MATHCOUNTS® Problem of the Week Archive

More Winter on the Way – February 3, 2025

Problems & Solutions

Over the weekend, the world's most famous groundhog, Punxsutawney Phil, enjoyed his favorite day of the year – Groundhog Day! According to historical data on Stormfax® Weather Almanac's website (stormfax.com/ghogday.htm), Phil has predicted a long winter 108 times, and an early spring 21 times from 1887 to 2024 (no data for nine of these years). That makes the odds of Phil seeing his shadow, thereby predicting six more weeks of winter for this year, 36 to 7. Based on this information, what is the percent probability of Phil seeing his shadow? Express your answer as a percent to the nearest whole number.

Knowing the odds of an event happening is like knowing the probability. When we are given the odds of an event happening, we are seeing a comparison of two numbers representing the likelihood of the event happening and the likelihood of the event not happening. So, if the odds of Phil seeing his shadow are 36 to 7, we can assume that he will see his shadow 36 times for every 7 times that he does not see his shadow. This means that Phil should see his shadow 36 times out of every 36 + 7 = 43 times he emerges from his burrow on Groundhog Day. Comparing 36 and 43 gives us the probability of Phil seeing his shadow: 36/43 ≈ ***84****%.*

Given this historical data, you might not be surprised to learn that when Phil emerged from his burrow in Gobbler's Knob this past Sunday, he **did** see his shadow, sending the message that winter will continue for another six weeks. Many people had hoped he wouldn't see his shadow so that spring would come early. Winter is officially from December 21 through March 19, inclusive. If Punxsutawney had predicted that spring was coming three weeks early this year, by what percent would the length of the normal winter be decreased? Express your answer as a percent to the nearest tenth.

If winter lasts from December 21 to March 19, inclusive, that is 11 days in December, 31 days in January, 28 days in February and 19 days in March, for a total of 11 + 31 + 28 + 19 = 89 days. If spring came three weeks early, these 89 days would decrease by 21 days. This is a decrease of 21/89 ≈ ***23.6****%.*

Historically, Phil's winter forecasts have been correct 39% of the time. Suppose Phil's historical accuracy of predicting an early spring is 50%. Based on the previous problems, what would be his historical accuracy of predicting a long winter? Express your answer as a percent to the nearest whole number.

If Phil's historical accuracy of predicting an early spring is 50%, then he would have predicted 0.50 × 21 = 10.5 early springs correctly. Since Phil's overall accuracy for his 108 + 21 = 129 recorded historical predictions is 39%, he's had 0.39 × 129 = 50.31 correct winter forecasts. Of those, 50.31 – 10.5 = 39.81 would have been correct forecasts for a long winter. That means Phil's historical accuracy for predicting a long winter would be 39.81/108 ≈ ***37****%.*

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