

MATH SPEAK - TO BE UNDERSTOOD AND MEMORIZED

- 1) **STATISTICS** = the branch of mathematics used to analyze and interpret *data*.
 - 2) **POPULATION** = all the members of a group to be statistically analyzed.
 - 3) **POPULATION SIZE** = the number of pieces of data in a *data set* and is represented by *n*.
 - 4) **SAMPLE** = some of the members of a group to be statistically analyzed.
 - 5) **SAMPLE SIZE** = the number of pieces of data in a *data set* and is represented by *n*.
 - 6) **MARGIN OF ERROR** = the possible difference between the estimated statistical value and the true value. The true value lies somewhere within the *margin of error*.
 - 7) **CONFIDENCE INTERVAL** = the range of values around the estimated value that the true value is found.
 - 8) **CONFIDENCE LEVEL** = a number representing the confidence we have in our *data*.
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CONFIDENCE INTERVALS

1) *Confidence intervals* are often used in reporting results of polls during elections. A polling company will randomly survey the population of BC to gather information about, for example, which political party or party leader they are most likely to vote for. Because the data they collect is based upon a random *sample* of the population it is not an exact representation of the entire population, it is an estimate and thus it must be recognized that there is some error included in the *data*. There are 3 statistics that are included in reputable polling information: The *statistic* itself, the *Margin of Error*, and the *Confidence Level*.

A) Consider this example

1) Ashby's Analytics surveyed 800 randomly selected people in Langley. The poll revealed that 89% of respondents between the aged of 19 to 35 years of age have a social networking account. The results are believed to be accurate within plus or minus 3%, 19 times out of 20. There are 125 600 people between the ages of 19 to 35 living in Langley.

a) What do these numbers mean?

- i) There are 125 600 people between the ages of 19 and 35 living in Langley. Only 800 of them, the *random sample*, were asked if they have a social networking account.
- ii) 89% means that 89% of the 800 people between the ages of 19 and 35 polled have a social networking account. It is assumed that 89% of the population of people between the ages of 19 and 35, 125 600 people, have a social networking account.

iii) The plus or minus 3% is called the *margin of error*. It recognizes that because the 89% is based on an 800 person random sample of the 125 600 population it is an estimate of the actual number of people within the entire populations that has a social networking account.

A} It is often recorded as:

B} It is used to calculate the *confidence interval*, which is the range around the estimated value that the polling company is confident that the actual value is found:

- iv) The phrase 19 times out of 20 is called the *confidence level*. It means that the polling company is confident that if the poll were conducted 20 times it would gather the same results 19 times. The smaller the confidence level the less accurate the information is. It can be recorded as a fraction or a percentage.

B) SAMPLE PROBLEMS 1

- 1) Ashby's Analytics polled a random sample of voters in Langley asking this question: If an election for Mayor were held today, whom would you vote for? The results indicated that 52% would vote for Mrs. Grewal while 48% would vote for Mr. Kang. There are 212 000 registered voters in Langley. The results were publicized in the local paper as being accurate within 4.1 percentage points, 19 times out of 20.
- How confident is the data collected by Ashby's Analytics?
 - How many registered voters would vote for each candidate?
 - Predict the winner of the election. Are they guaranteed to win the election? Justify your choice.
 - Is it possible for Mr. Kang to win the election? Justify your choice.
- 2) Ashby's Dental company advertises its newly developed toothpaste with the claim that 68% of those using it reported more favorable dental check-ups. This claim was based on a poll of new users and is considered accurate to within 3.9 percentage points, 9 out of 10 times.
- What is the confidence level of the poll?
 - Determine the confidence interval.
 - If 45 of Mr. Ashby's FOM 11 students used the toothpaste, determine the range of students that could expect to have more favorable check-ups.