Puzzle

– Ludo's Rope –

Materials:

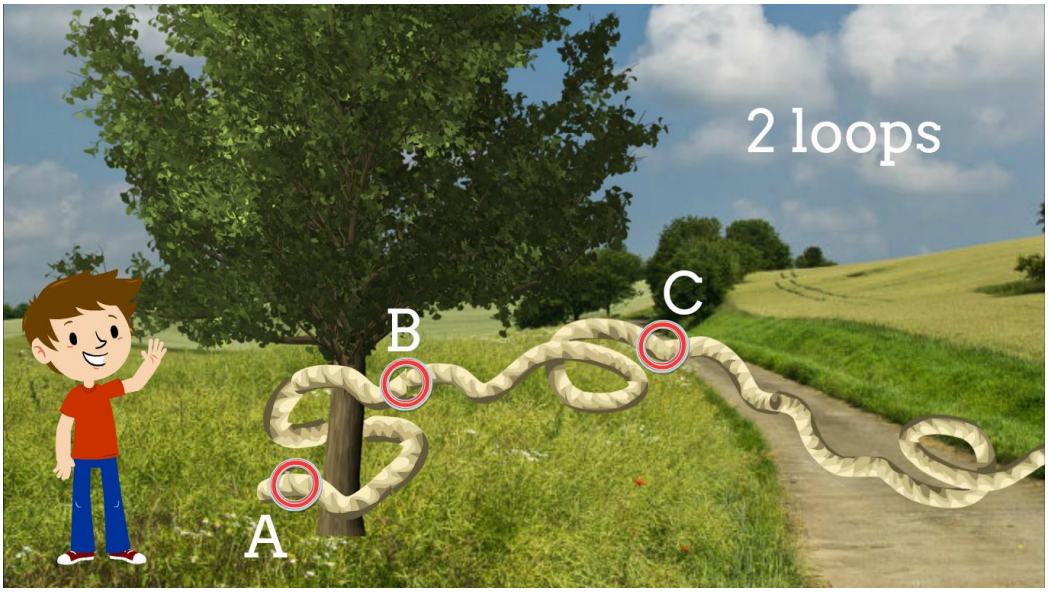
- Video of the puzzle
- Pen and paper

The Puzzle

On a bright summer day, Ludo decides to go to the park. Once there, he finds a very long rope. Ludo decides to make 3 knots on the rope; knot A, knot B, and knot C.

The distance between knot A and B ($\overline{AB}$) corresponds to $\frac{1}{15}$ of the rope's total length, and the distance between knot A and C ($\overline{AC}$) corresponds to $\frac{1}{6}$ of the rope's total length.

Ludo decides to wrap the $\overline{AB}$ segment around a tree trunk and finds out that it can make exactly two full turns.



On the same tree trunk, how many full turns would Ludo be able to do with the $\overline{BC}$ segment?

Puzzle Solution

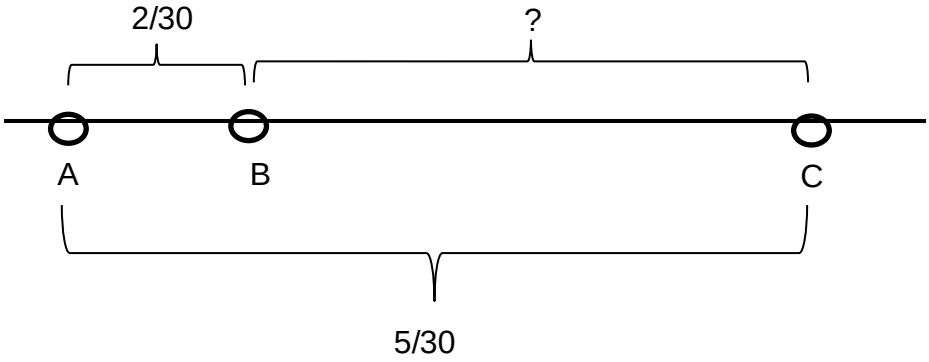
The answer:

With the $\overline{BC}$ segment, Ludo would be able to do 3 full turns of the tree trunk.

Possible solution:

We know that the length of the $\overline{AB}$ segment represents $\frac{1}{15}$ of the rope, and that the length of the $\overline{AC}$ segment represents $\frac{1}{6}$ of the rope.

One way to solve is to find a common denominator for the fractions. Because the smallest common denominator for 15 and 6 is 30 (2x15=30 and 5x6=30), $\frac{1}{15}$ would become $\frac{2}{30}$ and $\frac{1}{6}$ would become $\frac{5}{30}$.



The puzzle states that the **length of $\overline{AB}$ is exactly 2 full turns of the tree trunk**. Therefore, we know that $\frac{2}{30}$ of the rope equals to two turns. From this information, we can deduce that $\frac{1}{30}$ of the rope can do 1 turn of the tree trunk. We can also conclude that, because the length of $\overline{AC}$ equals to $\frac{5}{30}$ of the rope, this segment can do 5 turns of the tree trunk.

The length of the $\overline{AB}$ segment added to the length of the $\overline{BC}$ segment equals to the length of the $\overline{AC}$ segment ($\overline{AB}$ + $\overline{BC}$ = $\overline{AC}$ or $\frac{2}{30}$ + $\frac{X}{30}$ = $\frac{5}{30}$). From here, we can determine that the number of turns done by the $\overline{AB}$ segment added to the number of turns done by the $\overline{BC}$ segment equals the number of turns done by the $\overline{AC}$ segment.

Thus, to find out the number of turns that can be done with the $\overline{BC}$ segment, we must calculate $\overline{AC}$ - $\overline{AB}$ = $\overline{BC}$ or $\frac{5}{30}$ - $\frac{2}{30}$ = $\frac{3}{30}$. So, the length of the $\overline{BC}$ segment equals to $\frac{3}{30}$.

Therefore, the $\overline{BC}$ segment would be able to do 3 full turns of the tree trunk.

Another solution can be considered: We could have found the fraction of the $\overline{BC}$ segment in comparison with the total rope length, and then, knowing that $\frac{1}{30}$ equals one full turn, find out how many turns the length of the $\overline{BC}$ segment would be able to do.