WE CAN REBUILD IT, WE HAVE THE TECHNOLOGY

HOW RICH TASKS CAN MAKE ASSESSMENT BETTER, STRONGER

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Frankenstein’s Worksheet

**Square Root Equations**

Solve each equation. Check for multiple solutions.

1) \(11 - \sqrt{d} + 12 = \sqrt{d} + 12\)

2) \(5 - \sqrt{c} - 2 = \sqrt{c} - 2\)

3) \(10 = \left(\frac{5}{3}\right)^2\)

4) \((2p - 9)^2 + 4 = p\)

5) \(\sqrt{8g} = g\)

6) \(10 = \frac{\sqrt{y}}{\sqrt{6}}\)

7) \((11 - c)^2 = \left(\frac{5}{9}\right)^2\)

8) \(\sqrt{4z + 14} = \sqrt{9z - 15}\)

9) \((12h)^2 = (11 + 14h)^2\)

10) \(11 = (k + 3)^2\)

**Identify and Calculate the Area and Perimeter for each Polygon.**

1) \(s = 2.5 \text{ inches} \quad a = 3.8471 \text{ inches}\)

2) \(s = 2.7 \text{ cm} \quad a = 2.8633 \text{ cm}\)

3) \(s = 7.2 \text{ yds} \quad a = 7.2 \text{ yds}\)

4) \(s = 5.2 \text{ cm} \quad a = 5.3738 \text{ cm}\)

5) \(s = 2.8 \text{ inches} \quad a = 3.5717 \text{ inches}\)

6) \(a = 5.3 \text{ yds} \quad b = 8.22 \text{ yds}\)

**Simplifying Linear Expressions (A)**

Simplify each expression by combining like terms.

1. \(3w + 7 - 9w\)

2. \(-7w - 8 - 2w\)

3. \(6s - 9 + 4s\)

4. \(-7 + 2 - 7q\)

5. \(-6y - 4y - 9y\)
6) Dan and Melanie were able to paint a house in 3 hours together. It takes Melanie 10 hours to finish the same job alone. Without help, how long would it take Dan to finish the same job?

6) Dan and Melanie were able to paint a house in 8 hours together. It takes Melanie 13 hours to finish the same job alone. Without help, how long would it take Dan to finish the same job?
What kids are supposed to know / assessed on
What kids know

How are you going to tell this story?
BIONIC NEURO-LINK
BIPEDAL ASSEMBLY
CATALOG N914 PRH
NEURO FEEDBACK TERMINATED
POWER SUPPLY:
STORIC TYPE REC-2A
4920 WATT CONTINUOUS DUTY MOTOR.
The General Laws

The general laws of exponents we have learned was Additive Law of Exponents, Law of Repeated Exponentiation, and The Law of Logarithms. The Additive Law of Exponents is when you add the exponents together, but the only way you can add them is if the bases be the same. For example say I have base 3 cake and I eat 4 ounces, and base 3 cake and I eat 7 ounces, it would be 3^4 X 3^7 = 3^4+7 = 3^11.

The Law of Repeated Exponentiation is for example: 2^3 X 2^3 which equals (2^3)^2.

The Law of Logarithms helps us to find the variable of an unknown exponent. For example: “How many ounces of base 10 cake does Alice need to eat to become 239,000 times her height?” In exponential form we put it as: 10^x = 239,000. In logarithmic form we put it as: \log_{10} 239,000 = x. “Log” is assumed to be “\log_0”. 

\log_{10} x = \frac{1}{10} \log_0 x \Rightarrow \log_{10} x = \log_{10} a = x.

All Roads lead to Rome

The method I used was all of them. For example in alice I said “The reason why 5^0=1 works is because if she doesn’t eat anything then she wouldn’t grow, shrink, her height would remain the same.” Another example would be the graph after graphing I got when x=0, y=1.

Exponents to Solve a Problem

The activity I chose from the Alice Unit was “Many Meals for Alice”. In many meals for alice we used exponents to find her height after she eats cake. A problem from this activity was: “Suppose Alice eats 3 ounces of cake at each meal. What will her height be multiplied by after two meals? After three meals? After four? After M meals?” We were given the amount of base 2 cake. So what I did was I took the base and the once of cake she ate, which was 2^3 = 1 meal.. 2^3
Quality Tasks

- Finding tasks
- Adapting and designing tasks

Deploying and Assessing Tasks

- Rubrics with Common Indicators
- Reflection
Geoff’s First Theorem of Task Quality:

A quality task can be accessed by students a couple grades below, and still be found challenging a couple grades above.
How do you know you have the smallest difference?
Directions: Make the smallest (or largest) difference by filling in the boxes using the whole numbers 1-9 no more than one time each.

“Make the smallest non-zero difference.”
Geoff’s Second Theorem of Task Quality:

The quality of a task is correlated with how much student work it produces.

