

# Mutually Exclusive and Independent Events Worksheet

1. Determine whether the following events are mutually exclusive.

- a. Draw one card from a deck of 52 playing cards: get an Ace; get a Spade Yes (Ace spade) <sup>with replacement</sup>
- b. Draw one card from a deck of 52 playing cards: get a Spade; get a Diamond No
- c. Roll one die: get a prime number (2, 3, 5); get an odd number Yes (3, 5)
- d. Roll one die: get a number that is a multiple of 3; get a number that is a multiple of 2 Yes (6)
- e. Select one registered voter: get a Democrat; get a Republican No
- f. Select one day of the year: get a day in October; get Halloween Day. Yes (10/31)
- g. Select one student in Algebra I; select one student in Calculus. No

2. Determine if the events are independent or not independent.

- a. driving at age 16; having an automobile accident D
- b. drawing a King from a deck of 52 playing cards; rolling a 5 on a die I
- c. getting a raise in salary and losing at basketball I
- d. being over 7 foot tall and having a high IQ I
- e. having a high GPA and getting a college scholarship D
- f. parking in a no-parking zone and getting a parking ticket D

3. There are 3 literature books, 4 algebra books, and 2 biology books on a shelf. If a book is randomly selected, what is the probability of selecting a literature books or an algebra book? 9 books

$$\frac{3}{9} + \frac{4}{9} = \frac{7}{9} \approx 77.7\% \approx 78\%$$

4. A card is drawn from a standard deck of cards. What is the probability of drawing an ace or a face card? (Hint: A face cards is a jack, queen, or king).  $3 \times 4 = 12$

$P(\text{Ace or Face})$

$$\frac{4}{52} + \frac{12}{52} = \frac{16}{52} = \frac{4}{13} \approx 30.8\% \approx 31\%$$

5. One tile with each letter of the alphabet is placed in a bag, and one is drawn at random. What is the probability of selecting a vowel or a letter from the word equation?

$\frac{8}{26} = \frac{4}{13} \approx 31\%$

~~$P(\text{Vowel or Consonant})$~~

~~$P(\frac{5}{26} + \frac{19}{26} = \frac{24}{26} = 100\%)$~~

$\frac{5}{26} + \frac{8}{26} - \frac{5}{26}$

aeiou  
q  
u  
v  
w  
x  
y  
z

6. Each of the numbers from 1 to 30 is written on a card and placed in a bag. If one card is drawn at random, what is the probability that the number is a multiple of 2 or a multiple of 3?

$P(\text{Multiple of 2 or multiple of 3})$

$$\frac{15}{25} + \frac{10}{25} - \frac{5}{25} = \frac{20}{25} = \frac{4}{5} = 80\%$$

3? 3 18  
2 12 22 6 21 10  
4 14 24 9 24  
(15) 6 16 26 12 27  
8 14 28 15 30  
10 20 30

7. Determine the probability in the following scenarios:

a.) You draw 4 kings in a row from a deck of 52 cards.

Each card is **replaced** after each draw.

$$\frac{256}{731616} = \frac{16}{456976} = \frac{1}{28561} \quad \text{00003501}$$

$$\frac{4}{52} \cdot \frac{4}{52} \cdot \frac{4}{52} \cdot \frac{4}{52} = \frac{256}{731616}$$

b.) You draw three 6's in a row, **without replacing** the cards.

$$\frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} = \frac{24}{132600} = \frac{1}{5525}$$

8. Four aces and four 2's are mixed and then drawn one at a time at random. Two cards are drawn. Find the probability that both cards drawn are aces if:

a.) The card is replaced before the next draw

This is an example of events that are (independent / not independent)

Independent

b.) The card is not replaced before the next draw

This is an example of events that are (independent / not independent)

Dependent

9. Randy has 2 pennies, 2 nickels, and 3 dimes in his pocket. If he randomly chooses 2 coins, what is the probability that they both are dimes? Replacement 7 coins

$$\frac{3}{7} \cdot \frac{3}{7} = \frac{9}{49} = .18 \approx 18\%$$

10. A jar contains 6 red marbles, 3 green marbles, and 7 yellow marbles. Two marbles are chosen from the jar, without replacement. What is the probability that both marbles chosen are green? 16 marbles

$$\frac{3}{16} \cdot \frac{2}{15} = \frac{6}{240} = \frac{1}{40} = 0.025$$

2.5%

3%