

## Possibility and Probability Review problems

Note: No calculator is needed. You may leave your answers in “uncalculated form.”

- Out of a group of 10 students, how many different ways can four students be arranged in four seats.
- How many ways are there to choose 4 different toppings on a pizza if there are 10 choices?
- State a question for which the answer is  ${}_{15}P_6$ . (The most creative question wins!)
- Calculate (don't use a calculator!)
  - $3!$
  - $5!$
  - $0!$
  - ${}_{7}P_2$
  - ${}_{4}P_2$
  - ${}_{4}P_4$
  - ${}_{4}P_1$
  - ${}_{7}C_2$
  - ${}_{15}C_3$
  - ${}_{15}C_{12}$
  - ${}_{5}C_1$
  - ${}_{5}C_5$
  - ${}_{5}C_0$
- How many license plates are possible that start with a letter (A to Z), followed by 3 digits (0 to 9), and end with a P or W? (Repeats are allowed.)
- How many ways are there to rearrange the letters...
  - Math?
  - Susan?
  - EEEEESSS?
- How many possible routes are there on a 5x3 street grid that go from the NW corner to the SE corner?
- Why do the last two questions have the same answer?
- How many ways are there to choose...
  - a 3-person committee from a group of 7?
  - a 4-person committee from a group of 7?
  - (Why do the last two questions have the same answer?)
  - a 1-person committee from a group of 8?
  - an 8-person committee from a group of 8?
  - a 3-person committee from a group of 8?
- Herman is going on a three-day trip. He owns 7 shirts.
  - How many possible ways are there for him to pack 3 of his shirts to take on the trip?
  - How many ways can he choose to wear one shirt each day for the three days given that he can wear the same shirt more than one day? (Hint: “blue, blue, green” is different from “blue, green, blue”)
  - How many ways can he choose to wear one shirt each day for the three days given that he can't wear the same shirt more than one day? (Hint: “red, blue, green” is different from “red, green, blue”)
- There are 6 dogs and 4 cats in a pet store. How many ways can Bill and Kim choose one pet each if...
  - Bill chooses a cat and Kim chooses a dog?
  - They choose two pets and own them together.
- How many ways are there to choose a group of 17 students out of 20 to go on a camping trip?
- A deck of 9 cards contains 5 low cards (A,2,3,4,5) and 4 high cards (9,J,Q,K). What is the probability of...
  - Drawing one card and having it be a high card?
  - Drawing three cards and having them all be low cards?
- If you flip 4 coins, what is the probability that they will all be heads?
- If you roll two dice, what is the probability of...
  - that the sum will be a 5?
  - that the first die will be a 3, and the second die will be either a 5 or 6?
- There are 12 tulip bulbs in a package. Nine are yellow tulips, and three are red tulips. If two tulips are picked from the package at random, find the probability that...
  - Both tulips will be red.
  - The first will be red and the second will be yellow.
  - (Challenge!) One will be red and the other yellow.