

7-4: Use Probability Models

1. Sample answer: A probability model identifies the sample space, events within the sample space, and the probabilities of each event. The model can be analyzed to find the probability of any particular outcome in the sample set.
2. Sample answer: The sample space includes all the possible outcomes, and the sum of the probabilities of all outcomes should be equal to 1.
3. Sample answer: Using relative frequency of actual results to develop a probability model allows you to see the experimental probabilities of each event and compare them or use them to make an estimate about an unknown part of the situation, such as number of marbles or colors of marbles in a jar.
4. Sample space = {1, 2, 3, 4, 5}
 $P(1) = \frac{1}{5}$, $P(2) = \frac{1}{5}$, $P(3) = \frac{1}{5}$,
 $P(4) = \frac{1}{5}$, $P(5) = \frac{1}{5}$
5. Sample answer: Based on the data, the experimental probability of selecting an apple is 25% since $\frac{5}{20}$ of the students selected an apple.
6. About 27 green, 21 blue, and 12 white marbles
7. a. Sample answer: {A, Y, 3, 5}
b. $P(A) = \frac{1}{4}$, $P(Y) = \frac{1}{4}$, $P(3) = \frac{1}{4}$,
 $P(5) = \frac{1}{4}$
8. 3; 4
3; 4; 5
 $\frac{1}{6}, \frac{2}{6} = \frac{1}{3}, \frac{2}{6} = \frac{1}{3}, \frac{1}{6}$
9. a. $P(\text{glass}) = \frac{60}{300} = 20\%$
 $P(\text{wood}) = \frac{96}{300} = 32\%$
 $P(\text{brass}) = \frac{144}{300} = 48\%$
b. About 90 glass beads, about 144 wood beads, and about 216 brass beads.
10. a. Sample space, $S = \{14 \text{ green balls, } 12 \text{ orange balls, } 19 \text{ purple balls}\}$
 $P(\text{green}) = \frac{14}{45}$
 $P(\text{orange}) = \frac{12}{45}$
 $P(\text{purple}) = \frac{19}{45}$
b. 20; Sample answer:
 $P(\text{orange}) = \frac{12}{45}$.
Use proportional reasoning to predict how many orange balls will be selected in 75 trials:
 $\frac{12}{45} = \frac{x}{75}$; $x = 20$
11. $P(\text{yellow pepper}) = \frac{2}{5}$
12. a. 126
b. $P(\text{adventure}) = 15\%$
 $P(\text{comedy}) = 17\%$
 $P(\text{mystery}) = 25\%$
 $P(\text{romance}) = 22\%$
 $P(\text{other genre}) = 21\%$

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13. a. Sample space = {red, blue, yellow}

$$P(\text{red}) = \frac{45}{100}, P(\text{blue}) = \frac{40}{100},$$

$$P(\text{yellow}) = \frac{15}{100}$$

The probability of getting a red gum ball is 3 times as great as the probability of getting a yellow gum ball.

b. Sample answer: The gum balls might not have been evenly distributed in the gum ball machine. A greater number of red and blue gum balls might have been near the bottom of the machine, and now that they have been purchased, there are more yellow gum balls near the bottom.