Technology Tools for Supporting Classroom-Based Formative Assessment

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 ⅖ full.
How much did Mrs. Logan pay?

Source: Doing What Works, 2012

Jon Wray | @jonathanwray
April 27, 2016• 12:50 – 2:10 pm

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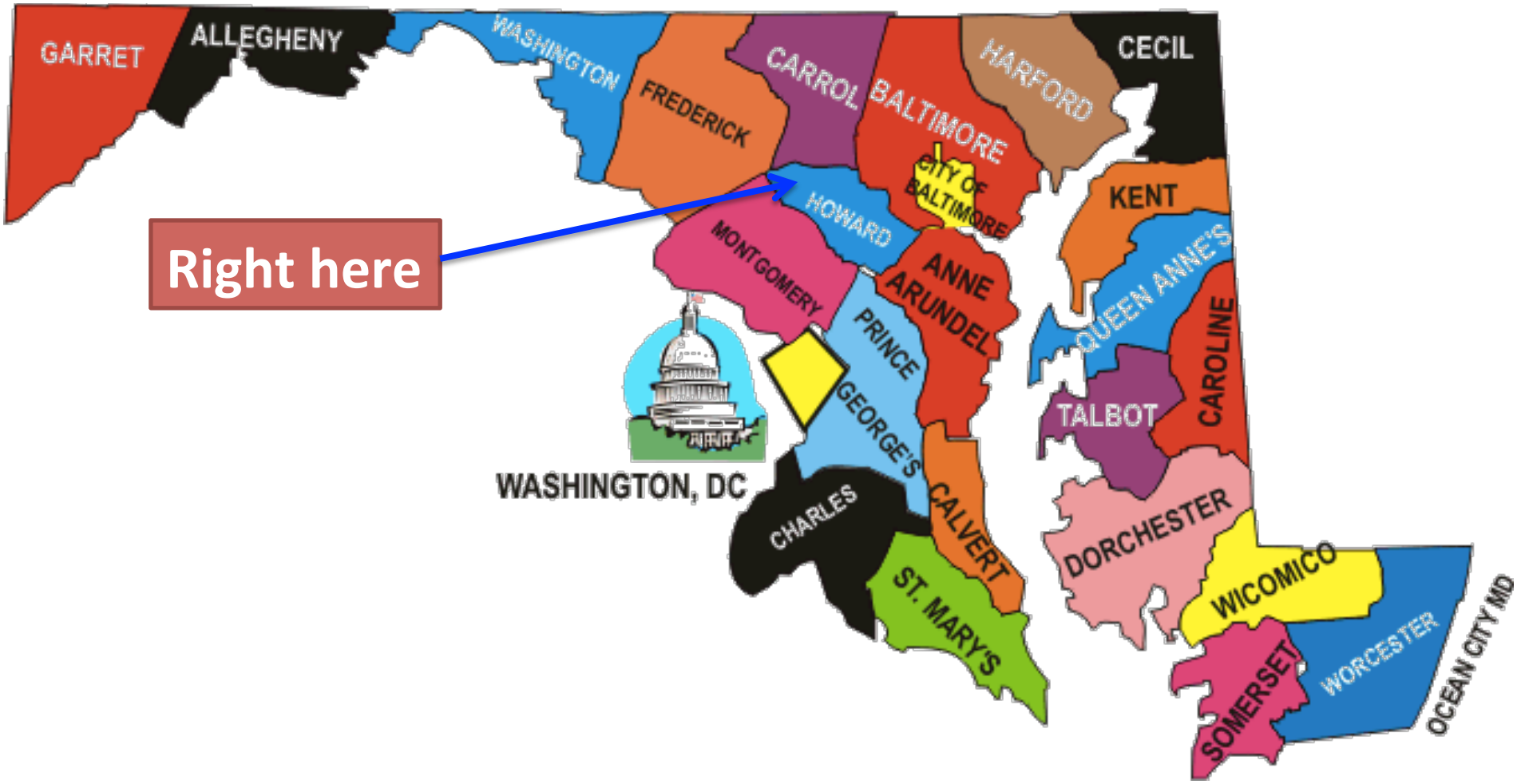
Howard County Public Schools

(Ellicott City, MD)



Howard County Public Schools

(Ellicott City, MD)

Fast Facts

76 Schools
41 elementary schools
20 middle schools
12 high schools
3 education centers

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*

Race/Ethnicity

American Indian/Alaskan	0.2%
Asian	20.3%
Black/African American	22.5%
Hawaiian/Pacific Islander	0.1%
Hispanic/Latino	9.9%
White	40.8%
Two or more races	6.2%

Students Receiving Special Services FY15

Free/Reduced-price Lunch	20.6%
Ltd. English Proficient	≤5.0%
Special Education	8.5%

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.

Attribution: http://www.thelifeofadventure.com/wp-content/uploads/2008/09/koenigsberg_castle_after_fire.jpg

