Estimating with Confidence				
4	3	2	1	**0**
Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Interpret/explain all of the following: • A confidence level in context • A confidence interval in context • A confidence interval gives a range of plausible values for the parameter • Identify/verify **and explain why** each of the three inference conditions **are important** • **How issues like nonresponse, undercoverage, and response bias can influence the interpretation of a confidence interval.** • The effect of the sample size and the level of confidence C on the margin of error of a confidence interval	Interpret/explain all of the following: • **A confidence level in context** • A confidence interval in context • A confidence interval gives a range of plausible values for the parameter • **Identify/verify each of the three inference conditions** • The effect of the sample size and the level of confidence C on the margin of error of a confidence interval	Interpret/explain all of the following: • A confidence interval in context • A confidence interval gives a range of plausible values for the parameter • The effect of the sample size and the level of confidence C on the margin of error of a confidence interval	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1
	Determine all of the following: • Critical values for calculating a confidence interval • the sample size required to obtain a level of confidence C interval for a population mean/proportion with a specified margin of error • sample statistics, **margin of error, and confidence level** from a confidence interval	Determine all of the following: • Critical values for calculating a confidence interval • the sample size required to obtain a level of confidence C interval for a population mean/proportion with a specified margin of error • sample statistics from a confidence interval	Determine all of the following: • Critical values for calculating a confidence interval • sample statistics from a confidence interval	
	Construct and interpret a confidence interval for a population • mean • proportion	Construct and interpret a confidence interval for a population • mean • proportion	Construct and interpret a confidence interval for a population • mean • proportion	

Testing a Claim				
4	3	2	1	**0**
Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	List/verify conditions for carrying out a test • a proportion • a mean **(including for small sample sizes)** Use a confidence interval to draw a conclusion for a two-sided test about • a proportion • a mean Conduct • a one sample t test about a population mean μ • a significance test about a population proportion ρ Interpret • **P-values in context** • **The relationship between a** type I error and a type II error in context, and give the consequences of each. • ways to increase power of a test and the value of power. Recognize paired data and use one sample t procedures to perform significance tests for such data	List/**verify** conditions for carrying out a test • a proportion • a mean **Use a confidence interval to draw a conclusion for a two-sided test about** • **a proportion** • **a mean** Conduct • a one sample t test about a population mean μ • a significance test about a population proportion ρ Interpret • a type I error and a type II error in context, **and give the consequences of each.** • ways to increase power of a test **and the value of power.** Recognize paired data and use one sample t procedures to perform significance tests for such data	List conditions for carrying out a test • a proportion • a mean Conduct • a one sample t test about a population mean μ • a significance test about a population proportion ρ Interpret • a type I error and a type II error in context • ways to increase power of a test	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1

Two Populations or Groups				
4	3	2	1	0
Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	Describe the characteristics and calculate probabilities for • the sampling distribution of $\hat{p}_1 - \hat{p}_2$ • the sampling distribution of $\bar{x}_1 - \bar{x}_2$ Identify and verify whether or not the conditions for performing inference are met Construct and interpret • a two sample z interval to compare two proportions • a two-sample t interval to compare two means Perform • a two sample z test to compare two proportions • a two-sample t test to compare two means Interpret • **p-value of the test** • the results of inference procedures in a randomized experiment. Determine **and explain** the proper inference procedure to use in a given setting	Describe the characteristics and calculate probabilities for • the sampling distribution of $\hat{p}_1 - \hat{p}_2$ • the sampling distribution of $\bar{x}_1 - \bar{x}_2$ Identify **and verify** whether or not the conditions for performing inference **are met** Construct **and interpret** • a two sample z interval to compare two proportions • a two-sample t interval to compare two means Perform • a two sample z test to compare two proportions • a two-sample t test to compare two means **Interpret the results of inference procedures in a randomized experiment.** Determine the proper inference procedure to use in a given setting	Describe the characteristics and calculate probabilities for • the sampling distribution of $\hat{p}_1 - \hat{p}_2$ • the sampling distribution of $\bar{x}_1 - \bar{x}_2$ Identify the conditions for performing inference Construct • a two sample z interval to compare two proportions • a two-sample t interval to compare two means Perform • a two sample z test to compare two proportions • a two-sample t test to compare two means Determine the proper inference procedure to use in a given setting	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1

Inference for Distribution of Categorical Data				
4	3	2	1	0
Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	For a chi-square test for goodness of fit • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts • **Identify when a one sample z test for proportions gives equivalent results** For a chi-square test based on data in a two-way table • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts • **Identify when a two sample z test for proportions gives equivalent results** Choose the appropriate chi-square test and perform it for • goodness of fit. • Homogeneity • Independence **Conduct a follow-up analysis when the results of a chi-square test are statistically significant.**	For a chi-square test for goodness of fit • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts For a chi-square test based on data in a two-way table • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts **Choose the appropriate chi-square test and perform it for** • **goodness of fit.** • **Homogeneity** • **Independence**	For a chi-square test for goodness of fit • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts For a chi-square test based on data in a two-way table • Calculate the chi-square statistic, degrees of freedom, and P-value • State appropriate hypotheses and compute expected counts	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1

More About Regression				
4	3	2	1	**0**
Can extend thinking beyond the standard, including tasks that may involve one of the following: • Designing • Connecting • Synthesizing • Applying • Justifying • Critiquing • Analyzing • Creating • Proving	For the slope of a population (true) regression line • Perform a significance test • Construct and interpret a confidence interval Interpret computer output from a least-squares regression analysis **Determine which settings best apply to exponential and power models** Use transformations involving • powers and roots to find a power model that describes the relationship between two variables, and use the model to make predictions. • logarithms to find a power model or an exponential model that describes the relationship between two variables, and use the model to make predictions. Determine which of several transformations does a better job of producing a linear relationship	For the slope of a population (true) regression line • Perform a significance test • Construct and interpret a confidence interval Interpret computer output from a least-squares regression analysis Use transformations involving • **powers and roots to find a power model that describes the relationship between two variables, and use the model to make predictions.** • logarithms to find a power model or an exponential model that describes the relationship between two variables, and use the model to make predictions. **Determine which of several transformations does a better job of producing a linear relationship**	For the slope of a population (true) regression line • Perform a significance test • Construct and interpret a confidence interval Interpret computer output from a least-squares regression analysis Use transformations involving • logarithms to find a power model or an exponential model that describes the relationship between two variables, and use the model to make predictions.	Little evidence of reasoning or application to solve the problem Does not meet the criteria in a level 1