Which of These is Not Like the Mug?
Using Launch/Explore/Summarize to Connect Concepts and Procedures

Anna Hilvert, Grace Frecke, Veronica Ilg

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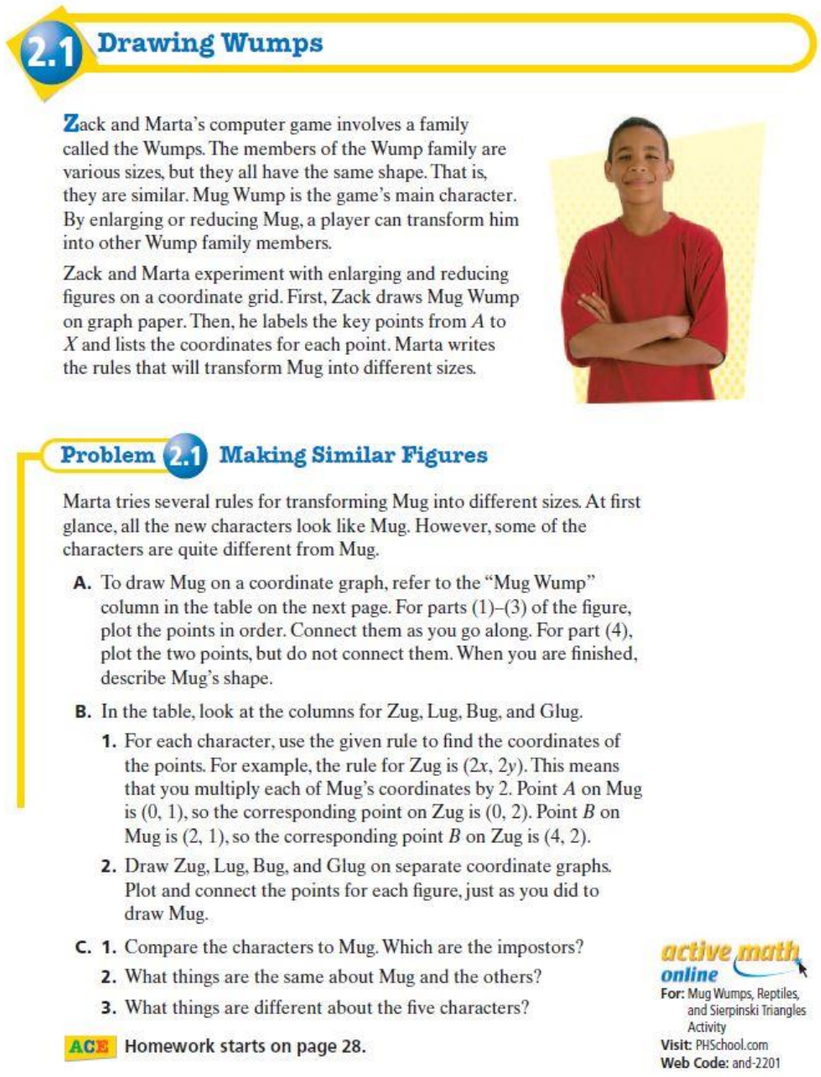
Part	Description	Example
Launch	• 3-5 Minutes • Exciting, Engaging, and Interesting • Background knowledge of terms	• A picture of Mug Wump and his family • A background story for him and his family
Explore	• Student led exploration • Guided questions by teachers • DO NOT GIVE AWAY ANSWER	• Creating each Wump from their given coordinates • Choosing the impostor • Why?
Summarize	• Question guided discussion • Have students summarize	• Go through each example of the Wumps and have students explain if their creation is a Wumps and why



2.1 Drawing Wumps

Zack and Marta's computer game involves a family called the Wumps. The members of the Wump family are various sizes, but they all have the same shape. That is, they are similar. Mug Wump is the game's main character. By enlarging or reducing Mug, a player can transform him into other Wump family members.

Zack and Marta experiment with enlarging and reducing figures on a coordinate grid. First, Zack draws Mug Wump on graph paper. Then, he labels the key points from *A* to *X* and lists the coordinates for each point. Marta writes the rules that will transform Mug into different sizes.