$$-3y + 9 = 15y - 9$$

$$+-15y \qquad -15y$$

$$-18y + 9 = -9$$

$$+-9 \quad +-9$$

$$-18y = -18$$

$$-18y = -18$$

$$y = 1$$

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.***

INDIANA JON

AND HIS

MATH CRUSADE…

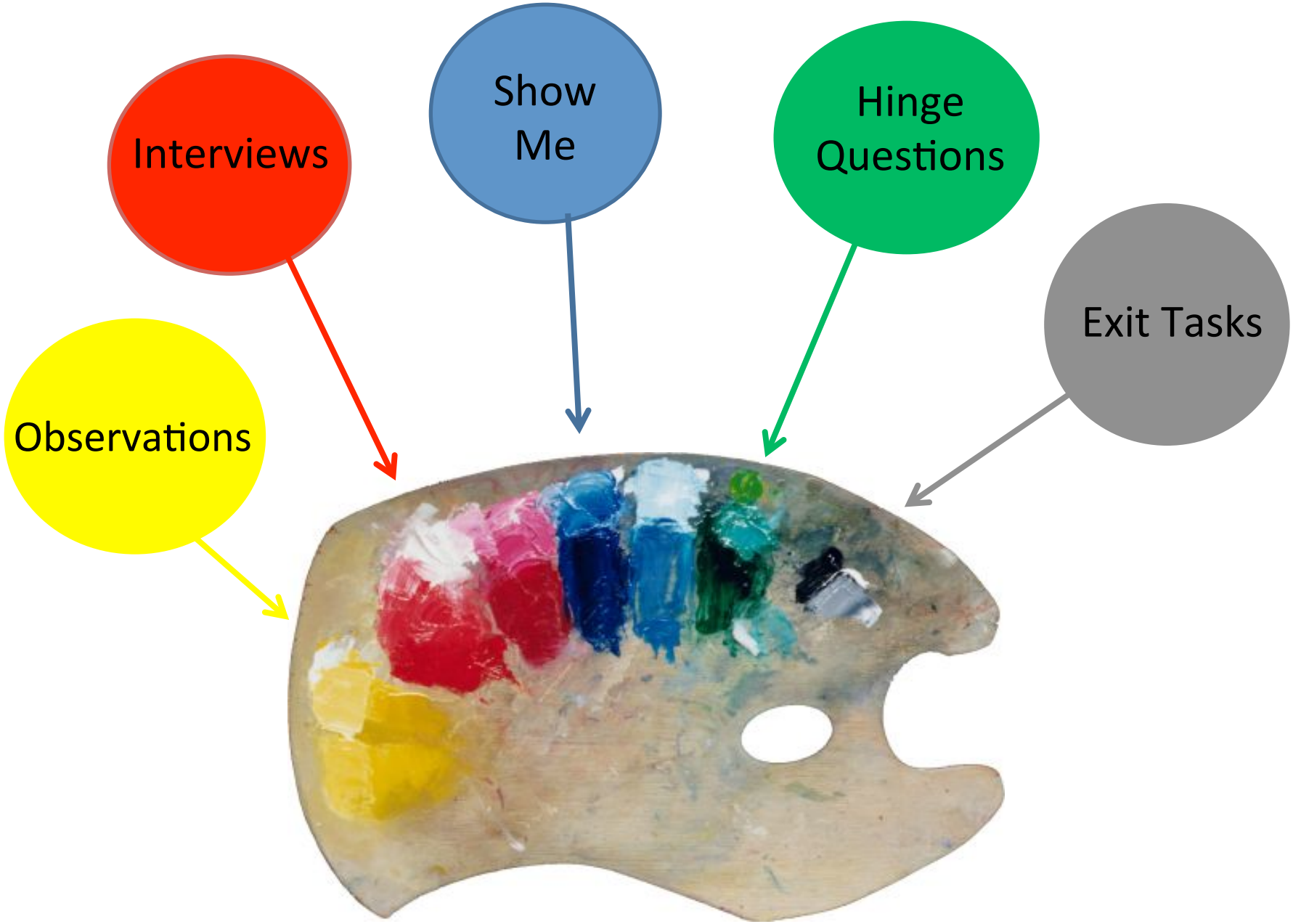
(Da-duh-duh-daa,

Da-duh-duh…!)

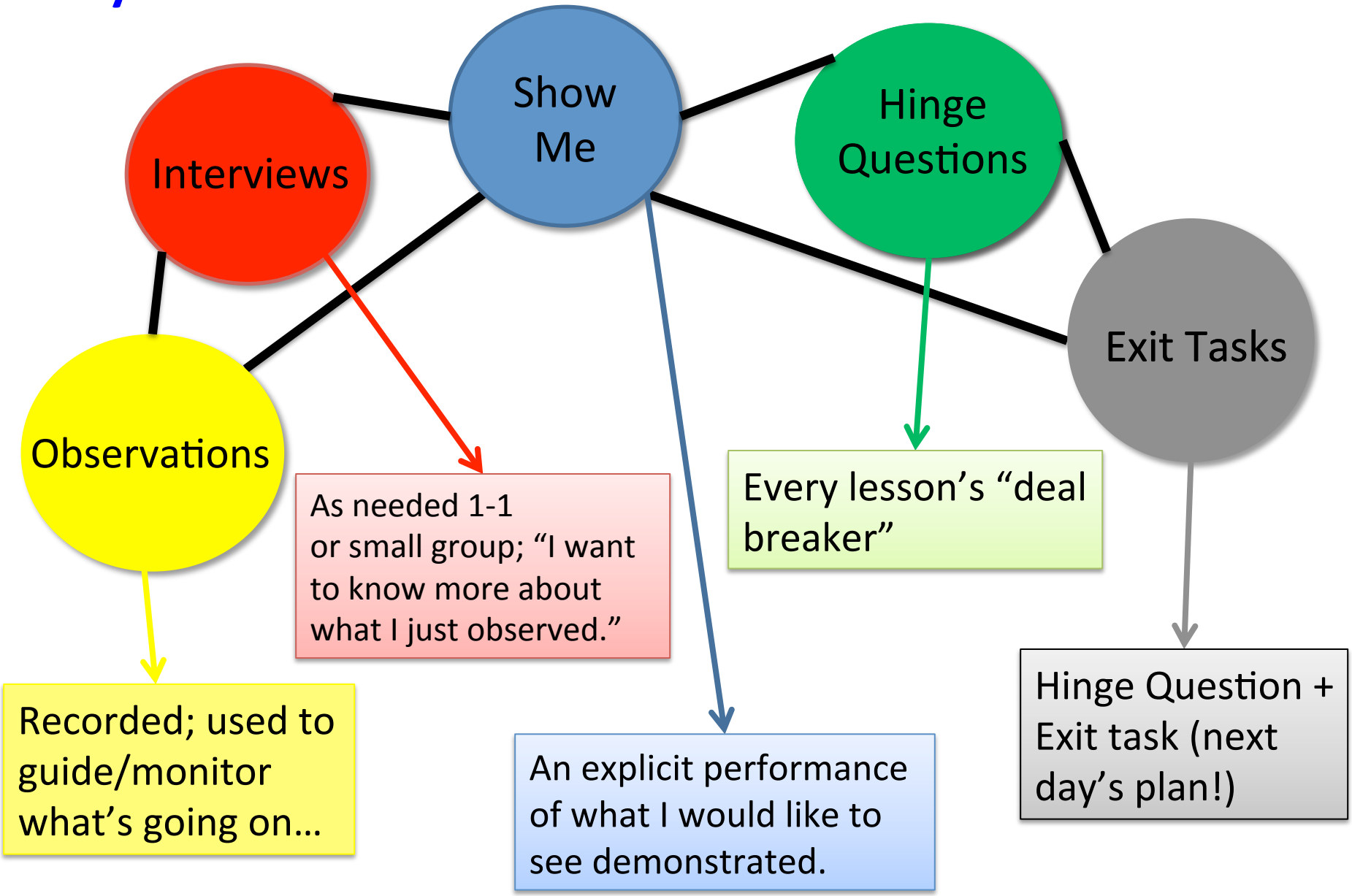
Here's what we will do this afternoon!

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



Daily Considerations



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?

