Good afternoon!
Please work on this problem!
Mrs. Logan went to the school bake sale to buy some brownies. All the pans of brownies were square. A pan of brownies cost $12. Customers could buy any fractional part of a pan and pay that fraction of $12. (e.g., ½ of a pan costs ½ of $12.) Mrs. Logan bought ¾ of a pan that was ⅚ full.
How much did Mrs. Logan pay?

Source: Doing What Works, 2012
Mrs. Logan went to the school bake sale to buy some brownies.

All the pans of brownies were square.

A pan of brownies cost $12.

Customers could buy any fractional part of a pan and pay that fraction of $12.

(For example, \( \frac{1}{2} \) of a pan costs \( \frac{1}{2} \) of $12.)

Mrs. Logan bought \( \frac{3}{4} \) of a pan that was \( \frac{2}{5} \) full.

How much did Mrs. Logan pay?

Source: Doing What Works, 2012
Howard County Public Schools
(Ellicott City, MD)
## Fast Facts

**Howard County Public Schools**  
(Ellicott City, MD)

<table>
<thead>
<tr>
<th>76 Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>41 elementary schools</td>
</tr>
<tr>
<td>20 middle schools</td>
</tr>
<tr>
<td>12 high schools</td>
</tr>
<tr>
<td>3 education centers</td>
</tr>
</tbody>
</table>

**Total Enrollment:** 53,637*  
Pre-K: 1,233  
Elementary (PreK–5): 24,245  
Middle (6–8): 12,715  
High (9–12): 16,574  
Special School: 103  

*Official count does not include Pre-K

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian/Alaskan</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Black/African American</td>
</tr>
<tr>
<td>Hawaiian/Pacific Islander</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Two or more races</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Students Receiving Special Services FY15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free/Reduced-price Lunch</td>
</tr>
<tr>
<td>Ltd. English Proficient</td>
</tr>
<tr>
<td>Special Education</td>
</tr>
</tbody>
</table>
Howard County Public Schools
(Ellicott City, MD)

Our Mission
We cultivate a vibrant learning community that prepares students to thrive in a dynamic world.

Our Vision
Every student is inspired to learn and empowered to excel.

Goal 1 - Every student achieves academic excellence in an inspiring, engaging, and supportive environment.

Goal 2 - Every staff member is engaged, supported, and successful.

Goal 3 - Families and the community are engaged and supported as partners in education.

Goal 4 - Schools are supported by world-class organizational practices.
-30 + 9 = 150 - 9
+ 159
- 159

-180 + 9 = -9 + 9

-180 = -18
-180 = -18

3 = 1
Learning artifact is a term used to describe an object created by students during the course of instruction. To be considered an artifact, an object needs to be lasting, durable, public, and materially present. The creation of material artifacts is a technique used to allow students to display their knowledge in a public forum. Artifacts can be in the form of paintings, drawings, sculptures, models, or anything else that is not erased after completion.
AND HIS
MATH CRUSADE...
(Da-duh-duh-daa,
Da-duh-duh...!)
Here’s what we will do this afternoon!

Consider the intentional, regular use of particular classroom-based formative assessment (CBFA) techniques and some planning and data gathering tools that help *gather and curate* student learning artifacts.
Classroom-Based Formative Assessment Techniques

- Interviews
- Show Me
- Hinge Questions
- Exit Tasks
- Observations
Recorded; used to guide/monitor what’s going on...

As needed 1-1 or small group; “I want to know more about what I just observed.”

An explicit performance of what I would like to see demonstrated.

Every lesson’s “deal breaker”

Hinge Question + Exit task (next day’s plan!)
Observations

• What would you hope to observe?

• How would you know it if you saw it?

• How might you record/note the observation?

• What misconceptions might you observe?
Interviews

- What would make you decide to work 1:1 with a student or small group?

- What questions might you ask? How might the questions be different?

- What will you anticipate from students? (Consider understandings AND possible misconceptions.)

- What follow-up questions might you ask?
Elena and her 3 friends ate 9 cookies. How many did each person eat?

