FOCUSING ON THE ESSENTIALS

TO SUPPORT A PASSION AND COMMITMENT FOR EDUCATIONAL EXCELLENCE

Book 2:
MATH
Edition

HOW WE TEACH:

Teachers Teaching and Formatively Assessing to Facilitate Each Student Learning & Applying a Guaranteed and Viable Curriculum

"By changing my question from, 'What answer did you get?' to 'How did you solve the problem?' I was able to understand how they were making sense of mathematics."

~Number Talks: Helping Children Build Mental Math & Computation Strategies, Sherry Parrish, 2003

Prepared for the Collaborative Learning Team Members of
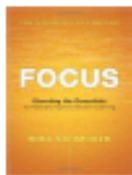
AVONDALE ELEMENTARY SCHOOL DISTRICT

by Dan Mulligan, flexiblecreativity.com

July 2016

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> "SOMETIMES THE QUESTIONS ARE COMPLEX AND THE ANSWERS ARE SIMPLE."
> ~DR. SEUSS

ELEVATING THE ESSENTIALS
To Radically Improve Student Learning

Mike Schmoker, ASCD, 2011

> The general underperformance of schools can be directly attributed to a failure to implement three simple, well-known elements: common curriculum, sound lessons, and authentic literacy.

There are three elements that we should approach with "simplicity and diligence," until they are satisfactorily understood and implemented in every subject area.

The three elements are so potent they do not need to be implemented perfectly or with any special skill. Their profound impact will come largely from all teachers applying them consistently and reasonably well. Then, as teachers continue to work in teams to practice and refine their implementation, even better results will ensue.

OVERVIEW

- **What We Teach** (*guaranteed and viable curriculum*)

  This simply means a decent, coherent curriculum, with topics and standards collectively selected by a team of teachers form the school district- that is actually taught.
  Why is this so important? Because such "guaranteed and viable curriculum" (Marzano, 2003, p. 22) is perhaps the most significant school factor that affects learning. But such a curriculum is found in very few schools (Berliner, 1984; Marzano, 2003; Schmidt, 2008)

- **How We Teach**

  Think of this simply as ordinary, structurally sound lessons that employ the same basic formula that educators have known for decades but few implement consistently.
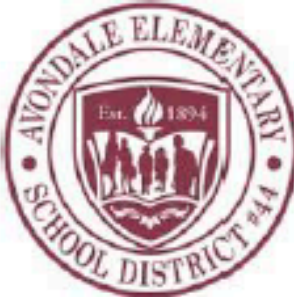
- **Authentic Literacy**

  Purposeful—and usually argumentative—reading, writing and talking (Lunsford & Ruszkiewics, 2009). Literacy is still the unrivalled, but grossly under-implemented, key to learning both content and thinking skills.

  Authentic literacy is categorically different from so-called "reading skills" and pseudo-standards that have wrought such havoc in language arts.

Overview of FOCUS:
Elevating the Essentials to Radically Improve Student Learning

What we teach:
- ~ Essential Knowledge
- ~ Essential Skills
- ~ Essential Vocabulary
- ~ Essential Processes

Guaranteed and Viable Curriculum
- ~ Focus on Power Standards
- ~ Pacing provides time for differentiation of support

How we teach:
Step 1:
　Clear Learning Objectives
Step 2:
　Modeling
　Guided Practice
　Independent Practice
Step 3:
　Checking for Understanding along the way
Step 4:
　Extending and Appling Knowledge

Instructional Frameworks
- ~**Clear objective:** *I can* statement and showcase vocabulary
- ~**Five Minute Limit:** teacher talk limited to short intervals
- ~**Student Engagement:** students actively review learning continually
- ~**Summarizing:** students summarizing learning continually
- ~**Rehearsal Time:** students collaborate to compare and contrast, share perspectives, etc.
- ~**Formative Assessment:** Frequent check for Understanding
- ~**TAPS: T**otal, **A**lone, **P**airs, **S**mall-group

9 Ways to Teach Anything
- ~Share clear learning goal(s)
- ~Clarify and teach each essential vocabulary
- ~Model higher order thinking
- ~Ask second questions
- ~Continually check for understanding (formative)
- ~Facilitate guided practice
- ~Monitor independent practice
- ~Engage whole class in discussion and debate
- ~Integrate consistent reading and writing with clear feedback
- ~Include opportunities to summarize & extend and apply new knowledge

Authentic Literacy Lessons

- ~**Read:** Close reading of a text, articles, books in all content areas
- ~**Annotate:** Purposefully interacting with the text
- ~**Discuss:** Making connections, questioning, citing evidence, debating
- ~**Write:** Facilitates free and creative thinking, applying new vocabulary; requires specific feedback

Foundations of the Research:

- ~ **Madeline Hunter** – Numerous works published between the 1960s and 1990s
- ~**Douglas & Nancy Frey** – *Checks for Understanding* (2007)
- ~**Robert Marzano** – *The Art and Science of Teaching* (2007)
- ~**Richard & Rebecca Dufour** – *Professional Learning Communities at Work* (2008)
- ~**Mike Mattos, Austin Buffum, Chris Weber** – *Pyramid of Response to Intervention* (2009)

Factors to Consider in Creating Meaningful Curriculum Mapping, Pacing, Formative/Summative Assessment, and Lesson Plans

Arizona Highly-Proficient Student-Engagement Verbs

Students as Problem Solvers

ANALYZE	DERIVE	DISCOVER	EVALUATE	EXPLORE
INVESTIGATE	PREDICT	SOLVE	SURVEY	VERIFY

Students Reasoning as Thinkers

CATEGORIZE	CLASSIFY	COMPARE	CONTRAST	DIFFERENTIATE
DESCRIBE	ESTIMATE	EXPLAIN	GENERALIZE	INTERPRET
JUSTIFY	ORDER	HYPOTHESIZE	PREDICT	INFER
PRIORITIZE	RANK	VALIDATE	SUMMARIZE	CITE EVIDENCE

Students as Communicators

CLARIFY	CORRESPOND	DESCRIBE	DISCUSS	DEMONSTRATE
EXHIBIT	EXPLAIN	EXPRESS	PERSUADE	PORTRAY
RESTATE	SHOW	SPEAK	STATE	WRITE
COLLABORATE				

DAN MULLIGAN, 2016 – 2017

Standard	Emerging 1	Developing 2	Proficient 3	Distinguished 4	Where am I?
3.G.A [1 to 2]	I can identify examples of quadrilaterals, recognize that examples of quadrilaterals have shared attributes, and that the shared attributes can define a larger category. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole (limited to halves and quarters).	I can understand the properties of quadrilaterals and the subcategories of quadrilaterals. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole (limited to halves, quarters, and eighths).	I can recognize and sort examples of quadrilaterals that have shared attributes and that the shared attributes can define a larger category. I can draw examples of quadrilaterals that don't belong to the categories of rhombuses, rectangles, and squares. I can partition shapes into parts with equal areas and express the area as a unit fraction (with denominators of 2, 3, 4, 6, or 8) of the whole.	I can recognize and sort examples of quadrilaterals that have shared attributes and that the shared attributes can define a larger category. I can draw examples and non-examples of quadrilaterals that are not rhombuses, rectangles, or squares. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole.	

Standard	Emerging 1	Developing 2	Proficient 3	Distinguished 4	Where am I?
4.G.A [1 to 3]	I can identify points, lines, line segments, rays, perpendicular, and parallel lines, two-dimensional figures, including right triangles, and line symmetric regular figures. I can classify angles (right, acute, obtuse).	I can identify and draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular, and parallel lines. I can classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines. I can identify triangles. I can draw lines of symmetry for regular two-dimensional figures.	I can draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular, and parallel lines. I can identify the above in two-dimensional figure. I can classify two-dimensional figures based on the presence or absence of angles of specific size. I can draw lines of symmetry for any two-dimensional figures.	I can create a two-dimensional shape when given specific attributes, including the presence or absence of parallel or perpendicular lines, the presence or absence of angles or specified size, and particular lines of symmetry.	

MATH ITEM SPECIFICATION

DOK LEVEL OF MATH ITEMS

According to the Arizona Department of Education, "DOK refers to the level of rigor or sophistication of the task in a given item, designed to reflect the complexity of the AzCCRS.

- Items at **DOK level 1** focus on the recall of information, such as definitions, terms, and simple procedures.
- Items at **DOK level 2** require students to make decisions, solve problems, or recognize patterns; in general, they require a greater degree of engagement and cognitive processing than items at DOK 1.
- Items at **DOK level 3** feature higher-order cognitive tasks that assess students' capacities to approach abstract or complex problems.

Grade	PERCENTAGE OF POINTS BY DEPTH OF KNOWLEDGE (DOK) LEVEL		
	DOK 1	DOK 2	DOK 3
3	10% to 20%	60% to 70%	12% to 30%
4	10% to 20%	60% to 70%	12% to 30%
5	10% to 20%	60% to 70%	12% to 30%
6	10% to 20%	60% to 70%	12% to 30%
7	10% to 20%	60% to 70%	12% to 30%
8	10% to 20%	60% to 70%	12% to 30%

PERCENT OF ITEMS BY STRAND

Grade	STRAND MINIMUM & MAXIMUM PERCENT OF ITEMS			
	Measurement and Data & Geometry	Numbers and Operations - Fractions	Numbers and Operations in Base Ten	Operations and Algebraic Thinking
3	26% to 30%	18% to 22%	49% to 53%	
4	15% to 19%	29% to 33%	24% to 28%	22% to 26%
5	26% to 35%	26% to 35%	38% to 42%	

Grade	Expressions and Equations	Geometry, Statistics & Probability	The Number System	Ratio and Proportional Relationships
6	29% to 33%	17% to 21%	25% to 29%	19% to 23%

Grade	Expressions and Equations	Geometry	The Number System	Ratio and Proportional Relationships	Statistics & Probability
7	23% to 27%	12% to 16%	19% to 23%	19% to 23%	15% to 19%

Grade	Expressions and Equations	Functions	Geometry	Statistics, Probability & the Number System
8	32% to 36%	21% to 25%	23% to 27%	15% to 19%

MATH ITEM SPECIFICATION SAMPLE

The AzMERIT Assessments are composed of item formats that include traditional multiple- choice response items and technology-enhanced response items (TEI). TEIs are computer- delivered response items that require students to interact with test content to select, construct, and/or support their responses. TEIs are better able to assess a deeper level of understanding.

