MATHCOUNTS® Problem of the Week Archive

Road Work Ahead – July 9, 2018

Problems & Solutions

A construction crew places orange barrels on both sides of a particular road to indicate a work zone. On each side of the road, the distance between the centers of consecutive barrels is 15 feet. If this work zone is 1.5 miles long, what is the total number of barrels that will be used?

Since 1 mile = 5280 feet, the work zone is 1.5 × 5280 = 7920 feet long. On each side of the road, starting with the first barrel placed at the "0-feet" mark and then placing another 7920 ÷ 15 = 528 barrels means that a total of 529 × 2 = ***1058*** *barrels are used.*

It took 7 days for 5 workers, to complete similar road work on a 2640-foot stretch of road. Working at the same rate, what is the minimum number of workers needed to complete 1.5 miles of the same road work in 7 days?

Notice that 2640 feet is 0.5 mile. Thus, to complete 1.5 miles of the same road work will take 3 times as long and will require at least 3 times as many workers to complete it in the same amount of time, or at least 5 × 3 = ***15*** *workers.*

If only 5 workers are available for the first 2 days of road work, how many additional workers will be needed on each of the last 5 days to complete the work on time?

If the entire 2640-foot job took 7 days, then 2640/7 feet of road work was completed each day. And (2640/7)/5 = 2640/35 = 528/7 feet of road work was completed by each worker. So, during the first 2 days, 5 workers complete (528/7) × 5 × 2 = 5280/7 feet of road work. Since 1.5 miles = 1.5 × 5280 = 7920 feet, it follows that after the first 2 days there will be 7920 – (5280/7) = 50,160/7 feet for road work remaining to be completed in 5 days. That means that (50,160/7)/5 = 10,032/7 feet of road work must be completed each day. At a rate of 528/7 feet of road work per day per worker, it will take total of (10,032/7)/(528/7) = 19 workers per day to complete the work on time. That's an additional 19 – 5 = ***14*** *workers.*

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