For Justin’s case, the polygon would not be able to contain a peg on the inside. I created a table & set them in descending order. I noticed as the number of pegs on the outside decreased by one, the area decreased by 0.5. I was quickly able to find that the equation was \( y = \frac{x}{2} - 1 \). In this case, \( y = \text{area} \) & \( x = \# \) of pegs on the outside. This works because if you plug in \((6,2)\), then you get: \( 2 = \frac{6}{2} - 1 \rightarrow 2 = 3 - 1 \rightarrow 2 = 2 \), so it works.
You can’t really have a robust conversation about this artifact.

Using Rounding to Estimate

You can use rounding to estimate products.

Use rounding to estimate $7 \times 28$.
First, round 28 to the nearest ten.
28 rounds to 30.
Then, multiply.
$7 \times 30 = 210$
So, $7 \times 28$ is about 210.

Use rounding to estimate $7 \times 215$.
First, round 215 to the nearest hundred.
215 rounds to 200.
Then, multiply.
$7 \times 200 = 1,400$
So, $7 \times 215$ is about 1,400.

Estimate each product.
1. $6 \times 88$ is close to $6 \times 90$
2. $270 \times 4$ is close to $300 \times 4$
3. $7 \times 31 = 210$
4. $38 \times 5 = 200$
5. $21 \times 6 = 120$
6. $3 \times 473 = 1500$
7. $5 \times 790 = 4000$
8. $488 \times 6 = 3000$

9. Number Sense Estimate to determine if $5 \times 68$ is greater than or less than 350. Tell how you decided.

So the answer would be 350.

10. Estimate how many of Part C would be made in 4 months.

11. Estimate how many of Part B would be made in 3 months.

12. Estimate how many of Part A would be made in 9 months.
You can have a robust conversation about this artifact.

Just count the Pegs Pow

Justin Short, Sarah Shorter, & Flashy Shortest. All three of them are trying to come up with a formula for each of their polygons that follow their rules. To begin, Justin wants to create a formula with zero peg inside the polygon, 2 pegs inside the polygon, & 2 pegs outside. The polygon for Sarah, her equation must be created with a polygon using 4 pegs, then a part 2 using a different number of pegs. Finally, you must find Flashy’s super formula by making any polygon # using both peg in interior & exterior to find the area.

<table>
<thead>
<tr>
<th>Process:</th>
<th>Justin</th>
<th>Sarah</th>
<th>Flashy</th>
</tr>
</thead>
<tbody>
<tr>
<td># of pegs inside</td>
<td>in</td>
<td>out</td>
<td># of pegs inside</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>in</td>
<td>0</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>in</td>
<td>1</td>
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<tr>
<td>10</td>
<td>5</td>
<td>15</td>
<td>in</td>
</tr>
</tbody>
</table>

equation: $y = \frac{x}{2} - 1$

For Justin's case, the polygon would not be able to contain a peg on the inside. I created a table & set them in descending order. I noticed as the number of pegs on the outside increased by one, the area decreased by 0.5.

I was quickly able to find that the equation was $y = \frac{x}{2} - 1$. In this case, $y = \text{area} & x = \# \text{ of pegs on}$.
Where can I find quality tasks?

<table>
<thead>
<tr>
<th>UNIT 8.2: Linear Relationships</th>
<th>8-EE.5,6, 7-RP.2,3</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Domino Effect (Mathalicious)</td>
<td>8-EE.5, 8-F.5</td>
<td>1</td>
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<tr>
<td>Cheesy Goldfish (Yummymath)</td>
<td>8-EE.5, 8-F.4, 7-RP.2,3</td>
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<tr>
<td>Rise and Run Triangles (NCTM Illuminations)</td>
<td>8-EE.5,6</td>
<td>1</td>
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<tr>
<td>Staircases and Steepness (Fawn)</td>
<td>8-EE.5</td>
<td>1</td>
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<tr>
<td>Journey (MARS)</td>
<td>8-EE.5,6</td>
<td>1</td>
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<td>Shelves (MARS)</td>
<td>8-EE.5,6</td>
<td>1</td>
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<tr>
<td>Collinear square corners (David)</td>
<td>8-EE.5, RP.1,2,3</td>
<td>1*</td>
</tr>
<tr>
<td>Bike Ride (MARS)</td>
<td>8-EE.5,6</td>
<td>1</td>
</tr>
<tr>
<td>Constant Dimensions (NCTM)</td>
<td>8-EE.5</td>
<td>1</td>
</tr>
</tbody>
</table>

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Search for “Portfolio Problems”

Or check out the “Common Core Problem Based Curriculum Maps”
How would you adapt a task? After looking at the following three tasks, discuss with your group how you would adapt one of them to yield the kind of work for our assessment?
1. A house has a 500-cubic-foot propane tank to provide gas to its appliances. The family uses an average of 0.95 cubic foot per day. Use the information to answer the following questions:

a. Write an equation for the number of cubic feet of gas in the tank after $t$ days.

b. To the nearest cubic foot, how much gas will have been used in 45 days?

c. To the nearest day, how long will it take for the entire tank to be used up?

