Bilingual Pupil Services
Professional Development
SIFE & ENTERING/EMERGING STUDENTS
ENL/MATH
January 11, 2019

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NYS RBERN Resource Specialists
Place one of these numbers 1, 2, 3, 4, 5, and 6 inside each circle so that the **sum** of the numbers on the side of the “triangle” is ___________. Do not repeat a number. What pattern(s) have you observed?

**SUM ___**
WARM-UP

Place one of these numbers 1, 2, 3, 4, 5, and 6 inside each circle so that the sum of the numbers on the side of the “triangle” is 9. Do not repeat a number. What pattern(s) have you observed?

SUM 9
WARM-UP

Place one of these numbers 1, 2, 3, 4, 5, and 6 inside each circle so that the sum of the numbers on the side of the “triangle” is 12. Do not repeat a number. What pattern(s) have you observed?

SUM 12
SUM OF 15

Place one of the number below in each cell of the grid so that their sum is equal to 15 (in either direction) horizontally, vertically, or diagonally:

1, 2, 3, 4, 5, 6, 7, 8, 9

Do not repeat a number.
Place one of these number in each cell of the grid so that their sum equal 15, horizontally, vertically, or diagonally: 1, 2, 3, 4, 5, 6, 7, 8, 9. Do not repeat a number.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>
15-SUM

2 7 6
9 5 1
4 3 8
Goals

- To identify and discuss modes of transportation using varied strategies, including labeling and repeating.

- To differentiate modes of transportation using different strategies, including sentence starters within the Visual-Vocal-Word-Association (VVWA). Examples:

  - I have... Who has...?
  - I’m going by... Who is going by...?
  - I like traveling by... Who likes traveling by...?
  - I’m commuting by..., and I’m wondering who is commuting by?

- To solve transportation-related math problems using the backwards-solution strategy within the Socratic Method of Teaching and Learning (SMTL).
Bloom’s Taxonomy

- **Remember**: Recall facts and basic concepts (define, duplicate, list, memorize, repeat, state)
- **Understand**: Explain ideas or concepts (classify, describe, discuss, explain, identify, locate, recognize, report, select, translate)
- **Apply**: Use information in new situations (execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch)
- **Analyze**: Draw connections among ideas (differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test)
- **Evaluate**: Justify a stand or decision (appraise, argue, defend, judge, select, support, value, critique, weigh)
- **Create**: Produce new or original work (design, assemble, construct, conjecture, develop, formulate, author, investigate)
Webb’s Depth of Knowledge (DOK) Levels

Level One (Recall)
- Describe
- Explain
- Interpret

Level Two (Skill/Concept)
- Level Four (Extended Thinking)

Level Three (Strategic Thinking)
- Design
- Connect
- Synthesize
- Apply Concepts
- Critique
- Analyze
- Create
- Prove

Level Four (Extended Thinking)
- Develop a Logical Argument
- Construct
- Use Concepts to Solve Non-Routine Problems
- Formulate
- Hypothesize
- Draw Conclusions
- Cite Evidence
- Investigate
- Differentiate
- Show

Level One (Recall)
- Draw
- Identify
- List
- Label
- Illustrate
- Measure
- Infer
- Categorize
- Collect and Display
- Identify Patterns
- Graph
- Classify
- Separate
- Cause/Effect
- Estimate
- Compare
- Relate
- Use Context Cues
- Make Observations
- Summarize
- Show
Webb’s DOK

Level 1: RECALL
Memorize & Recall

Level 2: SKILLS/CONCEPTS
Investigate & Hypothesize

Level 2: STRATEGIC THINKING
Compare & Infer

Level 2: EXTENDED THINKING
Synthesize & Critique

vs.

Bloom’s Taxonomy

create
produce new or original work
Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate
justify a stand or decision
appraise, argue, defend, judge, select, support, value, critique, weigh

analyze
draw connections among ideas
differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

apply
use information in new situations
execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand
explain ideas or concepts
classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember
recall facts and basic concepts
define, duplicate, list, memorize, repeat, state
Prior Knowledge
Frayer Model
A fraction is a part of whole thing (pizza) or a set of things (bag of marbles).