Currently, there are nine types of TEIs that may appear on the **Math Grade 5** computer based assessment for AzMERIT:

- ✓ Editing Tasks (ET)
- ✓ Editing Task Choice (ETC)
- ✓ Equation Editor (EQ)
- ✓ Graphic Response Item Display (GRID)
- ✓ Hot Text (HT)
    - Selectable Hot Text
    - Drag-and-Drop Hot Text
- ✓ Matching Item (MI)
- ✓ Multi-Select (MS)
- ✓ Open Response
- ✓ Table Item (TI)

|	
Content Standards	AzCCRS.Math.Content.5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
Explanations	None
Content Limits	Whole numbers Use only points located in the first quadrant of the coordinate plane. Plotting points given the ordered pair is aligned to 5.G.2
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is not allowed.	**Math Practices**	4, 6, 7

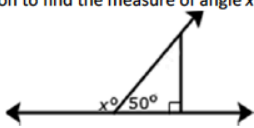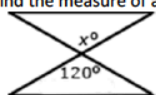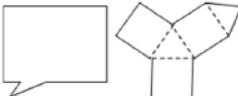| **Sample Task Demands**	**Common Item Formats**	**Recommended Math Practices**
Students will be required to find the coordinates of a point based on its distance from the origin in the direction of the axes.	• Graphic Response • Multiple Choice Response • Multi-Select Response	4, 6, 7
Students will be required to plot a point based on its distance from the origin in the direction of the axes.		4, 6, 7

Geometry (G)

Draw and identify lines and angles, and classify shapes by properties of their lines and angles

Standards *Students are expected to:*	Mathematical Practices	Explanations and Examples
4.G.A.1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. Connections: *4.MD.5; 4.MD.6; 4.G.2; ET04-S1C4-01*	**4.MP.5.** Use appropriate tools strategically. **4.MP.6.** Attend to precision.	Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students do not easily identify lines and rays because they are more abstract.
4.G.A.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. Connections: *4.MD.5; 4.MD.6; 4.G.1*		Two-dimensional figures may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement. Parallel or Perpendicular Lines: Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect in right angles (90°). Students may use transparencies with lines to arrange two lines in different ways to determine that the 2 lines might intersect in one point or may never intersect. Further investigations may be initiated using geometry software. These types of explorations may lead to a discussion on angles. *Continued on next page*

Geometry (G)

Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Standards *Students are expected to:*	Mathematical Practices	Explanations and Examples
7.G.B.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. Connection: *ET07-S1C4-01*	**7.MP.3.** Construct viable arguments and critique the reasoning of others. **7.MP.4.** Model with mathematics. **7.MP.5.** Use appropriate tools strategically. **7.MP.6.** Attend to precision. **7.MP.7.** Look for and make use of structure.	Angle relationships that can be explored include but are not limited to: • Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary. **Examples:** • Write and solve an equation to find the measure of angle *x*. • Write and solve an equation to find the measure of angle *x*.
7.G.B.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Connections: *6-8.WHST.2a; ET07-S1C4-01*	**7.MP.1.** Make sense of problems and persevere in solving them. **7.MP.2.** Reason abstractly and quantitatively. **7.MP.3.** Construct viable arguments and critique the reasoning of others. **7.MP.4.** Model with mathematics. **7.MP.5.** Use appropriate tools strategically. **7.MP.6.** Attend to precision.	Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations. **Examples:** • Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result? • A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class. *Continued on next page*

MATH 6 — Common Core Math Standards, Revised Bloom's Taxonomy, and Research-Based Strategies for Increasing Student Achievement in the 21st Century

Cognitive Domain	Remembering	Understanding	Applying	Analyzing RIGOR	Evaluating RIGOR	Creating RIGOR
Question Cues	Recognizing, listing, describing, identifying, retrieving, naming, locating, finding, googling, highlighting, favorite-ing, social networking	Interpreting, summarizing, inferring, explaining, paraphrasing, classifying, exemplifying, annotating, advanced searching, blog journaling, twittering, commenting	Implementing, carrying out, using, executing, running, loading, playing, operating, uploading for collaboration, sharing, editing	Comparing, organizing, deconstructing, attributing, outlining, finding, structuring, integrating, mashing resources, linking, cracking, mind-mapping, tagging	Checking, hypothesizing, critiquing, experimenting, judging, testing, detecting, monitoring, (Blog/vlog) commenting, reviewing, posting, moderating, collaborating, networking, reflecting	Designing, composing, constructing, planning, producing, devising, making, programming, filming, animating, Blogging, Video blogging, mixing, remixing, wiki-ing, publishing, videocasting, podcasting, directing
Research-Based Instructional Strategies	Similarities & Differences; Questions, Cues, & Advance Organizers; Homework & Practice	Nonlinguistic Representation; Similarities & Differences; Summarizing & Note Taking; Questions, Cues & Advance Organizers	Nonlinguistic Representation; Generating & Testing Hypotheses; Cooperative Learning	Generating & Testing Hypotheses; Similarities & Differences; Summarizing & Note Taking	Generating & Testing Hypotheses; Similarities & Differences; Summarizing & Note Taking; Setting Objectives & Providing Feedback; Nonlinguistic Representation	Generating & Testing Hypotheses; Summarizing & Note Taking; Cooperative Learning; Reinforcing Effort & Providing Recognition
Research-Based Assessment Strategies	Forced-Choice; TEI; Short Written Response	Forced-Choice; TEI; Short Written Response; Essay	Performance Assessment; Essay / TEI; Teacher Observation; Forced Choice	TEI; Essay; Short Written Response; Performance Assessment	Performance Assessment; Essay; Oral report; TEI	Student Self-Assessment; Essay; Performance Assessment; Teacher Observation; Oral Report
RP / NS / EE / G / SP	RP.1, EE.1, EE.2.a,b, EE.6, SP.2, SP.3,	RP.1, RP.2, RP.3a,c, NS.5, NS.6a,b,c, NS7c, EE.1, EE.2a, EE.4, G.2, SP.1, SP.2, SP.3, SP.4,	RP.3a,b,c,d, NS.1, NS.2, NS.3, NS.4, NS.8, EE.2c, EE.3, EE.5, EE.6, EE.7, EE.8, EE.9, G.2, G.3, SP.4,	RP.3b,c,d, NS.1, NS.4, NS.5, NS.7a,b,d, EE.8, G.1, G.2, SP.5a,d,	NS.1, NS7d, NS.8, EE.5, EE.8, G.4, SP.1, SP.5b,c,	NS.1, NS7b,c, NS.8, EE.2c, EE.6, EE.7, EE.8, G.1, G.2, G.3, G.4,

Unit and Time Frame / Learning Goals	Standards: Common Core GPS Correlation (DOK Level)	Essential Questions	Academic Vocabulary	Evidence of Learning: Projects/Activities using Differentiated Instruction and/or Multiple Intelligences/RBIS	Assessments: Embedded and other Formative	Resources
Springboard Algebra 1 Unit 1 Equations and Inequalities Aug. 3-26 **SpringBoard** *Algebra 1:* *Activity 1* *Algebra 1:* *Activity 2* *Algebra 1:* *Activity 3* **Learning Goal 1:** Students will be able to represent and interpret patterns from everyday life using tables, expressions and graphs. **Learning Goal 2:** Students will be able to write and solve equations and inequalities that represent real-world situations.	N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. N-Q.2 Define appropriate quantities for the purpose of descriptive modeling. N-Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. A-SSE.1 Interpret expressions that represent a quantity in terms of its context. A-SSE.1a Interpret parts of an expression, such as terms, factors and coefficients. A-SSE.1b Interpret complicated expressions by viewing one or more of their parts as a single entity. A-CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions and simple rational and exponential functions. A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	How can you represent patterns from everyday life by using tables, expressions, and graphs? How can you write and solve equations and inequalities?	• sequence • common difference • expression • variable • coefficient • substitution • equilateral • equation • solution • formula • literal equation • inequality • graph of an inequality • solution of an inequality • compound inequality • conjunction • disjunction • ordered pair • function	**August 3-24** **(16 days)** **Day 1: Unit 1** Overview/Unpack EA/Getting Ready **Day 2-3:** SpringBoard Algebra 1 Activity 1 **Day 4-8:** SpringBoard Algebra 1 Activity 2 **Day 9:** SpringBoard Algebra 1 Unit 1 EA1 **Day 10-12:** SpringBoard Algebra 1 Activity 3 **Day 13:** SpringBoard Algebra 1 Unit 1 EA2 **Day13:** SpringBoard Algebra 1 Unit 1 Review **Day 15-16: U1 Summative Assessment**	Equations and Inequalities Test - CR Equations and Inequalities Test - MC	

CREATING AN INCLUSIVE PACING GUIDE

Pacing at a Glance   Grade/Course _____

___ Quarter (suggested sequence; ____ days)

				Common formative assessment
Spiraling/Enrichment: See resource materials in reinforcement/extension guide □ □				
			Common formative assessment	Spiraling/Enrichment: See resource materials in reinforcement/extension guide □ □
			Common formative assessment	Spiraling/Enrichment: See resource materials in reinforcement/extension guide □ □
Adjustment to Pacing	Adjustment to Pacing	Adjustment to Pacing	District Common Summative Assessment	

Steps to create a FOCUSED and REAL Pacing Guide:

- Keep it real...use the district calendar and block-off days that contain instructional intrusions;
- Schedule formative assessment days and follow-up intervention/enrichment time;
- Schedule district mandated testing days
- Schedule state testing dates
- The new calendar is now REAL...
- Now place the POWER standards in the calendar (use the Arizona Performance Indicators where available) ...usually people are now in shock (because it is REALITY...)
- Teams now have to identify and place in a logical order the POWER standards...big ideas...concepts necessary for next grades
- The new document should be considered dynamic and open to revision

Avondale Grade 7

2016-2017 Pacing Guide

	Module 2 Aug 8 – Sep 14	Module 1 Sep 15 – Oct 28	Module 3 Oct 31 – Dec 16	Module 4 Jan 2 – Feb 1	Module 5 Feb 2 – Mar 10	Module 6 Mar 20 – May 26
	Rational Numbers	Ratios and Proportional Relationships	Expressions and Equations	Percent and Proportional Relationships	Statistics and Probability	Geometry
	28 days	27 days	29 days	23 days	27 days	45 days
	7.NS.A.1	7.RP.A.1	7.EE.A.1	7.RP.A.1	7.SP.A.1	7.G.A.2
	7.NS.A.2	7.RP.A.2	7.EE.A.2	7.RP.A.2	7.SP.A.2	7.G.B.5
	7.NS.A.3	7.RP.A.3	7.EE.B.3	7.RP.A.3	7.SP.B.3	7.G.B.6
	7.EE.A.2	7.EE.A.4	7.EE.B.4	7.EE.B.3	7.SP.B.4	
	7.EE.B.4	7.G.A.1	7.G.B.4	7.G.A.1	7.SP.C.5	
			7.G.B.5		7.SP.C.6	
			7.G.B.6		7.SP.C.7	
					7.SP.C.8	
	3 Topics	4 Topics	3 Topics	4 Topics	4 Topics	4 Topics
	22 Lessons	21 Lessons	26 Lessons	18 Lessons	19 Lessons	23 Lessons
	2 Assessment Days	4 Assessment Days	3 Assessment Days	5 Assessment Days	5 Assessment Days	5 Assessment Days

Major Clusters	Supporting Clusters	Additional Clusters
RP – Ratio and Proportional Reasoning (1, 2, 3) NS – The Number System (1, 2, 3) EE – Expressions and Equations (1, 2, 3, 4)	SP – Statistics and Probability (1, 2, 5, 6, 7, 8)	G – Geometry (1, 2, 3, 4, 5, 6) SP – Statistics and Probability (3, 4)

THE AVONDALE MATH REVISED CURRICULUM DOCUMENTS HAVE BEEN IMPROVED.

