Probability and Statistics with Applications
Course Number 1210300/IWA
KEY TERMINOLOGY OF THE CURRICULUM MAP

Unit/Organizing Principle: the overarching organizational structure used to group content and concepts within the curriculum map

Pacing: the recommended time period within the year for instruction related to the essential questions to occur

Essential Questions: the overarching question(s) that will serve to guide instruction and push students to higher levels of thinking; essential questions should guide students to the heart of the content

Measurement Topics: a list of the major underlying concepts covered in the development of the essential questions

Learning Targets/Skills: the content knowledge, processes and enabling skills that will ensure successful mastery of the essential questions

Benchmarks: the Next Generation Sunshine State Standards

Academic Language: the content vocabulary and other key terms and phrases with which students should be familiar and that support mastery of the learning targets, skills and essential questions

Activities and Resources: a listing of available, high quality and appropriate materials, strategies, lessons, textbooks, videos and other media sources that are aligned with the learning targets, skills and essential questions; developed to save teachers time when planning for instruction

Assessment: a list of required formative assessments as well as suggested assessments that are available to use as formative or summative assessments
## Unit/Organizing Principle: Interpreting Categorical and Quantitative Data - Exploring Data

### Essential Question: Can the student summarize, represent, and interpret univariate data?

### Measurement Topic

<table>
<thead>
<tr>
<th>Learning Targets/Skills</th>
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<tbody>
<tr>
<td>Differentiate between quantitative and qualitative variables</td>
<td>5</td>
<td>MA.912.S.1 MA.912.S.2</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td>Differentiate the difference between a Population (Parameter) and Sample (Statistics)</td>
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<tr>
<td>Differentiate between the four levels of measurements:</td>
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<tr>
<td><strong>2.1 Frequency Distributions, Histograms, and Related Topics</strong></td>
<td>4</td>
<td>MA.912.S.3.1 MA.912.S.3.2</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td><strong>2.3 Stem-and-Leaf Displays</strong></td>
<td>3</td>
<td>MA.912.S.3.1 MA.912.S.3.2</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td><strong>2.1 Histograms</strong></td>
<td>4</td>
<td>MA.912.S.3.8</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td><strong>3.1 Measures of Central Tendency: Mode, median, and Mean</strong></td>
<td>5</td>
<td>MA.912.S.3.3</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td><strong>3.2 Measures of Variation</strong></td>
<td>6</td>
<td>MA.912.S.3.4 MA.912.S.3.5</td>
<td>Qualitative variable Quantitative variable Population Parameter Sample Statistics Nominal Ordinal Interval Ratio Distribution Graphical Displays Measures of Central Tendency Resistant Trimmed mean Weighted average Variance Standard deviation Coefficient of variation Quartiles Percentiles Outliers Interquartile range Empirical Rule Normal curve z-score Standardizing</td>
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<td><strong>3.3 Percentiles and Box-and-Whisker Plots</strong></td>
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<td>MA.912.S.3.1 MA.912.S.3.2 MA.912.S.3.9</td>
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<td><strong>7.3 Areas under any Normal curve</strong></td>
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<td><strong>7.1 Graphs of Normal Probability Distributions</strong></td>
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<td>MA.912.S.3.6</td>
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<td><strong>7.2 Standard Units and Areas Under the Standard Normal Distribution</strong></td>
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<td><strong>Construct viable arguments and critique the reasoning of others.</strong></td>
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<td><strong>Model with Mathematics</strong></td>
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<td><strong>Use appropriate tools strategically.</strong></td>
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<td><strong>Attend to precision.</strong></td>
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<td><strong>Look for and make use of structure.</strong></td>
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**Essential Question:** Can the student summarize, represent, and interpret data on univariate data?