- **Numerator**
- **Denominator**
- **Fraction bar**
- **Division / fragmentation of things**

Examples:

\[
\begin{array}{cccc}
\frac{1}{2} & \frac{3}{4} & \frac{10}{2} & 0.5 \\
\end{array}
\]

Non-examples:

\[
\begin{array}{cccc}
10^2 & -8 & \\
\end{array}
\]
Concept Map
<table>
<thead>
<tr>
<th>What I know</th>
<th>What I want to know</th>
<th>What I have learned</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIOR KNOWLEDGE</td>
<td>GOAL</td>
<td>OUTCOME</td>
</tr>
<tr>
<td>K</td>
<td>W</td>
<td>L</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>What I <strong>know</strong></td>
<td>What I <strong>want to know</strong></td>
<td>What I have learned</td>
</tr>
<tr>
<td>PRIOR-KNOWLEDGE</td>
<td>GOAL</td>
<td>OUTCOME</td>
</tr>
<tr>
<td>I can add fractions with like (identical) denominators</td>
<td>How can I add fractions with unlike (different) denominators?</td>
<td>To add fractions with unlike denominators, I must look first for the least common denominator. Then I replace each fraction with their equivalent. Finally, I add the numerators, while keeping the common denominator.</td>
</tr>
</tbody>
</table>
A \cap B
ENL STRATEGIES FOR ELLs (SIFE & ENTERING LEVEL)

1. Brainstorming/Identifying modes of transportation
2. Reviewing/correcting picture labels of modes of transportation
3. Posting pictures to match labels of modes of transportation
4. Labeling pictures (writing down words) of modes of transportation
5. Anticipatory Guide: Checking for understanding (also for Prior Knowledge)
6. Vocal Visual Word Association (VVWA): Reading/Listening & Speaking
7. Picture Bingo: Listening, Speaking & Reading
8. Riddles: Writing/Making inferences
ENL STRATEGY-1

Brainstorming
Identifying modes of transportation
train
truck
airplane
bike/bicycle
rocket
car
horse  sailboat  helicopter

canoe  stage coach  donkey
fighter jet  warship  spacecraft
cow cart  sledding  walking
Vocabulary

car  train  taxi  boat  truck  cow  cart  scooter
walking  rocket  donkey  balloon  airplane  horse
warship  bike  sledding  rollerblade  coach bus
stage coach  spacecraft  canoe  school bus  sailboat
submarine  motorcycle  fighter jet  helicopter
How can you adjust this activity (if necessary) for your students?
Reviewing or correcting picture labels of modes of transportation
train  ✓  truck  ✓  airplane  ✓  balloon  ✓  bike  ✓  rocket  ✓  stage coach  ✓  car  ✓
How can you adjust this activity (if necessary) for your students?
ENL STRATEGY-3

Posting / cutting and pasting pictures to match labels of modes of transportation

Issuing proper IDs
1. canoe
2. Walking
3. airplane
4. stage coach
5. helicopter
6. motorcycle
1. canoe
2. Walking
3. airplane
4. stage coach
5. helicopter
6. motorcycle
How can you adjust this activity (if necessary) for your students?
ENL STRATEGY-4

Labeling pictures (writing down words) of modes of transportation
1. submarine  
2. boat  
3. taxi  
4. fighter jet  
5. spacecraft  
6. coach bus  
7. scooter  
8. school bus
How can you adjust this activity (if necessary) for your students?
Anticipatory Guide: Checking for understanding
<table>
<thead>
<tr>
<th>#</th>
<th>Identification of Transportation Modes</th>
<th>Yes</th>
<th>Maybe</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>This is a car.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>This is a boat.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>This is a taxi.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>This is a school bus.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>This is a coach bus.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>This is a space ship.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>This is a scooter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>This is a motorcycle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Identification of Transportation Modes</td>
<td>Yes</td>
<td>Maybe</td>
<td>No</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------</td>
<td>-----</td>
<td>-------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>This is a car.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2</td>
<td>This is a boat.</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>This is a taxi.</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>This is a school bus.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>This is a coach bus.</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>This is a space ship.</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>This is a scooter.</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>This is a motorcycle.</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How can you adjust this activity (if necessary) for your students?
ENL STRATEGY-6

Vocal Visual Word Association (VVWA)
Listening & Speaking Activity
Vocal Visual Word Association (VVWA) Listening & Speaking Activity

- Student A: What is it?
- Student B: It’s a...bike.
What is it?

