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Free Online Resources Not to Miss for Teaching Middle School Mathematics

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Web Bytes

Free Online Resources Not To Miss for Teaching Middle School Mathematics

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Do you need an infusion of richer tasks into your middle level mathematics classroom? Ask yourself the following questions:

- Have you been using the same text for your mathematics curriculum for multiple years?
- Has the promise of your text being “Iowa Core compatible” failed to come to fruition?
- Are you a new middle school mathematics instructor and feel stuck with the materials present when you first got your job?
- Are your middle school students generally lacking excitement towards any curricular choices you make or materials you use?
- Do you wish your students would show and discuss mathematical understanding more frequently?

If you answered yes to any of these questions, chances are you are in the market for something new. Many teachers are unaware of free Internet resources available that contain exciting and rigorous tasks for students. Online mathematics resources are often expected to having limited to students mindlessly answer question after question, often procedurally based. Online mathematics resources have evolved to become more interactive, game-based, and contain exploratory features supporting the doing and understanding of mathematics.

Throughout ten years of teaching, Master’s and Doctoral experiences, and multiple years in a 1:1 district, I have witnessed the good and the bad of mathematical materials. What follows is a countdown of my top five mathematical online resources to use in a middle level classroom; with each resource, I included how I implement the site’s materials in my classroom as an example to consider. The resources all provide information on how they connect to the *Common Core*, which can easily be transferred into *Iowa Core* language. Each resource could be used with or without a 1:1 program in place. Some resources would make use of a teacher computer if that is the only technology available.

Number Five: *Estimation 180*

Have you ever felt less than thrilled when you pose questions to your students that involve giving an approximate answer? Maybe the responses you get back are not even in the ballpark, and you wonder what you could do about it. *Estimation 180* (Stadel, 2015) to the rescue! This site offers a different picture or situation to analyze for all 180 days of the year (it is actually in the 200s now). The questions range from “How tall is this person?” to “How many minutes long is this song?” to my personal favorite, “How many cheese balls in the container?”



I utilize *Estimation 180* (Stadel, 2015) as an end of class activity, but do not confuse this with a task that would take only a few minutes. I normally allow ten minutes per estimate. Students have five minutes to come up with a plan for their estimate, collaborate with peers, and write down a detailed explanation of how they arrived at the response. After five minutes, I ask all students to stand up. I give ranges of responses and have students gradually sit down when they are not in that range. I wait until there are still two or three students standing, and have them explain the process of their estimation. I let the students know that it is not necessarily critical to get an exact answer, rather that the importance exists in a sound estimation strategy. Use this resource enough times and you may be surprised at the improvement of overall number sense of your students.

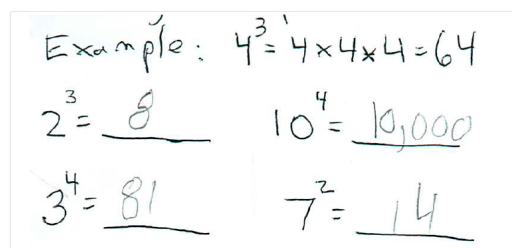
Estimation 180 (Stadel, 2015) has grown throughout the years to have its own *Twitter* page (@Estimation180) and hashtag (#estimation180) for teachers to submit their own estimation ideas. *Estimation 180* is the brainchild of Andrew Stadel, former teacher and current Digital Learning Coach.

Number Four: *Math Mistakes*

Math Mistakes (Pershan, 2015) focuses on students being able to understand and analyze mistakes, and is edited by New York City math teacher Michael Pershan. This site is organized into different mathematical problems (sorted by grade level) where real students have made mistakes. In my classroom, I display one mistake to students via television. I have students brainstorm what this individual might have been thinking, and figure out ways to correct the mistake.

“Two cubed is eight, but seven squared is fourteen.”

Posted on February 4, 2014 by mpershan | 4 Comments

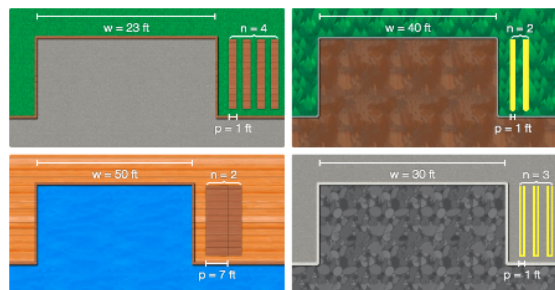


I find this site so valuable because it allows me to continue the dialog with my students as to why learning mathematics for understanding is so much more important than learning to memorize. I tell my students that if they can justify a response, they will have that knowledge forever, not just a week from now. Using this site turns work we do into a *Math Mistakes* (Pershan, 2015) session. Students feel more comfortable explaining their thinking with others and take pride in learning to understand.