30. Nutrition Half a pepperoni pizza plus three fourths of a ham-and-pineapple pizza contains 765 Calories. One fourth of a pepperoni pizza plus a whole ham-and-pineapple pizza contains 745 Calories. How many Calories are in a whole pepperoni pizza? How many Calories are in a whole ham-and-pineapple pizza?

54. Open-Ended Give a counterexample to show that $(x + y)^2 = x^2 + y^2$ is false.
How can I adapt tasks from existing tasks? What about designing tasks?

Remove the steps and sub-problems

Make it into an optimization problem: “most,” “least,” “highest,” “lowest,” “closest,” “shortest,” “longest,” “fastest,” “slowest”

Encourage rough draft thinking to be put to paper
Need-to-knows
Notice/Wonder
Brainstorming
Quality Tasks

- Deploying and Assessing Tasks
  - Rubrics with Common Indicators
    - Reflection
  - Adapting and designing tasks
- Finding tasks
Your grade: 80

What exactly does this mean?
Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Surface level problem

Deeper problem

Deeper problem

\[
\begin{array}{c}
8 \\
10
\end{array}
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80%
What do you notice about this rubric?

What do you wonder?

<table>
<thead>
<tr>
<th>Rubric: Energy Efficiency</th>
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<tbody>
<tr>
<td><strong>CONTENT / PROBLEM SPECIFIC</strong></td>
</tr>
<tr>
<td><strong>EMERGING</strong></td>
</tr>
<tr>
<td>Solution does not contain an equation that models the cost of energy use over time</td>
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<tr>
<td>Did not support a prediction by using one or more models (substitution and elimination)</td>
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<tr>
<td>Provides incorrect or incomplete solutions without justifications</td>
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<tr>
<td>Uses representations (diagrams, tables, graphs, formulas) in ways that do not apply to the task or are incorrect</td>
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Rubrics with Common Indicators

Problem-specific indicators - go ahead and grade these, if you must

Common indicators that can be applied to multiple problems
<table>
<thead>
<tr>
<th></th>
<th>Student Name</th>
<th>Student ID</th>
<th>PA: 1st Six-Weeks</th>
<th>Link to Student Work</th>
<th>PA: 2nd Six-Weeks</th>
<th>Link to Student Work</th>
<th>PA: 3rd Six-Weeks</th>
<th>Link to Student Work</th>
<th>PA: 4th Six-Weeks</th>
<th>Link to Student Work</th>
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Reflection
Both in the moment and after a time

In the moment

Turn and Talk!
What kind of prompt(s) would you ask to elicit student reflection just after a task?

After a time

After a time (i.e. end to the semester)?

Tools

What types of tools would you use to capture this reflection?
Reflection
Both in the moment and after a time

"What was particularly challenging about this problem and how did you handle it?"

"How effective were you as a teammate during this task?"

"Looking back at your work throughout the year, in what areas have you grown the most?"

"What do you want your teacher next year to know about you as a mathematician?"

Tools
- Journals
- Reflection Prompts
- Digital portfolios (i.e. google drive)
This year I learned the difference between knowing how to do something and understanding something. This is because most of the stuff I learned this semester was new and I didn't really understand it, so I knew that to get a good grade I would have to understand what was being taught, not just know it. An example of this was when we were learning how to do rotations, I didn't know how to do it at all so I looked it up online, asked for help from teachers, asked for help from peers, and most importantly, after I learned it, I made sure to practice it....Everything in this unit was challenging, but my mistakes gave me the drive to move forward and work harder.

Some people see how I'm able to do the math, or they see my grades and they say, "Oh, you must be some kind of genius." That's not true, I'm no where near genius, I'm just a hard worker. If I don't understand something, I ask for help, if I'm not good at something, I practice more, if I need to do something, I put my all into my work. If this is what you call being a genius, then everyone has the ability to be one if they just tried a little harder.
Our WHAT

Quality Tasks
- Finding tasks
- Adapting and Designing tasks

Our HOW

Deploying and Assessing Tasks
- Rubrics with Common Indicators
  - Reflection

Our WHY

“Damn, I’ve grown”
WE CAN REBUILD IT,
WE HAVE THE TECHNOLOGY
HOW RICH TASKS CAN MAKE ASSESSMENT BETTER, STRONGER

Columbus Hall GH
9:45 AM - 11:00 AM
WE CAN REBUILD IT,
WE HAVE THE TECHNOLOGY
HOW RICH TASKS CAN MAKE ASSESSMENT BETTER, STRONGER

Quality Tasks
Finding tasks
Deploying and Assessing Tasks
Designing tasks
Rubrics with Common Indicators
Reflection
Adapting tasks

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Columbus Hall GH 9:45 AM - 11:00 AM