12-4 Skills Practice

Multiplying Probabilities

A die is rolled twice. Find each probability.

1. $P(5, \text{then } 6)$ $\dfrac{1}{6} \cdot \dfrac{1}{6} = \boxed{\dfrac{1}{36}}$

2. $P(\text{no 2s})$ $\dfrac{5}{6} \cdot \dfrac{5}{6} = \boxed{\dfrac{25}{36}}$

3. $P(\text{two 1s})$ $\dfrac{1}{6} \cdot \dfrac{1}{6} = \boxed{\dfrac{1}{36}}$

4. $P(\text{any number, then not 5})$ $\dfrac{6}{6} \cdot \dfrac{5}{6} = \dfrac{30}{36}$ or $= \boxed{\dfrac{5}{6}}$

5. $P(4, \text{then not 6})$ $\dfrac{1}{6} \cdot \dfrac{5}{6} = \boxed{\dfrac{5}{36}}$

6. $P(\text{not 1, then not 2})$ $\dfrac{5}{6} \cdot \dfrac{5}{6} = \boxed{\dfrac{25}{36}}$

A board game uses a set of 6 different cards. Each card displays one of the following figures: a star, a square, a circle, a diamond, a rectangle, or a pentagon. The cards are placed face down, and a player chooses two cards. Find each probability.

7. $P(\text{circle, then star})$, if no replacement occurs $\dfrac{1}{6} \cdot \dfrac{1}{5} = \boxed{\dfrac{1}{30}}$

8. $P(\text{diamond, then square})$, if replacement occurs $\dfrac{1}{6} \cdot \dfrac{1}{6} = \boxed{\dfrac{1}{36}}$

9. $P(2 \text{ polygons})$, if replacement occurs $\dfrac{5}{6} \cdot \dfrac{5}{6} = \boxed{\dfrac{25}{36}}$

10. $P(2 \text{ polygons})$, if no replacement occurs $\dfrac{5}{6} \cdot \dfrac{4}{5} = \dfrac{20}{30} = \boxed{\dfrac{2}{3}}$

11. $P(\text{circle, then hexagon})$, if no replacement occurs $\boxed{0}$

**Determine whether the events are *independent* or *dependent*. Then find each probability.**

12. A mixed box of herbal teabags contains 2 lemon teabags, 3 orange-mango teabags, 3 chamomile teabags, and 1 apricot-ginger teabag. Kevin chooses 2 teabags at random to bring to work with him. What is the probability that he first chooses a lemon teabag and then a chamomile teabag? dependent $\dfrac{2}{9} \cdot \dfrac{3}{8} = \dfrac{6}{72} = \boxed{\dfrac{1}{12}}$

13. The chart shows the selection of olive oils that Hasha finds in a specialty foods catalog. If she randomly selects one type of oil, then randomly selects another, different oil, what is the probability th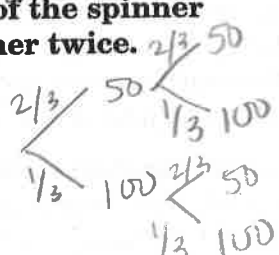at both selections are domestic, first cold pressed oils? dependent $\dfrac{7}{41} \cdot \dfrac{6}{40} = \dfrac{42}{1640} = \boxed{\dfrac{21}{820}}$

Type of Oil	Domestic	Imported
Pure	2	5
Cold Pressed	4	8
First Cold Pressed	7	15

For Exercises 14 and 15, two thirds of the area of the spinner earns you 50 points. Suppose you spin the spinner twice.
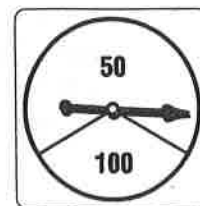
14. Sketch a tree diagram showing all of the possibilities. Use it to find the probability of spinning 50 points, then 100 points.

$2/3$ 50 $< \begin{array}{l} 2/3 \; 50 \\ 1/3 \; 100 \end{array}$

$1/3$ 100 $< \begin{array}{l} 2/3 \; 50 \\ 1/3 \; 100 \end{array}$

$\dfrac{2}{3} \cdot \dfrac{1}{3} = \dfrac{2}{9}$

15. What is the probability that you get 100 points on each spin?

$\dfrac{1}{3} \cdot \dfrac{1}{3} = \dfrac{1}{9}$

Lesson 12-4

12-4 Practice

Multiplying Probabilities

A die is rolled three times. Find each probability.

