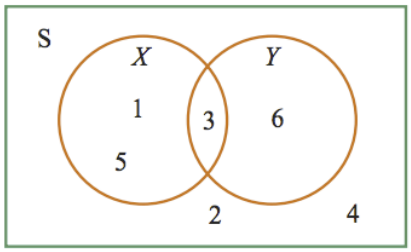
BIG PICTURE of this UNIT:	• How can we visualize events and outcomes when considering probability events? • How can we count outcomes in probability events? • How can we calculate probabilities, given different types of events • Can we predict how likely it is that an event occurs? How can we use that knowledge?

This lesson will be based upon a STUDENT DIRECTED DISCUSSION model ….. in your groups, you should be having DISCUSSIONS about how to think and work through and then present the solutions to the following questions. The questions will involve basic ideas including (i) visualizing the outcomes of probability events/experiments, (ii) determining probabilities of single and compound probability events, (iii) counting outcomes, and (iv). EVERY PROBLEM SET will involve spiralling through these major concepts as you will be given the opportunity to deepen and extend your conceptual knowledge & skill set on these major themes as you see them multiple times in our lessons.

So, in your group, discuss & prepare solutions to the following questions. Record the key ideas of your discussions/solutions in your notebook. Then, once you have had your discussions, present your solutions on the board. Solutions do NOT necessarily NEED to be correct – they simply form the basis for DISCUSSIONS !!!! If your group has (i) multiple solutions that lead to the same answers OR (ii) same/different solutions that lead to different answers, present them ANYWAY!!

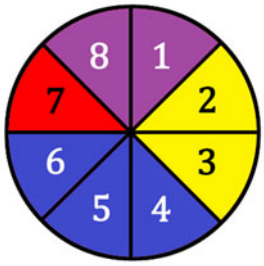
1. To help you understand and work with Venn diagrams, answer the following questions:

A six-sided die is rolled. The outcomes for this experiment and the events X and Y are shown in the Venn diagram.



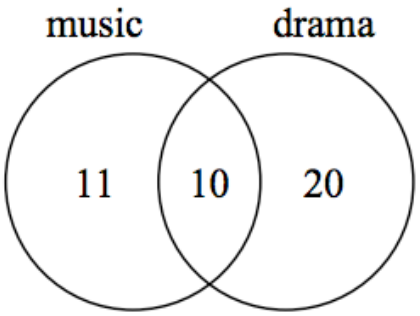
a List the sample space.
b List the set of outcomes for event X.
c List the set of outcomes for the event 'not X'.
d List the set of outcomes for event Y.
e List the set of outcomes for the event 'not Y'.
f List the set of outcomes for event 'X and Y'.
g i List the set of outcomes for the event 'X or Y or both'.
ii Is this an 'inclusive or' event or an 'exclusive or' event?
h i List the set of outcomes for the event 'X or Y but not both'.
ii Is this an 'inclusive or' event or an 'exclusive or' event?
i List the outcomes that belong to neither X nor Y.

2. Given a "spinner", determine the probability that you will:



a. Spin an even number on a 1-to-8 spinner.
b. Spin a prime number less than 7 on a 1-to-10 spinner.
c. Spin an odd prime number less than 7 on a 1-to-12 spinner.
d. Spin a positive integer on a 1-to-6 spinner.

3. The diagram below shows the classes students are taking music and drama



   a. How many students are taking music AND drama?
   b. How many students are taking music OR drama?
   c. Determine the probability that a randomly selected student takes drama?
   d. Determine the probability that a randomly selected student takes music?
   e. Determine the probability that a randomly selected student takes music AND drama?
   f. Determine the probability that a randomly selected student takes music OR drama?

4. A bag of MM's contains 6 red, 4 green and 2 brown candies. Sam takes one MM and then offers another one to his friend Roeland. What is the probability that they both have the same color MM's.

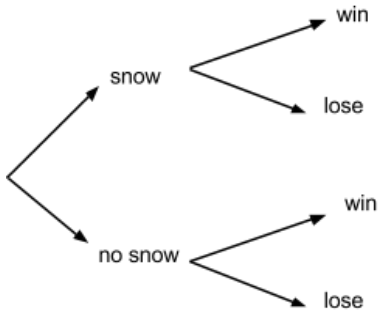
5. Ten students are trying out for three positions on a coed soccer team. The students include four boys (Adam, Alex, Anthony and Arnold) and six girls (Abbey, Aurora, Agnes, Alice, Amanda and Anna). All the students have an equal chance of being selected for the team.

   a. How many different three-member teams can be formed? Support your answer using words, numbers and/or diagrams.

   b. Determine the probability that the team would include: (in each answer, support your answer using words, numbers and/or diagrams
      i. Three boys.
      ii. One boy and two girls.
      iii. At most one girl.
      iv. Adam, Anthony and Alice.
      v. Agnes and two other students.

6. Use a tree diagram illustrate the following probability question ➔ show the possible outcomes of this "probability experiment" wherein school jackets can be either brown and black and come in three sizes S, M and L. Finally, how probable is it that you choose a black color jacket that is not of medium size?

7. A football team has a 70% chance of winning when it does not snow, but only a 40% chance of winning when it does snow. Suppose there is a 50% chance of snow. Complete this tree diagram to find the probability that the team will win.



8. Here are some simple coin tossing probability questions. Determine how probable it is that you:

   a. Toss heads on one flip of a coin.
   b. Toss heads or tails on one flip of a coin.
   c. Toss 3 heads on three flips of a coin.
   d. Toss 2 heads on three flips of a coin.
   e. Toss at least 2 heads on three flips of a coin.

Higher Level Questions for More Complex Concepts in Probability. Determine the probability of the event described in each exercise. Unless stated otherwise, assume all items of chance (dice, coins, cards, spinners, etc.) are fair.

1. Three friends decide to meet up at High Street one day during the school week, but have not decided which day. Given that the phone lines are all dead, internet is not working and school is on holiday, what is the probability that all three girls meet at High Street on the same day?

2. The probability that a person has a deadly virus is 5 in one thousand. If a patient does have the disease, a medical test will CORRECTLY diagnose the presence of the disease 95% of the time. Otherwise, the test INCORRECTLY diagnose the presence of the disease 20% of the time. Find the probability of this test giving a correct diagnosis.

3. Determine the following probabilities:

    a. Toss 3 heads on five flips of a coin.
    b. Toss at least 3 heads on five flips of a coin.
    c. Toss less than 1 tail on eight flips of a coin.
    d. Toss no more than 1 tail on eight flips of a coin.
    e. Toss at most 1 tail on eight flips of a coin.
    f. Toss no less than 1 tail on eight flips of a coin.
    g. Toss more than 1 tail on eight flips of a coin