}V_0t+gt^2/2$

$95m = 0 + 0 +9.8*t^2/2$

$95m = 4.9t^2$

$19.39=t^2$

t=4.403 seconds for it to fall the whole 95 m

Now the last 26% of its fall means it has already fallen 95 - (0.26*95) = 70.3m

So we want to know the time it takes for the bolt to fall 70.3m now.

With initial velocity and distance still equal to zero

70.3m = 4.9t^2

t for 72m is 3.787s

So 4.403 - 3.787 = 0.616 s to fall the rest of the last 26% of its fall

b) Well since it has traveled 70.3 m in 3.787 seconds, then

v = 70.3 / 3.787

v = 18.56 m/s

c) 95 m in 4.403s means

v = 95 / 4.403

v =21.58 m/s