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A rocket of mass m is fired vertically upward from rest. The rocket's engine produces a thrust of constant magnitude F for t_{thrust} seconds. Determine the time it takes the rocket to reach its apex (t_{apex}) as a function of F, t_{thrust}, m, and g.

Free-Body Diagram

Mathematical Analysis

Event 1:

Event 2:

Questions

If g = 0 m/s^2, what should t_{apex} equal? Does your function agree with this observation?

If F = mg, what should t_{apex} equal? Does your function agree with this observation?

For what value of F would $t_{apex} = 2t_{thrust}$?