## Mathematics Instruction at Park Academy

# Sarahpowellphd.com <br> Evidence-based mathematics resources for educators 


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Intervention: Occurs frequently and with intensity

## Validated Intervention

Program (e.g. Tier2,
Standard Protocol,
Secondary Intervention)



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## STANDARDS

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## Fluency

Fluently add and subtract
within 5.

\(\left.$$
\begin{array}{c|c|c} & \text { Add and } \\
\text { Fluently add } \\
\text { and subtract } \\
\text { within 5. }\end{array}
$$ \begin{array}{c}within 20, <br>
demonstratin <br>
gfluency for <br>
addition and <br>
subtraction <br>
and subtract <br>
within 100 <br>

using\end{array}\right\}\)| strategies |
| :---: |
| based on |
| place value, |
| properties of |
| operations, |
| and/or |

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| Fluently add |  |  |  |
| :---: | :---: | :---: | :---: |
| and subtract |  |  |  |
| within 5. | Add and <br> subtract <br> within 20, <br> demonstratin <br> g fluency for <br> addition and <br> subtraction <br> within 10. | Fluently add <br> and subtract <br> within 100 <br> using <br> strategies <br> based on <br> place value, <br> properties of <br> operations, <br> and/or <br> relationships. | Fluently <br> multiply and <br> divide within <br> 100, using <br> strategies <br> such as the <br> relationship <br> between <br> multiplication <br> and division... |




| Fluently add and subtract within 5. | Add and subtract within 20, demonstratin g fluency for addition and subtraction within 10. | Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or relationships. | Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division... | Fluently add and subtract multi-digit whole numbers using the standard algorithm. | Fluently multiply multi-digit whole numbers using the standard algorithm. | Fluently add, subtract, multiply, and divide multidigit decimals using the standard algorithm. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |





## Place Value



Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.


Use place value understanding to round whole numbers to the nearest 10 or 100 .






## Problem Solving



Solve realworld and mathematical problems leading to two linear equations in two variables.
fractions...


Solve multistep word problems posed with whole numbers and having wholenumber answers using the four operations...


Solve addition
and subtraction and subtraction
word problems, and add and subtract within
10...

Solve realworld and mathematical problems involving the four operations with rational numbers.

Use addition and subtraction within 100 to solve one- and two-step word problems...

Solve word problems involving addition and subtraction of fractions
referring to the same whole, including cases of unlike denominators





Understand place value and use it to solve problems using addition and subtraction

Measure and estimate lengths

Represent and solve problems using addition and subtraction

Represent and
solve problems using multiplication

## 1. Sort

2. Place on pathway

| Grade 3 | Grade 4 | Grade 5 |
| :---: | :---: | :---: |
| - Understand place value and use it to solve problems using addition and subtraction <br> - Represent and solve problems using addition and subtraction <br> - Represent and solve problems using multiplication <br> - Measure and estimate lengths <br> - Represent and interpret data <br> - Understand concepts of area and perimeter | - Use place value to understand multidigit numbers <br> - Represent and solve problems using multiplication and division <br> - Multiply and divide within 100 <br> - Be able to identify and use factors and multiples to solve problems <br> - Develop understanding of fractions as numbers <br> - Understand decimal notation for fractions <br> - Represent and interpret data <br> - Understand concepts of angles and measuring angles <br> - Draw and identify lines and angles; classify shapes | - Write and interpret numerical expressions <br> - Use place value to read, write and compare decimals; round decimals to any place <br> - Add, subtract and multiply decimals <br> - Identify and create equivalent fractions <br> - Multiply simple fractions <br> - Understand concept of volume; measure volume of various figures <br> - Classify two-dimensional figures based on their properties |



Explain a ratio relationship

Add, subtract, multiple and divide fractions and use them to solve real-world problems

1. Sort
2. Place on pathway
3. Continue from yellow cards

| Grade 6 | Grade 7 |  |
| :--- | :--- | :--- |
| Number Systems | The Number System, Expressions \& Equations | Number Systems |

