Time Frame: 50 minutes

Subject Matter: Binomial Distribution TELL ME

Objective: Find the exact probability for *X* successes in *n* trials of a binomial experiment.

Standards: DA – 5.6

 Materials: Transparencies and Worksheets

SHOW ME

Presentation of Information:

The teacher will discuss the following:

**Example 1:**

In a survey, three of four students said the courts show "too much concern" for criminals. Find the probability that at most three out of seven randomly selected students will agree with this statement.

Source: *Harper's Index.*

**Solution**

To find the probability that at most three out of seven randomly selected students will agree with this statement, it is necessary to find the individual probabilities for either 1, or 2, or 3, and then add them to get the total probability.

$$P\left(1\right)= \frac{7!}{\left(7-1\right)!1!}∙\left(\frac{3}{4}\right)^{1}∙\left(\frac{1}{4}\right)^{6}=0.001$$

$$P\left(2\right)= \frac{7!}{\left(7-2\right)!2!}∙\left(\frac{3}{4}\right)^{2}∙\left(\frac{1}{4}\right)^{5}=0.012$$

$$P\left(3\right)= \frac{7!}{\left(7-3\right)!3!}∙\left(\frac{3}{4}\right)^{3}∙\left(\frac{1}{4}\right)^{4}=0.058$$

Hence,

*P(*at most three out of seven randomly selected students will agree)

= 0.001 + 0.012 + 0.058 = 0.071 **Answer**

**Example 2:**

It was found that 60% of American victims of health care fraud are senior citizens. If 10 victims are randomly selected, find the probability that exactly 3 are senior citizens.

Source: *100% American* by Daniel Evan Weiss.

**Solution**

In this case, *n* = 10, X = 3, *p* = $0.60$, and *q* = $0.40$. Hence,

$$P\left(3\right)= \frac{10!}{\left(10-3\right)!3!}∙\left(0.60\right)^{3}∙\left(0.40\right)^{7}=0.042 Answer$$

Let Me Try

1. 40% of Americans do not think that having a college education is important to succeed in the business world. If a random sample of five Americans is selected, find these probabilities.
2. Exactly two people will agree with that statement.
3. At most three people will agree with that statement.
4. At least two people will agree with that statement.
5. Fewer than three people will agree with that statement.

Source: *100% American* by Daniel Evans Weiss.

1. If 30% of the people in a community use the library in one year, find these probabilities for a sample of l5 people.
2. At most 7 used the library
3. Exactly 7 used the library
4. At least 5 used the library
5. If 20% of the people in a community use the emergency room at a hospital in one year, find these probabilities for a sample of 10 people.
6. At most three used the emergency room.
7. Exactly three used the emergency room.
8. At least five used the emergency room.