MATHCOUNTS® Problem of the Week Archive

Construction Projects – August 12, 2019

Problems

A particular construction crew places orange barrels on both sides of a road that is under construction such that the centers of adjacent barrels on the same side of the road are 15 feet apart. If the crew does this for a 1.5 mile stretch of roadway, how many barrels will be placed on the two sides of the road in total?

> *There are 1.5 × 5280 = 7920 feet on each side of the road. We start with one barrel at the "zero" mark and then add 920 ÷ 15 = 528 barrels on each side of the road, for a total of 528 + 1 = 529 barrels per side. So for both sides there are a total of 2 × 529 = **1058** barrels.*

When planning how long this project will take, the construction company considers that it took 5 workers 7 days, while working as quickly as possible, to complete the same job on a 2640-foot stretch of road way. If they want this job (on a 1.5 mile stretch of road) completed in 7 days, what is the minimum number of workers they will need?

> *Notice that 2640 ft is equivalent to 0.5 miles. Thus, the 1.5 mile job is 3 times as long and will require 3 times as many workers to complete it in the same amount of time. Therefore, it will take 5 × 3 = **15** workers.*

If only 5 workers were available for the first 2 days, how many additional workers will be needed during the last 5 days so that the job can be completed on time?

> *Each worker works at a rate of 2640 ÷ (5 × 7) = 528/7 ft completed per day. Thus during the first 2 days, (528/7)(5 workers)(2 days) = 5280/7 ft will be completed if only 5 workers are working. The 1.5 mile stretch is equivalent to 1.5 × 5280 = 7920 ft, thus after the first 2 days there are 7920 – (5280/7) = 50,160/7 ft left to complete in 5 days. That means that (50,160/7)/5 = 10,032/7 ft must be completed each day. Since each worker works at a rate of 528/7 feet per day, they will need a total of (10,032/7)/(528/7) = 19 people working for the last 5 days to complete the job on time. They already have 5 people on site, to that is an additional 19 – 5 = **14** people.*

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