**A Tangled Tale Problem**

**Problem:** A man walked for 5 hours, first along a level road, then up a hill, and then he turned around and walked back to the starting point along the same path. He walks 4 mph on the level, 3 mph uphill, and 6 mph downhill. Find the distance he walked.

**Solution:** Given,

- Speed at level ground forward/backward = 4 mph
- Speed going uphill = 3 mph
- Speed going downhill = 6 mph

Let, time travelled uphill = \( t_1 \) and time travelled downhill = \( t_2 \).

So, \( distance \ up\ hill \ = \ 3t_1 \) and \( distance \ downhill \ = \ 6t_2 \).

Now, he travelled same distance uphill as he did for downhill.

So, \( 3t_1 = 6t_2 \) \( \Rightarrow \) \( t_1 = 2t_2 \).

For overall rate going uphill and coming downhill, \( r = \frac{3t_1 + 6t_2}{t_1 + t_2} = \frac{6t_2 + 6t_2}{2t_2 + t_2} = \frac{12t_2}{3t_2} = 4 \).

So, average rate travelling up and downhill is 4 mph, which is equal to average rate travelling level ground.

Hence, total distance covered in 5 hrs is 20 miles.

We get same average speed for level ground as we do for hills. This happens due to the average speeds for up and downhill are 3 mph and 6 mph respectively. Different values, however, will result average speed not equal to average speed of level ground. In fact, it would be impossible to solve (i.e. find the total distance) for values other than 3 mph and 6 mph.