KEY OPPORTUNITY:

Grade 7 Blueprints

	Minimum	Maximum
Ratio & Proportional Relationships	19%/**21.5%**	23%/**21.3%**
The Number System	19%/**21.5%**	23%/**21.3%**
Expressions & Equations	23%/**26.0%**	27%/**25.0%**
Geometry, Statistics & Probability	27%/**30.7%**	35%/**32.4%**

COMMON CORE MATHEMATICS CURRICULUM   *A Story of Ratios* Curriculum Overview

Test Date		Grade 6	Grade 7	Grade 8	
9/6/12	20 days	M1: Ratios and Unit Rates (35 days)	M1: Ratios and Proportional Relationships (30 days)	M1: Integer Exponents and Scientific Notation (20 days)	20 days
10/10/12	20 days			M2: The Concept of Congruence (25 days)	20 days
11/8/12	20 days	M2: Arithmetic Operations Including Dividing by a Fraction (25 days)	M2: Rational Numbers (30 days)	M3: Similarity (25 days)	20 days
12/11/12	20 days	M3: Rational Numbers (25 days)	M3: Expressions and Equations (35 days)		20 days
1/17/13	20 days			M4: Linear Equations (40 days)	20 days
2/15/13	20 days	M4: Expressions and Equations (45 days)	M4: Percent and Proportional Relationships (25 days)		20 days
3/22/13	20 days		M5: Statistics and Probability (25 days)	M5: Examples of Functions from Geometry (15 days)	20 days
		M5: Area, Surface Area, and Volume Problems (25 days)		M6: Linear Functions (20 days)	
4/29/13	20 days		M6: Geometry (35 days)	M7: Introduction to Irrational Numbers Using Geometry (35 days)	20 days
5/28/13	20 days	M6: Statistics (25 days)			20 days
6/26/13					

Note that date approximations are based on a first student day of 9/6/12 and last day of 6/26/13.

Approx. test date for Grades 6-8

Key:	Number	Geometry	Ratios and Proportions	Expressions and Equations	Statistics and Probability	Functions

Showcase Moment:

1. Select a standard from the grade-level performance indicator rubric document.
2. Find the corresponding Avondale (Eureka) curriculum document NOTE: A sample document is provided on the next 2 pages if the Wi-Fi connection is weak.
3. Use the 'Proficient' and 'Distinguished' criteria to explore whether documents can be enhanced by adding specific skills.
4. Will this revision result in a revision in the current assessment of student mastery?
5. Will this revision result in a revision in the current learning (lesson Plan) prepared for students?
6. Enjoy working with your peers…challenge each other to stretch…

Grade 5 – Mathematics
2016 – 2017   Pacing Guide

Module 1 Aug 8–Sept 16	Module 2 Sept 19 – Nov 11	Module 3 Nov 14 – Dec 14	Module 4 Dec 15 –Feb 17	Module 5 Feb 21 – Mar 31	Module 6 Apr 3 - May 26
Place Value and Decimal Fractions	Multi-Digit Whole Number and Decimal Fraction Operations	Addition and Subtraction of Fractions	Multiplication and Division of Fractions and Decimal Fractions	Addition and Multiplication with Volume and Area	Problem Solving with the Coordinate Plane
30 days	35 days	22 days	37 days	25 days	40 days
5.NBT.A.1	5.OA.A.1	5.NF.A.1	5.OA.A.1	5.NF.B.4b	5.OA.A.2
5.NBT.A.2	5.OA.A.2	5.NF.A.2	5.OA.A.2	5.NF.6	5.OA.B.3
5.NBT.A.3	5.NBT.A.1		5.NBT.B.7	5.MD.C.3	5.G.A.1
5.NBT.A.4	5.NBT.A.2		5.NF.B.3	5.MD.C.4	5.G.A.2
5.NBT.B.7	5.NBT.B.5		5.NF.B.4a	5.MD.C.5	
5.MD.A.1	5.NBT.B.6		5.NF.B.5	5.G.B.3	
	5.NBT.B.7		5.NF.B.6	5.G.B.4	
	5.MD.A.1		5.NF.B.7		
			5.MD.A.1		
			5.MD.B.2		
6 Topics	8 Topics	4 Topics	8 Topics	4 Topics:	5 Topics
16 Lessons	27 Lessons	14 Lessons	31 Lessons	19 - 20 Lessons	34 Lessons
2 Assess. Day	2 Assess. Day	2 Assess. Day	2 Assess. Day	2 Assess. Day	2 Assess. Day

Major Clusters	Supporting Clusters	Additional Clusters
NBT – Number and Operations in Base Ten (1, 2, 3, 4, 5, 6, 7) NF – Number and Operations – Fractions (1, 2, 3, 4, 5, 6, 7) MD – Measurement and Data (3, 4, 5)	MD – Measurement and Data (1, 2)	OA – Operations and Algebraic Thinking (1,2,3) G – Geometry (1,2,3,4)

Standard	Emerging 1	Developing 2	Proficient 3	Distinguished 4	Where am I?
5.G.A [1 to 2]	I can identify the key components of the coordinate plane (x-axis, y-axis, x-coordinate, y-coordinate, and origin). I can locate given points in the first quadrant of the coordinate plane.	I can interpret coordinate values of points in the first quadrant (e.g., reading line graphs), in context.	I can represent real-world and mathematical problems by locating and graphing points in the first quadrant of the coordinate plane.	I can use real-world data, create a representation and draw conclusions based on the data presented.	
5.G.B [3 to 4]	I can identify two-dimensional figures based on properties limited to sides and angles.	I can classify some two-dimensional figures into categories based on their properties (sides and angles).	I can understand that attributes belonging to a category of two-dimensional figures also belongs to all subcategories of that category. I can classify two-dimensional figures in the hierarchy based on their properties.	I can draw or construct specific two-dimensional figures according to the definitions provided, attributes described, or categories given.	

A Story of Units®

Eureka Math™

Grade 5, Module 5

Teacher Edition

5 GRADE **Mathematics Curriculum**

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GRADE 5 • MODULE 5

Addition and Multiplication with Volume and Area

2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
LITERARY TERMS	1	2	3	4	5	6
7 *Write For 5: You must write and share at least five times this quarter. A minimum of five free writes will be offered; any over five that you do will be classified as bonus. **Remember that this is a grade at the end of the quarter.**	**8**	**9** SOL: 9.3B; 9.6A,B *2ND SEMESTER BEGINS *Class Expectations & Procedures *Context Clues (Steps 1 & 2) *Literature: Read "The Most Dangerous Game" for 2-12 *HW: Get Syllabus Review Paper signed (due by 2-12)	**10** SOL: 9.3B; 9.7A *Context Clues Pre-Test *Context Clues (Step 3) *Grammar: Simple Sentences (Steps 1 & 2) *HW: Context Clues (Step 4) (due: Thursday, 2-11)	**11** SOL: 9.3B; 9.7A *Check Context Clues (Step 4) *Grammar Entrance Slip *Grammar: Simple Sentences (Steps 3 & 4) *HW: Context Clues (Step 5) (due: Friday, 2-12)	**12** SOL: 9.3B; 9.4E; 9.7A *Check Context Clues (Step 5) & Review *Grammar: Simple Sentences (Step 5) (finish for HW) *Literature: Begin Story Frame ("Most Dangerous Game")	**13**
14 Happy Valentines Day!	**15** SOL: 9.3A,B; 9.4E; 9.7A *Grammar: Simple Sentences (Check Step 5) *Vocabulary: Begin Unit 1 (Nonfiction Context Clues Analysis) *Literature: Story Frame & "Most Dangerous Game" *HW: Word Analysis Chart for Unit 1 (due: Wednesday, 2-17)	**16** SOL: 9.6A,C; 9.7A *Grammar: Simple Sentences: Prepositions (Step 2) *Writing: Begin Expository Essay (School Rules) *Thesis Statement Review (Thesis Statement due Wednesday, 2-17)	**17** SOL: 9.3A,B; 9.4E; 9.7A *Grammar: Simple Sentences: Prepositions (Step 5) *Word Analysis Chart 1 due *Thesis Statement due *Literature: Story Frame *HW: "Choosing the Right Word" for Unit 1 (due: Thursday, 2-18)	**18** SOL: 9.6B; 9.7A *Go over grades *Grammar: Simple Sentences: Prepositions (Step 5) *"Choosing...Word"1 due *Writing: Outline (due: Mon., 2-22) *HW: "Vocabulary in Context" for Unit 1 (due: Friday, 2-19)	**19** SOL: 9.3A,B; 9.4E; 9.7A *Check Grades *"Vocabulary...Context" 1 due *Vocabulary: Unit 1 test *Grammar: Simple Sentences: Prepositions (Step 5) *Literature: Story Frame due	**20**
21	**22** SOL: 9.3A,B; 9.6D-G *Outlines due *Vocabulary: Unit 2 (Nonfiction Context Clues Analysis) *Writing: Composition (Rough Drafts due Friday, 2-19) *HW: Word Analysis Chart 2 (due: Wednesday, 2-24)	**23** SOL: 9.5C; 9.6A,B; 9.7A *Grammar: Simple Sentences: Conjunctions (Step 2) *Write For 5 *Literature: Nonfiction (Steps 1 & 2) (Paired Passages)	**24** SOL: 9.5C; 9.6A,B; 9.7A *Word Analysis Chart 2 due *Grammar: Simple Sentences: Conjunctions (Step 2) *Literature: Nonfiction (Steps 1 & 2) (Paired Passages) *HW: "Choosing-Word" 2 (due: Thursday, 2-25)	**25** SOL: 9.3A,B; 9.5C; 9.7A *Go over grades *"Choosing...Word" 2 due *Grammar: Simple Sentences: Conjunctions (Step 3) *Literature: Nonfiction (Step 3) *HW: "Vocabulary-Context" 2 (due: Friday, 2-26)	**26** SOL: 9.3A,B; 9.6D-G *Check Grades *Expository Rough Drafts due (end of class) *"Vocabulary...Context" 2 due *Vocabulary: Unit 2 test	**27**
28 *NOVEL: *To Kill a Mockingbird* by Harper Lee	**29** SOL: 9.3A,B; 9.6F-H; 9.7A *Vocabulary: Unit 3 (Nonfiction Context Clues Analysis) (NF: Steps 1-3) *Writing: Revision Meetings *Grammar: Simple Sentences: Verbs & Objects (Step 2) *HW: Word Analysis Chart 3 (due: Wednesday, 3-2)	**1** SOL: 9.6F-H; 9.7A *Grammar: Simple Sentences: Verbs & Objects (Step 5) *Writing: Work on Expository Final Copy (due: end of class)	**2** SOL: 9.3A,B; 9.5C; 9.6A,B *Word Analysis Chart 3 due *Write For 5 *Literature: Nonfiction (Step 4) *HW: "Choosing-Word" 3 (due: Thursday, 3-3)	**3** SOL: 9.3A,B; 9.5C; 9.7A *Go over grades *"Choosing...Word" 3 due *Grammar: Simple Sentences: Verbs & Objects (Step 5) *Literature: Nonfiction (Step 5) *HW: "Vocabulary-Context" 2 (due: Friday, 3-4)	**4** SOL: 9.3A,B; 9.4G,I; 9.6A,B *Check Grades *"Vocabulary...Context" 3 due *Vocabulary: Unit 3 test *Write For 5 *Literature: 1st novel distributed & background information provided	**5** INTERIMS MARCH 9TH