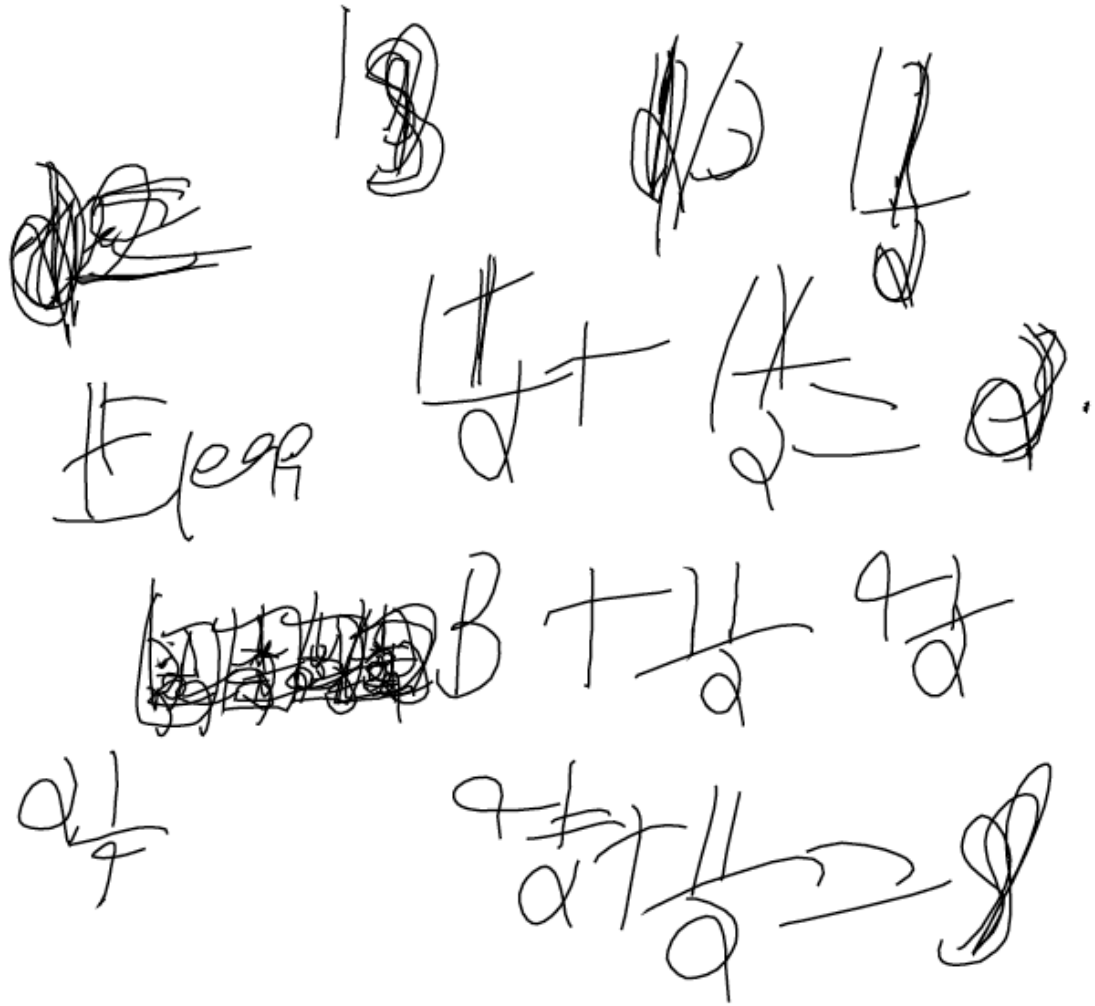
Interviews

- 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?

Interviews

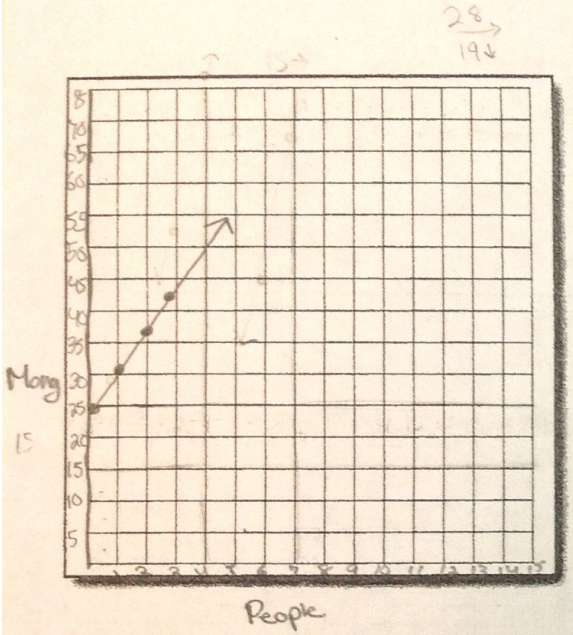
Elena and her 3 friends ate 9 cookies. How many did each person eat?

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.



$y = \$5.50p + \$25$

slope = $\frac{5.50}{1}$

y-int. = 0,25

Numeric/Algebraic Expression or Equation

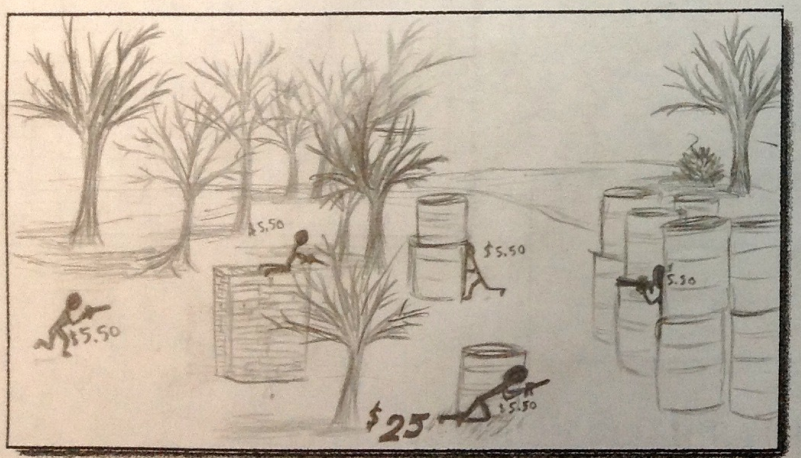
Graph

Table

Model(s)/ Picture(s)

Oral/Written Description

People X	Money Y
0	25
1	30.5
2	36
3	41.5
4	47
5	52.5
6	58
7	63.5
8	69
9	74.5
10	80