Problem 2.1 Making Similar Figures

Marta tries several rules for transforming Mug into different sizes. At first glance, all the new characters look like Mug. However, some of the characters are quite different from Mug.

A. To draw Mug on a coordinate graph, refer to the "Mug Wump" column in the table on the next page. For parts (1)–(3) of the figure, plot the points in order. Connect them as you go along. For part (4), plot the two points, but do not connect them. When you are finished, describe Mug's shape.

B. In the table, look at the columns for Zug, Lug, Bug, and Glug.

1. For each character, use the given rule to find the coordinates of the points. For example, the rule for Zug is $(2x, 2y)$. This means that you multiply each of Mug's coordinates by 2. Point *A* on Mug is (0, 1), so the corresponding point on Zug is (0, 2). Point *B* on Mug is (2, 1), so the corresponding point *B* on Zug is (4, 2).
2. Draw Zug, Lug, Bug, and Glug on separate coordinate graphs. Plot and connect the points for each figure, just as you did to draw Mug.

C. 1. Compare the characters to Mug. Which are the impostors?
2. What things are the same about Mug and the others?
3. What things are different about the five characters?

ACE Homework starts on page 28.

active math online
For: Mug Wumps, Reptiles, and Sierpinski Triangles Activity
Visit: PHSchool.com
Web Code: and-2201

Building Procedural Fluency from Conceptual Understanding

- Concepts help students know the math; procedures allow students to do the procedures
- When procedures are first taught, students will memorize the procedure for that one equation.
- We want them to be able to generalize, so they can solve ALL problems with their understanding.
- Conceptual understanding is the building blocks for procedural fluency.
- Mathematical Knowers and Doers
- "Wider range of options for entering a task and building mathematical thinking"

Mug Wumps:

- By having students explore the concept of scale factor through the Mug Wumps problem, students can understand the material in their own understanding
- This exploration will allow students to generalize the concept of scale factors.

Mathematical Representations

Jordan Maloyed

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Examples

Visual- diagrams/illustrations

Symbolic- number expressions

$2 \times 8 = 16$ $2+2+2+2+2+2+2+2=16$

Verbal- spoken explanation

In your own words, describe the array.

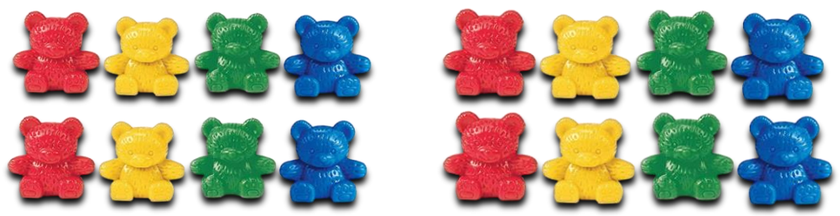
"There are 8 groups of 2."

Contextual- word problems

The zoo has 8 terrariums with two snakes in each terrarium. How many snakes are there?

Physical- manipulatives

Show 2 groups of 8 using your bear counters.

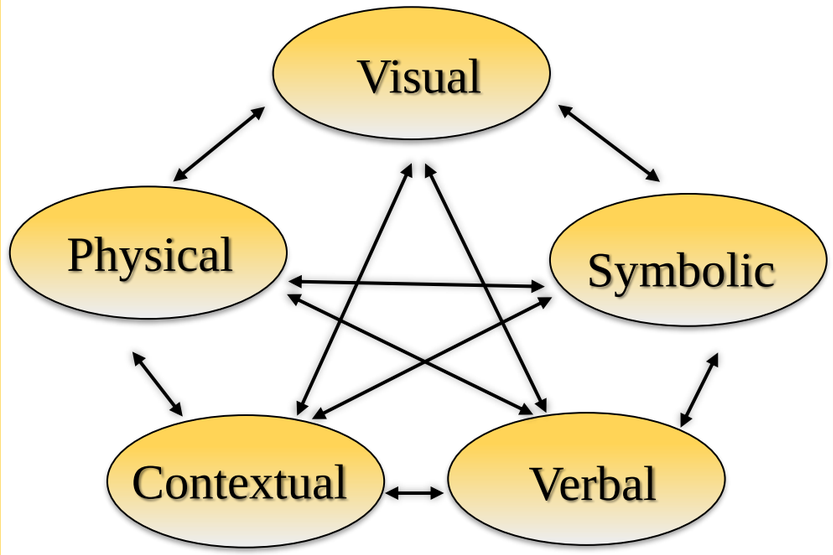


Group One Group Two

What is Representation?

