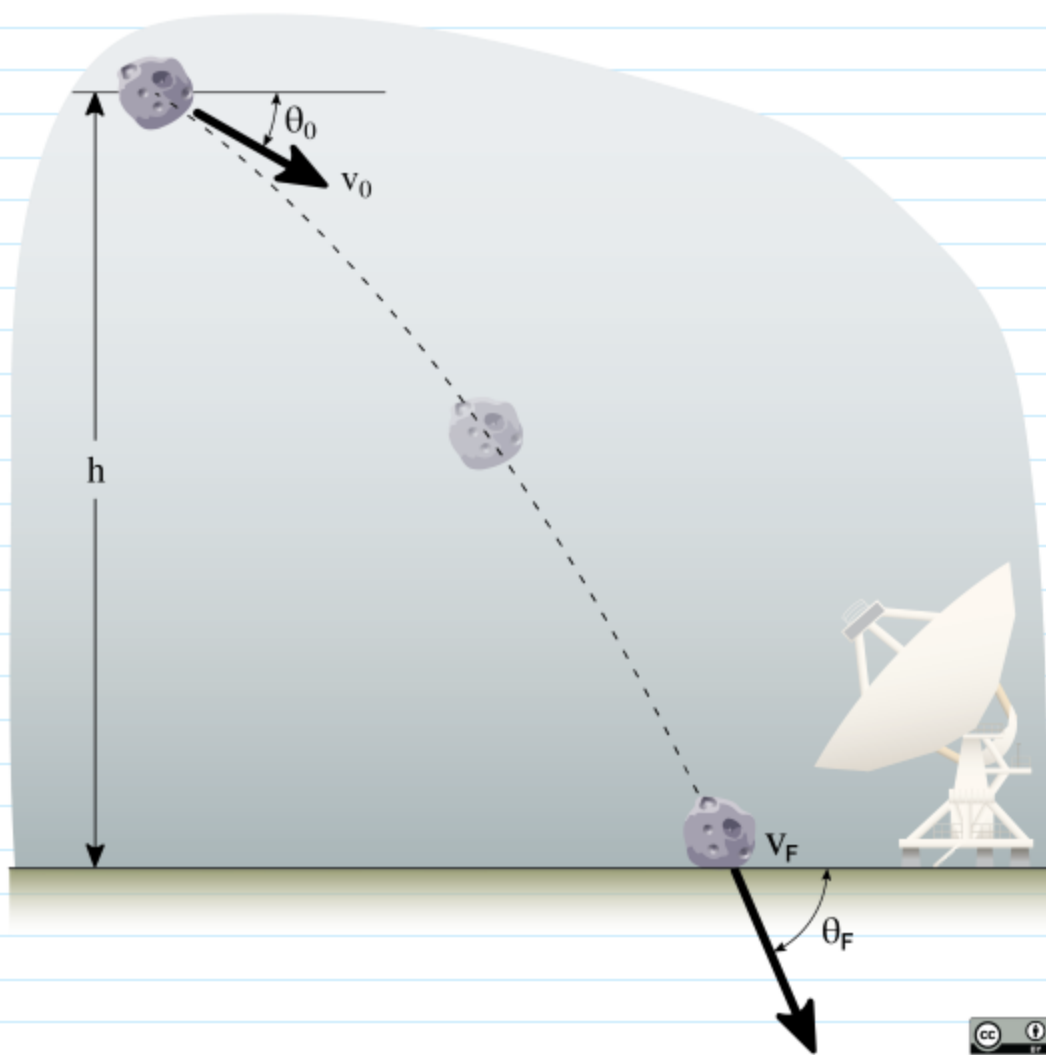


21-P-KM-GD-009

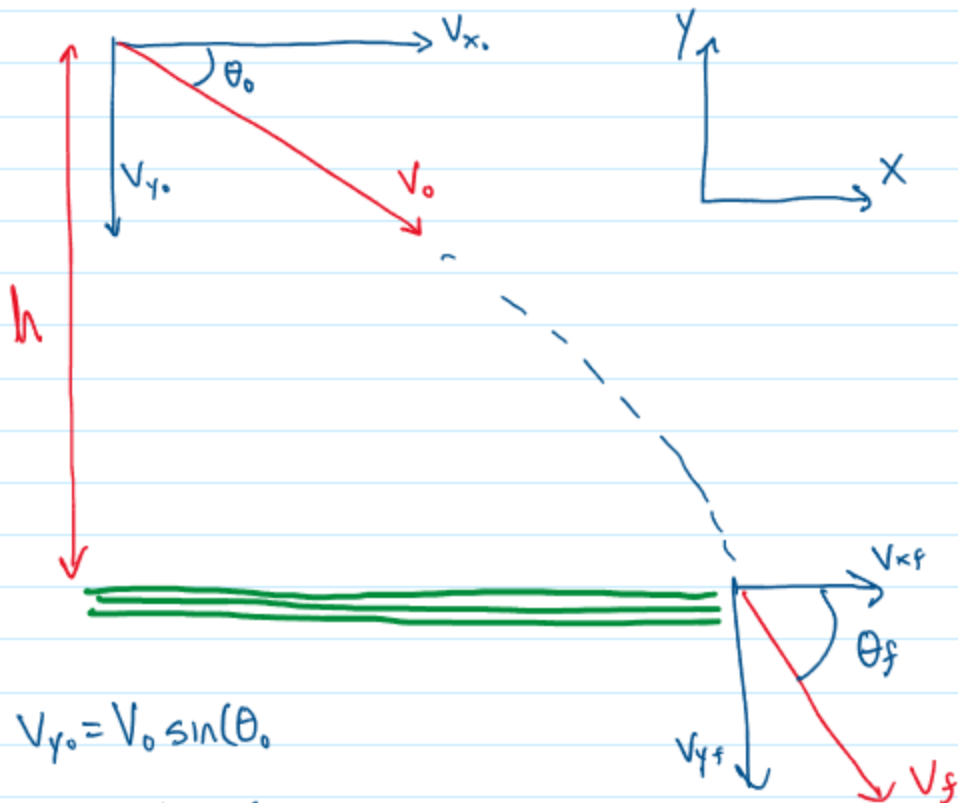


An early warning satellite dish detects a meteor that poses a danger to the satellite itself.

Luckily, the meteor missed the satellite, but the event needs to be investigated.

From the satellite data, the meteor was first detected at an altitude of h m, travelling at a speed v_0 m/s, at angle of θ_0 degrees below the horizontal.

You are tasked with finding the final velocity of the meteor the instant it impacts the ground, and the impact angle below the horizontal.



given
 h
 θ_0
 v_0

Find
 θ_f
 v_f

$$v_{y_0} = v_0 \sin(\theta_0)$$

$$v_{x_0} = v_0 \cos(\theta_0)$$

Y

$$v_{y_f}^2 = v_{y_0}^2 + 2gh$$

$$\underline{v_{x_f} = \sqrt{v_{y_0}^2 + 2gh}}$$

X

$$\underline{v_{x_0} = v_{x_f}}$$

$$\underline{v_f = \sqrt{v_{y_f}^2 + v_{x_f}^2}}$$

$$\underline{\theta_f = \tan^{-1} \left(\frac{-v_{y_f}}{v_{x_f}} \right)} \quad \text{degrees!}$$