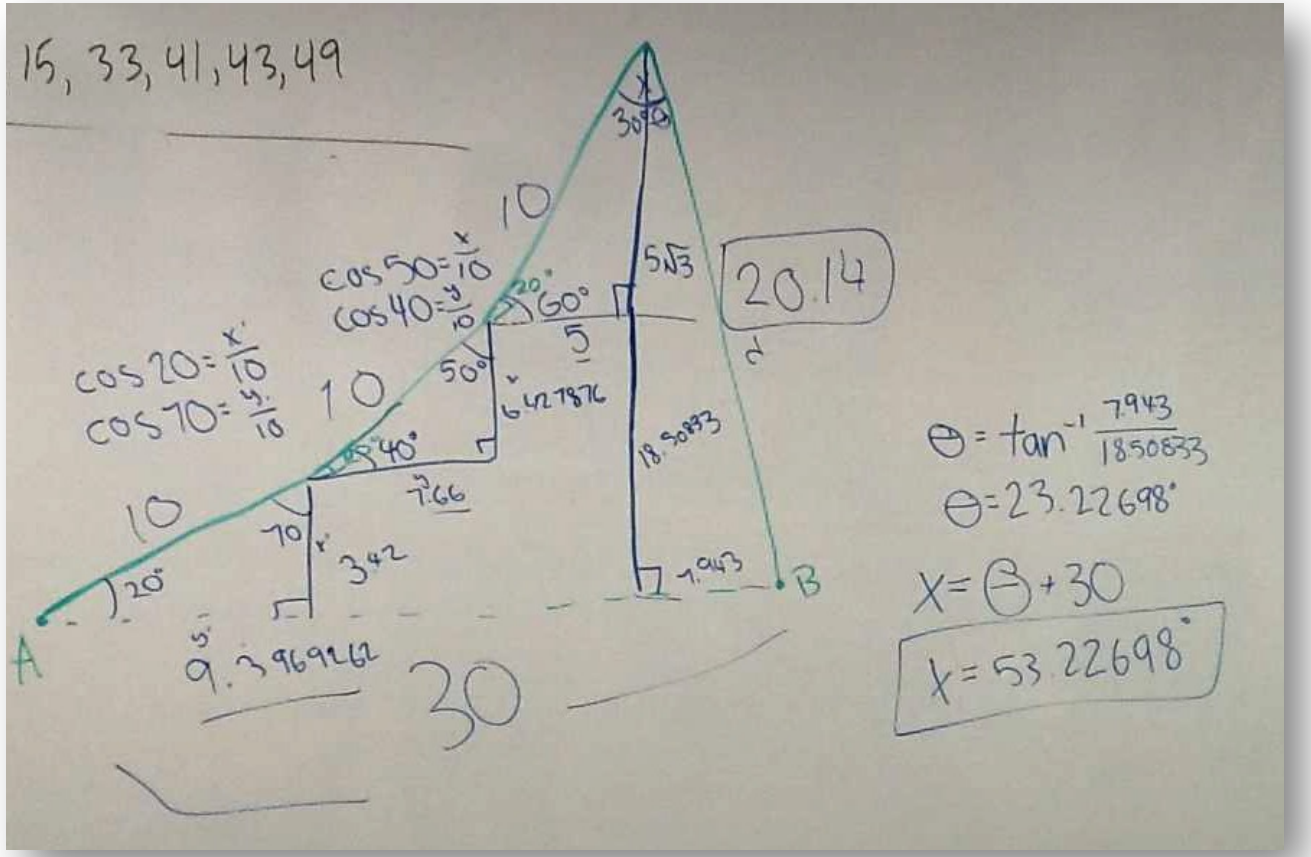


"Mark owns & operates a paintball field. In order to use the paintball field for one hour you have to pay a $25 fee and then pay $5.50 per person."

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 20º off course; for the second 10 miles, you move off course another 20º; and, for the final 10 miles, you move off course an additional 20º.

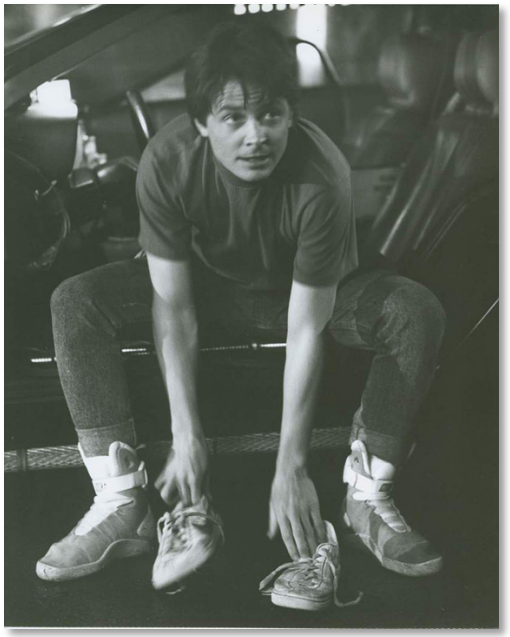


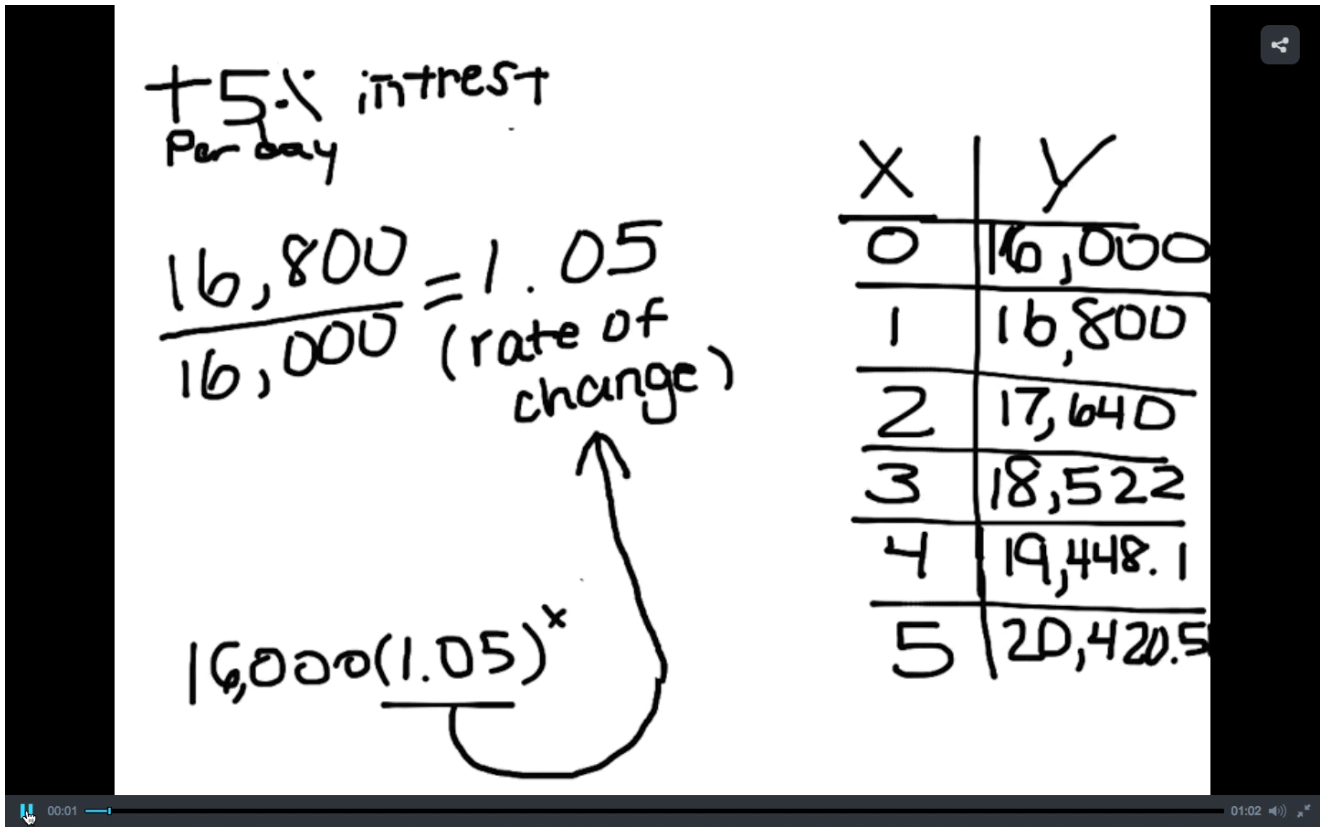
Source: Hollenbeck, 2015

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.