Mathematical representations include ways to convey or envision mathematical ideas.

Types of Representation



Why is Representation Important?

- Representations play an important role on deepening student learning of mathematics, as well as providing students with multiple entry points and access to the study of mathematics.
- Creates a web of interconnected ideas instead of disconnected rules and facts. Students make connections!
- Creates more experiences/practice for students.

Connections

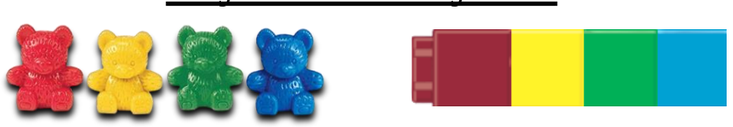
Between- A comparison of models from different categories.

Physical vs. Symbolic

2 + 2

Within- A comparison of models from the same category.

Physical vs. Physical



Alternate Directionality

Alternate directionality provides insight into teacher understanding of student thinking and identifies misunderstandings/confusion.

Example:

A student may do very well with solving expressions; however, may have trouble applying that mathematical knowledge to real-world problems. This means the student understands symbolic representation but needs work on contextual representation.

References:

Huinker, DeAnn, and Victoria Bill. *Taking Action: Implementing Effective Mathematics Teaching Practices in K-Grade 5*. National Council of Teachers of Mathematics, 2017.

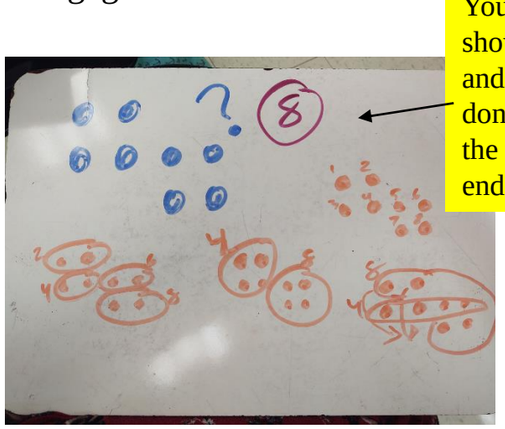
Let's Talk about Numbers

Bellamarie Neff

Join Bellamarie's Zoom Room

Number Talks

Number talks are a brief discussion that focuses on the student's solutions for a single, carefully chosen mental math computation problem. Students will share their different mental processes aloud while the teacher records their thinking visually on a chart or board. Students then build on each others thinking, requiring active listening and full engagement.

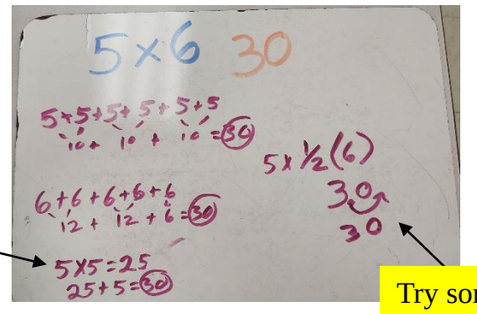


You can use dots like shown, or find a picture and count the objects, donuts, people, fingers, the possibilities are endless.

These work for all grade levels. An easy way to get started are by having students count the dots, record how they grouped the dots to find the answer. Start simple and become more complicated as they go, maybe try dot collection with symmetry and only providing a short time to view so students can not count one-by-one.

How I've used them so far.

I work in a 4th grade class and so far we have worked with students on a variety of topics. We have done addition, subtraction, and multiplication. We typically spend 10-15 minutes each day, and work through 3-5 problems. I like to start simple and work my way to more challenging problems that build on the previous question. The questions are designed to fit the students needs, and when needed we split them into two small groups for working with questions within a given level. Great for whole class instruction as well.