It’s a... car
It’s a bike

What is it?
What is it?

It’s a truck
What is it?

It’s a train
It’s a taxi

What is it?
What is it?

It's a cruise ship
What is it?

It’s a rocket
Other Versions of VVWA
Listening & Speaking Activity
Vocal Visual Word Association (VVWA)

A: I have a [Image: carriage with horses] . Who has a [Image: donkey] ?

A: I have a [Image: donkey] . Who has a [Image: canoe] ?

A: I have a [Image: canoe] . Who has a [Image: horse] ?
Vocal Visual Word Association (VVWA)
Listening & Speaking Activity

A: I’m going by                .  Who is going by                 ?

B: I’m going by                .  Who is going by                 ?

C: I’m going by                .  Who is going by                 ?
Sorry!

No More

Transportation Modes!
How can you increase the level of sophistication of this activity?
How can you adjust this activity (if necessary) for your students?
BINGO 5
How can you adjust this activity (if necessary) for your students?
Riddles: Making Inferences
ENL Riddles

WHO AM I?

1. I travel under the sea. ______________
2. I take students to school. ______________
3. I travel into space? ______________
4. I am the fastest with 2 wheels. __________
5. I carry passengers for a fee. __________
6. I am part of the air force. __________
ENL Riddles

WHO AM I?

1. I travel under the sea.    submarine
2. I take students to school.  school bus
3. I travel into space?       spacecraft
4. I am the fastest with 2 wheels.   motorcycle
5. I carry passengers for a fee.  taxi
6. I am part of the air force.   fighter jet
How can you adjust this activity (if necessary) for your students?
Models of Sequential Lessons for SIFE and Entering Students, Re: Bloom & DOK
1. Repeat after me:
   car  boat  bike

2. Point to the boat...car...bike...car

3. Say Yes or No.
   Is it a car?
   It is a boat?

4. Circle Yes or No.
   boat  bike  car
   Yes  No  Yes  No  Yes  No

5. Say and write the word for each picture.

6. Cut and paste a picture above each word.
   car  bike  boat
Transportation-related Mathematics
Complete the table using the adverbs on the left to match the given percents on the right.

<table>
<thead>
<tr>
<th>Percentages</th>
<th>Adverbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>always</td>
</tr>
<tr>
<td>90%</td>
<td>usually</td>
</tr>
<tr>
<td>50%</td>
<td>sometimes</td>
</tr>
<tr>
<td>10%</td>
<td>rarely</td>
</tr>
<tr>
<td>0%</td>
<td>never</td>
</tr>
</tbody>
</table>
• In light of this activity, what can you conclude?

• What are some implications for classroom instruction?
I. The 4 pillars of Mathematics Teaching & Learning

II. Math Scaffolding (Singapore Model)

III. The Socratic Method for Teaching & Learning- Backwards Solution

IV. Group Activities
   G1. Taxi Ride
   G2. Airplane Travel
   G3. Transit Travel: PAP-MIA-NY
   G4. The Gas Tank

V. General Reflections/Implications for your classrooms

VI. Questions & Answers
The 4 Pillars of 21st Century Math

- Concepts
- Problems
- Skills
- Language
1. The syntax / sentence structure of math can be troublesome. Example: 3 subtracted from 5 equals 2 can be written as $5 - 3 = 2$.

2. At times, key words can be deceiving. Use logic instead. Example:

*John has 2 cats and 4 dogs. How many cats does he have in all?*
Some Foundational Math Terms

- addend
- minuend
- factor
- dividend
- odd
- subtrahend
- multiple
- divisor
- more than
- less than
- product
- quotient
- even
- less than
- twice
- remainder
- double
- prime
- power
- composite
- difference
- percent
- inverse
Vocabulary
Types of Words

One-meaning words vs. multiple-meaning words

<table>
<thead>
<tr>
<th>Table</th>
<th>Domain</th>
<th>Exponent</th>
<th>Dividend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>Root</td>
<td>Hypotenuse</td>
<td>Gross</td>
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<td>Power</td>
<td>Bank</td>
<td>Coefficient</td>
<td>Terms</td>
</tr>
<tr>
<td>Total</td>
<td>Odd</td>
<td>Equation</td>
<td>Trapezoid</td>
</tr>
</tbody>
</table>
The bike travels **15 mph**. The horse travels **three times faster** than the bike does. How fast does the horse travel?

