Roller Coaster Madness – June 8, 2020

Problems & Solutions

The duration of a ride on the Shocker roller coaster is 1 minute 30 seconds. The Shocker has only one train consisting of a series of linked cars, each of which carries a pair of passengers. It takes each group of passengers exactly 30 seconds to board the train and exactly 30 seconds to exit the train. In one hour 480 people board the train, complete the ride and exit the train. Assuming there is never a seat left vacant, how many linked cars are in the Shocker's train?

*Each group of passengers boards the train, completes the ride and exits the train, which takes a combined total of 0.5 + 1.5 + 0.5 = 2.5 minutes. In 60 minutes this occurs 60 ÷ 2.5 = 24 times for 24 groups of passengers. If 480 people board, ride and exit the train in 60 minutes, it follows that each group consists of 480 ÷ 24 = 20 passengers. Since passengers are seated two to a car, the train must consist of 20 ÷ 2 = **10** cars.*

Marlo is waiting in the long line to ride the Shocker. He reaches a point where a sign is posted which reads, "Wait time from this point: 20 minutes." Assuming, once again, that there is never a seat left vacant and there are no gaps in the line, what is the furthest position (i.e. 1st, 2nd, etc.) Marlo can occupy in the line at this point?

*If 20 minutes will pass before Marlo boards the train, that means 20 ÷ 2.5 = 8 groups of passengers will board, ride and exit the Shocker. From his current position Marlo will be in the 9th group to board the ride. Since no seat is ever left vacant, there are 8 × 20 = 160 passengers who will ride the Shocker in the time it takes Marlo to move from his current position in the queue to board the train. The 9th group will have passengers who were 161st through 180th in line from the point where Marlo read the sign. Therefore, the furthest position Marlo can occupy in the line at the point where he encounters the sign is **180th**.*

The maximum speed of the Shocker is 65 mph. Its average speed, however, is a mere 8 mph due to the extremely slow rate at which the roller coaster ascends to the top of the first hill from which there is a 175 ft drop. If the ride on the Shocker takes 1 minute 30 seconds to be completed, how many feet long is the entire track? (Recall 1 mile = 5280 feet.)

*We can use the distance formula d = rt to solve this problem. We are told that r = 8 mph. The duration of the ride is 1.5 min which equals 1.5/60 = 0.025 h. Substituting, we get d = 8(.025) = 0.2 mi. Thus, the length of the Shocker's track is 0.2(5280) = **1056** ft.*

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