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| *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Chapters: 1 (Section 1.1), 2, 3, and 7 (Sections 7.1 – 7.3) |  
http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html |
| *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Notetaking Guide (Yixun shi) | • Assessment disk that accompanies the Brase & Brase Textbook. |
| *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Student Solution Guide (distribution at teacher’s discretion) | • Teacher made assessments |

**CPALMS:** [http://www.floridastandards.org](http://www.floridastandards.org)

**TI Activity Exchange & APPS:**  
[www.Education.ti.com](http://www.Education.ti.com) - Statistics

**Internet Resources:**

http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html

- Practice of Statistics Interactive website:  
http://bcs.whfreeman.com/tps3e
**Unit/Organizing Principle:** Interpreting Categorical and Quantitative Data – **Bivariate Data**  

**Pacing:** *Second Quarter*  

**Essential Questions:** Can the student summarize, represent, and interpret bivariate data?  
Can the student interpret a linear model?

<table>
<thead>
<tr>
<th>Measurement Topic</th>
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<th>Academic Language</th>
</tr>
</thead>
</table>
| 4.1 Scatter Diagrams and Linear Correlation | • Identify the response and explanatory variables  
• Construct and analyze scatter plots  
• Calculate and interpret the correlation coefficient | 3 | MA.912.S.3.1  
MA.912.S.3.2  
MA.912.S.3.7 | Scatter plot  
Explanatory variable  
Response variable |
| 4.2 Linear Regression and the Coefficient of Determination | • Find the equation of the least squares regression line and use it to make predictions  
• Interpret the coefficient of determination | 6 | MA.912.S.4.5  
MA.912.S.5.8  
MA.912.S.5.9 | Sample correlation coefficient  
Least-Squares line  
Interpolation  
Extrapolation  
Coefficient of Determination |

**Suggested Resource below**  
• Construct and interpret a residual plot  

<table>
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<th>Pacing (days)</th>
<th><em>Optional Topic</em></th>
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  • Assessment disk that accompanies the Brase & Brase Textbook.  
  • Teacher made assessments |

Section 3.2 Least-Squares Regression (PP. 214 - 219)*

**Understanding Basic Statistics,** Brase and Brase, Fifth Edition  
Chapter: 4

**Understanding Basic Statistics,** Brase and Brase, Fifth Edition  
Notetaking Guide (Yixun shi)

**Understanding Basic Statistics,** Brase and Brase, Fifth Edition  
Student Solution Guide (distribution at teacher’s discretion)

**CPALMS:** [http://www.floridastandards.org](http://www.floridastandards.org)

**TI Activity Exchange & APPS:**  
[www.Education.ti.com](http://www.Education.ti.com) - Statistics

**Internet Resources:**

  [http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html](http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html)

- Practice of Statistics Interactive website:  
  [http://bcs.whfreeman.com/tps3e](http://bcs.whfreeman.com/tps3e)
**Unit/Organizing Principle:** Making Inferences and Justifying Conclusions – Experimental Design

**Pacing:** Second Quarter

**Essential Questions:** Can the student understand and evaluate random processes underlying statistical experiments? Can the student make inferences and justify conclusions from sample surveys, experiments, and observational studies?

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<th>Benchmarks</th>
<th>Academic Language</th>
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<tbody>
<tr>
<td><strong>1.2 Random Samples</strong></td>
<td><strong>The Student will ….</strong></td>
<td>6</td>
<td>MA.912.S.1.1 MA.912.S.1.2 MA.912.S.2.1 MA.912.S.2.3</td>
<td>Simple Random Sample (SRS) Random Number Table Random Numbers Generator Sampling Sampling with replacement Sampling without replacement Stratified Systematic Clustering Multistage Convenience Sampling Frame Undercoverage Sampling error Census Population Sample Observational study Experiment Placebo effect Completely randomized experiment Block Control group Replication Nonresponse Truthfulness Faulty recall</td>
</tr>
<tr>
<td><strong>1.3 Introduction to Experimental Design</strong></td>
<td><strong>The Student will ….</strong></td>
<td>6</td>
<td>MA.912.S.1.1 MA.912.S.1.2 MA.912.S.2.1 MA.912.S.2.3</td>
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- Understand and evaluate random processes underlying statistical experiments
- Make inferences and justify conclusions from sample surveys, experiments and observational studies

