

**WEEK 10 REVIEW (7.2 – 7.4)**

A sample space in which each of the outcomes has the same chance of occurring is called a *uniform sample space*.

The *probability* of event  $E$  is  $P(E)$ , a number between 0 and 1. It is the ratio of the number of outcomes in event  $E$ ,  $n(E)$  to the number of outcomes in the sample space,  $n(S)$ :

$$P(E) = \frac{n(E)}{n(S)}$$

The *union rule* for sets can be applied to probability:

$n(E \cup F) = n(E) + n(F) - n(E \cap F)$  becomes

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

We can also find the empirical probability of an event by finding the *relative frequency* of the event.

A *probability distribution table* has the following properties:

1. Each of the entries is mutually exclusive with all other entries
2. The sum of the probabilities is 1

Events that can't occur at the same time are called *mutually exclusive*. Note that the simple events are mutually exclusive.

*Example:* A letter is chosen at random from the word WOOD. How many outcomes are in the uniform sample space for this experiment?

*Example:* A bowl has 3 blues and 2 red beads in it. Two beads are chosen at random from the bowl. What is the uniform sample space for this experiment?

*Example:* Suppose that  $S = \{a, b, c\}$  is a uniform sample space. If  $E = \{a, b\}$  and  $F = \{b, c\}$ , what is  $P(E \cap F)$ ?

*Example:* At a swim meet, 20% of the girls finished a race in less than 25 seconds. 55% of the girls finished this same race in 30 or fewer seconds. 15% of the girls took 35 seconds or more to finish this race. Arrange this information into a probability distribution table.

*Example:* Two fair six-sided dice are rolled. What is the probability that the sum of the numbers shown uppermost is 11 or at least one three is showing uppermost?

*Example:* Suppose we have a jar with 8 blue and 6 green marbles. Find the probability distribution table for the number of blue marbles in the sample of 2 marbles and find the probability there is at least one blue marble.

*Example:* When shopping for a ceiling fan, you find after looking at 100 fans that 65 of the fans have more than 4 blades, 35 of the fans are reversible and 80 of the fans have more than 4 blades or are reversible. What is the probability that a reversible fan has more than 4 blades?

*Example:* A student takes a true/false test with 5 questions by guessing (choose answer at random). Write a probability distribution table for the number of correct answers.

*Example:* You are dealt 3 cards from a standard deck of 52 cards. Find the probability distribution table for the number of spades in your hand of 3 cards.

*Example:* There are 72 marbles in a box. There are 18 different colors and 4 marbles of each color. Five marbles are chosen at random from the box. What is the probability of a full house? That is, 3 of one color and 2 of a different color.

*Example:* A coffee shop finds that 44% of its customers do not order coffee, 16% order only coffee and 6% order only a muffin. What is the probability that a randomly selected customer will order coffee or a muffin?

*Example:* A box has 30 transistors and a sample of 5 is chosen for testing to decide if the box is “good” or “bad”. A box is considered “bad” if one or more transistors in the sample are found to be defective. What is the probability that a box that has 4 defective transistors will be considered “good”?

*Example:* Matthew is studying for a Latin quiz and he learns the meaning of 24 nouns from the list of 30. The Latin quiz has 10 nouns. If a passing grade is 7 or more, what is the probability that Matthew passes this Latin quiz?

*Example:* A bowl has 3 pennies, 5 nickels and 4 quarters. Four coins are selected at random from the bowl. What is the probability that exactly 3 nickels or exactly one quarter is chosen?