Question:

A 50kg boy suspends himself from a point on a rope tied horizontally between two vertical poles. The two segments of the rope are then inclined at angles 30 degrees and 60 degrees respectively to the horizontal. The tensions in the segments of the rope in

Answer:
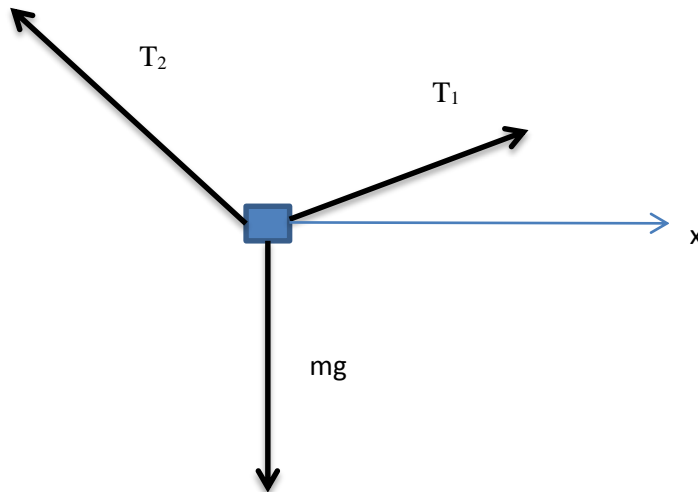
T_1 and T_2 are forces of tension.

mg is the weight of the boy.

Newton's first law of motion on y-axis:

$$mg = T_1 \sin 30 + T_2 \sin 60$$

Newton's first law of motion on x-axis:

$$T_1 \cos 30 = T_2 \cos 60$$

From second equation:

$$T_1 = \frac{\cos 60}{\cos 30} T_2$$

And from first:

$$mg = \frac{\cos 60}{\cos 30} \sin 30\, T_2 + T_2 \sin 60 = \frac{2}{\sqrt{3}} T_2$$

$$T_2 = \frac{\sqrt{3}}{2} mg$$

Therefore:

$$T_1 = \frac{\cos 60}{\cos 30} T_2 = \frac{1}{2} mg$$

Answer: $\frac{\sqrt{3}}{2} mg, \frac{1}{2} mg$