Source: Kobett, 2009
Show Me

• A performance-based response to what a teacher observes.
• Combines elements of the observation and interview.
• A *stop-and-drop* activity where a student, small group of students or perhaps the entire class might be asked to show how something works, a problem solved, or a particular representation used.
\[ y = 5.50p + 25 \]

**Graph**

**Model(s)/Picture(s)**

**Table**

<table>
<thead>
<tr>
<th>People</th>
<th>Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>1</td>
<td>30.5</td>
</tr>
<tr>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>41.5</td>
</tr>
<tr>
<td>4</td>
<td>47</td>
</tr>
<tr>
<td>5</td>
<td>52.5</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
</tr>
<tr>
<td>7</td>
<td>63.5</td>
</tr>
<tr>
<td>8</td>
<td>69</td>
</tr>
<tr>
<td>9</td>
<td>74.5</td>
</tr>
<tr>
<td>10</td>
<td>80</td>
</tr>
</tbody>
</table>

**Oral/Written Description**

"Mark owns & operates a paintball field. In order to use the paintball field for one hour you have to pay a $25 fee and then pay $5.50 per person."

Source: McMillion, 2014
Starting at point, you wish to travel 30 miles to point $B$, a point due East of point $A$.

However, your journey starts off course and repeatedly worsens. For the first 10 miles, you travel $20^\circ$ off course; for the second 10 miles, you move off course another $20^\circ$; and, for the final 10 miles, you move off course an additional $20^\circ$.

At the end of 30 miles, determine how far, $d$, you are from point $B$, and the angle, $x$, you need to turn to get back on course.

Source: Hollenbeck, 2015
Your (generous) big brother spots you money for the new power-laced Nike shoes on one condition – you must pay him back for the shoes and he is going to add 5% interest on the shoes for every day it takes you to pay him back.

How much would you owe your brother on the 5th day?

Source: Stevens, 2015
The Wray Household Protocol for Archiving Student Learning Artifacts

Is the work worth saving?

Yes

Framing / Displaying

Stacking

Storing
The Wray Household Protocol for Archiving Student Learning Artifacts

Is the work worth saving?

No
curator
noun: curator; plural noun: curators
- a keeper or custodian of a museum or other collection.
- a person who selects content for presentation, as on a website.

Synonyms - overseer, manager, guardian
The powerful effect of students leading students

A study of 109 students in fourth-, fifth, and sixth-grade classrooms found that students working in student-led groups learned almost as much as students getting one-on-one tutorial instruction from a teacher, and those in student-led groups actually learned more than those in teacher-led groups (Shacter, 2000, as cited in Wiliam, 2011, p. 134).
“At times, it is much easier to understand a concept when it is explained by one of our peers, than to have it explained again by a teacher. This is because our peers are usually at the same level of thought, and can state things in more general terms.”

- Student
More Data Gathering Tools

(Higher-Tech)
Sample Tools
Sample Apps

- **Still image and/or video capture tools**
  - **MAC OS, Windows, Android & IOS – FREE**
    - [http://tinyurl.com/oymgwhc](http://tinyurl.com/oymgwhc)

- **edcreations**
  - iOS and web version –
    - Base version **FREE, paid upgrades**
    - [http://www.educreations.com](http://www.educreations.com)

- ** Livescribe**
  - Windows & Mac - $120-250
    - [http://tinyurl.com/pwr7mlu](http://tinyurl.com/pwr7mlu)

- **doceri**
  - IOS – **FREE - $30**
    - [https://doceri.com](https://doceri.com)

- **showme**
  - Android & IOS – **FREE**
    - [http://www.showme.com](http://www.showme.com)

- **Android & IOS - $5.99**
  - [http://tinyurl.com/oe3nrhg](http://tinyurl.com/oe3nrhg)
Mrs. Logan went to the school bake sale to buy some brownies.

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Mrs. Logan bought $\frac{3}{4}$ of a pan that was $\frac{2}{5}$ full.

How much did Mrs. Logan pay?

