MATHCOUNTS® Problem of the Week Archive

Fourth of July – July 3, 2023

Problems & Solutions

The July 4 holiday is one that many people plan their summer vacations around. Peggy works a Monday through Friday job that has the following July 4 holiday policy. If July 4 falls on a weekend, employees get the following Monday off. If July 4 falls on Monday, Wednesday or Friday, employees just get July 4 off. If July 4 falls on a Tuesday or Thursday, employees get July 4 off, as well as the corresponding Monday or Friday, respectively. July 4, 2023 falls on a Tuesday. From Jan. 1, 2023 through Dec. 31, 2028, what is the average number of work days per year Peggy will have off due to the July 4 holiday? Express your answer as a decimal to the nearest hundredth.

From 2023 through 2028, July 4 will fall on Tuesday (2023), Thursday (2024 – leap year), Friday (2025), Saturday (2026), Sunday (2027) and Tuesday (2028 – leap year) over these six years. According to the policy, this will result in 2 + 2 + 1 + 1 + 1 + 2 = 9 work days off in six years due to the July 4 holiday. This is an average of 9 ÷ 6 = ***1.5 days*** *off per year, to the nearest hundredth.*

Part of Peggy's Fourth of July celebration this year includes a cookout. She purchased hot dogs and hot dog buns for the cookout. The hot dogs came in packages that each cost $3.99 and contained six hot dogs, and the buns came in packages that each cost $0.99 and contained eight buns. If Peggy purchased the minimum number of packages of hotdogs and packages of buns so that there were the exact same number of hot dogs and buns, how much did all of the hot dogs and buns cost before tax? (She purchased at least one package of hot dogs.)

Peggy is purchasing six hot dogs at a time and eight buns at a time. The least common multiple of six and eight is 24. This means she purchased four packages of six hotdogs and three packages of eight buns. This would cost 4($3.99) + 3($0.99) = ***$18.93*** *before tax.*

After the cookout, Peggy and her family are going to the local fireworks show. Peggy has heard that the show is a total of 45 minutes long with an 11-minute finale incorporated. She also knows that the average number of fireworks per minute during the finale is double the average number of fireworks per minute during the entire show. What percent of the show's fireworks are shot off during the first 34 minutes of the show? Express your answer to the nearest tenth.

We can let the average number of fireworks per minute for the entire show be x. This means there will be 45x fireworks during the entire show. It also means that the average number of fireworks during the final 11 minutes is 2x, so there will be 11(2x) = 22x fireworks during those 11 minutes. That leaves 45x – 22x = 23x fireworks for the first 34 minutes of the show. This is 23x ÷ 45x = 23 ÷ 45 = ***51.1%*** *of the fireworks for the entire show, to the nearest tenth.*

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