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

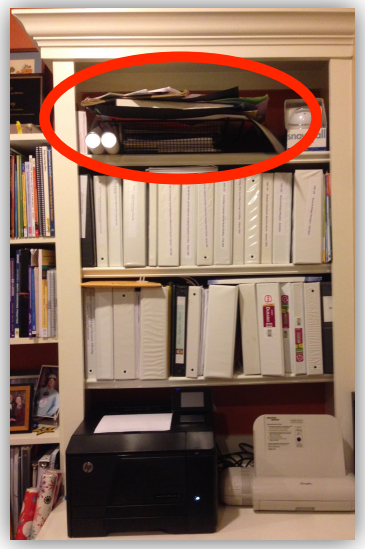
The Wray Household Protocol for Archiving Student Learning Artifacts

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

!

cu·ra·tor

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).

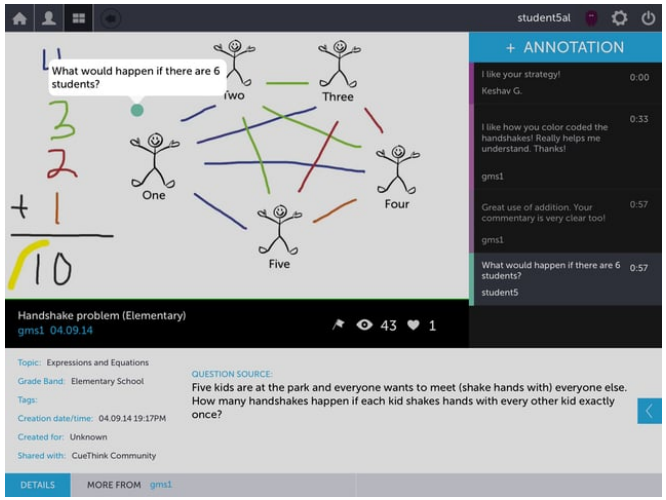
"At times, it is much easier to understand a concept when it is explained by one of our peers, than to have it explained again by a teacher. This is because our peers are usually at the same level of thought, and can state things in more general terms."

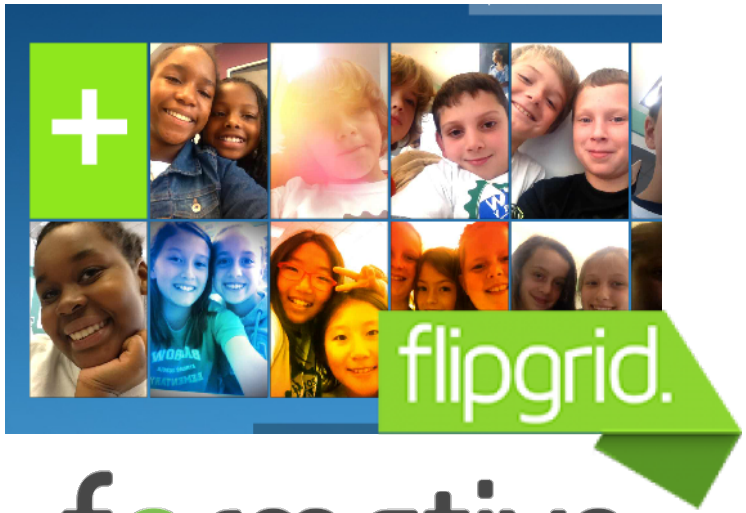
- Student

More Data Gathering Tools

(Higher-Tech)

Sample Tools





formative

Intervene in the moments that matter most.

GET LIVE RESULTS!

Sample Apps

MAC OS, Windows,
Android & IOS – **FREE***
http://tinyurl.com/oymgwhc

Still image and/or video capture tools

educreations

IOS and web version –
Base version **FREE, paid upgrades**
http://www.educreations.com