15 mph

- **1 time**
- **2 times**
- **3 times**

15 mph

45 mph

15 mph

15 + 15 + 15

or

3 \times 15
The horse travels 45 mph. The bike travels three times slower than the horse does. How fast does the bike travel?

h = 45 mph

\[ 45 - 15 - 15 \text{ or } 45 \div 3 \]

bike = 15 mph
Problem 1. speed = 350 mph. 5 times faster. So speed = __________

Problem 2. speed = 60 mph. 3 times slower. So speed = __________

Problem 3. speed = 40 mph. As fast as. So speed = __________
Socratic Method

Backwards Strategy
Problem Solving through Probing Questions
Taxi Ride

Facts (Taxi Fare)

- **Initial** fee = $3
- ½ mile = $1.50
- Distance = 16 miles
- **Tip** = $5

Questions

- Change out of $50 bill?
Taxi Ride  

**Facts (Taxi Fare)**
- Initial fee = $3
- $\frac{1}{2}$ mile = $1.50
- Distance = 16 miles
- Tip = $5

**Questions**
- Change out of $50 bill?

**Logical Reasoning**
- Change = Purse – Total expense
- Do I know the purse? Yes. $50
- Do I know the total expense? No
- Total expense = Initial fee + tip + mileage
- Do I know the initial fee? Yes. $3
- Do I know the tip? Yes. $5
- Do I know the mileage? No
- Mileage = $1.50 \times \text{number of } \frac{1}{2} \text{ miles}
- Do I know the number of $\frac{1}{2}$ miles? No
- Number of $\frac{1}{2}$ miles = 16 \times 2

**Solution Steps**
1. Number of $\frac{1}{2}$ miles = 16 \times 2 = 32
2. Mileage cost = $1.50 \times 32 = $48
3. Total expense = $3 + $5 + $48 = $56
4. Change
   \[50 - 56 = -6\]

Answer: Missing $6. Purse not enough.  

**Oooops!**
Facts
- Tickets = $1,200 per adult
  3 times cheaper per child
- Guest house = $300 per night
- Stay = 1 week
- Budget = $7,000

Questions
- Enough Budget?
- Explain.
Complete the table.

<table>
<thead>
<tr>
<th>Distance covered</th>
<th>Gas left in Tank</th>
<th>Gas Burned</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 mile</td>
<td>_____ gallons</td>
<td>_____ gallon</td>
</tr>
<tr>
<td>90 miles</td>
<td>40 gallons</td>
<td>_____ gallons</td>
</tr>
<tr>
<td>360 miles</td>
<td>10 gallons</td>
<td>_____ gallons</td>
</tr>
<tr>
<td>_____ miles</td>
<td>0 gallon</td>
<td>_____ gallons</td>
</tr>
</tbody>
</table>
- Yvette wants to travel from Port-au-Prince to New York.
- But she must **transit** in Miami.
- The distance between Port-Au-Prince and Miami is 711 miles.
- The distance between Miami and New York is 1,288 miles.
- Yvette has **already flown 80%** of the **total** distance.
- How much distance has Yvette left to travel in order to reach **destination**?

**Organic-way Mathematics: The Essence of Problem Solving**

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Math Journal
vs.
Learning Journal
APPENDIX

Not part of this PD
An immigrant story
I was maybe three years old. Then my father flew to America. He left me behind with Mom. Everybody was happy. Everybody was sad. Dad will make more money. But Mom and I would be all alone. We played more often. We had a lot of fun. We went to church.

We missed dad a lot. Maybe, he missed us too. He never wrote letters. Instead, he called us. The phone rang every evening. He sent money to us by Western Union. We bought more healthy foods. We bought nicer clothes. We bought good leather shoes.
Six years later, Dad came back home. We were excited. We celebrated every day. We bought more expensive things. Then he returned to New York. He promised to send for us. He kept his promise.

