Rich Mathematical Tasks

Studies have shown that the teacher has a greater impact on student learning than any other variable (Darling-Hammond, 2000)

The tasks and questions used during instruction help develop mathematical mindsets and create the conditions for deep, connected understanding.

The What

*__The 5 Cs of Mathematics Engagement__ (from Mindset book)

1)Curiosity
2)Connection Making
3)Challenge
4)Creativity
5)Collaboration

6 Characteristics of Rich Mathematical Tasks Blog

The How

*6 Questions: (from Mindset book)

1)Can You Open the Task to Encourage Multiple Methods, Pathways, and Representations?
2)Can You Make It an Inquiry Task?
3)Can You Ask the Problem Before Teaching the Method?
4)Can You Add a Visual Component?
5)Can You Make It Low Floor and High Ceiling?
6)Can You Add the Requirement to Convince and Reason?

Tasks, Questions, and Practices NCTM

The Following Websites Provide Mathematical Tasks that Incorporate One of More of The Above Features:

Youcubed: www.youcubed.org

NCTM: www.nctm.org

NCTM Illuminations: http://illuminations.nctm.org

Balanced Assessment (library of over 300 mathematics assessment tasks developed during the project remains freely available through this web site. Teachers may use these materials in their own classrooms at no cost.)**:** http://hgse.balancedassessment.org/

Math Forum: www.mathforum.org

Shell Center (The Shell Centre is known around the world for its innovative work on mathematics education. The Shell Centre team has a wide range of ongoing activities including design, development and research.Shell Centre Publications Ltd. was set up to distribute and license materials developed at the Centre, and offers a range of innovative teaching materials for mathematics education, together with research publications and tests)**:** http://map.mathshell.org/materials/index.php

Dan Meyer's Resources (Hi. I'm Dan Meyer. I taught high school math to students who didn't like high school math. I have advocated for better math instruction here and on CNN, Good Morning America, *Everyday With Rachel Ray*, and TED.com. I earned my doctorate from Stanford University in math education and I'm currently the Chief Academic Officer at Desmos where I explore the future of math, technology, and learning. I have worked with teachers internationally and in all fifty United States. I was named one of Tech & Learning's 30 Leaders of the Future. I live in Oakland, CA.)**:** http://blog.mrmeyer.com/

Geogebra (free math tools and calculators for graphing, geometry, 3D, and more!**:** https://www.geogebra.org

Video Mosaic Project (Collection of 300+ videos consisting of observational videos of students learning mathematical concepts from first grade through high school, 1992 to the present. The collection consists of video clips edited to highlight evidence of student reasoning and effective teaching practices.)**:** http://videomosaic.org/

NRich: http://nrich.maths.org

For teachers of mathematics, we:

- Offer FREE enrichment material (Problems, Articles and Games) for all ages that really can help to inspire and engage learners and embed RICH tasks into everyday practice.
- Help to promote RICH thinking in classrooms by offering on-line and face-to-face support at Primary and Secondary level.
- Deliver professional development courses and workshops in rich mathematics.

- Help teachers to think strategically about 'next steps' and progression in problem solving.

And for those learning mathematics, we:

- Provide FREE and interesting mathematical games, problems and articles.
- Encourage you to share your solutions to our mathematical problems.
- Offer a safe online space where you can meet others with similar interests.

Estimation 180 (Daily estimation activities)**:** http://www.estimation180.com

Visual Patterns (grades K-12)**:** http://www.visualpatterns.org

Number Strings: http://numberstings.com

What is a number string?

A number string is a set of related math problems, crafted to support students to construct big ideas about mathematics and build their own strategies (Fosnot & Dolk, 2002). Typically, a teacher gathers her students near the board and presents the problems — one at a time — providing plenty of time for students to think. Students first solve the problems mentally, then share their strategies with the class while making sure they understand others' thinking. Meanwhile, the teacher is representing students' strategies on a model and facilitating conversation among students about the sense they are making within and between the problems. Strings are not a rigid recipe but a flexible classroom routine — used by teachers daily or weekly with both small groups and entire classes.

Mathalicious (grades 6-12; real-world lessons for middle/high school**:**
http://www.mathalicious.com

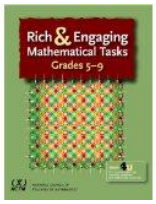
Mathalicious Helps Teachers Create a Different Kind of Math Class.

We create lessons that explore the math behind real-world topics, from sports to shopping to the odds of finding life on other planets. These lessons put teachers and students in a position to have interesting conversations that foster a classroom culture of curiosity and rigorous mathematical thinking.

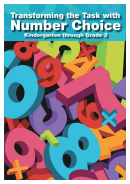
Teachers who use Mathalicious lessons say they enjoy their jobs more, and that their students look forward to coming to class. Imagine that.

****A week of mathematics lessons** that include rich mathematical task design features; grades 3-9; can be viewed/downloaded for free:
https://www.youcubed.org/week-of-inspirational-math/

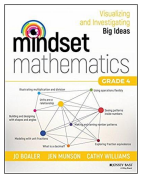
Keystone AEA Resources



B 95071 Rich and Engaging Mathematical Tasks Grades 5-9 Collection of selected articles from past issues of NCTM school journals. Each section of the book highlights articles on a key area of mathematics featured in the CCSSM: rational numbers; numbers; patterns and functions; measurement; probability and statistics; proportional reasoning; number theory; linear equations; and geometry. Includes some reproducible student activity pages. Edited by Glenda Lappan, Margaret S. Smith, and Elizabeth Jones.



B 96465 Transforming the Task with Number Choice presents a tool to help teachers provide an individual and responsive learning experience for every student. By choosing and sequencing productive arrays of numbers for problems, a teacher can-- meet the needs and strengths of individual learners with accessible, equitable, and differentiated math; address multiple content and practice standards; create rich, worthwhile tasks with multiple entry points; provide opportunities for students to vary their strategies and use the properties of operations; shift students' focus from merely calculating answers to examining number relationships; assess students' abilities and monitor their understanding. Provides examples of and strategies for using number choice to address a variety of Common Core (or other) content and practice standards & samples of work illustrating how students respond to different number choices.



B 96936 Mindset Mathematics: Visualizing and Investigating Big Ideas, Grade 4. A collection of low floor, high ceiling tasks that will help you teach mathematics, engage students and help them understand the connections between mathematics concepts by looking at the big ideas at the fourth-grade level through visualization, play, and investigation.

B 95102 Implementing the Common Core State Standards through Mathematical Problem Solving: High School

Provides high school mathematics teachers with dozens of problems they can use as is or adapt for their classrooms. The 44 problems and tasks for students in this book are organized into the major areas of the high school Common Core: algebra, functions, geometry, statistics and probability, and number and quantity. Examples of modeling, the other main CCSS area, are incorporated throughout. Every domain that is required of all mathematics students is represented.