## Number Systems

- Fluently add, subtract, multiply and divide multi-digit decimals
- Find the greatest common factor
- Find the least common multiple
- Use the distributive property


## Fractions

- Add, subtract, multiple and divide fractions and use them to solve real-world problems


## Ratios and Proportional Relationships

- Explain a ratio relationship
- Understand the concept of rate
- Make tables of equivalent ratios


## Expressions and Equations

- Understand the concept of equality and use this to rewrite expressions in equivalent forms
- Understand and use the order of operations (PEMDAS)
- Understand the use and meaning of variables in mathematical expressions
- Write expressions and equations; evaluate them and use formulas to solve problems
- Solve one-step single-variable equations
- Use equations to describe relationships between quantities


## Geometry

- Understand and solve for surface area and volume


## Statistics and Probability

- Understand mean, median and mode
- Display numerical data (dot plots, histograms, box plots)


## The Number System, Expressions \& Equations

- Understands fractions, decimals, and percents represent the same rational number
- Add, subtract, multiply and divide negative numbers
- Use equations to solve problems


## Ratios and Proportional Relationships

- Develop an understanding of proportionality
- Analyze proportional relationships and use them to solve real-world and mathematical problems
- Solve problems about scale drawings
- Graph proportional relationships
- Distinguish proportional relationships from other relationships


## Geometry

- Solve problems for circumferences and area of a circle
- Solve problems for the surface area of three dimensional objects
- Gain familiarity with relationships between angles formed by intersecting lines
- Work with three-dimensional figures
- Solve real-world and mathematical problems involving area, surface area and volume composed of a variety of shapes


## Statistics and Probability

- Use sampling to draw conclusions about populations


## Number Systems

- Know that there are numbers that are not rational
- Approximate irrational numbers


## Expressions and Equations

- Understand the connection between proportional relationships, lines, and linear equations
- Analyze and solve linear equations
- Analyze and solve pairs of simultaneous linear equations
- Understand and use square root and cube root


## Geometry

- Understand and apply the Pythagorean theorem
- Understand congruence and similarity
- Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres


## Functions

- Understand the purpose and definition of a function
- Use functions to model linear relationships
- Describe where a function is increasing or decreasing, linear or non-linear


## Statistics and Probability

- Investigate patterns of association in bivariate data


## EXPLICIT INSTRUCTION



## Modeling

Clear
Explanation
Planned
Examples

## Practice

Guided
Practice
Independent
Practice

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Goal and importance

## Modeling

## Clear

Explanation
Planned Examples
"Today, we are learning about division. This is important because sometimes you have to share objects or things with your friends."
"Let's continue working with our three-dimensional shapes and volume. Understanding volume and calculating volume helps with measuring capacity."

## Goal and importance

## Modeling

## Clear

Explanation
Planned Examples

## Model steps

"To solve 26 plus 79, I first decide about the operation. Do I add, subtract, multiply or divide?"
"The plus sign tells me to add. So, I'll add 26 plus 79 . I'll use the partial sums strategy. First, I add 20 plus 70. What's 20 plus 70?"
"20 plus 70 is 90 . I write 90 right here. Where do I write 90?"
"Then I add 6 plus 9. What's 6 plus 9?"
"6 plus 9 is 15 . So, I write 15 here. Where?"
"Finally, we add the partial sums: 90 and 15.90 plus 15 is 105. So, 26 plus 79 equals 105. Let's say that together.

## Goal and importance

## Modeling

## Clear

Explanation
Planned Examples

## Model steps

## Precise language

"To solve 26 plus 79, I first decide about the operation. Do I add, subtract, multiply, or divide?" "The plus sign tells me to add. So, l'll add 26 plus 79. I'll use the partial sums strategy. First, I add 20 plus 70. What's 20 plus 70?"
" 20 plus 70 is 90 . I write 90 right here under the equal line."
"Then I add 6 plus 9. What's 6 plus 9?"
" 6 plus 9 is 15 . So, I write 15 here."
"Finally, we add the partial sums: 90 and 15.90 plus 15 is 105 . So, 26 plus 79 equals 105 ."