One summer, Mom and I flew to New York. Dad was waiting at the airport. He took us into his nice car. He drove us to his apartment in The Bronx. We saw very tall buildings. The family was reunited again. I happened to like America. Here in America, we have a lot of opportunities.
I was probably three years old when my father traveled to America. He left behind Mom, Granma, and me. My mother told me that. He was excited to get an American visa. He knew that he would most likely going to work for more money. At the same time, Dad was sad. He was going to certainly missed us. Once in New York, he seldom wrote letters. Instead, he would call at night probably coming from work. There were many ways to send money from America. But he always used the Western Union. Mom and I would go downtown to the bureau to pick up the cash. The cashier always kept a small part of our money.

Six years had passed. My family was reunited temporarily. My father returned from New York for the very first time. Everybody was elated. We consumed exotic foods which we could not afford before. However, we felt morose because we realized that he would soon fly back to America. Suddenly, we felt the loneliness creeping back. As consolation, he promised to send for us soon. Indeed, he kept his promise. Three years later, Mom, my baby brother, and I immigrated to New York. We went to live in Dad’s building apartment on the second floor in Brooklyn. The family was together once more. For good!

I love to live in America. This country offers me a better opportunity to be whatever I want to be. I can even become more popular than the most popular vowel.
According to my mother, I must have been three years old when my father hit the skies en route to America, leaving us behind. I only had some scant recollections of him. Like many other immigrants, he was extremely thrilled to have obtained a visa to the wealthiest country on earth. He was convinced then he would be earning more money. Simultaneously, Dad was consumed with morosity. He knew he would absolutely miss us.

Once he reached The United States, he would write once in a while. Nonetheless, he would consistently ring during recess from work. Usually, my mother had already retired for the day prior to those nocturnal calls punctuating the serenity of the night. Mom was even more exuberant to commute downtown every other week to the Western Union bureau to claim the remittance Dad had wired. The Diaspora probably used the service of other money transfer companies. But it appeared that my father was a faithful customer of this particular business. He must have been very popular there. Anyway, the transfer allowed us to meet our financial obligations.

After six long melancholic years, my father finally returned home. We rejoiced over exotic foods that had been beyond our reach in the past. Occasionally, we felt gloomy at the thought of Dad’s prospective return overseas. As solace, he pledged he would have emigrate from Haiti. He had honored his promise, indeed. Two summers later, my mother, my baby brother, and I immigrated to join Dad in his second-floor apartment in Brooklyn. Wow! The family was, at last, reunited for good.

I had no idea of what I would do if I were to stay with Granma. I did love her tremendously for many reasons. For example, she would take me sometimes to church on Sundays and indulge me with ice cream and cookies after Mass. How can I forget that? Nevertheless, America offers me more than that—a unique opportunity to become whatever I set my goal on.
Comparative Adjectives

(Follow-up Lesson)
## (Follow-up Lesson)

<table>
<thead>
<tr>
<th>Adjective</th>
<th>Comparative Form</th>
<th>Adjective</th>
<th>Comparative Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>fast</td>
<td>faster</td>
<td>pretty</td>
<td>prettier</td>
</tr>
<tr>
<td>slow</td>
<td>slower</td>
<td>close</td>
<td>closer</td>
</tr>
<tr>
<td>Hard</td>
<td>harder</td>
<td>green</td>
<td>greener</td>
</tr>
<tr>
<td>tall</td>
<td>taller than</td>
<td>old</td>
<td>older</td>
</tr>
<tr>
<td>short</td>
<td>shorter</td>
<td>tiny</td>
<td>tinier</td>
</tr>
<tr>
<td>smart</td>
<td>smarter</td>
<td>healthy</td>
<td>healthier</td>
</tr>
<tr>
<td>big</td>
<td>bigger</td>
<td>good</td>
<td>better</td>
</tr>
<tr>
<td>small</td>
<td>smaller</td>
<td>bad</td>
<td>worse</td>
</tr>
</tbody>
</table>
(Follow-up Lesson)

**fast - faster**
- The bike is fast. But the car is faster.
- The car is faster than the biker.

**tall - taller**
- Joe is tall. But Mark is taller.
- Mark is taller than Joe.

**slow - slower**
- The cat is slow. But the turtle is slower.
- The turtle is slower than the cat.

**smart - smarter**
- Mary is smart. But Shayenne is smarter.
- Shayenne is smarter than Mary.

**good - better**
- Your work is good. But mine is better.
- My work is better than yours.

**bad - worse**
- Not working hard is bad. But being absent is worse.
- Being absent is worse than not working hard.