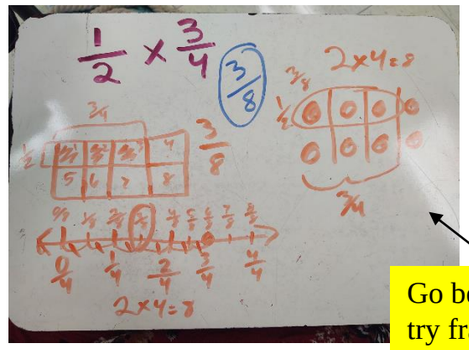
Allows them to use what they already know.

Try some new strategies

This example is a beginning question for multiplication. Did you know the trick for multiplying by 5s? Just take half of the other number and move the decimal over one place. One of my students uses this as a quick mental process. I would follow this question by doing 50x6, 50x60, and then 500x60. Students are still working with adding the zeros at the end when doing multiples of 10, For some these are easy others, this allows a bit of a challenge.

Works across the grade levels and platforms.

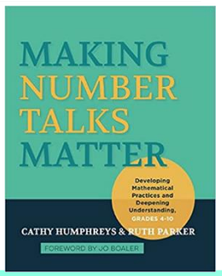
Number talks are a great way to start engaging students at all levels. You can grow from basic addition, to more complex decimals and fractions. It would be safe to say that these strategies could be used even for working with algebra and word problems. Its all about getting the students to talk and share. I have done mine through video call so far, imagine what you could do with them in class. Use manipulatives? Visuals? Posters?



Go beyond and try fractions, use numbers or visuals.

References:

A great book to add to your collection for more information and step-by-step instructions.
Great for grades 4-10.



Regression Analysis of Influencing Factors on Graduation Rate in Kentucky Public High Schools

Presented by Rebecca Price
Western Kentucky University

Join Rebecca's Zoom Room

Project Goal

Determine if selected factors have any predictive ability on graduation rate.

Factors

- Student to Teacher Ratio
- Number of Students on Free and Reduced Lunch
- Total Population
- Non-White Student Population
- School Spending Per Student

Data Collection and Organization

Data on schools was collected from the Kentucky Department of Education's School Report Cards.

The list of 1,477 schools was narrowed to 223 based on missing data.

Data organized into an Excel workbook to perform calculations in Excel.

Calculations

Regression analysis was performed in Excel using the data analysis feature. The image below shows an example of the regression output.

Regression Statistics	
Multiple R	0.529074944
R Square	0.279920296
Adjusted R Square	0.263251784
Standard Error	3.921578958
Observations	222

ANOVA

	df	*SS*	*MS*	*F*	*S*
Regression	5	1291.306975	258.261395	16.79335874	
Residual	216	3321.816809	15.37878152		
Total	221	4613.123784			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	92.42654416	1.975283199	46.79154069	5.0849E-115
STR	0.193803748	0.121534734	1.594636702	0.112255637
FRL	-0.009530252	0.001972599	-4.831316606	2.56968E-06
TP	0.005074623	0.001091449	4.649438286	5.79287E-06
NW	-0.006502151	0.001560643	-4.166327127	4.47682E-05
SPS	-3.80365E-06	2.6961E-05	-0.141080026	0.887938206

Analysis

The coefficients, P-values, and R squared values from the regression table were all used in forming the predictive equations.