Number Three: *Desmos Classroom Activities*

Desmos (Desmos Inc, 2015) contains a graphing calculator with much more functionality than found in handheld devices. From what I have heard on *Twitter*, high school teachers rave about what you can do with *Desmos* (Desmos Inc, 2015) mathematically. Most of what I have seen pertains to high school with the exception of a few eighth grade areas.

The number of dividers can change now.
 How wide should each space be if there are n dividers?
 w is the width of the lot
 p is the width of each divider
 n is the number of dividers



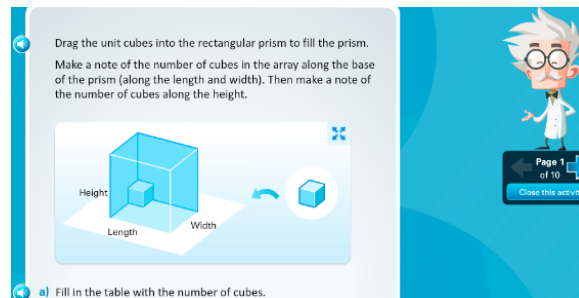
Aside from the graphing calculator, *Desmos* (Desmos Inc, 2015) also has a site with interactive premade activities. This is the part of *Desmos* (Desmos Inc, 2015) I use. My favorite activity is *Central Park*. (Desmos Inc, 2015). Students park vehicles to go explore a mathematical progression starting with estimation, moving to answering questions, and eventually creating a formula.

What is unique about these interactive activities is the teacher interface. Teachers can gain access to a four-digit code that all students enter in their device. Entering this code instantly includes the students in the teacher's interface. The teacher can see what question a student is on, how they answered the questions, and what problem areas they encountered. It actually displays the sentences the students are typing so you can easily see who needs the most help and who should move on with the remainder of the activity. If many students are having trouble with one particular question, you can gather a group of students to talk about that question, leaving the others to continue working. Other activities from *Desmos* (Desmos Inc, 2015) I have used include *Functional Carnival* and *Water Line* which have a similar interface and are very enjoyable for the students.

Number Two: *Buzzmath*

At first glance, *Buzzmath* (Buzzmath, 2015) seems like your typical question and answer program, however, *Buzzmath* (Buzzmath, 2015) stands alone in other areas. First, most activities start with interactive questions aimed at getting students to understand the mathematical concept through understanding the situation. As students begin to understand the visuals and animations

provided, the focus shifts more to a regular question, forcing students to transfer understanding gained in the first few questions to the remaining portion of the activity.



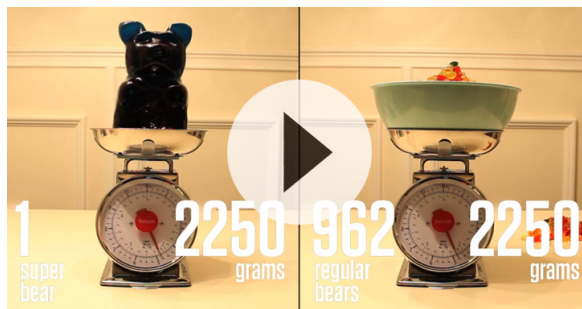
Second, questions on *Buzzmath* (Buzzmath, 2015) are quite robust and similar to what you might find on the *Smarter Balanced Assessments*.

I have tried other question and answer programs such as IXL (2015; ixl.com), but *Buzzmath* (Buzzmath, 2015) is by far the resource that students prefer. Students like that the questions are more pointed allowing for fewer total questions to receive the same level of practice. Students also like the fun and exciting visuals. Students also enjoy the *Buzzmath* (Buzzmath, 2015) virtual badges awarded for different accomplishments. I have begun printing and laminating real badges for students to display on the outside of their computers because they are so motivated to collect them. I do not assign these badges; the students earn them by doing work outside of class time.

