

Math III Homepage

**Problem Solving  
(Communication, Concept Utilization, and Solution Method Rubrics)**

- **Communication Strand Rubric (Math I)**
  - In the area of communication, students will be evaluated on their written explanation of how they answered a question or solved a problem on a particular concept.
  - The students will also be evaluated on the rationale for giving the answer or solution that they did.
  - It must be noted that the length of the response, the grammar used, and the syntax are not the critical elements of this strand.
- **Concept Utilization Rubric (Math II)**
  - Students will use their knowledge of mathematical concepts to aid them in finding a correct solution to a problem.
  - Students will be evaluated on their ability to use the proper mathematical concept(s) correctly.
  - Some problems may require the use of one or more concepts in order to correctly solve the problem.
- **Solution Method Rubric (Math III)**
  - Students will recognize and use an appropriate solution method(s) for solving a variety of problem types. Some problems may require more than one method in order to solve it correctly.
  - Students will identify important elements of the problem and use models, diagrams and symbols to systematically represent and integrate concepts.

Problem solving in mathematics uses the communication skills used in Math I, the concepts that were utilized in Math II, and the knowledge about various problem solving methods that are learned in Math III. Therefore all three columns of the following rubric will be used for the Problem Solving Strand for Math III.

Score Level	Communication	Concept(s) Utilization	Solution Method
Exemplary - 4 -	Gives a complete written explanation of the solution process employed. The explanation given addresses both what was done and why it was done. If a diagram is appropriate, there is a complete explanation of all the elements of the diagram.	The mathematical concept(s) selected is used to correctly solve the problem. Entire solution process is displayed. Solution to problem is correct.	Identifies all of the important elements of the problem and shows complete understanding of the relationship among the elements. Reflects an appropriate and systematic solution method(s) for solving the problem. Gives clear evidence of complete and systematic solution process.
Proficient - 3 -	Gives a nearly complete explanation of the solution process employed. Either what was done or the rationale for the solution process is presented, but not both; communication is vague. May include a diagram with some elements explained.	The mathematical concept(s) selected is used to correctly solve the problem. A majority of the solution process is displayed with a minimal number of mistakes. Solution to problem may be correct.	Identifies most of the important elements of the problem and shows general understanding of the relationships among them. Reflects an appropriate solution method(s) for solving the problem. Solution process is nearly complete.
Needs Work - 2 -	Provides minimal explanation of the solution process; may fail to explain or may omit information about what was done. Explanation does not match the presented solution process or the communication is difficult to interpret. May include minimal discussion of elements in the diagram; explanation of significant elements is unclear.	The mathematical concept selected is not appropriate for the given problem, or an appropriate concept is chosen, but is not used correctly. Either a minimal amount of the solution process is displayed, or a majority of the process is displayed with numerous errors. Solution to problem may be correct.	Fails to identify important elements or places too much emphasis on unimportant elements. Appears to reflect an appropriate solution method(s) but application of the method(s) is unclear, or inappropriate strategy is applied logically and consistently, or gives minimal evidence of the solution process. Process may be difficult to identify. May attempt to use outside irrelevant information.
Unacceptable - 0 -	No written explanation of the solution is provided.	Concept not understood. No solution process is displayed. Solution to problem may be correct.	No apparent solution method.

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Name \_\_\_\_\_

Communication \_\_\_\_\_ Solution Method \_\_\_\_\_ Concept Utilization \_\_\_\_\_

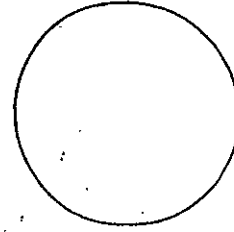
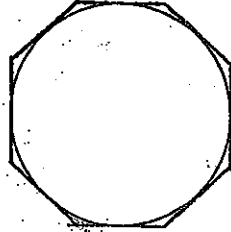
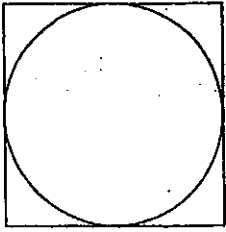
We will score this problem using the rubric on the back. You must explain your solution method and why you chose the operations that you performed.

A hospital is in need of a helipad to land a new emergency helicopter it has purchased. The planning committee must decide the shape of a landing area. Safety regulations require that the helipad contain a circle with a radius of 30 feet, and it must be 2 feet 6 inches thick. The committee is trying to decide whether to surround the circle with a square, a regular octagon, or simply build the circular area. As a constructional engineer, you have been asked to calculate the volume of cement needed for each proposal. Show all your work and explain your calculations as several members of the committee are not mathematic experts but do need to understand your answers.

Proposal #1

Proposal #2

Proposal #3



Calculations:	Calculations:	Calculations:
Explanation of Calculations:	Explanation of Calculations:	Explanation of Calculations:
Why might you choose this option:	Why might you choose this option:	Why might you choose this option:

After your presentation, the committee members understand the volume of cement needed for each proposal. Now they are concerned with the cost of each proposal. It is estimated that proposal #1 will take 48 man hours to produce. It is estimated that proposal #2 will take 92 man hours to produce. It is estimated that proposal #3 will take 120 man hours to produce. The cost of each man hour is \$88. The cost of each cubic foot of cement is \$4. Calculate the cost of each proposal. Again, explain your calculations as several of the committee members are not mathematical experts.

Calculations:	Calculations:	Calculations:
Explanation of Calculations:	Explanation of Calculations:	Explanation of Calculations:

Based on cost and design, which proposal would you recommend? Explain your choice.