Section 3.3: Probabilities Using Counting Methods

In the previous unit we solved problems using the Fundamental Counting Principle, permutations and combinations.

Now we will use these counting techniques to solve probability problems.

Remember: Probability $= \dfrac{favourable}{total}$

Example 1:

A survey was conducted of 500 adults who wore Halloween costumes to a party. Each person was asked how he/she acquired the costume:

* 360 adults created their costumes
* 60 adults rented their costumes
* 60 adults bought their costumes
* 20 adults borrowed costumes

What is the probability that the first four people who were polled all created their costumes?

What are the total number of possible outcomes?

What are the number of favourable outcomes?

Probability =

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Example 2:

There are 7 teachers and 3 administrators at a conference. Find the probability of 3 different door prizes being awarded to teachers only.

Probability =

Example 3:

A 4-digit number is generated at random from the digits 2, 3, 5 and 7 (without repetition of the digit), what is the probability that it will be even?

Total # of outcomes:

Total # of favourable outcomes:

Probability =

Example 4:

If a 4-digit PIN number can begin with any digit, except zero, and the remaining digits have no restriction. If repeated digits are allowed, determine the probability of the PIN code beginning with a number greater than 7 and ending with a 3.

Total # of outcomes:

Total # of favourable outcomes:

Probability =

Example 5:

Mark, Abby and 5 other students are standing in a line.

a) Determine the probability Mark and Abby are standing together.

b) Determine the probability Mark and Abby are not standing together.

Example 6:

A bookcase contains 6 different math books and 12 different biology books. If a student randomly selects two of these books, determine the probability they are both math or both biology books.

Example 7:

A jar contains 5 red, 7 blue and 5 purple candies. If the total number of candies is 20, determine the probability that a handful of four candies contains one of each colour.

Example 8: (ex. 1, p. 152)

Jamaal, Ethan and Alberto are competing with seven other boys to be on their school's cross-country team. All the boys have an equal chance of winning the trial race. Determine the probability that Jamaal, Ethan and Alberto will place first, second, and third, in any order.

Total # of outcomes:

Total # of favourable outcomes:

Probability =

Example 9: (ex. 2, p. 154)

About 20 years after they graduated from high school, Blake, Mario and Simon met in a mall. Blake had two daughters with him, and he said he had three other children at home. Determine the probability that at least one of Blake's children is a boy.

Example 10: (ex. 3, p. 156)

Bob hosts a morning radio show in Saskatoon.To advertise his show, he is holding a contest at a local mall. He spells out SASKATCHEWAN with letter tiles. Then he turns the tiles face down and mixes them up.

He asks Sally to arrange the tiles in a row and turn them face down. If the row of tiles spells SASKATCHEWAN, Sally will win a new car. Determine the probability that Sally will win the car.

Practice Questions:

p. 159 - 161, # 1, 2, 3, 5, 10, 11, 15, 16