Question 32403

For an inclined plane,
1) $N = mg\cos\theta$
2) $ma = F - F_f - mg\sin\theta$
, where F_f is the friction force, which is equal to $F_f = \mu N = \mu mg\cos\theta$ (according to first equation). μ Is the friction coefficient, one needs to find.

Hence, from equation 2):

$$a = \frac{F - \mu mg\cos\theta - mg\sin\theta}{m} \quad .$$

Let us convert given force and mass into Newtons and kilograms:
$m = 120\,lb = 54.36\,kg ; F = 86\,lbs = 382.2\,N$

Since the motion is with constant speed, acceleration is zero, which yields
$F - \mu mg\cos\theta - mg\sin\theta = 0 \Rightarrow \mu = \frac{F - mg\sin\theta}{mg\cos\theta}$, which after calculation gives $\mu \approx 0.399$.