

# Warm Up Exercises: Unit 3, Forces

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## 1 Memory Bank

1.  $\vec{F} = m\vec{a}$  ... Newton's 2nd Law

## 2 Chapter 4 - Forces

1. A particle of mass  $m$  is falling under the influence of gravity, but experiences a thrust force upwards  $\vec{F}_t = kt\hat{j}$ , making the net force  $\vec{F}_{\text{Net}} = kt\hat{j} - mg\hat{j}$ . (a) Express the vertical *velocity* as a function of time, assuming the vertical velocity is  $v_0$  at  $t = 0$ . (b) If  $v_0 = 3$  m/s,  $m = 20$  kg, and  $v(10) = 30$  m/s, what is  $k$ ?
2. A 20,000 kg jet fighter lands on an aircraft carrier, moving at 108 km/hr. A tow cable grabs the aircraft and pulls it to a stop in 100 meters. (a) What is the average acceleration? (b) What force does the tow cable exert to stop the jet?