What would you include in a parent/student pacing/cubiculum map? Why?…explain…

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1 MWMR= Mondays with Mrs. Richards	**2** *Harlem Renaissance *MWMR: *Current Events & Celebrations* SOL: USII.6.c	**3** TEACHER WORK DAY NO SCHOOL FOR STUDENTS	**4** *Great Depression *INB-USII.6.d *HW: Wkst. Harlem Renaissance SOL: USII.6.d	**5** *New Deal *INB-USII.6.d HW: Wkst. New Deal *GAME TIME **End of Grading Period** TUTORING 3:30-5p CLASS MEETING SOL: USII.6.d	**6** *Performance-Based Assessment	**7** GAME Time: Every Friday teacher will meet with students & review: Grades Agenda Missing Work & Evaluate progress
8 Homework: Every Tuesday and Thursday.	**9** *Section IV-Ch. 15 & 16 Quiz *MWMR: *Current Events & Celebrations* SOL: USII.6.a & 6.b	**10** *Section IV-Ch. 17 & 18 Quiz HW: None TUTORING 3:30-5p SOL: USII.6.c & 6.d	**11** *Response Papers: completed in class SOL: USII.6.c	**12** *Benchmark Review HW: None **Report Cards** TUTORING 3:30-5p CLASS MEETING SOL: USII.2.b-6.d	**13** *Benchmark Review Vocab 5 Review Flash Cards *GAME time SOL: USII.2.b-6.d	**14**
15 Parent/Guardian Visitation Day in History Class	**16** *BENCHMARK THINKING CAP SOL: USII.2.b-6.d	**17** *Causes of WWII Neutrality, Early Action (Review 5.c WWI) *INB-USII.7.a *MWMR: *Current Events & Celebrations* HW: Wkst. WWII TUTORING 3:30-5p SOL: USII.7.a	**18** *Causes of WWII (Fascism, Change in American Policy, Pearl Harbor) *INB-USII.7.a*INB-USII.7.b VISIT HISTORY CLASS SOL: USII.7.b	**19** *Major Events WWII HW: Wkst. The Holocaust TUTORING 3:30-5p CLASS MEETING SOL: USII.7.b	**20** *The Holocaust *INB-7.b *GAME time SOL: USII.7.c	**21** HOMEWORK HELP & TUTORING: Begins in October; Tuesdays & Thursdays after school. Permission slip required.
22 Interactive Notebook: Students will create, maintain, and use as an assessment study tool. (INB)	**23** *WWII American Home front (Review 5.c WWI) *INB-7.c *MWMR: *Current Events & Celebrations* SOL: USII.7.a-7.c	**24** *"Redtail Reborn" HW: NONE NO TUTORING SOL: USII.7.b	**25** HOLIDAY NO SCHOOL	**26** Give Thanks Happy Thanksgiving	**27** HOLIDAY NO SCHOOL	**28**
29	**30** *Post WWII Rebuilding; United Nations *MWMR: *Current Events & Celebrations* SOL: USII.8.a	**1**	**2**	**3**	**4**	Class Meeting: Will be held every Thursday; see handout for explanation

PURPOSEFUL FORMATIVE ASSESSMENT

The BIG Idea

There are two reasons why we assess:
- To inform instructional decisions (what will we say or do next for each student?)
- To encourage each student to try.

Definition
> *is a process used by teachers and students <u>during instruction</u> that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes* (Perie et al., 2007)

Uses
> Classroom teachers use to diagnose where students are in their learning, where gaps in knowledge and understanding exist, and how to help teachers and students improve student learning
> The assessment is embedded within the learning activity and linked directly to the current unit of instruction
> Tasks presented may vary from student to student depending on teacher's judgment about the need for specific information

STUDENTS	TEACHERS
Understand the target (Focus on learning goals)	Select and clearly communicate the learning target
Produce work	Make at least one task
Compare the work with the target	Compare student performance with the target or goal
Evaluate current strengths and areas of opportunity for growth	Evaluate students' current strengths and areas of opportunity for growth
Participate in developing action plan for improvement	Provide clear oral and written feedback and develop action plan
Take action for improvement: practice, guided group, rewrite, etc.	Support or assign action to seize opportunity to improve student achievement

POST ASSESSMENT DATA PROTOCOL

LOOKING AT OURSELVES

STRENGTHS	Looking at scores across all the classes, what collective strengths can we celebrate?	Why were students successful in these areas? What did we do to promote these successes?	What are our commitments to action to build on these strengths?
OPPORTUNITIES	Looking at scores across all the classes, what collective weaknesses do we see?	Why did students struggle in these areas? In what areas do we need more impactful strategies?	What are our commitments to action to improve on these weaknesses?
LEARNING FROM EACH OTHER	Looking at scores between classes, what are the relative strengths we can grow from?	What contributed to the class' strength for that item?	What are our commitments to action to grow?

CHARTING OUR STUDENTS' PROGRESS

1 – Prioritize

What standard(s) did the most students struggle with?

2 – SPIRAL

When will you be able to re-teach these three standards to the class in small chunks on a regular basis? (e.g. For the first 10 minutes of each class, we will review two similar items until at least 80% of the class can consistently get these accurate independently)

3 – DIFFERENTIATE

Create a chart of the next three most difficult standards for my students and determine who needs help with those. When can I reteach in a small group for those who need it? (e.g. Pull a small group during independent work time each day for 10-15 minutes)

Student	Standard x.x	Standard y.y	Standard z.z
A	X	X	
B		X	X
C	X		
D	X		X
E			
F…	X	X	x

(For example, pull students A, C, D, F for standard x.x on Monday and Tuesday; students A, B, F for standard y.y on Wednesday and Thursday; students B, D, F for standard z.z on Friday)

Student ENGAGEMENT Folder:
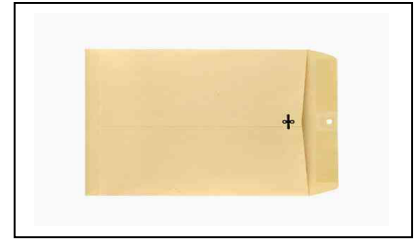
For each student, laminate a manila envelope and then slit the laminated sealed opening with a sharp tool. Fold then glue the envelope in each student's interactive notebook.

Suggested items for the SEF:

- ✓ *A laminated piece of light-colored construction paper – this serves as a simple whiteboard for students.*
- ✓ *A flannel square or sock – this serves as a dry eraser for the construction paper whiteboard.*
- ✓ *A dry-erase pen – these are available in thin styles to cause less bulk in the envelope.*
- ✓ *True/Not True/True with Modifications/Unable to Determine (based on information learned) Hold-Up Cards – These can be used throughout the year as a quick check.*
- ✓ *Multiple-Choice Hold-Up Cards (ABCD/FGHJ) – These can be used throughout the year as a quick check.*
- ✓ *Deck of paper-clipped number cards – These cards can be used for hold-ups or to express 'comfort' with a topic.*
- ✓ *A completed appointment agenda – This chart is useful for quickly 'shaking-up' a class. Students are pre-assigned to a series of groups (each cluster having a designation name.*
- ✓ *The Processing Card (Ready to Share/Still Thinking) – This card is another tool that students can use to express their level of understanding.*
- ✓ *A laminated hundreds chart – For elementary school and middle school children, this chart allows you to plan activities that build number sense. For example, students use a dry-erase pen and the chart to circle common multiples, common factors, prime numbers, skip count, and other activities that demonstrate number relationships.*
- ✓ *A laminated A – Z Chart – For early childhood classrooms, this chart allows all students to point to initial, middle, and ending sounds, and to find letters and sounds as directed by the teacher. For upper-elementary and secondary classrooms, this chart is a brainstorming strategy that allows students to generate as many words that relate to the topic as they can that begin with each letter of the alphabet.*
- ✓ *Laminated content-related charts – Examples include a periodic table of elements, formula pages in secondary math, a timeline, a map, or other grade-level or content tool that can be used repeatedly.*
- ✓ *A smaller envelope with pieces of scrap paper or index cards – These are used for Quick-Writes, Quick-Draws, on-the spot Hold-Ups, collecting ideas from peers. They can be glued into interactive notebooks.*
- ✓ *Bounce Cards – These are useful to elevate thinking in student – student dialogue,*
- ✓ *Think Pad sheet – To capture each student's thinking…How do you know?*

STEPS TO CREATE A BALANCED ASSESSMENT SYSTEM - THE ARIZONA EDITION

Step BAS1:	Identify the essential knowledge, vocabulary, skills, & processes of the state, district, and/or school standards to be assessed

Essential Knowledge (What each student should know)	**Essential Skills** (What each student should be able to do)	**Essential Vocabulary** (What each student should be able to communicate)

Step BAS2:	Determine the assessment type based on the desired feedback.

