A crate is resting on a frictionless incline supported by a cable as shown. The weight of the crate is 80 lb. Find:
(a) angle $\alpha$, for which the tension in the cable required to hold the crate at rest is minimal;
(b) the corresponding magnitude of the tension;
(c) the corresponding normal force exerted on the crate by the surface of the wedge.

Given: $W=80$ lb
Find:
- $\alpha$, so that $T$ is minimal
- $T$
- $N$

\[\Sigma F_x = 0: \quad W_x - T \cos \alpha = 0\]
\[\Sigma F_y = 0: \quad N + T \sin \alpha - W_y\]

$BC^2 = AC^2 + AB^2 = 64 + 36 = 100$, and $BC=10$ ft

From $\Sigma F_x$, $T \cos \alpha = 0.8W = 64$ lb

Now, since $W$ is fixed, minimum $T$ corresponds to maximum $\cos \alpha$, which is 1, and

$\alpha = 0$.

Then, $T = 64$ lb, $\sin \alpha = 0$, and from $\Sigma F_y$,

$N = -W_y = 0.6W = 48$ lb.