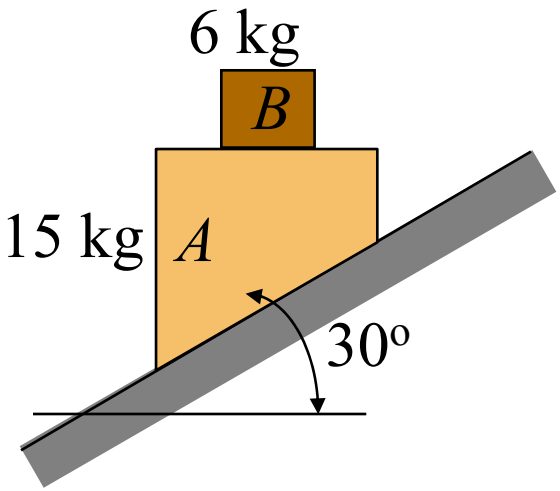
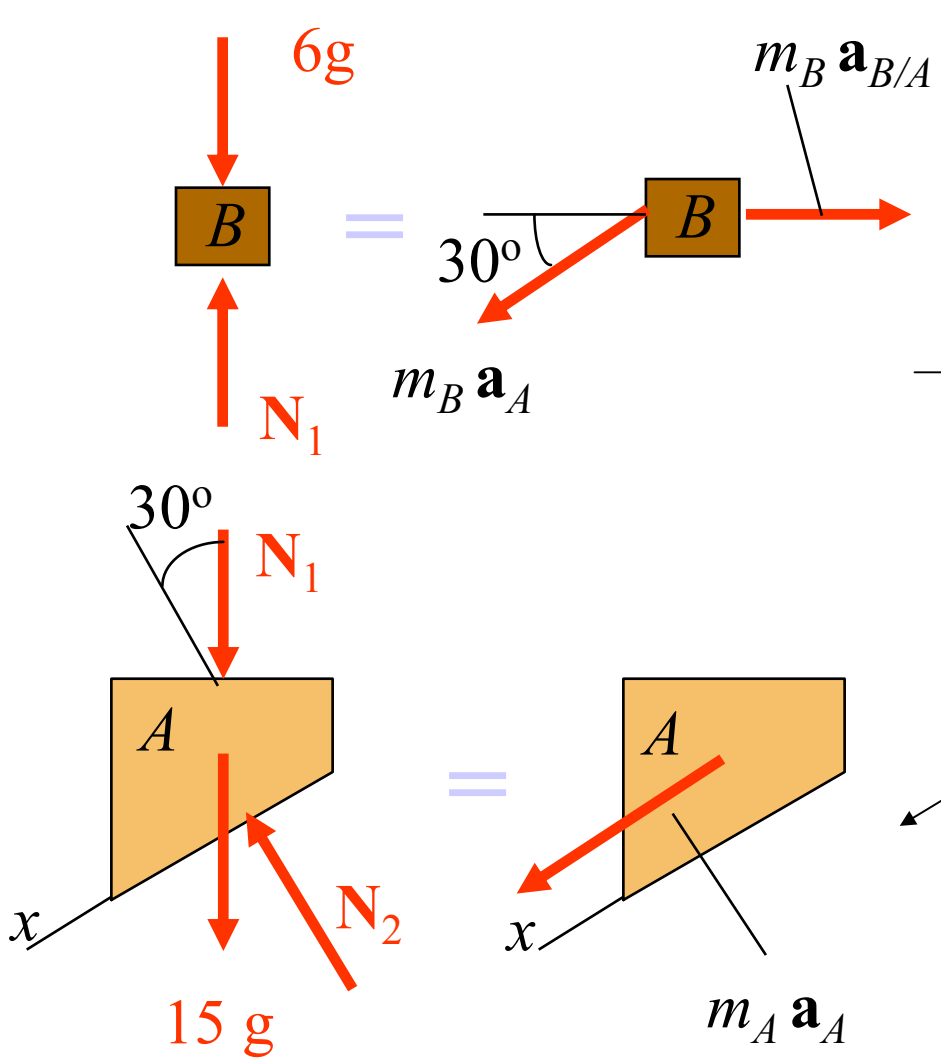
Problem 12.125



A 6-kg block B rests as shown on the upper surface of a 15-kg wedge A. Neglecting friction, determine immediately after the system is released from rest (a) the acceleration of A, (b) the acceleration of B relative to A.

1. **Kinematics**: Examine the acceleration of the particles.

2. **Kinetics**: Draw a free body diagram showing the applied forces and an equivalent force diagram showing the vector $m\mathbf{a}$ or its components.



$\downarrow \quad 6g - N_1 = 6\, a_A \sin 30^\circ \quad (1)$

$\rightarrow \quad 0 = 6\, a_{B/A} - 6\, a_A \cos 30^\circ \quad (2)$

$\swarrow \quad (N_1 + 15g) \sin 30^\circ = 15\, a_A \quad (3)$

Solving equations (1), (2), and (3) gives:

$\mathbf{a}_A = 6.24 \text{ m/s}^2 \measuredangle 30^\circ$

$\mathbf{a}_{B/A} = 5.41 \text{ m/s}^2 \rightarrow$