We assess to inform instructional decisions and to encourage students to try. Use the chart below to determine the <u>assessment that will provide valid and reliable feedback</u>:

Assessment Type	DOK/Bloom Alignment	Format	Usefulness and Resulting Evidence
Closed Tasks & Selected Response	**DOK 1** **Recall & Reproduction** **Bloom A/B** **Remembering, Understanding**	• Multiple Choice • True False • Fill-in-Blank • Solve (without showing work) • TEI	• Useful for assessing content-based standards (facts, knowledge, concepts) • Takes less time
Open Tasks & Constructed Response	**DOK 2** **Basic Skills & Concepts** **Bloom B/C** **Understanding, Applying**	• Tasks with different possible answers • Tasks with different possible processes • TEI	Useful for assessing ability to: • Use processes and strategies • Interpret information • Apply information • Reasoning • Communicate thinking
Performance Assessment	**DOK 3** **Strategic Thinking** **DOK 4** **Extended Thinking** **Bloom E, F** **Evaluate, Create**	• Integrative tasks that yield specific products • Real-life situations • Authentic assessments	Useful for assessing ability to: • Organize, synthesize, and apply information and skills • Use of resources • Cite specific evidence • Develop and justify solution path
Informal Assessment	**DOK 2** **Basic Skills & Concepts** **DOK 3** **Strategic Thinking** **Bloom B, D** **Understand, Analyze**	• Teacher observations • Teacher/Student Rubrics • Conversations • Interviews • Portfolio	Depending on what is discussed or observed, these may reveal: • Process/thinking used to accomplish task • Understanding of a topic or concept • Ability to communicate and collaborate
Self-Assessment or Reflection	**DOK 3** **Strategic Thinking & Reasoning** **Bloom E** **Evaluate**	• Student journals or interactive Notebooks • Student checklists/observations • Daily or weekly self-evaluation • Teacher/Student interview	• Develops student awareness of strengths and opportunities to improve; conscious use of thinking skills • Can illustrate progress, thinking, and reasoning • Reveals student disposition • Sets personal goals

1.G.A.3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of, fourth of,* and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Connections: *1.RI.3; 1.RI.4; 1.SL.1; 1.SL.2; ET01-S2C1-01*

Fraction Fill In

Materials: fraction spinner (paperclip), game board, crayons

Directions:

Students may play with a partner or in a small group. Each player will spin the spinner and choose a shape. They will name the shape and color the fraction the spinner lands on. Example: "I will color one fourth of the hexagon". If the spinner lands on "Lose a Turn" then the student will not color any fraction. If a shape is completely filled in then the shape is complete. The first player to complete all the shapes wins!
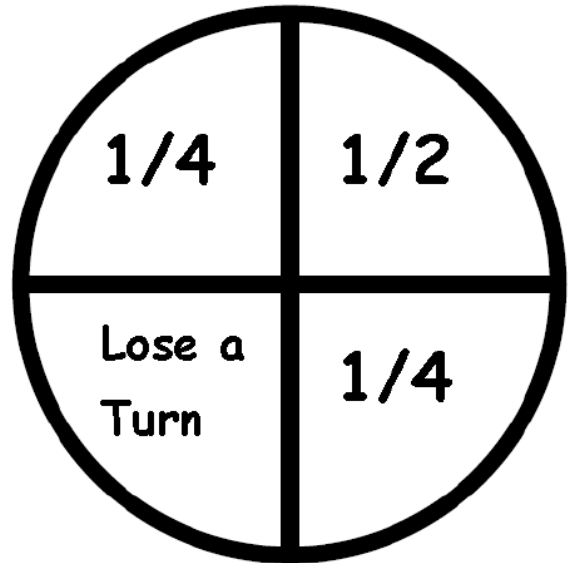
Name: _____   Date: _____
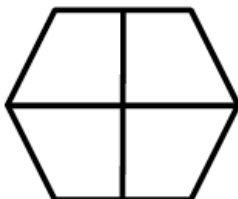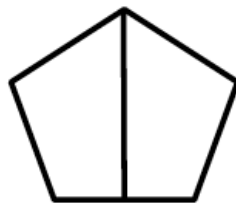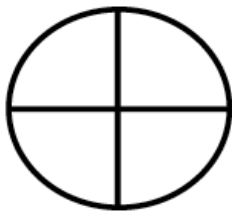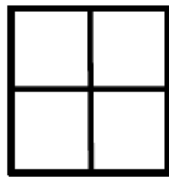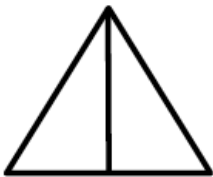
Record your thinking below:

DOES THIS STRUCTURE EFFECTIVELY ADDRESS THIS STANDARD? HOW COULD THIS STRUCTURE BE EXTENDED FOR STUDENTS?

Common Core Math Process Skills

Process Skill *and student actions*	What does this *'Math Talk'* sound like?
Make sense of problems and persevere in solving them. • Interpret and make meaning of the problem to find a starting point. Analyze what is given in order to explain to themselves the meaning of the problem. • Plan a solution pathway instead of jumping to a solution. • Monitor their progress and change the approach if necessary. • See relationships between various representations. • Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another. • Continually ask themselves, "Does this make sense?" • Can understand various approaches to solutions.	1. How would you describe the problem in your own words? 2. How would you describe what you are trying to find? 3. What do you notice about...? 4. What information is given in the problem? 5. Describe the relationship between the quantities. 6. Describe what you have already tried. What might you change? 7. Talk me through the steps you've used to this point. 8. What steps in the process are you most confident about? 9. What are some other strategies you might try? 10. What are some other problems that are similar to this one? 11. How might you use one of your previous problems to help you begin? 12. How else might you organize...represent... show...?
Reason abstractly and quantitatively. • Make sense of quantities and their relationships. • Decontextualize (represent a situation symbolically and manipulate the symbols) and contextualize (make meaning of the symbols in a problem) quantitative relationships. • Understand the meaning of quantities and are flexible in the use of operations and their properties. • Create a logical representation of the problem. • Attends to the meaning of quantities, not just how to compute them.	1. What do the numbers used in the problem represent? 2. What is the relationship of the quantities? 3. How is _____ related to _____? 4. What is the relationship between _____ and _____? 5. What does_____mean to you? (e.g. symbol, quantity, diagram) 6. What properties might we use to find a solution? 7. How did you decide in this task that you needed to use...? 8. Could we have used another operation or property to solve this task? Why or why not?
Construct viable arguments and critique the reasoning of others. • Analyze problems and use stated mathematical assumptions, definitions, and established results in making arguments. • Justify conclusions with mathematical ideas. • Listen to the arguments of others and ask useful questions to determine if an argument makes sense. • Ask clarifying questions or suggest ideas to improve/revise the argument. • Compare two arguments and determine correct or flawed logic.	1. What math evidence would support your solution? 2. How can we be sure that...? / How could you prove that...? 3. Will it still work if...? 4. What were you considering when...? 5. How did you decide to try that strategy? 6. How did you test whether your approach worked? 7. How did you decide what the problem was asking you to find? (What was unknown?) 8. Did you try a method that did not work? Why didn't it work? Would it ever work? Why or why not? 9. What is the same and what is different about...? 10. How could you demonstrate a counter-example?

Process Skill *and student actions*	What does this *'Math Talk'* sound like?
Model with mathematics. • Understand this is a way to reason quantitatively and abstractly (able to decontextualize and contextualize). • Apply the mathematics they know to solve everyday problems. • Are able to simplify a complex problem and identify important quantities to look at relationships. • Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation. • Reflect on whether the results make sense, possibly improving/revising the model. • Ask themselves, "How can I represent this mathematically?"	1. What number model could you construct to represent the problem? 2. What are some ways to represent the quantities? 3. What is an equation or expression that matches the diagram, number line.., chart..., table..? 4. Where did you see one of the quantities in the task in your equation or expression? 5. How would it help to create a diagram, graph, table...? 6. What are some ways to visually represent...? 7. What formula might apply in this situation?
Use appropriate tools strategically. • Use available tools recognizing the strengths and limitations of each. • Use estimation and other mathematical knowledge to detect possible errors. • Identify relevant external mathematical resources to pose and solve problems. • Use technological tools to deepen their understanding of mathematics.	1. What mathematical tools could we use to visualize and represent the situation? 2. What information do you have? 3. What do you know that is not stated in the problem? 4. What approach are you considering trying first? 5. What estimate did you make for the solution? 6. In this situation would it be helpful to use...a graph..., number line..., ruler..., diagram..., calculator..., manipulative? 7. Why was it helpful to use...? 8. What can using a _____ show us that _____may not? 9. In what situations might it be more informative or helpful to use...?
Attend to precision. • Communicate precisely with others and try to use clear mathematical language when discussing their reasoning. • Understand the meanings of symbols used in mathematics and can label quantities appropriately. • Express numerical answers with a degree of precision appropriate for the problem context. • Calculate efficiently and accurately.	1. What mathematical terms apply in this situation? 2. How did you know your solution was reasonable? 3. Explain how you might show that your solution answers the problem. 4. What would be a more efficient strategy? 5. How are you showing the meaning of the quantities? 6. What symbols or mathematical notations are important in this problem? 7. What mathematical language...,definitions..., properties can you use to explain...? 8. How could you test your solution to see if it answers the problem?

Process Skill *and student actions*	What does this *'Math Talk'* sound like?
Look for and make use of structure. • Apply general mathematical rules to specific situations. • Look for the overall structure and patterns in mathematics. • See complicated things as single objects or as being composed of several objects.	1. What observations do you make about...? 2. What do you notice when...? 3. What parts of the problem might you eliminate..., simplify...? 4. What patterns do you find in...? 5. How do you know if something is a pattern? 6. What ideas that we have learned before were useful in solving this problem? 7. What are some other problems that are similar to this one? 8. How does this relate to...? 9. In what ways does this problem connect to other mathematical concepts?
Look for and express regularity in repeated reasoning. • See repeated calculations and look for generalizations and shortcuts. • See the overall process of the problem and still attend to the details. • Understand the broader application of patterns and see the structure in similar situations. • Continually evaluate the reasonableness of their intermediate results	1. Explain how this strategy works in other situations? 2. Is this always true, sometimes true or never true? 3. How would we prove that...? 4. What do you notice about...? 5. What is happening in this situation? 6. What would happen if...? 7. Is there a mathematical rule for...? 8. What predictions or generalizations can this pattern support? 9. What mathematical consistencies do you notice ?

STEPS IN DESIGNING A PERFORMANCE ASSESSMENT - THE ARIZONA EDITION

Step 1:	Identify the essential knowledge, vocabulary, skills, & processes of the state, division, and/or school standards to be assessed

Essential Knowledge (What each student should know)	Essential Skills (What each student should be able to do)	Essential Vocabulary (What each student should be able to communicate)

Step 2:	Determine the most effective form of assessment based on learning goals

In order to engage each student in the assessment, create scenarios within a meaningful context – use meaningful real life situations. The prompt should include:

<div align="center">

Setting and Role
Goal or Challenge
Product/Performance and Purpose
Intended Audience

</div>

Step 3:	Determine criteria for each level of success

- ✓ Identify what each student needs to be able to do to succeed
- ✓ Determine the scoring method – rubric, checklist, or point system that will be used and shared with students
- ✓ Review and discuss the identified elements and scoring scale with students prior to the assessment (*consider student input into rubric/scale development*)
- ✓ Explain and clarify the quality of work expected
- ✓ Display actual student responses that demonstrate the key characteristics of an exemplary response

Step 4:	Revise based on experience and student feedback

Evaluate the success of the assessment by asking:	What evidence can you cite?
✓ How does essential classroom instruction/learning need to change?	
✓ Does the prompt need to be revised?	
✓ Does the scoring method need to be revised	
✓ Did the students understand how their work would be scored?	
✓ What feedback can students give concerning this assessment?	
✓ What differentiation/scaffolding should be made for individual/groups of students?	