1. P(three 4s) $\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \boxed{\frac{1}{216}}$

2. P(no 4s) $\frac{5}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} = \boxed{\frac{125}{216}}$

3. P(2, then 3, then 1) $\frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \boxed{\frac{1}{216}}$

4. P(three different even numbers) $\frac{3}{6} \cdot \frac{2}{6} \cdot \frac{1}{6} = \frac{6}{216}$

5. P(any number, then 5, then 5) $\boxed{\frac{1}{36}}$ $\frac{6}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{6}{216}$

6. P(even number, then odd number, then 1) $= \frac{1}{36}$
$\frac{3}{6} \cdot \frac{3}{6} \cdot \frac{1}{6} = \frac{9}{216} = \boxed{\frac{1}{24}}$

There are 3 nickels, 2 dimes, and 5 quarters in a purse. Three coins are selected in succession at random. Find the probability.

7. P(nickel, then dime, then quarter), if no replacement occurs $\frac{3}{10} \cdot \frac{2}{9} \cdot \frac{5}{8} = \frac{30}{720} = \boxed{\frac{1}{24}}$

8. P(nickel, then dime, then quarter), if replacement occurs $\frac{3}{10} \cdot \frac{2}{10} \cdot \frac{5}{10} = \frac{30}{1000} = \boxed{\frac{3}{100}}$

9. P(2 nickels, then 1 quarter), if no replacement occurs

10. P(3 dimes), if replacement occurs $\frac{2}{10} \cdot \frac{2}{10} \cdot \frac{2}{10} = \frac{8}{1000}$ $\frac{3}{10} \cdot \frac{2}{9} \cdot \frac{5}{8} = \frac{30}{720} = \boxed{\frac{1}{24}}$

11. P(3 dimes), if no replacement occurs $\boxed{\frac{1}{125}}$ 0

For Exercises 12 and 13, determine whether the events are *independent* or *dependent*. Then find each probability.

12. Serena is creating a painting. She wants to use 2 more colors. She chooses randomly from 6 shades of red, 10 shades of green, 4 shades of yellow, 4 shades of purple, and 6 shades of blue. What is the probability that she chooses 2 shades of green? dependent
$\frac{10}{30} \cdot \frac{9}{29} = \frac{90}{870} = \boxed{\frac{3}{29}}$

13. Kershel's mother is shopping at a bakery. The owner offers Kershel a cookie from a jar containing 22 chocolate chip cookies, 18 sugar cookies, and 15 oatmeal cookies. Without looking, Kershel selects one, drops it back in, and then randomly selects another. What is the probability that neither selection was a chocolate chip cookie? independent $\frac{33}{55} \cdot \frac{33}{55} = \frac{1089}{3025} \boxed{\frac{9}{25}}$

14. **METEOROLOGY** The Fadeeva's are planning a 3-day vacation to the mountains. A long-range forecast reports that the probability of rain each day is 10%. Assuming that the daily probabilities of rain are independent, what is the probability that there is no rain on the first two days, but that it rains on the third day? $\frac{90}{100} \cdot \frac{90}{100} \cdot \frac{10}{100} = \frac{81000}{1000000} = \boxed{\frac{81}{1000}}$

RANDOM NUMBERS For Exercises 15 and 16, use the following information.

Anita has a list of 20 jobs around the house to do, and plans to do 3 of them today. She assigns each job a number from 1 to 20, and sets her calculator to generate random numbers from 1 to 20, which can reoccur. Of the jobs, 3 are outside, and the rest are inside.

15. Sketch a tree diagram showing all of the possibilities that the first three numbers generated correspond to inside jobs or outside jobs. Use it to find the probability that the first two numbers correspond to inside jobs, and the third to an outside job. $.85 \times .85 \times .15 = .108375$

16. What is the probability that the number generated corresponds to an outside job three times in a row? $.15 \times .15 \times .15 = .003375$