Determine the force, F in lbf, required to lift a five gallon bucket full of water from rest with an acceleration of 3 m/s . Ignore the mass of the bucket.

Solution:

Let:

$a = 3\ m/c^2$

$V = 5\ galon$

$F = mg + ma$

$m = \rho * V = 1 * 5 * 4.546 = 22.73\ Kg; (1 galon = 4.546\ L)$

$F = 22.73 * 9.8 + 22.73 * 3 = 290.944\ N = 65.41\ Lbf; (1\ Lbf = 4.448\ N)$

Answer: 65.41 lbf.