GRADE 3

Detailed	3.NF.A [1 to 2b]	Identifies the numerator and denominator of a fraction or a fraction on a number line where the increments are equal to the denominator.	Identifies the meaning of the numerator and denominator of a fraction. Represents a fraction on a partitioned number line.	Understands 1/b is equal to one part when the whole is partitioned into b equal parts (where the denominators are 2, 3, 4, 6 or 8). Represents a fraction on a number line by partitioning into equal parts.	Applies understanding of unit fractions to real world situations and problems. Represents a set of fractions with unlike denominators on a number line by partitioning into equal parts.

Task 1: Flower Garden

Mrs. Wu owns a flower shop and grows flowers in a local garden. The garden is divided into sections. Each section grows a different color flower.
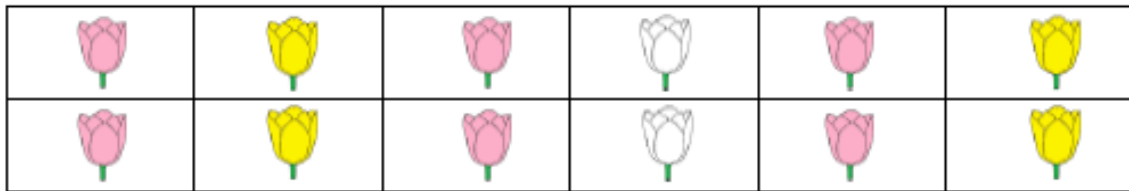
Part A: Mrs. Wu needs to determine what fraction of the garden is used to grow each different color.

A1.   Write the fraction represented by each section of color of flower in the garden.

White Flowers	—
Yellow Flowers	—
Pink Flowers	—

A2.   Write a comparison of the fractional part of white flowers to yellow flowers using the "<" symbol provided.

—	<	—

Part B: The flower shop wants to use half the garden for pink flowers and half the garden for yellow flowers.

B1.   Explain what change would need to be made for the flower shop to use half the garden for pink flowers and half the garden for yellow flowers.

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Task 2: Running Laps

Keaton wants to train to run in the local half marathon. Her training will also allow her to join the school running team. Keaton trains by running around the block of her home. Keaton ran around the block of her home 8 times to complete 1 mile.

Part A: Use the number line below to show the distance Keaton ran.

A1.   Label each mark on the number line to show the fraction of the mile each time Keaton ran around the block.
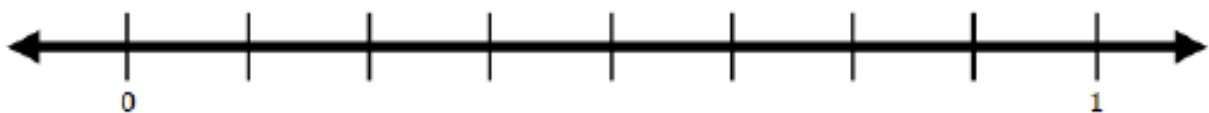
A2.   How many times will Keaton need to run around the block to complete $\frac{3}{8}$ of a mile? Explain how you found your answer.

Part B: Keaton marked the number line with an **A** to show the distance she ran on Tuesday.
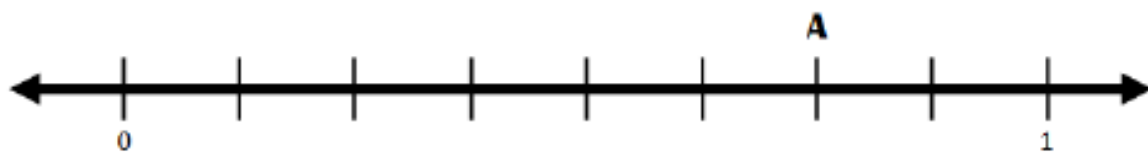
B1.   On Wednesday, Keaton ran $\frac{4}{8}$ of a mile. Create a comparison using <, > or = to represent the distance Keaton ran on Tuesday and the distance she ran on Wednesday.

—		—

Task 2: Running Laps

Scoring Rubric

Score	Description
4	**Exceeds Expected Proficiency** I have answered completely and correctly all aspects of the question. My responses effectively communicate my mathematical understanding. My strategies and ability to carry out my strategies meet the content demands of all parts of the task.
3	**Proficient** I have answered some aspects of the question completely and correctly. My responses demonstrate adequate evidence and understanding necessary to complete the task with minor errors in execution. I demonstrate some mathematical understanding and will be able to revise my work with discussion and/or feedback from my peers or teacher. My errors may include: • Incomplete justifications for written responses • Incorrectly labeling part of the number line • Minor error in fractional comparison in Part B
2	**Not Yet Proficient** Many of my answers do not provide complete and correct responses. I demonstrated effort to complete the task; however, there are many conceptual errors throughout the task. My work will require significant revisions. My errors may include: • Incomplete justifications for written responses • Incorrectly labeling the number line • Error in identifying factional representations in Part B
1	**Limited Proficiency** I attempted to complete the task, but do not understand the concepts or the directions of the task. I demonstrated some effort, and made some connections to the content. After discussing the task with my peers or the teacher, I will need to re-attempt the task.
0	**No Proficiency** I did not attempt the task. I do not understand the concepts or the directions of the task.

Comments:	
(Student Notes)	(Teacher Notes)

LESSON PLAN FRAMEWORK

Grade Level:	
Subject:	

Standard(s) What is it we want the students to know and be able to do?

DOK Level of Standard(s):

Essential Vocabulary

Background Vocabulary – these are words we will use to explain the new concepts –check for understanding	New Vocabulary – these are terms essential to understanding the new concepts

Assessment: What will students do to provide evidence of their level of proficiency in owning the essential understandings at the stated DOK level? How will we know when they have learned it?

FRAMEWORK FOR LEARNING

Essential Question(s) (this is the driving question to frame the learning process)

How will we respond it our students already know it?
What will students do to remain actively engaged with this content?

How will we check for and build students' background knowledge?
What will students do to connect new learning to prior knowledge?

What will we do to assist student's as they acquire understanding?
What will students do to provide evidence of understanding?

What will we do to facilitate students as they explain their understanding and extend their thinking?
How will students summarize and apply knowledge?

What will we do if our students have not learned it?
How will students develop mastery?

VERBS AND PRODUCTS BY QUADRANT (DOK) OF THE LEARNING FRAMEWORK

C (DOK 3) STUDENT THINKS

VERBS	PRODUCTS
Analyze	Essay
Compare	Abstract
Examine	Blueprint
Contrast	Inventory
Differentiate	Report
Explain	Plan
Dissect	Chart
Categorize	Investigation
Classify	Questionnaire
Diagram	Classification
Discriminate	

D (DOK 4) STUDENT THINKS AND WORKS

VERBS	PRODUCTS
Evaluate	Evaluation
Formulate	Newspaper
Justify	Estimation
Rate	Trial
Recommend	Editorial
Infer	Radio Program
Prioritize	Play
Revise	Collage
Predict	Machine
Argue	Adaptation
Conclude	Poem
	Debate
	New Game
	Invention

A (DOK 1) TEACHER WORKS

VERBS	PRODUCTS
Name	Definition
Label	Worksheet
Define	List
Select	Quiz
Identify	Test
List	Workbook
Recite	True-False
Locate	Reproduction
Record	Recitation
Memorize	

B (DOK 2) STUDENT WORKS

VERBS	PRODUCTS
Apply	Scrapbook
Sequence	Summary
Demonstrate	Interpretation
Interview	Collection
Construct	Annotation
Solve	Explanation
Calculate	Solution
Dramatize	Demonstration
Interpret	Outline
Illustrate	

VERBS AND PRODUCTS BY QUADRANT (DOK)

Ask questions to summarize, analyze, organize, or evaluate:

- How are these similar/different?
- How is this like___?
- What's another way we could say/explain/express that?
- What do you think are some reasons/causes that ___?
- Why did ___ changes occur?
- How can you distinguish between ___?
- What is a better solution to ___?
- How would you defend your position about ___?
- What changes to ___ would you recommend?
- What evidence can you offer?
- How do you know?
- Which ones do you think belong together?
- What things/events lead up to ___?
- What is the author's purpose?

Ask questions to predict, design, or create:

- How would you design a ___ to ___?
- How would you compose a song about ___?
- How would you rewrite the ending to the story?
- What would be different today, if that event occurred as ___?
- Can you see a possible solution to ___?
- How could you teach that to others?
- If you had access to all the resources, how would you deal with ___?
- How would you devise your own to deal with ___?
- What new and unusual uses would you create for ___?
- Can you develop a proposal that would ___?
- How would you have handled ___?
- How would you do it differently?

C **D**

A **B**

Ask questions to recall facts, make observations, or demonstrate understanding:

- What is/are ___?
- How many ___?
- How do/does ___?
- What did you observe ___?
- What else can you tell me about ___?
- What does it mean ___?
- What can you recall ___?
- Where did you find that ___?
- Who is/was ___?
- In what ways ___?
- How would you define that in your own terms?
- What do/did you notice about this ___?
- What do/did you feel/see/hear/smell ___?
- What do/did you remember about ___?
- What did you find out about ___?

Ask questions to apply or relate:

