**Algebra 2 12.1 Probability Distributions Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

A **frequency table** is a list of the outcomes in a sample space and the number of times each outcome occurs.

Ex: Eye Color tally Frequency (number of students with eye color)

 Brown

 Green

 Blue

 Hazel

What is the probability that a randomly chosen student has brown eyes?

**Cumulative Probability-** probability over a continuous range of events (frequency tables are very helpful)

|  |  |
| --- | --- |
| **Number of Sports** | **Number of Students** |
| 3 | 60 |
| 2 | 125 |
| 1 | 421 |
| 0 | 494 |
| Total Students | 1100 |

Ex. Find the probability that a student is involved in at least one sport.

Ex. Find the probability that a student is involved in more than one sport.

**Probability Distribution-** a function that gives the probability of each event in a sample space

Ex. Suppose you roll two number cubes. Show the probability of each event in the sample space of the sums.

36 outcomes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |

**Rolling Two Number Cubes**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sum** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| **Frequency** |  |  |  |  |  |  |  |  |  |  |  |
| **Probability** |  |  |  |  |  |  |  |  |  |  |  |

Create a histogram using the data from your frequency table

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |

Ex. Genetics

Parent Plant (white)

 RR = Red

 Rr = Pink

Parent Plant (red)

 rr = White

 Graph your results

**Simulation using a Probability Distribution**

Ex: The probability of an information desk at a library receiving calls each hour varies according to this distribution.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Calls** | 0 | 1 | 2 | 3 | 4 | 5 |
| **P (calls)** | 0.05 | 0.15 | 0.25 | 0.3 | 0.2 | 0.05 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Calls** | **Probability** | **Cumulative Probability** | **Assign #’s** |
| 0 |  |  |  |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

Simulation to see the total number of calls in an eight hour day

Using the random integer function on your calculator

RandInt (1,100)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **# of Calls** | **0** | **1** | **2** | **3** | **4** | **5** |
| Tally |  |  |  |  |  |  |
| Frequency |  |  |  |  |  |  |

# Algebra 2 12.2 Conditional Probability Name:

**Conditional Probability** $P(B \left| A\right.)$ **-** the probability that event B will happen if event A has happened.

Ex. Do you own a pet? *P*(own a pet) =

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| Female |  |  |
| Male |  |  |

Find the *P* (*own a pet* $\left| female\right. )$

Ex. Municipal waste collected in US (millions of tons)

|  |  |  |
| --- | --- | --- |
| **Material** | **Recycled** | **Not Recycled** |
| Paper | 34.9 | 48.9 |
| Metal | 6.5 | 10.1 |
| Glass | 2.9 | 9.1 |
| Plastic | 1.1 | 20.4 |
| Other | 15.3 | 67.8 |

 a. Find the probability that a material, which was not recycled, was plastic.

 b. Find the probability that material was recycled given that it was paper.

**Conditional Probability Formula**

 $P\left(A\right)= \frac{P(A and B)}{P(A)}$

Ex: Use the probability formula to find the probability $P\left( Not Recycled\right)$

Ex: Use the probability formula to find the probability $P\left( Recycled\right)$

Ex: Researchers asked people who exercised regularly whether they walk or jog. 58% of the respondents were male. 20% of all respondents were males who said they jogged. Find the probability that a male respondent jogs.

**Tree Diagrams**

Ex: Buffalo, NY

* Of all snowfalls, 5% are heavy (at least 6 inches)
* After a heavy snowfall, schools are closed 67% of the time
* After a light snowfall (less than 6 inches), schools are closed 3% of the time

Find the probability that the snow is light and schools are open.

Find the probability school is open when the snow is heavy.