

Rocket Review Problem

Use $g = 10 \text{ m/s}^2$

$p = mv$

$J = F\Delta t = m\Delta v$

$F = ma$

$v_f^2 = v_i^2 + 2a\Delta y$

$\Delta y = v_{iy}\Delta t + \frac{1}{2} a\Delta t^2$

$a = \frac{\Delta v}{\Delta t}$

Name Key

WS 1

A model rocket of mass 0.250 kg initially at rest is launched vertically with an upward thrust force of 10.0 N.

a. Taking the downward force of gravity on the rocket (its weight) into account, what is the net force on the rocket?

7.5 N

b. Using that net force, if the engine fires for 2 seconds, what is the impulse the engine provides on the rocket?

~~15 N~~ 15 Ns

c. Using that impulse, what is the speed of the rocket when the engine stops firing?

60 m/s

d. What is the acceleration of the rocket? Hint: you can use the answer from either a) or c) to find the answer.

30 m/s²

e. Using kinematics with the acceleration from part d) (not acceleration due to gravity!), how high does the rocket go while the engine is firing?

60 m

f. When the engine stops firing, we can treat the rocket as an object in free fall (acted on only by gravity). Using the velocity in part c) as the initial velocity, what maximum height will the rocket reach? Hint: you can use conservation of energy or kinematics to find this answer. Don't forget to add the height from part e).

240 m