43. (a) If L ($= 1500\,\text{cm}$) is the unstretched length of the rope and $\Delta L = 2.8\,\text{cm}$ is the amount it stretches then the strain is $\Delta L/L = (2.8\,\text{cm})/(1500\,\text{cm}) = 1.9 \times 10^{-3}$.

(b) The stress is given by F/A where F is the stretching force applied to one end of the rope and A is the cross-sectional area of the rope. Here F is the force of gravity on the rock climber. If m is the mass of the rock climber then $F = mg$. If r is the radius of the rope then $A = \pi r^2$. Thus the stress is

$$\frac{F}{A} = \frac{mg}{\pi r^2} = \frac{(95\,\text{kg})(9.8\,\text{m/s}^2)}{\pi(4.8 \times 10^{-3}\,\text{m})^2} = 1.3 \times 10^7\ \text{N/m}^2\ .$$

(c) Young's modulus is the stress divided by the strain: $E = (1.3 \times 10^7\,\text{N/m}^2)/(1.9 \times 10^{-3}) = 6.9 \times 10^9\,\text{N/m}^2$.