- How would you do that?
- Where will you use that knowledge?
- How does that relate to your experience?
- How can you demonstrate that?
- What observations relate to ___?
- Where would you locate that information?
- Calculate that for ___?
- How would you illustrate that?
- How would you interpret that?
- Who could you interview?
- How could you collect the data?
- How do you know it works?
- Can you show me?
- Can you apply what you know to this real-world problem?
- How do you make sure it is done correctly?
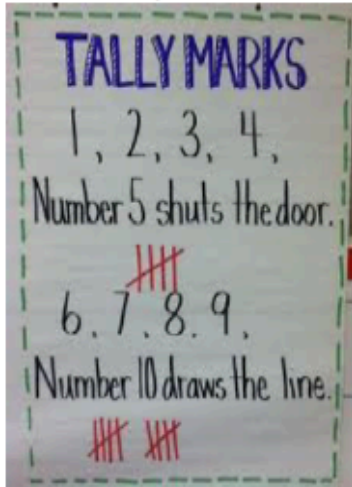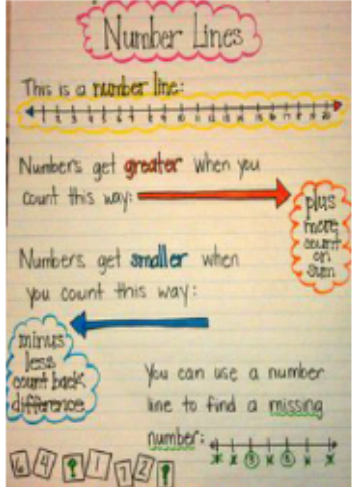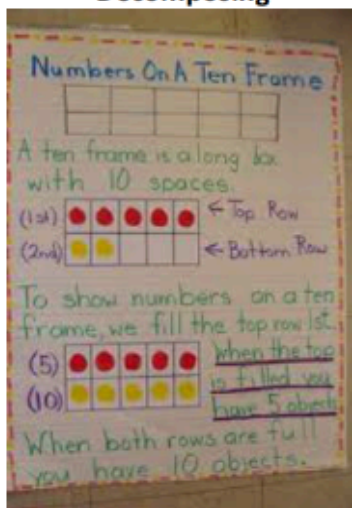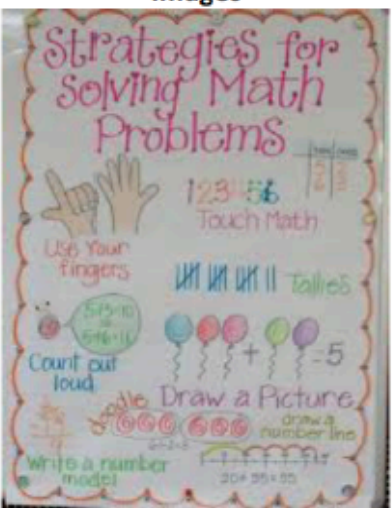
MEASURING YOUR PRACTICE
SELF-ASSESSMENT OF BACKGROUND KNOWLEDGE STRATEGIES
How do I foster background knowledge across the
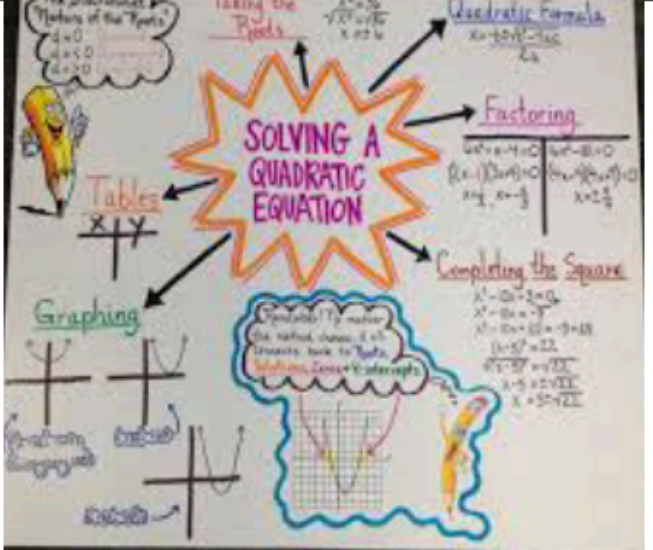
	5	4	3	2	1
Knowledge of Misconceptions Common to the Topic	My units include topic-specific misconceptions that are directly assessed. Explicit teaching is designed to interrupt misconceptions.	My units include topic-specific misconceptions. These are assessed, but are not directly assessed in teaching.	Misconceptions are sometimes included in my units and may or may not be assessed or directly addressed in my teaching.	I have an awareness of some topic-specific misconceptions. These are integrated into some aspects of my assessing and teaching.	Honestly, I am unfamiliar with topic-specific misconceptions that should be anticipated from my students.
Assessing Background Knowledge	Common formative assessments in my grade focus on core background knowledge, not incidental knowledge.	Formative assessment focuses mostly on core background knowledge. These assessment results are used to plan instruction and re-teaching, but are based within single classrooms.	Formative assessment is used, but core and incidental background knowledge is not differentiated. Results are used for some instructional planning, but not routinely. Results are not discussed with colleagues.	Assessment is used as a pretest, but is rarely analyzed for planning instruction and re-teaching. Results are not discussed with colleagues.	Assessment is summative and is used primarily for grading purposes. Results are not used for the purposes of improving future instruction.
Activating Background Knowledge	Both unit and lesson purposes are established at the onset of every one of my lessons. Varied oral and written language tools are used throughout the lesson to cause activation.	Both unit and lesson purposes re established during most of my lessons.. Varied oral and written language tools are used to activate background knowledge, but primarily at the start of the lesson.	Unit and lesson purposes are posted but are not discussed within the lesson. Oral and written language tools are occasionally used in some lessons.	Purpose of the lesson is posted but is not linked to larger unit purposes. Oral or written language tools are used as icebreakers or warm-ups.	Purposes are behavioral in nature and are not linked to larger unit concepts. Students have few opportunities to reflect on what they know about a topic or concept.
Building Background Knowledge	Indirect and direct methods for building background knowledge are used daily, including teacher modeling, wide reading, and experiential learning outside of class.	Indirect and direct methods for building background knowledge are used daily, including teacher modeling and wide reading. These methods are confined to in-class learning.	Indirect methods, such as wide reading and experiential learning are used, but teacher modeling occurs only occasionally.	Methods for building background knowledge are used occasionally, primarily when students demonstrate a gap.	Lessons are designed to present content. Any gaps in background knowledge are assumed to be the responsibility of students.
Using Technological Literacy to Build Background Knowledge	Students search for, evaluate, and create information daily using relevant technological tools and literacy processes that are integrated into classroom learning.	Students search for, evaluate, and create information regularly and in the company of peers in and out of the classroom. Their own technology tools are off-limits.	Students regularly use technology to gather and evaluate information, but rarely to create new digital products.	Some technology is sanctioned for classroom learning, but only to gather information.	Technology is seen as a separate and limited function, with an emphasis on tools. Students must go to another area of the school to use these tools.

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Why use anchor charts? • To recognize goals • To review concepts • To set expectations • To • To How to use anchor charts • Put them in journals or interactive notebooks • Print them for review • Make them colorful and print-rich • Laminate them	**Tally Marks** 	**Number Lines**
Decomposing 	**Counting Up** 	**Images**

SECONDARY ANCHOR CHARTS

These documents are grounded in research-based strategies and depend on the intended engagement of the learner to be valid and reliable.

What I KNOW about _____!

I think _____ is:

_____
_____
_____
_____
_____

One question I have about _____ is:

_____
_____
_____
_____

Here is a picture to show what _____ is:

Focus Strategy: ALPHA BLOCKS SORT

Topic: _____

ABC	DEF	GHI
JKL	**MN**	**OPQ**
RST	**UVW**	**XYZ**

On the back of the sheet, write a summary of the topic. In the summary, use the most important words from the list of words that appear in the above blocks.

Chatter Drawing

1. **Close your eyes and think about** _____ . **Now, open your eyes and draw what you saw.**

2. **Now that you have learned more about** _____ , **draw a second picture to show what you learned.**

3. **In the space below, tell what you have changed about your before and after pictures. Explain why you made those changes.**

MY GRADE-LEVEL AND/OR DEPARTMENT STRATEGY TO SET OBJECTIVES AND CHECK FOR BACKGROUND KNOWLEDGE…

35

These are _____

These are NOT _____

Which of these are _____?

Explain how to recognize _____?

My examples of _____ **are…**

3. Monitor, evaluate and restate the solution.
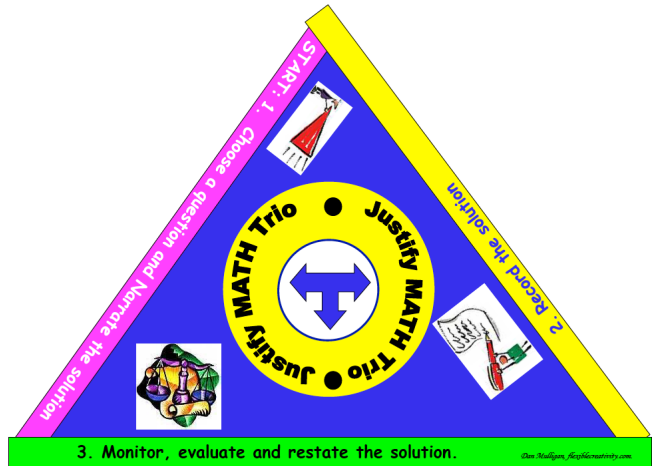
WHAT'S MY RULE

Theme:

YES	NO

Rule:

WHAT'S MY RULE

Theme:

YES	NO

Rule:

MY GRADE-LEVEL AND/OR DEPARTMENT STRATEGY TO ASSIST MY STUDENTS IN DEVELOPING UNDERSTANDING…

5 STEP MATH

STEPS TO PROBLEM SOLVING

1 The Question
What questions do I need to answer?

2 The Facts
What do I know?

Is there any *missing* information?

Is there any *irrelevant* information?

3 The Plan/Strategy
What steps can I take to answer the question?

Some Strategies for Problem Solving:

- Look for a pattern
- Set up an equation/expression
- Make a chart
- Draw a picture
- Make a model
- Make a list
- Guess and check
- Solve a simpler problem

4 The Solution
Now, the fun part... Solve your problem.

5 The Check
Does my solution answer the question?

Is my solution reasonable?

Extend Your Thinking...

Can you solve the problem another way?

Standard	Emerging 1	Developing 2	Proficient 3	Distinguished 4	Where am I?
3.G.A [1 to 2]	I can identify examples of quadrilaterals, recognize that examples of quadrilaterals have shared attributes, and that the shared attributes can define a larger category. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole (limited to halves and quarters).	I can understand the properties of quadrilaterals and the subcategories of quadrilaterals. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole (limited to halves, quarters, and eighths).	I can recognize and sort examples of quadrilaterals that have shared attributes and that the shared attributes can define a larger category. I can draw examples of quadrilaterals that don't belong to the categories of rhombuses, rectangles, and squares. I can partition shapes into parts with equal areas and express the area as a unit fraction (with denominators of 2, 3, 4, 6, or 8) of the whole.	I can recognize and sort examples of quadrilaterals that have shared attributes and that the shared attributes can define a larger category. I can draw examples and non-examples of quadrilaterals that are not rhombuses, rectangles, or squares. I can partition shapes into parts with equal areas and express the area as a unit fraction of the whole.	

BEGIN WITH THE END IN MIND:

My Circus Trip

Name:_____   Date:_____

Circus Trip

On a trip to the Circus, I spotted the items below. How are the items

alike? How are these items different? How could I put them in order?
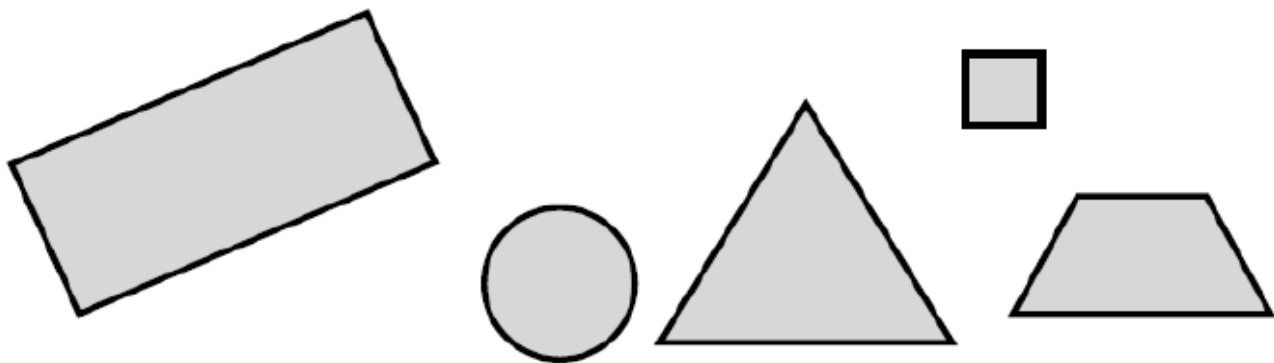
Show your mathematical thinking.