livescribe

Windows & Mac - $120-250
http://tinyurl.com/pwr7mlu

doceri

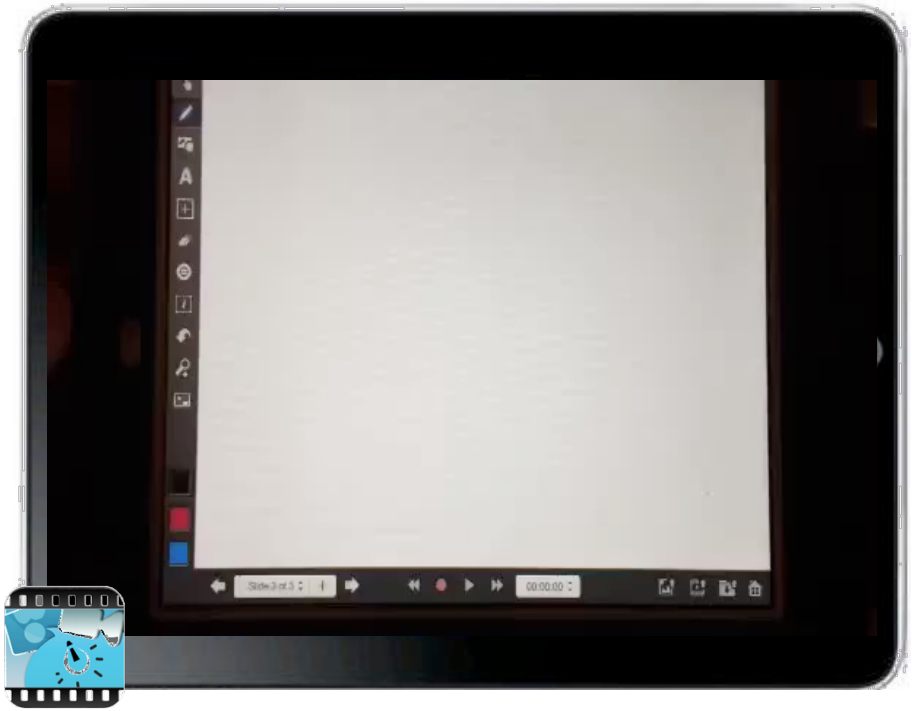
IOS – **FREE - $30**
https://doceri.com

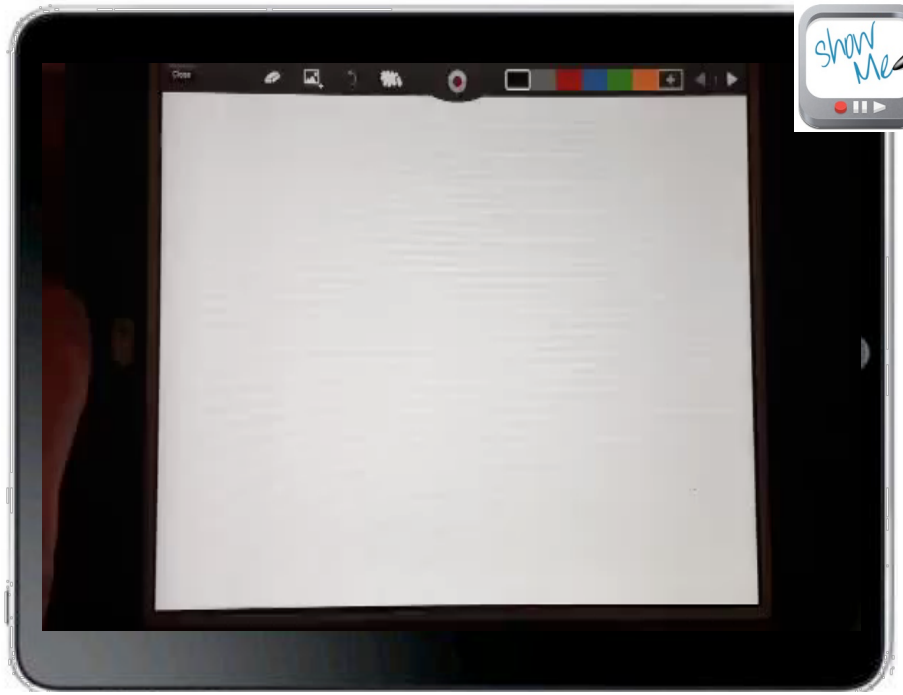
Android & IOS - **$5.99**
http://tinyurl.com/oe3nrhg

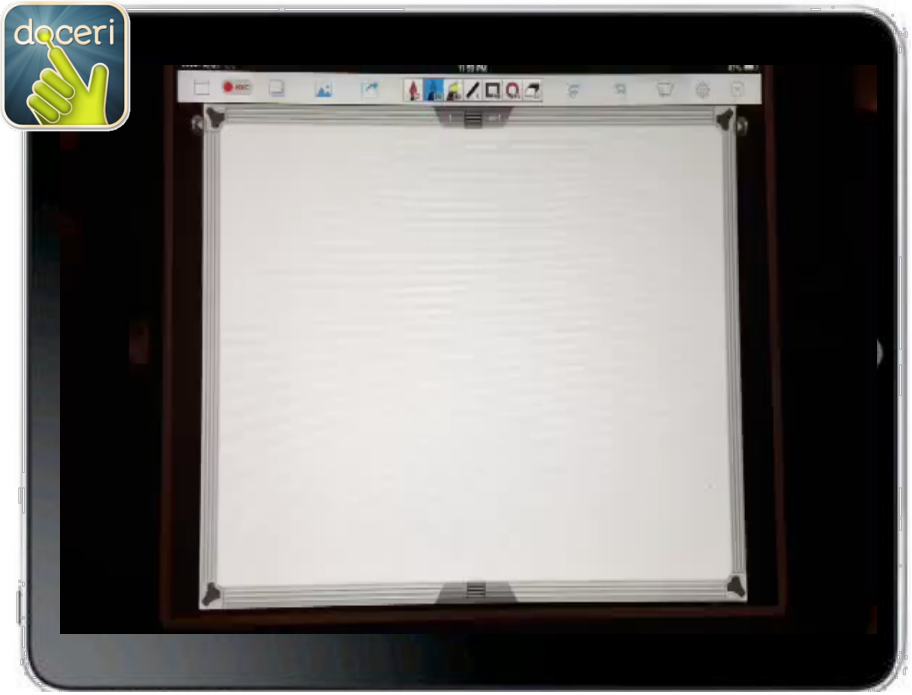
show Me

Android & IOS – **FREE**
http://www.showme.com


Done
rec
1 of 1







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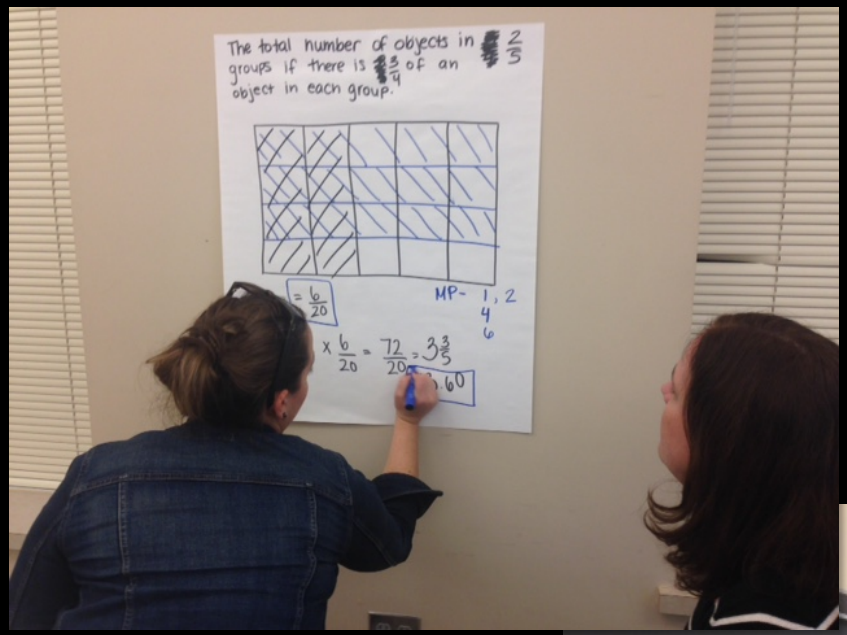
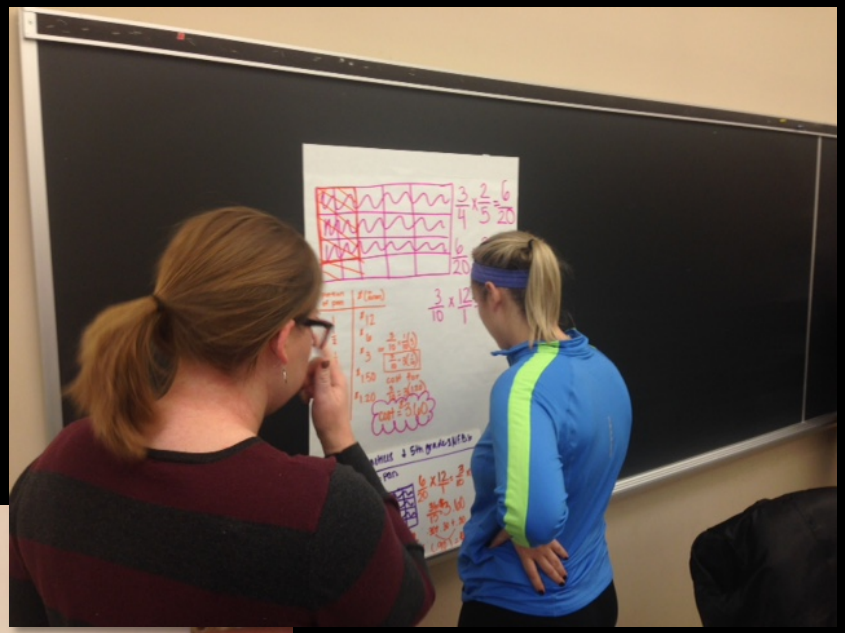
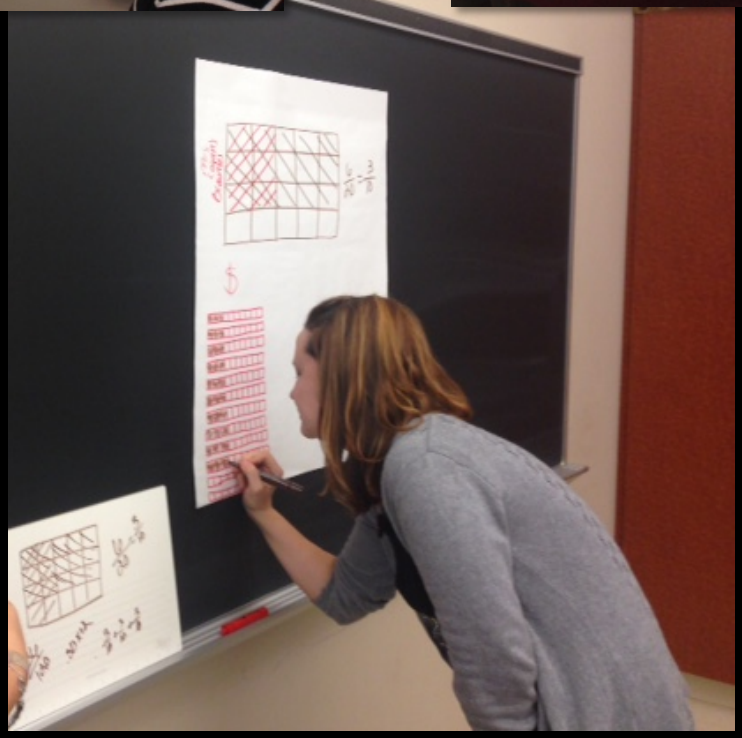

