SHOW ALL WORK!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

The two blocks shown are on an inclined plane. The force \( F \) is parallel to the plane. All surfaces have the same coefficients of friction.

(a) Draw careful, clear, free body and force diagrams for object 1 and object 2. Label them clearly.
(b) Calculate the maximum value of \( F \) such that object 2 does NOT slide with respect to object 1.

\[
\begin{align*}
m_1 &= 3.25 \text{ kg} \\
m_2 &= 2.65 \text{ kg} \\
\mu_s &= 0.60 \\
\mu_k &= 0.40 \\
\theta &= 27.0^\circ
\end{align*}
\]

\[
F_1 = (m_1 + m_2)g \cos \theta \\
F F_1 = \mu_k N_1 \\
F N_2 = m_2 g \cos \theta \\
F F_2 = \mu_k N_2
\]

\[
\begin{align*}
N_1 &= (m_1 + m_2)g \cos \theta \\
N_2 &= m_2 g \cos \theta \\
F_1 &= \mu_k N_1 \\
F_2 &= \mu_k N_2
\end{align*}
\]

\[
F_f + m_1 g \sin \theta - \frac{F + m_1 g \sin \theta - \mu_k (m_1 + m_2)g \cos \theta - \mu_s m_2 g \cos \theta}{m_1} = m_1 a
\]

\[
m_2 g \sin \theta + \mu_s m_2 g \cos \theta = m_2 a \\
\therefore a = g \sin \theta + \mu_s g \cos \theta
\]
\[ F = \mu_k (m_1 + m_2) g \cos \theta + \mu_s m_2 g \cos \theta - m_1 g \sin \theta + m_1 (g \sin \theta + \mu_s g \cos \theta) = \]
\[ = \mu_k (m_1 + m_2) g \cos \theta + \mu_s g \cos \theta (m_1 + m_2) = \]
\[ = (\mu_k + \mu_s) (m_1 + m_2) g \cos \theta \]
\[ \Rightarrow F = 51.5 N \]