A block is on a inclined plane. The inclined plane has an angle of 15° from the horizontal. An external force, $F$, is applied to the block at an angle of 40.0° from the horizontal. The coefficients of friction are $\mu_k = 0.55$ and $\mu_s = 0.65$. The mass is 4.27 kg.

(a) Calculate the acceleration of the block in m/s² if the force $F$ is 35.0 N. The positive direction is up the plane as shown.

(b) Determine the value of the force (in N) needed to move the block at a constant speed up the incline.

\[
N = W \cos 15° - F \sin 25°,
\]

\[
F_k = \mu N; \ \text{kinetic friction needed} \implies F_k = \mu N
\]

\[
a = \frac{F \cos 25° - W \sin 15° - \mu_k (W \cos 15° - F \sin 25°)}{m}
\]

\[
a = 1.59 \text{ m/s}^2
\]

\[
\therefore a = 0 \implies F \cos 25° - W \sin 15° - \mu_k (W \cos 15° - F \sin 25°) = 0.
\]

\[
\Rightarrow F = \frac{W \sin 15° + \mu_k \cos 15°}{\cos 25° + \mu_k \sin 25°} = 29.0 \text{ N}
\]