## Examples

## Modeling

Clear
Explanation
Planned
Examples
"Today, we are learning about division. This is important because sometimes you have to share objects or things with your friends."

## $24 / 6$ <br> $28 \div 7$ <br> $3 5 \longdiv { 5 }$

## With examples

Modeling
Clear
Explanation
Planned Examples
"Today, we are learning about division. This is important because sometimes you have to share objects or things with your friends."

## $24 / 6$ <br> $28 \div 7$ <br> $3 5 \longdiv { 5 }$

## With non-examples

$$
32 \div 8 \quad 42 \div 7 \quad 25-5
$$

## Modeling

Clear
Explanation
Planned
Examples

## Practice

Guided
Practice
Independent
Practice

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Practice

Guided
Practice
Independent
Practice

## Practice

Guided
Teacher and student practice together

Independent
Practice

## Practice

Guided
Practice
Independent
Practice

## Student practices with

 teacher support
## Modeling

Clear
Explanation
Planned
Examples

## Practice

Guided
Practice
Independent
Practice

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Low-level and high-level

"What is 7 times 9?"
"Which shape has 6 sides?"
"What do you do when you see a word problem?"
"Why do you have to regroup?"
"How would you solve this problem?"
"Why do you have to use zero pairs?"

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Low-level and high-level

## Classwide, individual, partner, write on paper, write on whiteboard, thumbs up, etc.

"Turn and discuss the formula for perimeter with your partner."
"Write the multiplication problem on your whiteboard."

## Supports

- Asking the right questions

Eliciting frequent responses

- Providing immediate specific feedback
- Maintaining a brisk pace


## Low-level and high-level

## Classwide, individual, partner, write on paper, write on whiteboard, thumbs up, etc.

## Affirmative and corrective

## Supports

- Asking the right questions
- Eliciting frequent responses

Providing immediate specific feedback

- Maintaining a brisk pace
"Good work using your word-problem attack strategy."
"Let's look at that again. Tell me how you added in the hundreds column."


## Low-level and high-level

> Classwide, individual, partner, write on paper, write on whiteboard, thumbs up, etc.

## Affirmative and corrective

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback Maintaining a brisk pace


## Modeling

Clear
Explanation
Planned
Examples

## Practice

Guided
Practice
Independent
Practice

## Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace


## Modeling Practice

## Supports

Introduction of material

## Modeling

Supports

Review of material

## Modeling Practice

Supports


## FLUENCY AND COMPUTATION



## Fluency

Fluency

Addition


Subtraction

Multiplication


## Addition Facts

## 100 addition basic facts

- Single-digit addends sum to a single- or double-digit number

| 5 | $($ addend) |
| :--- | :--- |
| $+\quad 4$ | $($ addend) |
| 9 | sum) |

## Addition: Part-Part-Whole (Total)

Count one set, count another set, put sets together, count sum


$$
2+3=5
$$

## Addition: Join (Change Increase)

Start with a set, add the other set, count sum


# Why is it important to understand addition in two separate ways? 

## Total

## Parts put together into a total

- Jin saw 4 cardinals and 5 blue jays. How many birds did Jin see?

$$
4+5=?
$$

## Change

An amount that increases or decreases

- Mara had \$4. Then she earned \$3 for cleaning her room. How much money does Mara have now?

$$
4+3=\text { ? }
$$

## Part-Part-Whole Versus Join

$$
\begin{aligned}
& 3+9= \\
& 7+4=
\end{aligned}
$$

Teach this problem to a student.

