What Makes a Rich Task?

You are instrumental in helping students develop skills and attitudes that build their ability to solve problems effectively. The tasks presented and the guidance provided enable students to gain confidence as they encounter a variety of problems that require them to employ a range of mathematical skills. To learn how to persevere in solving problems, students must be given opportunities to meet challenges but not be overwhelmed by them.

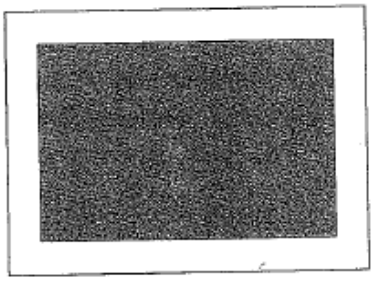
Provide Good Problems/ Tasks

You play a critical role in supporting students' ability to make sense of problems and persevere in solving them. The first of these roles is the presentation of appropriate problems or tasks for students to solve. While it seems that appropriate is subjective, there are six questions you might want to discuss within your collaborative team when planning lessons to assess the quality of a problem or mathematical task.

1. **Is the task interesting to students?** With information about students' lives (for example, their social and creative interests), you can create or select problems that will engage students by inviting them to be personally invested in the problem.
2. **Does the task involve meaningful mathematics?** Meaningful mathematics is mathematics that will propel students forward in their mathematical knowledge at an appropriate level. Consider the problem in figure 2.2 related to the CCSS for mathematics grade 5 domain Number and Operations in Base Ten.

   This very common problem is distorted by the use of mathematics that does not contribute to students' understanding of the problem context. While this problem meets the intent of the standard in which students are multiplying decimals to hundredths, it involves unreasonable dimensions and makes the problems nonsensical.

Randy has a rectangular yard within which he wishes to build a rectangular pool. The pool will be surrounded by a walkway that is the same width all the way around.



If the yard's dimensions are 36.34 ft. by 25.65 ft., and the pool's dimensions are 28.14 ft. by 19.35 ft., how much of the yard will be used for the walkway?

Figure 2.2: Sample mathematics task.

3. **Does the task provide an opportunity for students to apply and extend mathematics?** Problems and tasks that support students in applying and extending the mathematics they are learning or have learned help students understand the purpose of the tasks and give students a starting point for solving the problem.
4. **Is the task challenging for all students?** The purpose of this challenge is not to frustrate students but to build within students the kind of attitudes and perseverance necessary to be a problem solver and to exercise students' mental mathematical thought.
5. **Does the task support the use of multiple strategies and entry points?** Two students can read the same problem and have two different ways of perceiving and approaching the problem. Consider the following example in figure 2.3 from the fifth grade CCSS for mathematics domain Number and Operation in Base Ten (see 5.NBT.5)

Students who have not been taught the standard algorithm for dividing multidigit numbers are presented with the following problem:

There are 228 players in the softball league. How many 12-member teams can be formed if each player is placed on exactly one team?

Solution one: Students might repeatedly subtract 12 from the number of available players until there are no players left.

Solution two: Students might use a guess-and-check strategy in which they multiply 12 by different factors until they reach a product of 228.

Figure 2.3: Sample mathematics task.

6. **Will students' interactions with the task reveal information about the students' mathematical understanding?** Examining students' interactions with a task (for example, students' work, discussions, and processes) should provide information about how students' thinking is hindered or advanced by interaction with the problem.

This is not an exhaustive list of questions, but it is a beginning step toward examining problems and tasks that will potentially benefit students' mathematical learning.

Facilitate Student Engagement in the Problem- Solving Process

Successful problem solving does not mean that students will always conclude with the correct response to a problem but rather that students will undertake a genuine effort to engage in the problem-solving process, drawing on resources such as appropriate tools, prior knowledge, discussion with others, and the questions to aid in the process. Successful problem solvers also exhibit a willingness to persevere.

Adapted from *Common Core Mathematics in a PLC at Work: Grades 3-5. Larson, M.; Fennel, F; Adams, T; Dixon, J; Kobett, B; Wray, J (2012)*