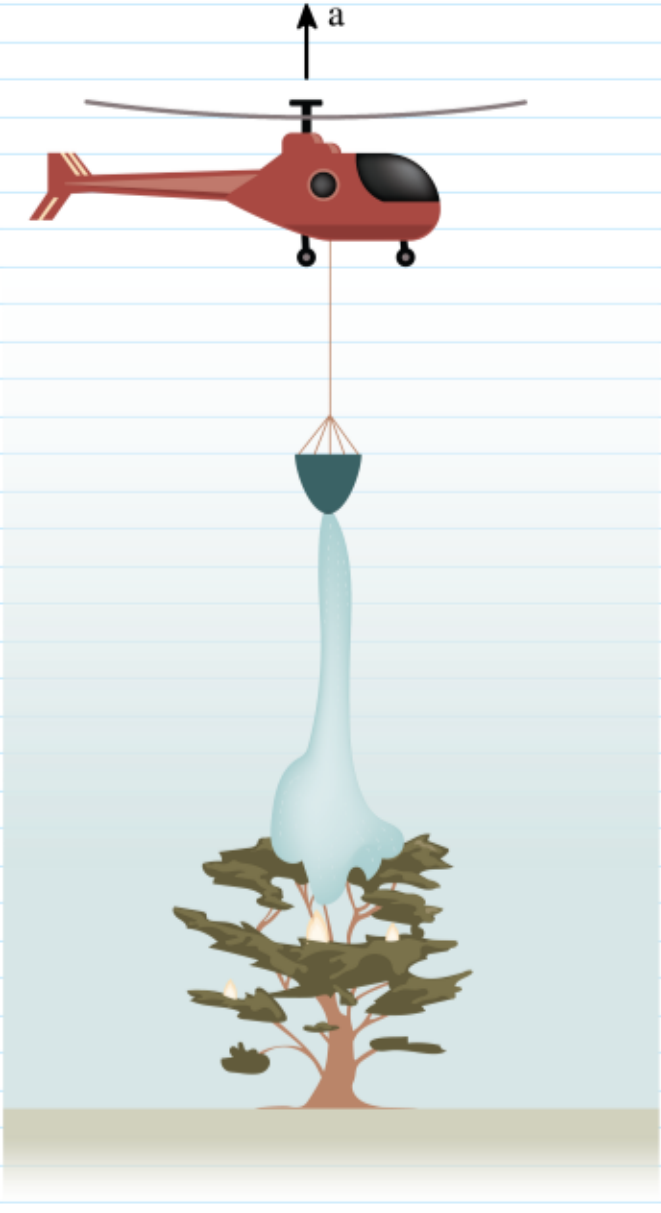
21-P-FA-GD-002



A water-bombing helicopter has been called in to fight a fire started by a gender reveal party. Due to the nature of the incident, it was likely a boy.

The helicopter rotor provides F N of downward thrust.

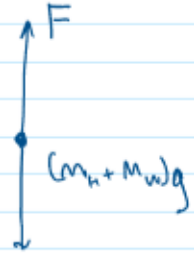
The helicopter is initially stably hovering and when the water is dropped, the helicopter accelerates upward at a.

What is the mass of the helicopter? What was the mass of the water dropped? (Assume $g = 9.81\ m/s^2$)

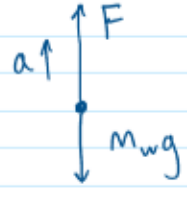
given
F, a, g

find
$m_{water}, m_{Helicopter}$

Before



After



Force Equilibrium

$\Sigma F = 0 = F - (m_H + m_w)g$

$F = (m_H + m_w)g$

Force Equilibrium

$\Sigma F = m_H a = F - m_H g$

$F = m_H(a+g)$

$m_H = \frac{F}{a+g}$

$F = \left(\frac{F}{a+g} + m_w\right)g$

$m_w = F/g - F/(a+g)$