**Mathematics Department**
Volusia County Schools
Revised August 2012

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| *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Chapter: 1 (Sections 1.2 and 1.3) | • Assessment disk that accompanies the Brase & Brase Textbook.  
• Teacher made assessments |
| *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Notetaking Guide (Yixun shi) | |
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| CPALMS: [http://www.floridastandards.org](http://www.floridastandards.org) | |
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| • Practice of Statistics Interactive website:  
[http://bcs.whfreeman.com/tps3e](http://bcs.whfreeman.com/tps3e) | |
# Unit/Organizing Principle: Conditional Probability and the Rules of Probability

### Essential Questions:
Can the student understand independence and conditional probability and use them to interpret data?
Can the student use the rules of probability to compute probabilities of compound events in a uniform probability mode?

### Measurement Topic
#### 5.1 What is Probability
- The Student will …
  - Determine a sample space
  - Determine probabilities of events in a sample space
  - Determine probabilities of complementary events
- Pacing (days): 6
- Academic Language: Probability, Law of large numbers, Event

### Measurement Topic
#### 5.2 Some Probability Rules – Compound Events
- The Student will …
  - Determine the probabilities of independent events
  - Calculate conditional probabilities
- Pacing (days): 7
- Benchmarks: MA.912.P.2.2, MA.912.P.2.3
- Academic Language: Simple event, Sample Space, Complement, Independent events, Dependent events, Conditional probability, Multiplication rules, Mutually exclusive, Contingency table (Two-way), Tree diagram, Factorial notation, Permutation, Combination

### Measurement Topic
#### 5.3 Trees and Counting Techniques
- The Student will …
  - Determine probabilities of events in a sample space
  - Determine probabilities of complementary events
- Pacing (days): 6
- Benchmarks: MA.912.P.1.2, MA.912.P.2.1
- Academic Language: Probability, Law of large numbers, Event

### Mathematical Practice Standards
- Make sense of problems and persevere in solving them.
  - MA.CC.K12.MP.1
- Reason abstractly and quantitatively.
  - MA.CC.K12.MP.1
- Construct viable arguments and critique the reasoning of others.
  - MA.CC.K12.MP.1
- Model with Mathematics
  - Use appropriate tools strategically.
  - Attend to precision.
  - Look for and make use of structure.
  - Look for and express regularity in repeated reasoning.
  - MA.CC.K12.MP.1

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<td>Big Ideas: <em>Understanding Basic Statistics</em>, Brase and Brase, Fifth Edition&lt;br&gt;Chapter: 5</td>
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**CPALMS:** [http://www.floridastandards.org](http://www.floridastandards.org)

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**Internet Resources:**
- Practice of Statistics Interactive website:<br>[http://bcs.whfreeman.com/tps3e](http://bcs.whfreeman.com/tps3e)
## Unit/Organizing Principle: Using Probability to Make Decisions

### Pacing: Third Quarter

### Essential Questions:
- Can the student calculate expected values and use them to solve problems?
- Can a student determine when a binomial distribution is closely approximated to normal?

