1. A 1500 kg car starts from a standstill an accelerates to a velocity of 20 m/s in 10 s. It then hits a concrete wall. What is the force produced by this impact.

<u>Data</u>

$m = 1500 \ kg$

$V_0 = 0 \ m/s$

$V_f = 20 \ m/s$

$t = 10 \ s$

$a = ?$

<u>Formula</u>

$V_f = V_0 + a \cdot t$

$F = m \cdot a$

<u>Calculation</u>

$a = \dfrac{V_f - V_0}{t} = \dfrac{20 - 0}{10} = 2 \ m/s^2$

$F = m \cdot a = 1500 \cdot 2 = 3000 \ N$

2. Calculate the force exerted by a 100 g apple drop from a height of 10 m.

<u>Data</u>

$m = 100 \ g = 0.1 \ kg$

$a = 9.8 \ m/s^2$

No other data is important.

<u>Formula</u>

$F = m \cdot a$

<u>Calculation</u>

$F = 0.1 \times 9.8 = 0.98 \ N$

3. What will be the final velocity of a 500 kg motorbike that starts at a standstill, drives for 8 s and then produces a force of 500 N when it hits the back of a truck. (Luckily nobody is hurt!)

<u>Data</u>

$m = 500 \ kg$

$F = 500 \ N$

$a = ?$

$V_0 = 0$

$V_f = ?$

$t = 8$

<u>Formula</u>

$F = m \cdot a$

$S_f = S_0 + V_0 \cdot t + \frac{1}{2} a t^2$

$V_f = V_0 + a \cdot t$

<u>Calculations</u>

$F = m \cdot a \ // \ a = \dfrac{F}{m} = 1 \ m/s^2$

$V_f = 0 + 1 \cdot 8 = 8 \ m/s$