The total number of objects in 2/3 groups if there is 3/4 of an object in each group.
= 6/20
MP- 1, 2
4
6
x 6/20 = 72/20 = 3 3/5
.60


3/4 x 2/5 = 6/20
6/20
3/10 x 12/1



The total number of objects in $\frac{2}{5}$ groups if there is $\frac{3}{4}$ of an object in each group.

$\boxed{= \frac{6}{20}}$

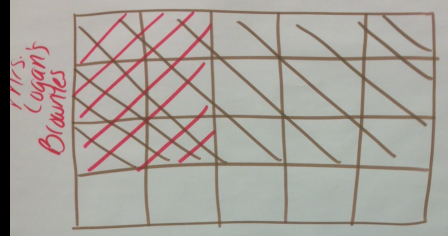
MP- 1, 2, 4, 6

$12 \times \frac{6}{20} = \frac{72}{20} = 3\frac{3}{5}$

$\boxed{= \$3.60}$

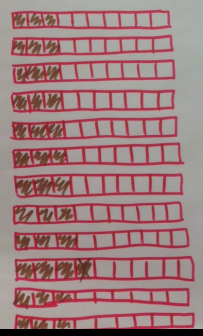
Student Practices

1, 4, 8

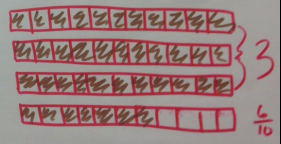


$\frac{6}{20} = \frac{3}{10}$

$

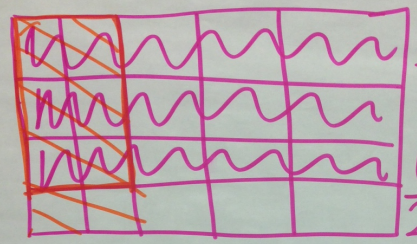


$\frac{36}{120}$



$3.\frac{6}{10} = 3\frac{60}{100}$

$3.60



$\frac{3}{4} \times \frac{2}{5} = \frac{6}{20}$

$\frac{6}{20} = \frac{3}{10}$

Portion of pan	$ (in dollars)
1	$12
$\frac{1}{2}$	$6
$\frac{1}{4}$	$3
$\frac{1}{8}$	$1.50
$\frac{1}{10}$	$1.20

$\frac{3}{10} = \frac{1}{10}(3)$ or $\boxed{\frac{3}{10} = 3(\frac{1}{10})}$

cost for $\frac{3}{10} = 3(1.20)$

cost = $3.60

$\frac{3}{10} \times \frac{12}{1} = \frac{36}{10}$

$\frac{36}{10} = \$3.60$

MP.1
MP.3
MP.4
MP.6

Same as $\frac{3}{4} \times \frac{2}{5} \times \frac{12}{1}$

$\frac{72}{20} = 3\frac{12}{20}$ or $3\frac{6}{10}$ or $3.60

Show Me

Considerations:

1. What might you want a student or students to <u>say</u> or <u>do</u> 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 ***E**very **P**upil **R**esponse*).

Source: Wiliam, 2015

Sample Hinge Questions

1. Can you name a fraction that is greater than $3/4$?
2. Which of the fractions below is > $3/4$?

   A. $1/4$

   B. $1/2$

   C. $4/4$

   D. $3/5$

Kahoot!

