KEY TERMS				
• <u>Central Limit Theorem</u> : a theorem used to estimate proportions in a population for which if three basic conditions are met, the sampling distribution of the sample proportion is close to the Normal Distribution				
 Condition 1: Sampling is random & independent 				
• Condition 2: Large sample: The sample size is large enough that the sample expects				
at least 10 successes (yes) & 10 failures (no). ■ Successes: np ² ≥ 10 ■ Failures: n(1-p ²) ≥ 10 ○ Condition 3: Big population: If sampling is done without replacement the population				
must be at least 10 times larger than the sample size. ■ N ≥ 10n				
Gould, R., & Ryan, C. N. (2015). Introductory statistics: Exploring the world through data. Pearson.				

Central Limit Theorem Worksheet (Answer Key)

During June 2020, 2,395 salinity measurements were taken in the Mokauea loko i'a. From an analysis of this data, approximately 33% of the salinity measurements were greater than 22.5 PSU. Suppose you examined 150 random data points from this set of data. Find the approximate probability that more than 20% of the sample will be greater than 22.5 PSU.

With the above information, fill in the following:

•	N = 2,395	•	n = 150
•	p = 0.33	•	p [^] = > 0.20

With this information, perform the Central Limit Theorem Conditions Check.

Condition 1: Random & independent

The sample is random & independent because the problem states "random data points".

Condition 2: Sample Size

Successes: $49.5 \ge 10 \checkmark$ Failures: $100.5 \ge 10 \checkmark$ The sample size is large enough.

Condition 3: Population Size

 $2,395 ≥ 1,500 \checkmark$ The population size is large enough. Is the distribution Normal? If so, find the problem's Standard Error. Round to the nearest thousandth.

The distribution is Normal because it meets the three conditions of the Central Limit Theorem.

SE = 0.038

With the Standard Error found, fill in the blanks: N(____0.33____, ___0.038____)

Now, Find the approximate probability that more than 20% of the sample will be greater than 22.5 PSU. Interpret your answer as a percentage.

The probability that the proportion of salinity data points in our sample will be more than 63% is 99.97%.