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<td><strong>The Student will …</strong></td>
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<td></td>
<td></td>
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</table>
| **6.1 Introduction to random variables and probability distribution** | ● Determine the mean, standard deviation, and probability of events using a discrete distribution  
● Determine the mean, standard deviation, and probability of events using a normal distribution | 5 | MA.912.P.3.1  
MA.912.P.3.2 | Random variable  
Discrete random variable  
Continuous random variable  
Probability distribution |
| **6.2 Binomial probabilities**  
**6.3 Additional Properties of the Binomial Distribution** | ● Determine the mean, standard deviation, and probability of events using a binomial distribution | 6 | MA.912.P.3.1  
MA.912.P.3.2 | Mean  
Standard deviation  
Expected value  
Binomial experiment  
Binomial coefficient  
Binomial probability distribution  
Estimation  
Testing  
Regression  
Sampling distribution |
| **Review 7.1 – 7.2** | ● Use the 68-95-99.7 rule (empirical rule) to find proportions under the normal curve | 3 | MA.912.S.3.6 | |
| **7.3 Areas Under any Normal curve** | ● Find the standardized value (z-score) of an observation | 4 | MA.912.S.3.1  
MA.912.S.3.2 | |
| **7.4 Sampling Distributions** | ● Use a simulation to approximate sampling distributions for the mean | 4 | MA.912.P.4.2 | |
| **7.5 The Central Limit Theorem** | ● Apply the Central Limit Theorem (CLT) | 3 | MA.912.P.3.4  
MA.912.S.4.3 | Unbiased  
Variability |
| **7.6 Normal Approximation to the Binomial Distribution** | ● Determine under what criteria binomial distributions become approximately normal. | 2 | MA.912.P.3.1  
MA.912.P.3.2  
MA.912.S.4.3 | |

| Make sense of problems and persevere in solving them. | Reason abstractly and quantitatively. | Construct viable arguments and critique the reasoning of others. | Model with Mathematics | Use appropriate tools strategically. | Attend to precision. | Look for and make use of structure. | Look for and express regularity in repeated reasoning. |
**Essential Questions:** Can the student calculate expected values and use them to solve problems?  
Can a student determine when a binomial distribution is closely approximated to normal?

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- Assessment disk that accompanies the Brase & Brase Textbook.  
- Teacher made assessments |

**Big Ideas:** *Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Chapters: 6 and 7 (Review 7.1 – 7.3; cover 7.3 – 7.6)

*Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Notetaking Guide (Yixun shi)

*Understanding Basic Statistics*, Brase and Brase, Fifth Edition  
Student Solution Guide (distribution at teacher’s discretion)

**CPALMS:** [http://www.floridastandards.org](http://www.floridastandards.org)

**TI Activity Exchange & APPS:**  
[www.Education.ti.com](http://www.Education.ti.com) - Statistics

**Internet Resources:**

  [http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html](http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html)

- Practice of Statistics Interactive website:  
  [http://bcs.whfreeman.com(tps3e](http://bcs.whfreeman.com(tps3e)
## Unit/Organizing Principle: Inference

Pacing: Third & Fourth Quarters

### Essential Questions: Can the student take data and apply the general principles of inferential statistics?

<table>
<thead>
<tr>
<th>Measurement Topic</th>
<th>Learning Targets/Skills</th>
<th>Pacing (days)</th>
<th>Benchmarks</th>
<th>Academic Language</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter 8: Estimation</strong></td>
<td>Calculate, explain, and interpret confidence to include: one sample ( z )-interval, one sample ( t )-interval, and a one-proportion ( z )-interval</td>
<td>10</td>
<td>MA.912.S.4.4, MA.912.S.5.1</td>
<td>Point estimate ( \mu ), ( \pi ), Margin of error, Confidence level, Confidence value, Confidence interval for ( \mu ), ( \pi ), Student's ( t ) distribution, Student's ( \pi ) variable, Degree of freedom, Hypotheses (null &amp; alternate), Test type (left-tailed, right-tailed, two-tailed), ( P )-value, Level of significance, Power, Statistical significance, Critical region, Critical values, Paired data, Dependent samples, Independent samples, Pooled estimates, One sample ( t ) &amp; ( z ) intervals (tests), One proportion ( z ) interval (test), Matched pairs ( t ) – test, Two sample ( t ) &amp; ( z ) tests, Two proportion ( z ) test, Chi-square test of Independence, Homogeneity, and GOF, Variance, Standard deviation, Linear regression, Rho, Standard error</td>
</tr>
<tr>
<td><strong>Chapter 9: Hypothesis Testing</strong></td>
<td>Perform various hypothesis tests to include: one sample ( z ) – test, one sample ( t ) – test, and a one proportion ( z ) test, matched – pairs ( t ) – test, two sample ( t ) – test, two sample ( z ) – test, two proportion ( z ) – test, Chi – square test of independence, homogeneity, and goodness-of-fit.</td>
<td>12</td>
<td>MA.912.S.5.2, MA.912.S.5.3, MA.912.S.5.4, MA.912.S.5.5, MA.912.S.5.6</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter 10: Inferences about Differences</strong></td>
<td>Perform a test on a single variance</td>
<td>5</td>
<td>Optional Topic</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter 11: Additional Topics using inference (sections 11.1 &amp; 11.2)</strong></td>
<td>Perform a linear regression ( t ) – test</td>
<td></td>
<td></td>
<td></td>
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</table>