Explicit instruction

Precise language

Multiple
representations

## Subtraction Facts

## 100 subtraction basic facts

- Subtrahend and difference are single-digit numbers and minuend is single- or double-digit number

| 16 |
| ---: |
| $-\quad 8$ |
| 8 |

(minuend)
(subtrahend)
(difference)

## Subtraction: Separate (Change Decrease)

Start with a set, take away from that set, count difference


$$
5-3=2
$$

## Subtraction: Compare (Difference)

Compare two sets, count difference

$5-3=2$

# Why is it important to understand subtraction in two separate ways? 

## Change

## An amount that increases or decreases

- Aishwarya had 9 cookies. Then she ate 2 of the cookies. How many cookies does Aishwarya have now?

$$
9-2=\text { ? }
$$

## Difference

Greater and less amounts compared for a

- Brad has 9 apples. Caroline has 4 apples. How many more apples does Brad have? (How many fewer does Caroline have?)
- $9-4$ =


## Separate Versus Compare

$$
\begin{aligned}
& 9-5= \\
& 8-3=
\end{aligned}
$$

Teach this problem to a student.

Explicit instruction

Precise language

Multiple
representations

## Multiplication Facts

## 100 multiplication basic facts

- Multiplication of single-digit factors results in a single- or doubledigit product

| 2 | (factor) |
| :--- | :--- |
| $\times \quad 3$ | (factor) |
| 6 | (product) |

## Multiplication: Equal Groups

Show the groups, show the amount for each group, count product

$3 \times 2=6$

## Multiplication: Array/Area

## Make the array, count product


$3 \times 2=6$

## Multiplication: Comparison

Show a set, then multiply the set

$3 \times 2=6$

Why is it important to understand multiplication in different ways?

## Equal Groups

Groups multiplied by number in each group for a product

- Carlos has 2 bags of apples. There are 6 apples in each bag. How many apples does Carlos have altogether?
- $2 \times 6=$ ?


## Comparison

Set multiplied by a number of times for a product

- Beth picked 6 apples. Amy picked 2 times as many apples as Beth. How many apples did Amy pick?
- $6 \times 2=$ ?


## Equal Groups versus Comparison

$2 \times 5=$
$4 \times 3=-$
Determine a word problem for each schema.

Explicit instruction

Precise language

Multiple
representations

## Division Facts

## 90 division basic facts

- Divisor and quotient are single-digit numbers and dividend is single- or double-digit number

| 8 | $\div$ | 4 |
| :---: | :---: | :---: |
| (dividend) | 2 |  |
| (divisor) |  |  |

## Division: Equal Groups (Partitive Division)

Show the dividend, divide equally among divisor, count quotient


## Division: Equal Groups (Measurement Division)

Show the dividend, make groups of the divisor, count groups


$$
6 \div 3=2
$$

Why is it important to understand division in different ways?

## Equal Groups

Groups multiplied by number in each group for a product

- Carlos has 12 apples. He wants to share them equally among his 2 friends. How many apples will each friend receive?
- $2 \times$ ? $=12$
- Carlos has 12 apples. He put them into bags containing 6 apples each. How many bags did Carlos use?
- ? $\times 6=12$


## Partitive versus Measurement

$$
\begin{aligned}
& 10 \div 5= \\
& 12 \div 4=
\end{aligned}
$$

# Determine a word problem for each schema. 



Explicit instruction

Precise language

Multiple
representations

## Fact Practice

Students should practice small sets of facts

- These small sets should include known and unknown facts


## BRIEF

## DAILY

## (1-2 min) <br> (everyday)

## Cover, Copy, Compare

## BEFORE

1. Create sheet with 10-12 answered problems and room to copy facts

## DURING

1. Student reads entire fact
2. Student covers fact
3. Student rewrites entire fact
4. Student compares

| counc, cop, compore |  |
| :---: | :---: |
| 9 | 8 |
| + 6 | + 6 |
| 54 | 48 |
| 7 | 6 |
| $\times 8$ | + 5 |
| 56 | 30 |
| 9 | 7 |
| $\times 9$ | $\times \quad 9$ |
| 81 | 63 |
| 6 | 8 |
| $\times 7$ | + 5 |
| 42 | 40 |
| 8 | 7 |
| $\times 8$ | $\times 7$ |
| 64 | 49 |

