#1) A group of students is surveyed about race and gender identity for research purposes. The survey lists 6 categories for race and 4 categories for gender. Determine how many different survey results are possible, given each of the following constraints:

a) Students are allowed to check exactly 1 box under race and 1 box under gender.
b) Students are allowed to check 1 or 2 boxes under race and 1 or 2 under gender.
c) Students are allowed to check as many boxes as they wish (including 0).

#2) A student club focused on diversity is forming a recruitment committee consisting of 7 of its 30 members. 10 of the club's members identify as gay and 5 identify as asexual. How many ways are there to form a recruitment committee which includes at least three members from each of these groups?

#3) In how many ways can three men, three women, and three non-binary students stand in a circle if no two people of the same gender identity are allowed to stand next to each other?

#4) You conduct an experiment in which you interview a large number of families, each of which has 5 children. For each family, you write down the biological sex (M for male, F for female, I for intersex) of the children, in order from oldest to youngest.

a) How many possible results are there?
b) Out of all the possible results, how many have exactly two I's?
c) Out of all the possible results, how many have at least one I, one F, and two M's?

#5) Jon wants to choose a different three-letter name for herself to better match her pronouns. How many consonant-vowel-consonant options does she have to choose from?

#6) Three people are on a date together and decide to play an ice-breaking game in which they try to guess each other's favorite seasons. (They write their guesses down all at once so the game isn't spoiled when the answers are revealed.) What are the odds that:

a) At least one of their six guesses is correct?
b) Exactly two of their guesses are correct?

#7) Consider the set of letters, {*L, G, B, T, Q, I, A*}:

a) How many ways are there to form a string containing exactly one copy of each letter?
b) Suppose all license plates in a certain state consist of three distinct consonants followed by two distinct vowels. How many such license plates can be formed from the given set?
c) Suppose three letters are chosen from this set at random (repeats allowed); what are the odds that at least one of them is a vowel (rounded to four digits)?

#8) Charlie and her girlfriend, Amber, go to lunch at a restaurant with 7 sandwiches on the menu. There are also 5 beverages on the menu. How many possible two-sandwich, two-drink meals can they order (regardless of which of them orders first)...

a) if they order different sandwiches and drinks from each other?
b) If they each order without concern for what the other ordered?

#9) Imagine you attend a civil rights rally, looking for a friend who has volunteered their time to the event. You know that they will be at one of the 12 informational booths for half of the event, and another for the rest. If you only manage to visit 6 of the booths (dividing your time at each equally), what are your chances of finding them?

#10) A club of 200 students is forming a committee with 10 members. Given that 15% of club members identify as queer, what are the odds that a randomly selected committee reflects this ratio within a 10% margin?

#11) 80 people attend an underground drag ball. What is the minimum number of people there who all share the same birth month?

#12) Suppose you attend a drag show in which two of your friends are performing. There are also two other performers scheduled that night, but you don't know what order they'll be in and you only have time to stay for half the show. What are the odds that:

a) You'll see both of your friends perform?
b) You'll see just one of your friends perform?

#13) Imagine you are conducting an on-campus survey to measure student awareness of the legacy of colonialism and slavery. The survey consists of five true/false historical questions, and you survey six students. Suppose, for simplicity, that every student has a 50/50 chance of answering each question correctly. What are the odds that:

a) A given student scores 100%?
b) A given student scores at least 80%?
c) Two or more students score at least 60%?

Also:

d) Is it possible for all students to get different scores? Why or why not?

#14) A small civil rights non-profit is selecting 3 of its 15 employees to form a task force focused on voting rights.

a) How many such task forces could they possibly select?
b) How many possibilities are there if they assign each member of the task force a unique role?

#15) 100 people are marching on the capitol to protest racial injustice. They intend to organize themselves into a pentagonal marching pattern, each point of the pentagon consisting of a four-person by five-person rectangular formation.

a) How many ways are there to separate the marchers into five groups?
b) Within each group, how many possible four-by-five formations are there?
c) How many ways are there to arrange five different objects to form a pentagon?
d) Overall, how many possible organizations do the marchers have to choose from?

#16) Your local gay bar is hosting a trivia night, and you decide to test your psychic abilities by participating and answering each question blindly. Suppose you answer 5 multiple-choice questions - each with four possible answers. What are your odds of:

a) Answering none of the questions correctly?
b) Answering three of the questions correctly?
c) Answering three questions correctly in a row?

#17) A recent Stanford University study on racial bias in police traffic stops found that, among the US municipalities it analyzed, "the annual per-capita stop rate for black drivers was 0.20 compared to 0.14 for white drivers. For Hispanic drivers … 0.09". Now, imagine a US city in which 40% of the population is black, 35% is white, and 25% is Hispanic. Working from the data provided by the aforementioned study, what is the approximate likelihood that a given driver stopped by the police in this city is black?
(https://5harad.com/papers/100M-stops.pdf)

#18) A group of 12 highschoolers is attending queer prom together. If they want to arrange themselves into 6 couples, how many possible couple arrangements can they choose from?

#19) The organizers of a LGBTQ rally are making pride flags. Five people all choose different flag designs from among ten; how many possible combinations of flags might they end up with?

#20) Recent census data has concluded that approximately 1.44% of US couples living together are "same-sex". Of these, about 53.66% are legally married, which accounts for roughly 0.88% of married households in the country. Given a randomly selected US couple living in the same household (of any sexual orientation), what is the approximate likelihood that they are married?
(https://www.census.gov/newsroom/press-releases/2019/same-sex-households.html)

#21) According to a poll published by the Wall Street Journal in August 2020, "47% of voters who back Mr. Biden ... plan to vote by mail rather than in person, compared with 11% of Trump supporters. By contrast, 66% of Trump voters say they plan to cast ballots in person on Election Day ... compared with 26% of Biden supporters." The same poll also concluded that 30% of all US voters planned to vote by mail and 43% planned to vote in person on Election Day. Also, a Gallup poll published in July 2020 determined that 50% of US adults leaned toward or identified with the Democratic Party while 39% leaned toward or identified with the Republican Party. Working from these statistics and (unrealistically) assuming a 1-1 correspondence between party support and votes for that party's presidential candidate:

a) What proportion of in-person Election Day 2020 votes would you expect Biden receives?
b) What proportion of in-person Election Day 2020 votes would you expect Trump receives?
c) What proportion of mail-in votes would you expect Biden receives in the 2020 election?
d) What proportion of mail-in votes would you expect Trump receives in the 2020 election?

(https://news.gallup.com/poll/315734/party-preferences-swung-sharply-toward-democrats.aspx)

(https://www.wsj.com/articles/biden-supporters-more-likely-than-trumps-to-vote-by-mail-poll-shows-11597683600)