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

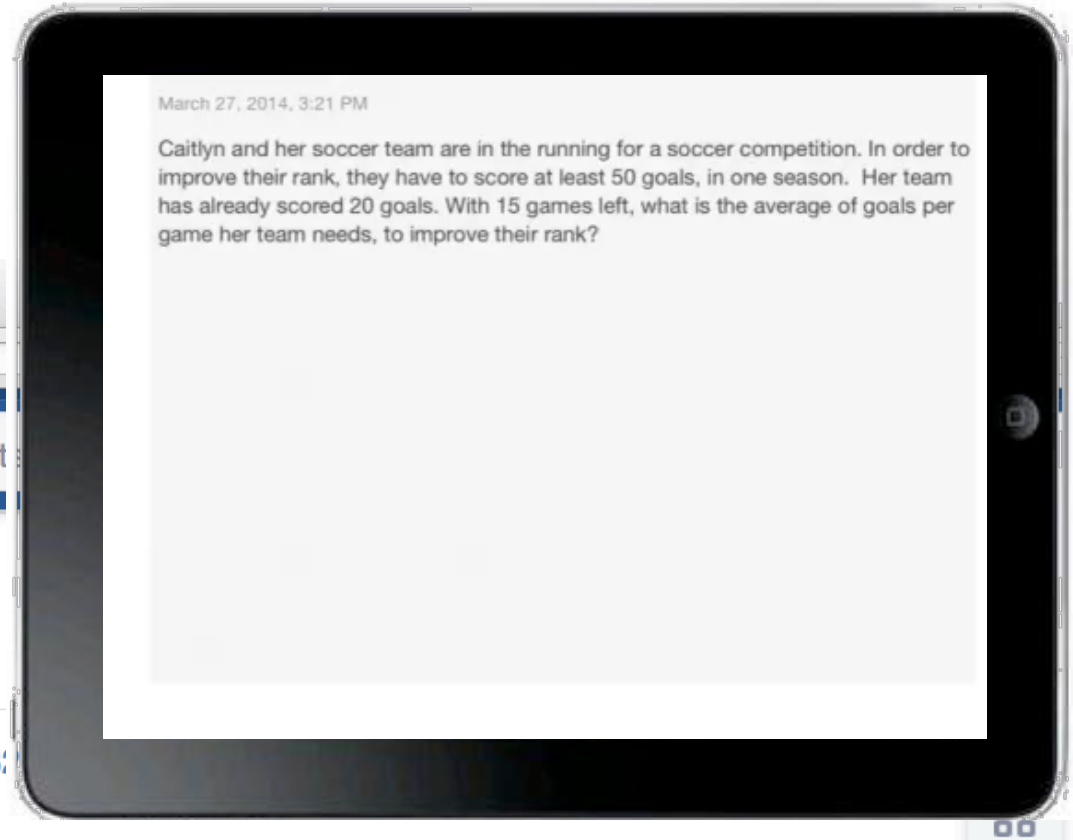
Hinge Question:		
	Yes	No
Will the hinge question assess important mathematical understandings of the day?		
Will students understand the question?		
Will students be able to respond in about a minute?		
Will expected responses be such that they can be analyzed and interpreted quickly?		
General consideration: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



Edmodo | Pre-Algebra

https://www.edmodo.com/home#/group?id=6491396

Search post

Justine H. to Pre-Algebra

HW

video_201403

MP4 File

1

3 Replies · Share

Mar 28, 2014

Vincent H. · Mar 28, 2014

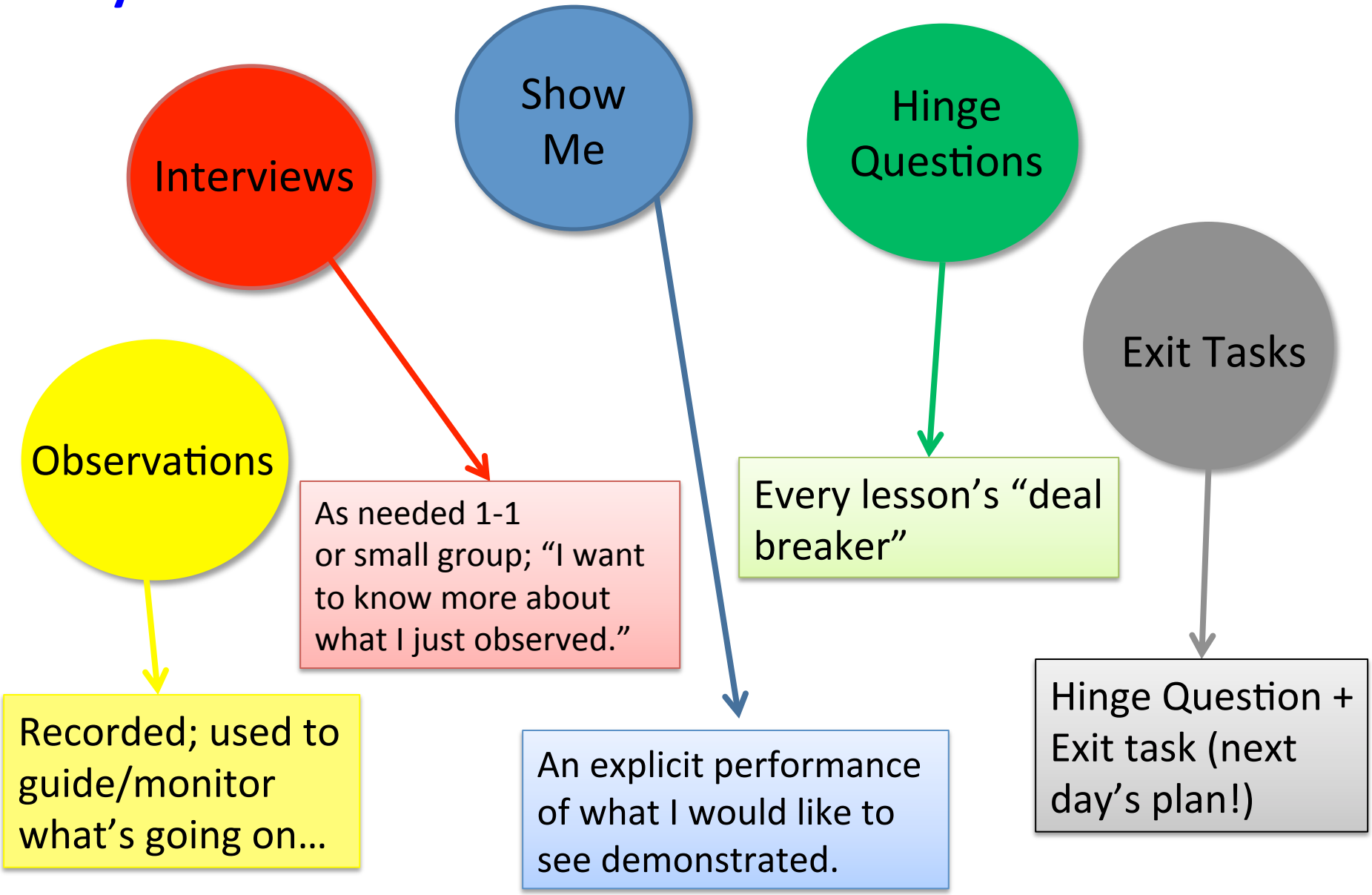
Positive comment: Nice work and the inequality is excellent because it was easy to understand.

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/
- **Flipgrid** – Submit a question on a "grid"; audience responds via video; view responses. http://www.flipgrid.com
- **Cuethink** – A peer-to-peer iPad application for problems solving http://www.cuethink.com

Daily Considerations



Appropriate & Strategic Use of Technology

+ Formative Assessment Techniques

#PromisingOptions4CapturingCurating&SharingStudentThinking


MO
MATH