Chapter 3: Framing the Problem
Math Tasks by Rigor/Relevance Quadrant (ES, MS, HS)

Learning Experiences in the Rigor/Relevance Framework

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Elementary Examples</th>
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</thead>
<tbody>
<tr>
<td><strong>Quadrant C Assimilation</strong></td>
<td><strong>Quadrant D Adaptation</strong></td>
</tr>
<tr>
<td>6</td>
<td>• Predict and analyze patterns of sides of three-dimensional boxes.</td>
</tr>
<tr>
<td>5</td>
<td>• Use pattern blocks to construct desired shapes.</td>
</tr>
<tr>
<td>4</td>
<td>• Identify next numbers in a sequence.</td>
</tr>
<tr>
<td>3</td>
<td>• Find values in number sentences when represented by unknowns.</td>
</tr>
<tr>
<td>2</td>
<td>• Round off numbers and estimate answers.</td>
</tr>
<tr>
<td>1</td>
<td>• Use a balance to predict and determine equivalent value.</td>
</tr>
<tr>
<td></td>
<td>• Create math word problems for younger students.</td>
</tr>
<tr>
<td><strong>Quadrant A Acquisition</strong></td>
<td><strong>Quadrant B Application</strong></td>
</tr>
<tr>
<td>6</td>
<td>• Explore likenesses and differences of objects (color, shape, size).</td>
</tr>
<tr>
<td>5</td>
<td>• Sort and classify objects, such as buttons, blocks, and bottle tops.</td>
</tr>
<tr>
<td>4</td>
<td>• Use color counters to solve simple computational problems.</td>
</tr>
<tr>
<td>3</td>
<td>• Divide objects to illustrate whole, half, third, and quarter.</td>
</tr>
<tr>
<td>2</td>
<td>• Construct shapes and patterns with craft sticks.</td>
</tr>
<tr>
<td>1</td>
<td>• Memorize multiplication tables.</td>
</tr>
<tr>
<td></td>
<td>• Find the lines of symmetry in letters of the alphabet and numerals.</td>
</tr>
<tr>
<td></td>
<td>• Use pegboards to discover multiplied values.</td>
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<td>Measure interior angles of polygons and discover the relationship between number of</td>
<td>Hold a competition to determine when using a calculator or doing mental math is most</td>
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<tr>
<td>sides and sum of angles.</td>
<td>efficient.</td>
</tr>
<tr>
<td>Graph the perimeters and areas of squares of different sizes.</td>
<td>Obtain historical data about local weather to estimate amount of snow, rain, or sun</td>
</tr>
<tr>
<td>Express probabilities as fractions, percents, or decimals.</td>
<td>during a given season of the current year.</td>
</tr>
<tr>
<td>Evaluate equivalency and the relationship of decimal and fractions.</td>
<td>Use graphing calculators and computer spreadsheets to organize and analyze data.</td>
</tr>
<tr>
<td>Determine the largest area for a fixed perimeter.</td>
<td>Test consumer products, such as absorbency of paper towels, devise a scale, and</td>
</tr>
<tr>
<td>Fill in missing numbers for ordered pairs for an algebraic function.</td>
<td>illustrate data graphically.</td>
</tr>
<tr>
<td>Evaluate objects for similarity and congruence.</td>
<td>Plan a large school event and calculate resources (e.g., food, decorations) needed</td>
</tr>
<tr>
<td>Estimate sums of complex fractions.</td>
<td>and costs.</td>
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<tr>
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<td>Select computational operation to solve word problems.</td>
<td>Make a scale drawing of the classroom.</td>
</tr>
<tr>
<td>Calculate volume of regular solids.</td>
<td>Calculate percents of daily requirements met through a typical school lunch.</td>
</tr>
<tr>
<td>Measure angles with a protractor.</td>
<td>Calculate potential combinations of a group of variables, such as wardrobe components,</td>
</tr>
<tr>
<td>Find and measure the sides and angles of a right triangle using the Pythagorean</td>
<td>and estimate the probability of any one combination being picked at random.</td>
</tr>
<tr>
<td>theorem and trigonometric ratios.</td>
<td>Calculate percentages of advertising in a newspaper.</td>
</tr>
<tr>
<td>Organize and display collected data, using tables, charts, or graphs.</td>
<td>Play a simulated baseball game and calculate statistics.</td>
</tr>
<tr>
<td>Use basic properties of equality to solve equations with one variable.</td>
<td>Calculate paint needed for a summer business painting houses.</td>
</tr>
<tr>
<td>Plot the coordinates for quadrilaterals on a grid.</td>
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</table>

