New Outcome: Apply principles of probability to calculate or verify the chances of an event.

TASK: Please copy into your notes the following basic probability terminology and use it to answer the questions below.

- Experiment: Some process that occurs with well defined outcomes.
- Outcome: A result from a single trial of the experiment.
- Event: A collection of one or more outcomes.
- Sample Space: A collection of all of the outcomes of an experiment.

1. An experiment is run whereby a spinner is spun around a circle with 5 equal sectors that have been marked off as shown.

(a) What is the experiment?

(b) Give one outcome of the experiment.

(c) What is the probability of spinning the spinner and landing on an odd number? What is the event here? What outcomes fall into the event?

[COPY THE FOLLOWING INTO NOTES]

> The probability of an event E occurring is given by the ratio $P(E) = \frac{n(E)}{n(S)}$, where:
> $n(E)$ is the number of outcomes that fall into the event E.
> $n(S)$ is the number of outcomes that fall into the sample space.

EXPLORE: Mathematics seeks to quantify and model just about everything. One of the greatest challenges is to try to quantify chance. But that is exactly what probability seeks to do. With probability, we attempt to assign a number to how likely an event is to occur.

> Referring to the definition of the probability of an event above, we can reason that ALL probabilities must fall between 0 and 1.

When we deal with ***theoretical probability*** we don't actually have to run the experiment to determine the probability of an event. We simply have to know the number of outcomes in the sample space and the number of outcomes that fall into our event.

2. A fair coin is flipped three times and the result is noted each time. The sample space consists of ordered triples such as HHT, which would represent a head on the first toss, a head on the second toss, and a tail on the third toss.

    (a) Draw a tree diagram to show all of the different outcomes in the sample space.
    [Not sure what a tree diagram looks like? Click here]

    (b) List all of the outcomes as ordered triples. How many of them are there?

    (c) Find each of the following probabilities based on your answers from (a) and (b):

(i) P(all heads)   (ii) P(exactly 2 heads)   (iii) P(all heads or all tails)

Sometimes we have to quantify chance by using observations that have been made in the real-world. In this case we talk about ***empirical probability.***

3. A survey was done by a marketing company to determine which of three sodas was preferred by people in a blind taste test. The results are shown below. Express your answers as fractions.

(a) Find the empirical probability that a person selected at random from this group would prefer soda B.

Soda	Number who Preferred
A	18
B	24
C	11
Total	53

(b) Find the empirical probability that a person selected at random from this group would *not* prefer soda A.

SUMMARY: Before you take the google form, can you answer the following questions?
- What is the difference between theoretical and empirical probability?
- What is a sample space? What is an outcome?
- Create an example of an experiment using the words sample space, outcome, and event.