8.7 Probability and Odds

Wednesday, June 10, 2020 2:13 PM

A jar has 20 marbles in it: 4 Blue, 6 Red, 2 White, 8 Green

Ratio $2:7$

① You pick a single marble:

- Probability of selecting a Green marble

$$P(G) = \frac{8 \leftarrow \#\text{ Green marbles}}{20 \leftarrow \#\text{ of total marbles}} = \frac{2}{5} \rightarrow 0.4 \text{ or } 40\%$$

- Probability of selecting a Red marble

$$P(R) = \frac{6 \leftarrow \#\text{ Red marbles}}{20 \leftarrow \#\text{ of total marbles}} = \frac{3}{10} \rightarrow 0.3 \text{ or } 30\%$$

The Probability of an Event:

$$P(E) = \frac{\#\text{ of "winners"}}{\text{total \# of outcomes}}$$

- Odds of selecting a Green marble

$$O(G) = 8 : 12 = 2:3$$

(8: # of Green marbles; 12: # of non-green marbles)

- Odds of selecting a Red marble

$$O(R) = 6 : 14 = 3:7$$

(6: # of Red marbles; 14: # of non-red marbles)

The Odds of an Event:

$$O(E) = \#\text{ of "winners"} : \#\text{ of "losers"}$$

② You pick two marbles from the jar:

- With Replacement (pick out a marble and put it back in the jar before selecting 2nd marble)

$$P(G,R) = P(G)\cdot P(R) = \frac{8}{20}\cdot\frac{6}{20} = \frac{2}{5}\cdot\frac{3}{10} = \frac{6}{50} = \frac{3}{25}$$

(40%) (30%) (12%)

$$P(B,W) = P(B)\cdot P(W) = \frac{4}{20}\cdot\frac{2}{20} = \frac{1}{5}\cdot\frac{1}{10} = \frac{1}{50}$$

20% 10% 2%

- Without Replacement (pick 1st marble and leave it out, then pick 2nd marble)

$$P(G,R) = P(G)\cdot P(R) = \frac{8}{20}\cdot\frac{6}{19} = \frac{2}{5}\cdot\frac{6}{19} = \frac{12}{95}$$

12.63%

(19: not 20 because we took a marble out)

$$P(B,W) = P(B)\cdot P(W) = \frac{4}{20}\cdot\frac{2}{19} = \frac{1}{5}\cdot\frac{2}{19} = \frac{2}{95}$$

2.11%

ex

	Chocolate	Vanilla	Strawberry	Total
10th	45	32	15	92
11th	52	64	17	133
12th	80	22	13	115
Total	177	118	45	340

① What percent of 12th graders chose chocolate?

$$\frac{\#\text{ of 12th graders that chose chocolate}}{\text{total of 12th graders}} = \frac{80}{115} = 0.69565\cdot 100 = 69.56\%$$

② What percent of the total population is in 10th grade?

$$\frac{92}{340} = 0.2706\cdot 100 = 27.06\%$$

③ What percent of people who chose

$$\frac{17}{\quad} = 0.3778\cdot 100 = 37.78\%$$

③ What percent of people who chose strawberry are in 11th grade? $\frac{17}{45} = 0.3778 \cdot 100 = \boxed{37.78\%}$