Learning Experiences in the Rigor/Relevance Framework

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**Mathematics**

### Quadrant C Assimilation
- Measure interior angles of polygons and discover the relationship between number of sides and sum of angles.
- Graph the perimeters and areas of squares of different sizes.
- Express probabilities as fractions, percents, or decimals.
- Evaluate equivalency and the relationship of decimal and fractions.
- Determine the largest area for a fixed perimeter.
- Fill in missing numbers for ordered pairs for an algebraic function.
- Evaluate objects for similarity and congruence.
- Estimate sums of complex fractions.

### Quadrant D Adaptation
- Hold a competition to determine when using a calculator or doing mental math is most efficient.
- Obtain historical data about local weather to estimate amount of snow, rain, or sun during a given season of the current year.
- Use graphing calculators and computer spreadsheets to organize and analyze data.
- Test consumer products, such as absorbency of paper towels, devise a scale, and illustrate data graphically.
- Plan a large school event and calculate resources (e.g., food, decorations) needed and costs.

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**Middle Level Examples**

### Quadrant A Acquisition
- Select computational operation to solve word problems.
- Calculate volume of regular solids.
- Measure angles with a protractor.
- Find and measure the sides and angles of a right triangle using the Pythagorean theorem and trigonometric ratios.
- Organize and display collected data, using tables, charts, or graphs.
- Use basic properties of equality to solve equations with one variable.
- Plot the coordinates for quadrilaterals on a grid.

### Quadrant B Application
- Make a scale drawing of the classroom.
- Calculate percents of daily requirements met through a typical school lunch.
- Calculate potential combinations of a group of variables, such as wardrobe components, and estimate the probability of any one combination being picked at random.
- Calculate percentages of advertising in a newspaper.
- Play a simulated baseball game and calculate statistics.
- Calculate paint needed for a summer business painting houses.
## Learning Experiences in the Rigor/Relevance Framework

### Quadrant C Assimilation
- Solve interdisciplinary problems with signed numbers, such as molecules with a charge of protons and electrons.
- Identify congruence of shapes from expressions and truth statements.
- Complete Euclidean proofs in geometry.
- Construct truth tables as a shorthand method for discussing logical sentences.
- Analyze factors in difference between theoretical empirical probability.
- Select best measures of central tendency to support a particular point of view.
- Solve quadratic equations and linear inequalities.

### Quadrant B Application
- Distinguish rational from irrational numbers.
- Simplify, factor, and compute polynomials.
- Solve and graph linear equations.
- Create and solve factorial expressions for permutation problems.
- Construct and solve for unknowns in ratio problems.
- Compute numbers with scientific notation.
- Predict the probability of events using ratios.
- Bisect line segments and angles.
- Provide examples to illustrate properties of real numbers.

### Quadrant D Adaptation
- Determine types of measurements/calculations involved in designing everyday items.
- Make calculations of electrical load of appliances based on usage in homes in the community.
- Examine the different elements, visual effects, and features found in a computer game, and use mathematics to design some of these elements.
- Create formulas to predict changes in stock market values.
- Design support posts of different materials and size to handle stress load in a building.
- Develop a sampling plan for a public opinion poll.
- Design a roller coaster ride.

### Quadrant A Acquisition
- Draw Venn diagrams to represent a set of real conditions (e.g., common characteristics of students in class).
- Find length of line segments without measuring.
- Take measurements using calipers and micrometers.
- Calculate measurement error in real observations.
- Calculate frequency of vibration of various piano strings.
- Calculate medical dosages for different weight animals.
- Plot changes in temperature at different altitudes from a NASA space flight.

### High School Examples
- Solve interdisciplinary problems with signed numbers, such as molecules with a charge of protons and electrons.
- Identify congruence of shapes from expressions and truth statements.
- Complete Euclidean proofs in geometry.
- Construct truth tables as a shorthand method for discussing logical sentences.
- Analyze factors in difference between theoretical empirical probability.
- Select best measures of central tendency to support a particular point of view.
- Solve quadratic equations and linear inequalities.

- Determine types of measurements/calculations involved in designing everyday items.
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