Finally, *Buzzmath* (Buzzmath, 2015) is free, and additional features can be included for a small per-student fee. I used *Buzzmath* (Buzzmath, 2015) free for two years, and wanted to see what the additional features included, so I wrote a grant for this year to purchase these extras this year so I could determine if the benefits were worth the cost.

One of the downfalls of the free version of *Buzzmath* (Buzzmath, 2015) is that detailed explanations to each question are not given when a student incorrectly answers a question; these are provided for the fee. To provide explanations when using the free version, I assigned *Buzzmath* (Buzzmath, 2015) activities to be done only in class so I could assist with any misconceptions or lack of understanding arising. The paid version also provides more functionality to track a student's progress. In the free version, you must click on each individual student instead of getting a full list of students and activities they did. The paid version also allows for online performance tasks, which are a nice bonus feature. Since I used *Buzzmath* (Buzzmath, 2015) free for two years and loved it, I will get the paid version next year if I can secure another grant.

Number One: Dan Meyer's Three Acts Math Tasks



<http://mrmeyer.com/threeacts/superbear/>

In my opinion, this spreadsheet created by Dan Meyer (found by an Internet search for “*Dan Meyer Three Acts Spreadsheet*”), former math teacher and current Doctoral student at Stanford, is the best Internet resource I have found. It started my teaching down the road of task-based instruction. Presenting the world of mathematics in interesting tasks for my students has in turn increased the

levels of mathematics happening in my classroom. In each activity, students watch a video introduction to set up a situation. I let students do this on their computers either individually or in groups. Following the introduction, a video or collection of pictures gives students the information they need to begin brainstorming ways to solve the problem. Both of these steps could easily be done for the whole class using the teacher computer and a projection device.

After the information has been collected, students pick a path to follow and come up with the solution. These problems typically have numerous ways to come to a solution. My students are expected to explain all of their thinking on paper or a white board for me to approve. This process normally takes one to two 60-minute class periods to finish. That seems like a long time, but when you consider all the student-to-student discussion, student-to-teacher discussion, the formulation of an argument, all the while developing mathematical understanding of the topic, you may begin to see how this much time is needed and how it is time well spent.

My students and I have used all of the tasks on the spreadsheet with my favorites being the *Super Bear* (Meyer, 2015) and *Money Duck* (Meyer, 2015). The students were so engaged with these tasks that I bought a *Super Bear* and a *Money Duck* online for my classroom.

Dan Meyer's spreadsheet as a resource is amazing, but what really matters is that since implementing this task-based approach, everything we do in my class is aimed toward more mathematical understanding. Showing understanding and verbally discussing have become the norm. The sheer ability to transform my

classroom is the reason I put this resource at the top.

There are many other sites online that feature mathematical tasks. I have even started to think of my own ideas to turn into tasks. Here are a few other resources dealing with task-based instruction.

How did I find all these wonderful resources? Did I spend hours and hours scouring the Internet? No, not really. The key is letting resources come to you. I recommend creating a *Twitter* account and following key individuals in mathematics education so information comes to you. I follow a very small number of people and only follow those who send out great mathematical ideas (not lunch plans).

With these resources and others you may find, you will find it easier to motivate your students. The quality of work and mathematical understanding you will find can make for a much richer classroom curriculum for your middle level mathematics classroom.

Tap Into Teen Minds Three Act Math Tasks <tapintoteenminds.com/real-world-math-tasks>

Mowing the Lawn
How long will it take to mow the lawn?


Grade 6 Grade 7

Like 7 +1 1 Tweet 23

Shared By:
Kyle Pearce

Math Topic:
Find the area of composite figures to solve problems. Extensions can include proportional reasoning and linear relationships.

Common Core State Standard Alignment:
• Grade 6 [6.G.1]
• Grade 7 [7.G.6]



Robert Kaplinsky Tasks <robertkaplinsky.com/lessons>

How Did They Make Ms. Pac-Man?

The Situation

You want to make a video game similar to the one below and are beginning by animating Ms. Pac-Man.

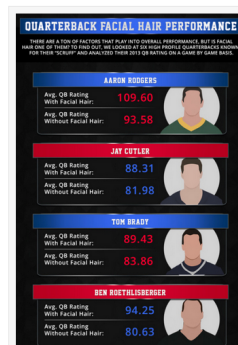


Yummy Math <yummymath.com>

Clean Close Shave

January 26, 2015

Take a look at the infographic. What do you see? What do you think? What do you wonder?