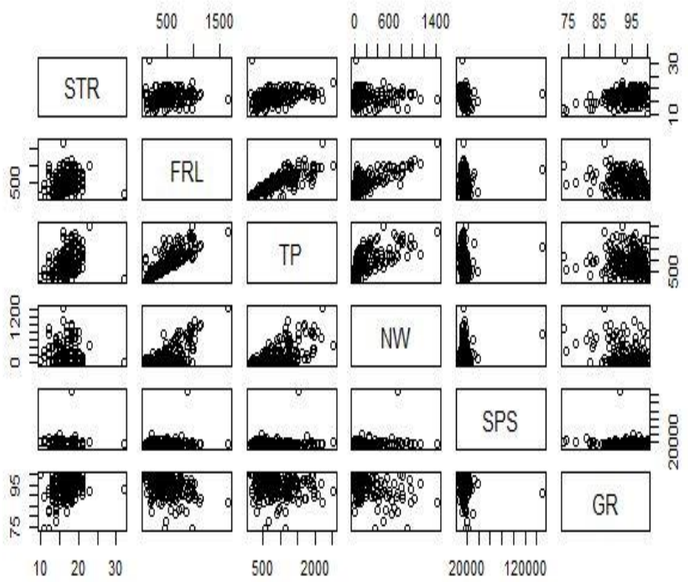
Predictive Equations

Predictive equation general form

- $Y=b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5$

All factors against gradation rate equation

- $Y=92.4265+0.1938x_1-0.000953x_2+0.00507x_3-0.0065x_4-0.0000038x_5$



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Kentucky School Report Cards. (2020). Retrieved October 28, 2020, from https://www.kyschoolreportcard.com/organization/20?year=2020

The Impact of Literature on Students' Attitudes Towards Math

ASBURY UNIVERSITY
Established 1890

JULIA N. STAPLETON
Advisor: Cheryll Crowe Johnson, Ph.D.

Join Julia's Zoom Room

INTRODUCTION

In general, mathematics can be a difficult subject for a student to understand and apply; therefore, it causes mathematical stress and anxiety to develop. Studies have shown that students who experience low success in math early in life will have a disrupted and distorted attitude towards the subject in the future (Sharma, 2016).

Deringol (2018) and Sharma (2016) both posit that excessive anxiety levels could lead to an interrupted learning process. Therefore, many studies have been conducted where literature has been intertwined with mathematics. The results have shown the positive effects of reducing math anxiety. Researchers have concluded that utilizing literature to effectively introduce, extend, or enhance math concepts has been demonstrated to slow growth in math anxiety and even help prevent it (An et al., 2019).

PURPOSE OF STUDY

Being a personal victim of math anxiety, I felt directly convicted to test ways to improve and combat that anxiety. As many researchers have mentioned, it's easy to be good in math and not feel stressed by it; however, many students don't find that desired success. For me, I understood math better when I looked at it from a different perspective: through literature, through visuals or hands-on manipulatives, through real-life examples, etc. This personal impact influenced my desire to pursue a 'math and literature' experiment and note the change in attitude towards math. Based on the studies I read, researchers have concluded and discussed that students excel better in math when they can connect to it, apply it to themselves, and find a genuine understanding and likeness towards it (Deringol, 2018).

RESEARCH QUESTION

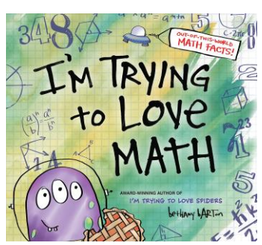
Does the use of literature implementation in second-grade lessons affect students' attitudes towards mathematics?

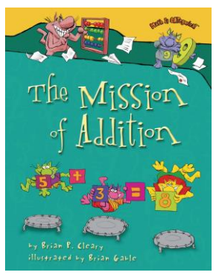
METHODS

Subjects: This study was conducted in a second-grade classroom with seventeen students between the ages of six and seven years old.

Design: Of the seventeen, eight students were taught a traditional math lesson on addition and subtraction within one hundred *without* using literature. Therefore, the other nine of the seventeen were exposed to an experimental strategy that incorporated literature in a math lesson on addition and subtraction within one hundred.

The traditional lesson consisted of engaging activities as well as meaningful content; however, it lacked the literature component. The experimental lesson included two children's books that were mathematical related. The two texts are located below:





DATA ANALYSIS

Data analysis is in progress.