**Make sense of problems and persevere in solving them.**

MACC.K12.MP.1

**Reason abstractly and quantitatively.**

MACC.K12.MP.1

**Construct viable arguments and critique the reasoning of others.**

MACC.K12.MP.1

**Model with Mathematics**

MACC.K12.MP.1

**Use appropriate tools strategically.**

MACC.K12.MP.1

**Attend to precision.**

MACC.K12.MP.1

**Look for and make use of structure.**

MACC.K12.MP.1

**Look for and express regularity in repeated reasoning.**

MACC.K12.MP.1

Mathematics Department
Volusia County Schools
Revised August 2012

Probability and Statistics with Applications
1210300/IWA
### Essential Questions: Can the student take data and apply the general principles of inferential statistics?

<table>
<thead>
<tr>
<th>Activities/Resources:</th>
<th>Assessments:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suggested Resources</strong></td>
<td>• Online Practice Tests <a href="http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html">http://college.cengage.com/mathematics/brase/understanding_basic/5e/student_home.html</a></td>
</tr>
<tr>
<td><strong>Big Ideas</strong>: <em>Understanding Basic Statistics</em>, Brase and Brase, Fifth Edition Chapters: 8, 9, 10, and 11</td>
<td>• Assessment disk that accompanies the Brase &amp; Brase Textbook.</td>
</tr>
<tr>
<td><em>Understanding Basic Statistics</em>, Brase and Brase, Fifth Edition Notetaking Guide (Yixun shi)</td>
<td>• Teacher made assessments</td>
</tr>
<tr>
<td><em>Understanding Basic Statistics</em>, Brase and Brase, Fifth Edition Student Solution Guide (distribution at teacher’s discretion)</td>
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### Unit/Organizing Principle: Additional Learning Strategies

| Pacing: Entire year |

#### Essential Questions: Can the student use appropriate language arts strategies to achieve success in mathematics?

<table>
<thead>
<tr>
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<tr>
<td>The Student will</td>
<td></td>
<td></td>
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<tr>
<td>- Use new vocabulary that is introduced and taught directly</td>
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<td></td>
<td>LA.1112.1.6.1</td>
<td></td>
</tr>
<tr>
<td>- Determine the correct meaning of words with multiple meanings in context</td>
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<td></td>
<td>LA.1112.1.6.9</td>
<td></td>
</tr>
<tr>
<td>- Write an informational report that integrates information and makes distinctions between the relative value and significance of specific data, facts, and ideas.</td>
<td></td>
<td></td>
<td>LA.1112.6.2.3</td>
<td></td>
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</table>

- Make sense of problems and persevere in solving them.  
- Reason abstractly and quantitatively.  
- Construct viable arguments and critique the reasoning of others.  
- Model with Mathematics  
- Use appropriate tools strategically.  
- Attend to precision.  
- Look for and make use of structure.  
- Look for and express regularity in repeated reasoning.  

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