| Probability | | | | |
|---|---|---|---|---|
| 4 | 3 | 2 | 1 | 0 |
| Can extend thinking beyond the standard, including tasks that may involve one of the following:<br><br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Interpret probability as a long-run relative frequency.<br><br>Design and conduct simulations to model chance behavior<br><br>Complete a probability model for a chance process.<br><br>Interpret probabilities in context by using more than one of the following<br>• Complement rule<br>• Addition rule<br>• Multiplication rule<br>• A created Venn diagram for two events<br>• A created tree diagram<br><br>Determine<br>• Independence of events<br>• Disjoint/mutually exclusive events<br>• The probability of an event using two-way tables<br>• Conditional probability | Interpret probability as a long-run relative frequency.<br><br>Design simulations to model chance behavior<br><br>Verify a probability model of a chance process.<br><br>Interpret probabilities in context from<br>• Complement rule<br>• Addition rule<br>• Multiplication rule<br>• A created Venn diagram for two events<br>• A created tree diagram<br><br>Determine<br>• Independence of events<br>• The probability of an event using two-way tables<br>• Conditional probability | Interpret probability as a long-run relative frequency.<br><br>Conduct a given simulations to model chance behavior<br><br>Identify the criteria for a probability model of a chance process.<br><br>Calculate probabilities from<br>• Complement rule<br>• Addition rule<br>• Multiplication rule<br>• A given Venn diagram for two events<br>• A given tree diagram<br><br>Determine<br>• Independence of events<br>• The probability of an event using two-way tables | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

| Random Variables | | | | |
|---|---|---|---|---|
| 4 | 3 | 2 | 1 | **0** |
| Can extend thinking beyond the standard, including tasks that may involve one of the following:<br><br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | For discrete random variables<br>• Identify<br>• Calculate the mean and standard deviation<br>• Calculate probabilities<br>• Explain the effects of transforming a random variable<br>• Determine the distribution of the sum or difference of two random variables<br><br>For continuous random variables<br>• Identify<br>• Calculate probabilities using a normal curve<br>• Explain the effects of transforming a random variable<br>• Determine the distribution of the sum or difference of two random variables<br><br>For binomial random variables<br>• Identify binomial setting<br>• Calculate the mean and standard deviation<br>• Calculate probabilities with formulas and technology<br>• Approximate using a normal curve<br><br>For geometric random variables<br>• Identify geometric setting<br>• Calculate the mean<br>• Calculate probabilities with formulas and technology | For discrete random variables<br>• Identify<br>• Calculate the mean and standard deviation<br>• Calculate probabilities<br>• Explain the effects of transforming a random variable<br><br>For continuous random variables<br>• Identify<br>• Calculate probabilities using a normal curve<br>• Explain the effects of transforming a random variable<br><br>For binomial random variables<br>• Identify binomial setting<br>• Calculate the mean and standard deviation<br>• Calculate probabilities with formulas or technology<br><br>For geometric random variables<br>• Identify geometric setting<br>• Calculate the mean<br>• Calculate probabilities with formulas or technology | For discrete random variables<br>• Identify<br>• Calculate the mean and standard deviation<br>• Calculate probabilities<br><br>For continuous random variables<br>• Identify<br>• Calculate probabilities using a normal curve<br><br>For binomial random variables<br>• Identify binomial setting<br>• Calculate the mean and standard deviation<br>• Calculate probabilities with technology<br><br>For geometric random variables<br>• Identify geometric setting<br>• Calculate the mean<br>• Calculate probabilities with technology | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |

| Sampling Distributions | | | | |
|---|---|---|---|---|
| 4 | 3 | 2 | 1 | 0 |
| Can extend thinking beyond the standard, including tasks that may involve one of the following:<br><br>• Designing<br>• Connecting<br>• Synthesizing<br>• Applying<br>• Justifying<br>• Critiquing<br>• Analyzing<br>• Creating<br>• Proving | Describe <u>and interpret</u><br>• Parameter and a statistic<br>• Population distribution, sampling distribution, and a distribution of sample data<br>• An unbiased estimator of a population parameter<br>• The relationship between sample size and the variability of a statistic<br><br>For sample proportions<br>• Calculate and interpret the mean<br>• Calculate and interpret standard deviation<br>• Use Normal approximation to calculate <u>and interpret</u> probabilities<br>• Check for independence (10% rule)<br>• Check for normality (np and n(1-p) $\geq$ 10)<br><br><br>For sample mean<br>• Calculate and interpret the mean<br>• Calculate and interpret standard deviation<br>• Use Normal approximation to calculate <u>and interpret</u> probabilities<br>• Check for independence (10% rule)<br>• Check for normality (central limit theorem) | Describe<br>• Parameter and a statistic<br>• Population distribution, sampling distribution, and a distribution of sample data<br>• <u>An unbiased estimator of a population parameter</u><br>• <u>The relationship between sample size and the variability of a statistic</u><br><br>For sample proportions<br>• Calculate <u>and interpret</u> the mean<br>• Calculate <u>and interpret</u> standard deviation<br>• Use Normal approximation to calculate probabilities<br>• Check for independence (10% rule)<br>• Check for normality (np and n(1-p) $\geq$ 10)<br><br><br>For sample mean<br>• Calculate <u>and interpret</u> the mean<br>• Calculate <u>and interpret</u> standard deviation<br>• Use Normal approximation to calculate probabilities<br>• Check for independence (10% rule)<br>• Check for normality (central limit theorem) | Describe<br>• Parameter and a statistic<br>• Population distribution, sampling distribution, and a distribution of sample data<br><br><br>For sample proportions<br>• Calculate the mean<br>• Calculate standard deviation<br>• Use Normal approximation to calculate probabilities<br><br><br>For sample mean<br>• Calculate the mean<br>• Calculate standard deviation<br>• Use Normal approximation to calculate probabilities | Little evidence of reasoning or application to solve the problem<br><br>Does not meet the criteria in a level 1 |