DISCUSSION

Findings:

Traditional Lesson									Experimental Group								
Student	Pre-Q1	Post-Q1	Change	Pre-Q2	Post-Q2	Change	Pre-Q3	Post-Q3	Content Assessment	Student	Pre-Q1	Post-Q1	Change	Pre-Q2	Post-Q2	Change	Pre-Q3	Post-Q3	Change	Content Assessment
A	Happy	Happy		Happy	Happy		Happy	Happy	Scored 2/3 -- At-Criteria	I	Happy	Happy		Bored	Bored		Happy	Confused		Scored 3/3 -- At-Criteria
B	Confused	Confused		Bored	Bored		Confused	Confused	Scored 2/3 -- At-Criteria	J	Happy	Happy		Happy	Happy		Happy	Happy		Scored 3/3 -- At-Criteria
C	Confused	Confused		Bored	Bored		Happy	Happy	Scored 2/3 -- At-Criteria	K	Confused	Happy		Happy	Confused		Happy	Confused		Scored 3/3 -- At-Criteria
D	Confused	Happy		Happy	Happy		Happy	Confused	Scored 3/3 -- At-Criteria	L	Happy	Happy		Bored	Bored		Confused	Confused		Scored 3/3 -- At-Criteria
E	Confused	Confused		Confused	Confused		Confused	Confused	Scored 1/3 -- Below-Criteria	M	Happy	Happy		Happy	Happy		Happy	Happy		Scored 3/3 -- At-Criteria
F	Happy	Happy		Happy	Confused		Happy	Happy	Scored 3/3 -- At-Criteria	N	Happy	Bored		Happy	Confused		Confused	Happy		Scored 3/3 -- At-Criteria
G	Happy	Happy		Confused	Confused		Confused	Confused	Scored 1/3 -- Below-Criteria	O	Happy	Happy		Happy	Happy		Happy	Happy		Scored 3/3 -- At-Criteria
H	Bored	Bored		Confused	Bored		Bored	Bored	Scored 1/3 -- Below-Criteria	P	Happy	Happy		Happy	Happy		Happy	Happy		Scored 3/3 -- At-Criteria
										Q	Happy	Happy		Happy	Happy		Confused	Happy		Scored 3/3 -- At-Criteria

Student	Pre-Q1	Post-Q1	Change	Pre-Q2	Post-Q2	Change	Pre-Q3	Post-Q3	Change	Pre-Q4	Post-Q4	Change	Pre-Q5	Post-Q5	Change	Student	Pre-Q1	Post-Q1	Change	Pre-Q2	Post-Q2	Change	Pre-Q3	Post-Q3	Change	Pre-Q4	Post-Q4	Change	Pre-Q5	Post-Q5	Change
A	Yes	Yes		Yes	Yes		No	No		Yes	Yes		Yes	Yes		I	Yes	Yes		Yes	Yes		No	No		Yes	No		Yes	Yes	
B	Yes	Yes		Yes	Yes		No	No		No	No		No	No		J	Yes	Yes		Yes	Yes		No	No		No	No		Yes	Yes	
C	Yes	Yes		Yes	Yes		No	No		Yes	Yes		Yes	Yes		K	Yes	Yes		Yes	Yes		No	No		Yes	Yes		Yes	Yes	
D	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		L	Yes	Yes		Yes	Yes		No	No		Yes	No		Yes	Yes	
E	Yes	Yes		Yes	Yes		No	No		Yes	Yes		Yes	Yes		M	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
F	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		N	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
G	Yes	Yes		Yes	Yes		Yes	Yes		No	No		No	No		O	No	Yes		Yes	Yes		No	No		No	No		Yes	Yes	
H	No	Yes		Yes	No		Yes	Yes		No	No		No	Yes		P	Yes	Yes		Yes	Yes		No	No		Yes	Yes		Yes	Yes	
																Q	Yes	Yes		Yes	Yes		Yes	Yes		No	No		Yes	Yes	

Limitations: For this study, the research was only performed on one second-grade classroom, split in half. Also, this was spread out over the course of two days, so each group heard the other lesson taught. Although I waited to implement the literature until day two, students of the experimental group could have been slightly influenced by the proceeding lesson's content.

Future Research: This topic is a fascinating one, something that is worth further research. For example, scholars should consider enhancing math topics, like measurement or capacity, with literature where content-specific books are written specifically to enrich that topic. Researchers could also see the impact literature has a math achievement.

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