Deflategate

January 25, 2015



The deflated ball controversy makes an interesting segue into negative number line understanding. A particular digital psi football gauge reads 0 when the ball is at a proper NFL inflation of 13 psi. Footballs inflated under 13 psi produce negative psi readings and students have to decide the range of possible inflation levels and which reading is less inflated. Students work with negative numbers, inequalities, and graph on the number line, all in this controversial context. Finally, students use proportional reasoning to determine if an air temperature difference could have accounted for the deflated footballs (the math & physics has been simplified down a bit, we went with many sources boiled the math down to, you can see all the math here). Older students can dabble in writing compound inequalities and absolute value inequalities.

Paging Doctor Math <pagingdoctormath.blogspot.com>

Paging Doctor Math

Paging Doctor Math is an extension of my Twitter account, @Doctor_Math. When 160 characters just aren't enough, come to Paging Doctor Math to see what I am using in my classroom, my views on the world of mathematical education, and examples of useful mathematics in the real world. Please comment on everything you read at this blog with your own ideas, views, and reactions to the content!

Sunday, January 18, 2015

In-N-Out Burger Task

A day before I presented this task, I showed the students a picture of In-N-Out's 100 by 100 burger to gauge the response. The results were about 50/50... either wishing they had this sandwich for lunch or running to the garbage can because the picture was so off-putting. No matter the response, the picture brought 100% interest.

I found this task on @robertkaplinsky's site (which has numerous free and engaging resources). The focus is largely on creating an equation to find out how much a burger would cost no matter the number of hamburger patties and slices of cheese. I decided to take this in a slightly different direction (although in hindsight I might as well have added the equation creation as well).

8+1 0

Introduction to Doctor Math

CLICK HERE

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References

- Buzzmath. Retrieved Feb. 4, 2015, www.buzzmath.com.
- Desmos Inc. Desmos, retrieved Feb. 4, 2015, www.teacher.desmos.com.
- IXL. Retrieved Feb. 4, 2015, www.ixl.com.

Meyer, Dan. *Dan Meyer's Three-Acts Math Tasks*, retrieved Feb. 4, 2015, docs.google.com/spreadsheets/cc?key=0AjIqyKM9d7ZYdEhtR3BJMmdBwnM2YWxWYVM1UWowTEE#gid=0

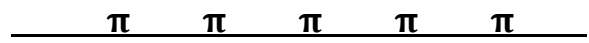
Meyer, Dan. *Money Duck*, retrieved Feb. 4, 2015, <http://blog.mrmeyer.com/2014/3act-s-money-duck/>

Meyer, Dan. *Super Bear*, retrieved Feb. 4, 2015, <http://mrmeyer.com/threeacts/superbear/>

Pershan, Michael. *Math Mistakes*, retrieved Feb. 4, 2015, www.mathmistakes.org.

Smarter Balanced Performance Tests. Smarter Balanced Assessment Consortium, retrieved Feb. 4, 2014, www.smarterbalanced.org.

Stadel, Andrew. *Estimation 180*, retrieved Feb. 4, 2014, www.estimated180.com.



To learn more about formative assessment books by Page Keeley and Cheryl Rose Tobey, with others, see

<http://www.uncoveringstudentideas.org/>

See Jo Boaler's work: tasks, teaching ideas, knowledge center, free online courses for children and adults, videos, books, papers, and research:

<http://youcubed.stanford.edu/>



	<p><i>Uncovering Student Thinking in Mathematics: 25 Formative Assessment Probes (series of 3 by grade bands)</i> Page Keeley, with others</p>
<p><i>Mindset: The New Psychology of Success</i> By Carol Dweck</p> <p>How does a 'fixed' or 'growth' mindset affect success in learning mathematics?</p>	
	<p><i>Uncovering Student Thinking About Mathematics in the Common Core, 25 Formative Assessment Probes</i> Cheryl Rose Tobey, with others</p>
<p><i>Connecting Mathematical Ideas: Middle School Video Cases to Support Teaching and Learning</i> Jo Boaler, Cathy Humphries, Deb Lowenberg Ball</p>	
	<p><i>What's Math Got to Do with It?: How Teachers and Parents Can Transform Mathematics Learning and Inspire Success</i> Coming 3- 31-2015</p>