Which One Doesn't Belong?

Name _____   Date _____

Which One Doesn't Belong?
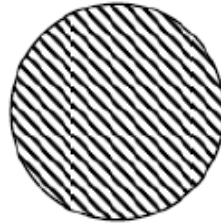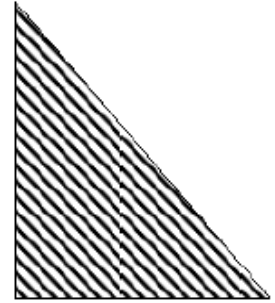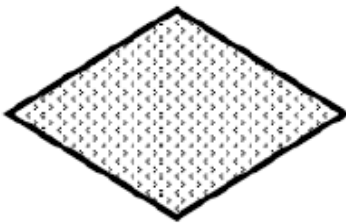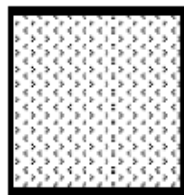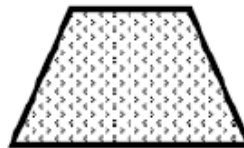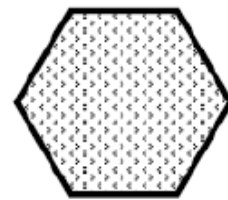
A   B   C   D

Shape _____ doesn't belong because _____

_____

_____.

Which One Doesn't Belong?

A   B   C   D

Shape _____ doesn't belong because _____

_____

_____

Which One Doesn't Belong?
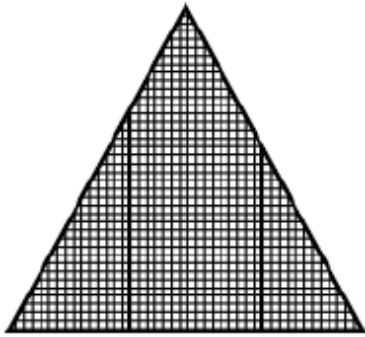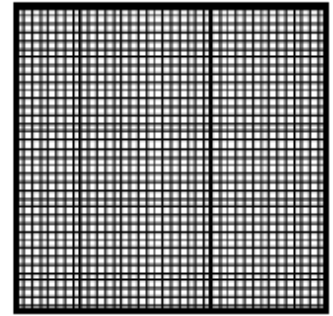
A   B   C   D

Shape _____ doesn't belong because _____

_____

_____

This is your chance to create a *Which One Doesn't Belong?*

Which One Doesn't Belong?

A   B   C   D

Shape _____ doesn't belong because _____

_____

_____

Build it!

Part I

Read *The Greedy Triangle,* a book about a shape that wanted to be something else (or other similar book about various shapes). Discuss the shapes in the story, what the shape-shifter does to create a new shape (adds one side and one angle) and the real world connections in the pictures. As you are reading, record any new information from the story on chart paper.

Part II

Ask students if they think they could build shapes using their bodies. Give each child a long piece of yarn (or other similar material), to use to create a shape. Call out a shape and have students create a way to use their bodies and the yarn to make the shape (For example, name a triangle for students to make. Students could spread their feet apart while standing on the yarn, lift up the two ends of the yarn and bring the two ends together with raised hands to create a triangle). Repeat this activity by naming several other shapes for students to create independently or with a partner.

Part III

Students will use straws and pipe cleaners to recreate a triangle, circle, rectangle, and square. Tell the students that the straws are the sides and the pipe cleaners are the corners. Model how you connect the straws and pipe cleaners to create a shape (sample below). The teacher will read *The Greedy Triangle* aloud to the students again. The students will create the shapes with the straws and pipe cleaners as the teacher comes to each shape. This will allow students to practice constructing shapes with the materials provided.

A VERTICALLY ARTICULATED NOTE-TAKING STRATEGY TO SUPPORT LITERACY

Table of Contents

Word	Page #	My Description	My example or picture
Acute angle			
Addend			
Associative Property			
Binomial			
Expression			
Equation			
Dilation			
Equilateral Triangle			

1. A referent for a 45° angle is the angle created by a diagonal of a square and one of the sides of the square that share a common vertex. "V" forms one.

2. A referent for a 90° angle (right angle) is the angle created by the corner of a square.

3. A referent for a 180° angle (straight angle) is the angle created by a straight line.

4. Protractors and angle-rulers are tools commonly used to measure angles.

AN IDEA WE CAN USE TO ADD TO WHAT WE CURRENTLY DO…

T E A M

Think and Turn

1	4
2	3

Connecting Theme:

200 POINTS

100 POINTS   *100 POINTS*

50 POINTS   *50 POINTS*   *50 POINTS*

"Things associated with"

Dan Mulligan, 2015 - 2016

Two-Word Strategy

Name(s): _____

Concept: _____

Brainstorm here:

Word 1   Word 2

I chose Word 1 because –	I chose Word 2 because –

MY GRADE-LEVEL AND/OR DEPARTMENT STRATEGY TO ASSIST MY STUDENTS IN DEVELOPING UNDERSTANDING…

SEARCHING FOR OPPORTUNITY

Learning Essentials	Where are we?	Opportunity
Math class is a time for talk		
Have students explain their reasoning (*Getting to 'WHY*).		
Make writing a part of math learning		
Support learning with math manipulatives		
Present math activities in context		
Celebrate the struggle		
Encourage different ways to thinking		
Foster student creation of valid questions		
Use guided groups to encourage students and target support		
Integrate technology into the process of learning math.		

Mathematical Practice Look Fors

Student Behaviors	
Actively solving problems *Students are:* • Working and reading rich problems carefully • Drawing, pictures, diagrams, tables, or using objects to make sense of problems • Discussing the meaning of problems with classmates • Making choices about which solution path to take • Trying out potential solution paths and making changes as needed • Checking answers and making sure solutions are reasonable and make sense • Persisting in efforts to solve challenging problems, even after reaching a point of frustration	
Consistently reason mathematically *Students are:* • Using mathematical symbols to represent situations • Taking quantities out of context to work with them • Putting quantities back in context to see if they make sense • Considering units when determining if the answer makes sense in terms of the situation	
Collaboratively justify own reasoning and the reasoning of others *Students are:* • Making and testing conjectures • Explaining and justifying their thinking using words, objects, and drawings • Listening to the ideas of others and determining if they make sense • Asking useful questions • Identifying flaws in logic when responding to the approaches of teammates • Elaborating with a second sentence to explain their thinking and connect it to the first sentence • Talking about and asking questions about each other's thinking • Revising their work based upon the justification and explanations of others	
Model their mathematical thinking *Students are:* • Using mathematical models (e.g., formulas, equations, symbols) to solve problems in the world • Using appropriate tools such as objects, drawings, and tables to create mathematical models • Making connections between different mathematical representations (concrete, verbal, algebraic, numerical, graphical, pictorial, etc.) • Checking if an answer makes sense within the context of a situation and changing the model as needed	

Use appropriate tools strategically
Students are:
 	
• Using technological tools to explore and deepen understanding of concepts
• Deciding which tool will best help solve the problem
    ○ Calculator
    ○ Concrete models
    ○ Digital technology
    ○ Pencil/paper
    ○ Ruler, compass, protractor
• Estimating solutions before using a tool
• Comparing estimates to solutions to see if the tool was effective	

Regularly demonstrate mathematical precision *Students are:* • Communicating using clear language and accurate mathematical vocabulary • Deciding when to estimate or give an accurate answer • Calculating accurately and efficiently, expressing answers with an appropriate degree of precision • Using appropriate units; appropriately labeling diagrams and graphs	
Make Mathematical Connections *Students are:* • Finding and explaining patterns in numbers • Finding and explaining patterns in diagrams and graphs • Using patterns to make rules about math • Using math rules to help them solve problems	

Mathematical Practice Look Fors

Teacher Behaviors	
Actively solving Problems *Teachers are:* • Providing rich problems aligned to the Essential Knowledge and Skills of the standards • Providing appropriate time for students to engage in the productive struggle of problem solving • Asking open-ended questions: *What do you know? What do you need to find out? What can we do?* • Asking rigorous questions: *How is ___'s way of solving the problem like/different from yours? Why?* • Asking guiding questions: *What tools/manipulatives might help? How can we get past this?*	
Consistently reason mathematically *Teachers are:* • Providing a variety of problems in different contexts that allow students to arrive at a solution in different ways • Using think aloud strategies (math talk) as they model the 'thinking' involved in problem solving • Attentively listening for strategies students are using to solve problems • Asking meaningful questions: *What does the number ____ (or variable) represent in the problem? How can you represent the problem with symbols and numbers? Can you make a chart, table, or graph?*	
Collaboratively justify own reasoning and the reasoning of others *Teachers are:* • Posing tasks that require students to explain, justify, argue, or critique • Providing many opportunities for student discourse in pairs, groups, and during whole group instruction • Create discourse by asking: *What examples could prove or disprove your reasoning? What questions would you ask about___?*	
Model their mathematical thinking *Teachers are;* • Providing opportunities for students to solve problems in real world contexts • Identifying problem solving connects connected to student interests • Asking questions: *Can you write a number sentence to describe this situation? What do you already know about solving this problem? What connections do you see? Why do the results make sense? Is this working or do you need to change your model?*	
Use appropriate tools strategically *Teachers are:* • Using Making a variety of tools readily accessible to students and allowing them to select appropriate tools for themselves • Helping students understand the benefits and limitations of a variety of math tools • Asking questions: *Which tool/manipulative would be best for this problem? Why? What other resources would help you solve tis problem?*	
Regularly demonstrate mathematical precision *Teachers are:* • Explicitly teaching mathematics vocabulary • Insisting on accurate use of academic language from students • Modeling precise communication • Requiring students to answer problems with complete sentences, including units • Providing students to check the accuracy of their work • Asking questions: *Illustrate or give an example of the word in context. How do know your answer is accurate? Explain.*	
Make Mathematical Connections *Teachers are:* • Providing sense making experiences for all students • Allowing students to do the work of using structure to find patterns for themselves rather than doing the work for students • Asking questions: *Why does this happen? How is ___ related to ___? Why is this important to the problem? What do you know about ___ that you can apply to this situation? How can you use what you know to explain why it works? What patterns do you see?*	

Hunt for Solutions

Recording Sheet

Question	Page Number	Reasoning
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My Notes