



The Math Forum @ Drexel University
An enterprise of the Drexel School of Education

National Council of Teachers of Mathematics
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Using Rich Problems to Reach All Learners

<http://mathforum.org/~claire/richproblems/>

- Introductions and Overview
- Guiding Questions:
 - **What is a rich problem?**
 - **How can rich problems help teachers differentiate instruction for learners with diverse developmental levels and learning styles?**
 - Key ingredients
 - Know the math
 - Know the students
 - Create a climate of math learners
 - Management issues
 - General strategies that enable more students to succeed
 - Strategies for adapting problems to make them more accessible
 - Strategies for adapting problems to make them more challenging
 - **How do rich problems help us address the Process Standards?**
- Online Resources
- Q & A

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The Math Fundamentals Problem of the Week Scoring Rubric for Students

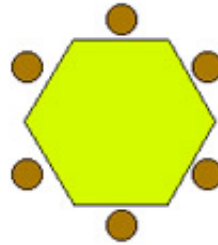
For each category, choose the level that *best describes your work*.

	Novice	Apprentice	Practitioner	Expert
Problem Solving				
Interpretation	I do not understand much of the problem.	I understand some of the math in the problem. I completed part of the problem.	I understand all of the math in the problem. I completed all parts of the main problem.	I understand the Extra(s) and I believe I solved all correctly. I am at least a Practitioner in Strategy.
Strategy	I do not know how to set up the problem. or My work does not show my strategy. or My strategy didn't work.	My strategy made sense, but it wasn't enough to solve the whole problem. or I didn't apply my strategy systematically.	I picked a good strategy. My approach was systematic. I solved the problem through skill, not luck.	I used two different strategies. I used a good strategy for the Extra(s). I used an unusual strategy. I made good use of technology.
Accuracy	I think I made many errors.	Some of my work is accurate. I may have one or two errors.	My work is accurate and contains no arithmetic mistakes.	[not possible for most problems]
Communication				
Completeness	I wrote very little to explain how I solved the problem.	My explanation does not include calculations. or I did not explain why I did my calculations.	I explained most of my steps, with enough detail so that another student could follow it. I explained why I used my calculations, equations or expressions.	I included some special ideas and/or patterns I discovered about the problem.
Clarity	My explanation is very difficult to read and follow.	My explanation isn't totally unreadable, but another student wouldn't be able to follow it easily. My explanation includes spelling or typing errors which make it hard to understand.	Another student would be able to read and understand my solution. I used correct math language, including correct units. I tried to use good grammar, spelling, organization, and typing.	My organization makes my ideas especially clear. My answer is very readable and it looks good! Optional: I included a diagram to help a reader understand.
Reflection (See list)	I did nothing reflective.	I did one reflective thing.	I did two reflective things.	I did three or more reflective things or I did a really good job with two of them.
	<p>The items to the right are all considered reflective. They can be in your solution or the comment you leave after viewing our answer.</p> <ul style="list-style-type: none"> • I've revised and improved my work. • I show how I checked my own answer using another method. • I've explained why my answer is reasonable. • I've stated assumptions I made. 	<ul style="list-style-type: none"> • I've connected the problem to another problem or experience. • I've explained where I'm stuck. • I've suggested a hint I would give to another solver. • I've described an "Aha!" moment I had. 	<ul style="list-style-type: none"> • I've explained why I think the problem is easy or difficult. • I've described an error I made and how I found and corrected it. • I told what I learned from solving the problem. • I've summarized my process. 	

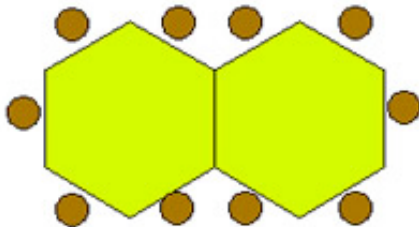
Math Forum - Problem of the Week

4651: The Teddy Bears' Banquet *

Ursinus Hotel is one of the world's few hotels just for bears. The tables in its banquet room are regular hexagons with room for one seat along each side. In other words, one table standing alone seats six bears.



To make more room for dancing at the Teddy Bears' wedding banquet, the staff arrange the tables in a long row along one side of the room. When they connect two tables together, here's how the seating looks:



1. How many guests can sit at 10 tables?
2. How many guests can sit at 25 tables?
3. How many guests can sit at 100 tables?

Explain how you found your answers and how you know you are right. Describe any patterns that helped you.

Note: Here is a link to virtual pattern blocks that might help you solve the problem: http://nlvm.usu.edu/en/nav/frames_asid_170_g_2_t_2.html

Extra 1: Use either words or numbers and symbols to write a rule for calculating the number of bears that can sit at any given number of tables.

Extra 2: How many tables would it take, arranged in one straight row, to seat 120 bears?

[Learn About Our Scoring System](#)

Math Forum - Problem of the Week

3619: Wooden Legs

Wendy builds wooden dollhouse furniture. She uses the same kind of legs to make 3-legged stools and 4-legged tables.



She has a supply of 31 legs and wants to use them all to make stools and tables.

Find all the different ways she can use them.

Explain how you solved the problem and how you know you have found all solutions.

Extra: Wendy sells her furniture to the local toy store. She gets \$2 for each stool and \$3 for each table. Of all the ways you found which would earn her the most money?

Be sure to explain how you know.

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