15. (a) The forces acting on bucket are the force of gravity, down, and the tension force of cable A, up. Since the bucket is in equilibrium and its weight is $W_B = m_B g = (817\,\text{kg})(9.8\,\text{m/s}^2) = 8.01 \times 10^3\,\text{N}$, the tension force of cable A is $T_A = 8.01 \times 10^3\,\text{N}$.

(b) We use the coordinates axes defined in the diagram. Cable A makes an angle of 66° with the negative y axis, cable B makes an angle of 27° with the positive y axis, and cable C is along the x axis. The y components of the forces must sum to zero since the knot is in equilibrium. This means $T_B \cos 27° - T_A \cos 66° = 0$ and

$$T_B = \frac{\cos 66°}{\cos 27°}\, T_A = \left(\frac{\cos 66°}{\cos 27°}\right)(8.01 \times 10^3\,\text{N}) = 3.65 \times 10^3\,\text{N}\ .$$

(c) The x components must also sum to zero. This means $T_C + T_B \sin 27° - T_A \sin 66° = 0$ and

$$T_C = T_A \sin 66° - T_B \sin 27° = (8.01 \times 10^3\,\text{N}) \sin 66° - (3.65 \times 10^3\,\text{N}) \sin 27° = 5.66 \times 10^3\,\text{N}\ .$$