Day 24

9-7 Probability of Multiple Events

(1) Finding the Probability of A and B

Dependent Events: when the outcome of 1 event affects the outcome of the 2nd event

"without replacement"

Independent: when the outcome of the 1st event does NOT affect the outcome of the 2nd

"with replacement"

* Multiply the probability of each event

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

$$P(4, \text{heads}) = \frac{1}{6} \cdot \frac{1}{2} = \frac{1}{12}$$

(2) If A and B are Mutually Exclusive

then $P(A \text{ or } B) = P(A) + P(B)$

Mut. Excl. means the events CANNOT Happen at the same time

(ex) $P(\text{rolling a 2 or 3}) = P(2) + P(3)$

$$\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$$

Events can happen at the same time

If A and B are NOT mutually exclusive

then $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

(ex) P(Jack or Heart)

$$\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$$

Name _____ Block _____ Date _____

Practice 9-7

Probability of Multiple Events

Classify each pair of events as *dependent* or *independent*.

1. A member of the junior class and a second member of the same class are randomly selected. dependent
2. A member of the junior class and a member of another class are randomly chosen. independent
3. An odd-numbered problem is assigned for homework, and an even-numbered problem is picked for a test. independent
4. The sum and the product of two rolls of a number cube dependent

Find each probability. sum product

5. A natural number from 1 to 10 is randomly chosen.

   a. P(even or 7) $\frac{5}{10}+\frac{1}{10}=\frac{6}{10}=\frac{3}{5}$

   b. P(even or odd) $\frac{5}{10}+\frac{5}{10}=\frac{10}{10}=1$

   c. P(multiple of 2 or multiple of 3) $\frac{5}{10}+\frac{3}{10}-\frac{1}{10}=\frac{7}{10}$

   d. P(odd or less than 3) $\frac{5}{10}+\frac{2}{10}-\frac{1}{10}=\frac{6}{10}=\frac{3}{5}$

6. A standard number cube is tossed.

   a. P(even or 3) $\frac{3}{6}+\frac{1}{6}=\frac{4}{6}=\frac{2}{3}$

   b. P(less than 2 or even) _____

   c. P(prime or 4) $\frac{3}{6}+\frac{1}{6}=\frac{4}{6}=\frac{2}{3}$

   d. P(2 or greater than 6) $(.93)(.93)(.93)(.93)(.93)=(.93)^5$

7. Only 93% of the airplane parts Salome is examining pass inspection. What is the probability that all of the next five parts pass inspection? Independent $\approx 69.6\%$

8. There is a 50% chance of thunderstorms the next three days. What is the probability that there will be thunderstorms each of the next three days? $(.50)(.50)(.50)=$ 12.5%

Q and R are independent events. Find $P(Q$ and $R)$. $P(Q)\cdot P(R)$

9. $P(Q)=\frac{1}{8}$, $P(R)=\frac{2}{5}$ $\frac{1}{8}\cdot\frac{2}{5}=\frac{1}{20}$

10. $P(Q)=0.8$, $P(R)=0.2$ $(.8)(.2)=.16$

11. $P(Q)=\frac{1}{4}$, $P(R)=\frac{1}{5}$ $\frac{1}{4}\cdot\frac{1}{5}=\frac{1}{20}$

M and N are mutually exclusive events. Find $P(M$ or $N)$.

12. $P(M)=\frac{3}{4}$, $P(N)=\frac{1}{6}$ $\frac{3\cdot3}{3\cdot4}+\frac{1\cdot2}{6\cdot2}=\frac{9}{12}+\frac{2}{12}=\frac{11}{12}$

13. $P(M)=10\%$, $P(N)=45\%$ $10+45=55\%$

14. $P(M)=\frac{1}{5}$, $P(N)=18\%$ $20\%+18\%=38\%$

1 2 3 4 5

6 7 8 9 10

multiple 2 : 2, 4, 6, 8, 10

multiple 3 : 3, 6, 9

Prime

2, 3, 5, 7