13-6 Study Guide and Intervention

Probabilities of Mutually Exclusive Events

Mutually Exclusive Events If two events cannot happen at the same time, and therefore have no common outcomes, they are said to be **mutually exclusive**. The following are the **Addition Rules for Probability**:

Probability of Mutually Exclusive Events	$P(A \text{ or } B) = P(A) + P(B)$
Probability of Non-Mutually Exclusive Events	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Example At the ballpark souvenir shop, there are 15 posters of the first baseman, 20 of the pitcher, 14 of the center fielder, and 12 of the shortstop. What is the probability that a fan choosing a poster at random will choose a poster of the center fielder or the shortstop?

These are mutually exclusive events because the posters are of two different players.

Let C represent selecting a poster of the center fielder.

Let S represent selecting a poster of the shortstop.

$P(C \text{ or } S) = P(C) + P(S)$

$\qquad = \dfrac{14}{61} + \dfrac{12}{61}$

$\qquad = \dfrac{26}{61}$ or about 43%

Exercises

Determine whether the events are *mutually exclusive* or *not mutually exclusive*. Then find the probability. Round to the nearest hundredth.

1. **SHELTER** selecting a cat or dog at the animal shelter that has 15 cats, 25 dogs, 9 rabbits and 3 horses

   mutually exclusive, 0.77

2. **GAME** rolling a 6 or an even number on a die while playing a game

   not mutually exclusive, 0.5

3. **AWARDS** The student of the month gets to choose his or her award from 9 gift certificates to area restaurants, 8 CDs, 6 DVDs, or 5 gift cards to the mall. What is the probability that the student of the month chooses a CD or DVD?

   mutually exclusive, 0.5

4. **STUDENT COUNCIL** According to the table shown at the right, what is the probability that a person on a student council committee is a junior or on the service committee?

   not mutually exclusive, 0.57

Committee	Soph.	Junior	Senior
Service	4	5	6
Advertising	3	2	2
Dances	4	8	6
Administrative Liaison	1	1	4

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Probabilities of Mutually Exclusive Events

Probabilities of Complements The complement of an event A is all of the outcomes in the sample space that are not included as outcomes of event A.

Probability of the Complement of an Event	$P(\text{not } A) = 1 - P(A)$

Example A school has a photography display of 100 pictures. One of the pictures will be chosen for display at the district office. Lorenzo has 3 pictures on display. What is the probability that one of his photographs is not chosen?

Let A represent selecting one of Lorenzo's photographs.

Then find the probability of the complement of A.

$P(\text{not } A) = 1 - P(A)$ Probability of a complement

$\qquad = 1 - \dfrac{3}{100}$ Substitution

$\qquad = \dfrac{97}{100}$ or 0.97 Simplify

The probability that one of Lorenzo's photos is not selected is 97%.

Exercises

Determine the probability of each event.

1. If there is a 4 in 5 chance that your mom will tell you to clean your room today after school, what is the probability that she won't?

0.2

2. What is the probability of drawing a card from a standard deck and not getting a spade?

0.75

3. What is the probability of flipping a coin and not landing on tails?

0.5

4. What is the probability of rolling a pair of dice and not rolling a 6?

0.69

5. A survey found that about 90% of the junior class is right handed. If 2 juniors are chosen at random out of 100 juniors, what is the probability that at least one of them is not right handed?

0.191