Four hundred randomly sampled automobile owners were asked whether they selected the particular make and model of their present car mainly because of its appearance or because of its performance. The results were as follows:

Owner	Appearance	Performance	Total
Male	95	55	150
Female	85	165	250

What is the probability that an automobile owner buys a car mainly for its appearance?
ANSWER: P(Appearance) = 45%

What is the probability that an automobile owner buys a car mainly for its appearance and the automobile owner is a male?
ANSWER: P(Appearance and Male) = 23.75%

What is the probability that a female automobile owner purchases the car mainly because of its appearance?
ANSWER: P(Appearance | Female) = 34%

A quality-control engineer summarized the frequency of the type of defect with the manufacturing of a certain motor. The following table shows which of the three shifts was responsible for the type of defect:

	Type of Defect				
Shift	Misaligned Component	Missing Component	Measurement Outside of Specification Limits	Other	Total
1	23	13	12	14	62
2	15	15	18	12	60
3	5	11	10	2	28

What is the probability that a defective motor will have a measurement outside of its specification limits?
ANSWER: P(Measurement Outside of Specification Limits) = 26.67%

What is the probability that a defective motor was not produced by Shift 1?
ANSWER: $P(\text{Shift 1})^C = 58.67\%$

What is the probability that a defective motor has a misaligned component or was produced by Shift 1?
ANSWER: P(Misaligned Component or Shift 1) = 54.67%

What is the probability that a defective motor was both produced by Shift 2 and the defect was classified as other?
ANSWER: P(Shift 2 and Other) = 8%

What is the probability that a defective motor has a misaligned component and a measurement outside of its specification limits?

ANSWER: P(Misaligned Component and Measurement Outside of Specification Limits) = 0%

Are the events of a motor being produced by Shift 3 and having a defect classified as other independent events?
ANSWER: P(Other | Shift 3) = P(Other) This is a FALSE statement so the events are NOT independent

The employment center at a university wanted to know the proportion of students who worked and also the proportion of those students who lived in the dorm. The following data were collected:

	Work Situation			
Living Arrangements	Full Time	Part Time	Do Not Work	Total
In dorm	19	22	20	61
Not in dorm	25	9	5	39
				100

What is the probability of selecting a student at random who works either full or part time?
ANSWER: P(FT or PT) = 75%

What is the probability that a student who works lives in the dorm?
ANSWER: P(Dorm | Works) = 54.67%

What is the probability that a student either works full time or does not live in the dorm?
ANSWER: P(FT or Not Dorm) = 58%

Is the event that a student lives in the dorm independent of the event that a student works full time?
ANSWER: P(FT | Dorm) = P(FT) This is a FALSE statement so the events are NOT independent

At a semiconductor plant, 60% of the workers are skilled and 80% of the workers are full-time. Ninety percent of the skilled workers are full-time.

What is the probability that an employee selected at random is a skilled full-time employee?
ANSWER: P(Skilled and FT) = 54%

What is the probability that an employee selected at random is a skilled worker or a full-time workers?
ANSWER: P(Skilled or FT) = 86%

What percentage of the full-time workers are skilled?
ANSWER: P(Skilled | FT) = 67.5%

At a certain university, 30% of the students major in math. Of the students majoring in math, 60% are males. Of all the students at the university, 70% are males.

What is the probability that a student selected at random in the university is a male majoring in math?
ANSWER: P(Male and Math) = 18%

What is the probability that a student selected at random in the university is a male or is majoring in math?
ANSWER: P(Male or Math) = 82%

What proportion of the males are majoring in math?
ANSWER: P(Math | Male) = 25.71%

How many ways can a quality-control inspector select 4 components from a batch of 20 components if the inspector samples without replacement?

ANSWER: $C_4^{20} = 4845$

How many ways can an advisory board of 10 members be chosen from a list of 15 executives?

ANSWER: $C_{10}^{15} = 3003$

How many ways can five employees be assigned to three different shifts?

ANSWER: $C_3^5 = 10$

A firm has 100 laborers, 20 salespersons, and 10 executives. If an employee is chosen from each of these categories, how many different sets of three employees are possible?

ANSWER: 100 x 20 x 10 = 20,000

Ten people are running an race. The 1st place runner will receive a gold metal, the 2nd place runner will receive a silver metal, and the 3rd place runner will receive a bronze metal. How many possible outcomes are there for the race?

ANSWER: $P_3^{10} = 720$

The U.S. population by age is as follows. The data are in millions of people.

Age	Number (in millions)
19 and under	80.5
20 to 24	19.0
25 to 34	39.9
35 to 44	45.2
45 to 54	37.7
55 to 64	24.3
65 and over	35.0

Assume that a person will be randomly chosen from this population.

What is the probability the person is 20 to 24 years old?
ANSWER: P(20 to 24) = 6.75%

What is the probability the person is 20 to 34 years old?
ANSWER: P(20 to 34) = 20.92%

What is the probability the person is 45 years or older?
ANSWER: P(45 or Older) = 34.45%

What is the probability the person is not 24 or younger?
ANSWER: P(24 or Younger)^{C} = 64.67%

The U.S. Energy Department states that 63% of all U.S. households have ceiling fans. In addition, 31% of all U.S. households have an outdoor grill. Suppose 15% of all U.S. households have both a ceiling fan and an outdoor grill. A U.S. household is randomly selected. What is the probability that the household has a ceiling fan or an outdoor grill?
ANSWER: P(Ceiling fan or Outdoor grill) = 79%

A study by Hart Research Associates for the Nasdaq Stock Market revealed that 47% of all U.S. adults are stockholders. In addition, the study determined that 77% of all U.S. adult stockholders have some college education. Suppose 47% of all U.S. adults have some college education. A U.S. adult is randomly selected. What is the probability that the adult owns stock and has some college education?
ANSWER: P(SH and CE) = 36.19%

Abel Alonzo, Director of Human Resources, is exploring employee absenteeism at the Plano Power Plant. Ten percent of all plant employees work in the finishing department; 20% of all plant employees are absent excessively; and 7% of all plant employees work in the finishing department and are absent excessively. A plant employee is selected randomly; F is the event "works in the finishing department;" and A is the event "is absent excessively." What is the probability that an employee that works in the finishing department is absent excessively? ”
ANSWER: P(A | F) = 70%