

Hickman Charter School

Mathematics

Problem of the Month

Overview



2016 - 2017

HCS Problem of the Month Overview

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Problem solving is the cornerstone of doing mathematics; and consequently, a fundamental goal of any strong mathematics program. If we want our students to be both problem solvers and mathematically powerful, we must model perseverance and challenge students with non-routine problems. At Hickman Charter School, we are committed to improving our math program by emphasizing the importance of the problem solving process. We are making it a focus through the “Problem of the Month” (POM) program. The “Problem of the Month” program will help all of us in our school community foster the first standard of mathematical practice: “Make sense of problems and persevere in solving them.” It is our hope that all of our homeschooling families participate in the process in order to encourage and teach our students to be strong problem solvers.

Several Levels of Complexity

Each learning period, a new “Problem of the Month” will be given to you by your Education Coordinator. It will present our students with a non-routine problem for them to attack and solve. The problem will have several levels so that all students will be able to work on a part of the problem appropriate to their learning development. The structure of the “Problem of the Month” is a “shallow floor” and “high ceiling”, so that all students can constructively engage, struggle and persevere.

The Primary Version of Level A is designed to be accessible to all students and especially the key challenge for grades K-1.

Levels A-D are combined in one packet for students in grades 2 through 8.

Level A will be challenging for most second and third graders.

Level B may be the limit of where fourth and fifth grade students have success and understanding.

Level C may stretch sixth and seventh grade students.

Level D may challenge most eighth and ninth graders.

These grade-level expectations are just estimates and should not be used as an absolute minimum or maximum expectation or limitation for all students.

It is suggested that all students start with level A and then work through the different tasks. It is understood that some students will not get too far into the problem. The process of attacking and struggling on a non-routine problem is important to learn, as we must encourage the students to struggle and persevere to develop their problem-solving skills. When your child has reached the maximum level of his/her understanding, please celebrate their progress. ***A very important component of problem solving is the process, and that students are stretched to go as far as their understanding and skills take them.***

IMPORTANT NOTE: The Problem of the Month is not designed to be completed in a single session. Students will benefit from returning to it again and again (continuing with a level or taking on the next) throughout the learning period.

Ask, Don't Tell

We are asking that all parent/educators be careful not to lead or guide but rather to pose clarifying questions and questions that require the students to reflect on their work. A good method is to have students try various processes and to share those with you and/or any other students with whom they are working. Be careful not to emphasize one solution method over another as students share their ideas.

Trials, errors, and retries are key attributes of good problem solvers. We ask you to encourage your students to persevere and to help them see mistakes as learning opportunities (part of the problem solving process). Many students might want to initially give up. The best support for your student is encouragement through good questions. Some good questions are:

What have you tried?

Why do you think it doesn't work?

Have you tried to make the problem simpler?

What do you need to know to be able to solve the problem?

There are many other good questions; however, questions which lead directly to a solution path or the actual solution are not helpful in this process. The process of finding and understanding a solution outweighs the benefit of having a correct answer. Doing the difficult part of the problem for the student actually inhibits the problem-solving process. Many students will receive the hidden message that they can't solve problems by themselves, and will learn to stop and wait for someone else to answer.

It's Not Over When It's Over

One of the more important areas of problem solving that goes mostly neglected is the explanation of the process. You will play an important role in supporting your child's work on these problems. With the "Problem of the Month", once students have reached their level of understanding, they are asked to complete a write-up of their findings. Students should communicate how they went about solving the problem as well as the solution they found. This write-up helps students understand how they think and approach new problems.

Problem of the Month Write-up

You are encouraged to have your students follow the Problem of the Month write-up, which is outlined below. This provides a common format for examining student work with other parent/educators as well as Hickman Charter School teachers. Processing the solutions and methods with your children is important in developing their skills.

**Please note that for Primary Level A, students will do an abbreviated write-up of their experience.*

1. Problem Statement

In your own words, state the general overall problem clearly enough that someone unfamiliar with the problem could pick up your paper and understand what you are asked to do.

2. Process

Describe in detail how you attempted to solve this problem. You may want to consider some of the following questions. You should also include things that didn't work.

- How did you get started?
- What approaches did you try?
- Where did you get stuck?
- Did you talk to anyone about the problem?
- Did talking to someone help or hinder you?
- What drawing, chart, graph, or model did you use?

3. Solution

State your solutions as clearly as you can. Include any charts, graphs, lists, and so on that you used to help you. If you were able to generalize the solution, include your results. Defend why you believe your solution is correct or the best possible answer. Your explanations should be written in a way that will be convincing to someone else.

4. Learning

Reflect on the problem. What did you learn? What mathematics did you use?

A Larger Goal

Problem solving is a learned skill, and students need many experiences to develop their reasoning skills, approaches, strategies, and the perseverance to be successful. Our larger goal at Hickman Charter School is to see the process of problem-solving transfer to their everyday work with their math program - text, etc, - as well as to other subjects and life in general. We look forward to a partnership with you around problem solving. Thank you for supporting your child.