Source: Doing What Works, 2012
The total number of objects in each group if there is 4/3 of an object in each group.
The total number of objects in \( \frac{2}{3} \) groups if there is \( \frac{3}{4} \) of an object in each group.

\[
\frac{6}{20} = \frac{3}{10}
\]

\[
12 \times \frac{6}{20} = \frac{72}{20} = \frac{9}{5}
\]

\[
\text{Cost} = \$3.60
\]
Show Me

Considerations:

1. What might you want a student or students to say or do as they describe their show me response?

2. How does this (the show me CBFA technique) work in concert with an interview and/or observation?

3. When might a teacher use a show me in their setting?
Hinge Questions

**Hinge questions** provide a check for understanding/proficiency at a ‘hinge-point’ in a lesson, or stated differently, success of the lesson hinges on responses to such questions as they provide an indication of whether the teacher can move from one important idea/concept/skill to the another (or not). Such responses impact both planning and instruction.
Guidelines for Developing/Selecting Hinge Questions

1. Design hinge questions that elicit the right response for the right reason.

2. When using multiple choice (selected response) items, *incorrect answers* should be *interpretable*.

3. Sometimes it makes sense to administer a hinge question as a series of simple questions (used with *Every Pupil Response*).

Source: Wiliam, 2015
Sample Hinge Questions

1. Can you name a fraction that is greater than $\frac{3}{4}$?

2. Which of the fractions below is $> \frac{3}{4}$?
   A. $\frac{1}{4}$
   B. $\frac{1}{2}$
   C. $\frac{4}{4}$
   D. $\frac{3}{5}$

Note the differences – both regarding responses and creation and use.
“My Favorite No” (AKA - One of my favorite low-tech formative assessment techniques)

Source: Teaching Channel on Youtube, 2011
https://www.youtube.com/watch?v=Rulmok_9HVs
# Hinge Question Planning Tool

<table>
<thead>
<tr>
<th>Hinge Question:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will the hinge question assess important mathematical understandings of the day?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will students understand the question?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will students be able to respond in about a minute?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will expected responses be such that they can be analyzed and interpreted quickly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General consideration: Will responses assist in shaping planning for tomorrow’s lesson? (circle one)</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

(if no, revise hinge question)

**HOW?**

Fennell, Kobett & Wray, 2015, p. 58
Exit Tasks

• The exit task is designed to provide a capstone problem or exercise that captures the major focus of the lesson of the day.

• This is a class assessment tool, and like the hinge question, student responses to the exit task help in identifying needs and in the planning for the next day’s lesson.
An Exit Task using screencasting with student-to-student interaction

Caitlyn and her soccer team are in the running for a soccer competition. In order to improve their rank, they have to score at least 50 goals, in one season. Her team has already scored 20 goals. With 15 games left, what is the average of goals per game her team needs, to improve their rank?

Positive comment: Nice work and the inequality is excellent because it was easy to understand.
Feedback: When you wrote and solved the inequality, you didn't subtract 50 by 20, therefore you did the wrong way, but you still got the right answer: 2.
A Few [More] Comprehensive Tools

• **Formative** – create formative tasks; students respond by typing, drawing, or with images. [http://goformative.com/](http://goformative.com/)

• **Flipgrid** – Submit a question on a “grid”; audience responds via video; view responses. [http://www.flipgrid.com](http://www.flipgrid.com)

• **Cuethink** – A peer-to-peer iPad application for problems solving [http://www.cuethink.com](http://www.cuethink.com)
Daily Considerations

- **Interviews**
  - Recorded; used to guide/monitor what’s going on...
  - As needed 1-1 or small group; “I want to know more about what I just observed.”

- **Show Me**
  - An explicit performance of what I would like to see demonstrated.

- **Hinge Questions**
  - Every lesson’s “deal breaker”
  - Hinge Question + Exit task (next day’s plan!)

- **Exit Tasks**
Appropriate & Strategic Use of Technology

+ Formative Assessment Techniques

#PromisingOptions4CapturingCurating&SharingStudentThinking