## File Folder

## BEFORE

1. Create sheet with 15-25 answered facts

## DURING

1. Student folds answers over
2. Student writes answers to all facts
3. Student unfolds answers and compare

File Folder
$6+3=\square$
$1+7=\quad 8$
$6+4=$
10
$7+3=$
10
$2+7=\quad 9$
$5+6=\quad 11$
$4+7=\quad 11$
$7+8=\quad 15$
$6+7=$
13
$7+9=\quad 16$
$7+6=$
13

| $8+7=$ | 15 |
| :--- | :--- |
| $7+0=$ | 7 |

$7+0=$
7
$9+6=\quad 15$
$6+0=$
6
$6+8=$

## Taped Problems

## BEFORE

1. Create worksheet with 15-25 facts
2. Make a recording:
3. Say fact (e.g., " 6 times 5 equals...")
4. Pause for $1-5$ seconds
5. Say fact answer (e.g., " $30^{\prime \prime}$ )
6. Continue with all facts on page

## DURING

1. Student listens to recording
2. Student writes fact answer before the answer is stated on the recording

| Taped Problems |  |  |  |
| :---: | :---: | :---: | :---: |
| $\begin{array}{r}6 \\ \times \quad 5 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ \times 6 \\ \hline\end{array}$ | $\begin{array}{r}7 \\ \times \quad 9 \\ \hline\end{array}$ | 6 $\times \quad 8$ |
| $\begin{array}{r}9 \\ \times 8 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ \times \quad 5 \\ \hline\end{array}$ | 7 $\times \quad 8$ | 6 $\times 6$ |
| $\begin{array}{r} 7 \\ \times \quad 7 \end{array}$ | $\begin{array}{r}6 \\ \times \quad 9 \\ \hline\end{array}$ | $\begin{array}{r}5 \\ \times \quad 9 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ \times \quad 4 \\ \hline\end{array}$ |
| $\begin{array}{r}9 \\ \times 4 \\ \hline\end{array}$ | $\begin{array}{r}6 \\ \times \quad 9 \\ \hline\end{array}$ | $\begin{array}{r}9 \\ \times \quad 5 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ \times \quad 7 \\ \hline\end{array}$ |
| $\begin{array}{r}6 \\ \times \quad 7 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ \times \quad 8 \\ \hline\end{array}$ | 4 $\times \quad 8$ | 5 $\times \quad 7$ |

## Flash Cards with Constant Time Delay

## BEFORE

1. Collect small set of flash cards

## DURING

1. Show student flash card for 3 seconds
2. Student answers
3. If correct, state correct answer and place back in pile
4. If incorrect, state correct answer and have student repeat it; place back in pile
5. Work through pile of cards for 1-2 minutes


## Flash Cards with Graphing

## BEFORE

1. Collect small set of flash cards

## DURING

1. Show student flash card
2. Student answers flash card
3. If correct, place in correct pile
4. If incorrect, review fact
5. Time for 1-2 minutes
6. Count total score
7. Graph total score
8. Could opt to try to beat score for another 1-2 minutes
9. Graph highest score


## Flash Cards with Incremental Rehearsal

## BEFORE

1. Select 1 unknown fact from a set of flash cards
2. Select 9 known facts from a set of flash cards

DURING

1. Read unknown fact aloud, provide answer, and ask student to read problem with you
2. Keep unknown fact flash card and combine with 1 known fact flash card
3. Show 2 flash cards to student
4. If student answer correctly, go to next flash card
5. If student answers incorrectly, read fact with answer and ask student to read with you
6. Work on cards until student answers correctly within 2 seconds
7. Add in 1 known fact flash card; continue with 3 cards
8. Keep adding in known fact flash cards until student achieves fluency with unknown card
9. Select new unknown fact and repeat process

## Worksheets

## DURING

1. Students answer facts for $1-2$ minutes
2. Students graph highest score of day or week

| $\begin{array}{r} 8 \\ +\quad 3 \\ \hline \end{array}$ | $\begin{array}{r}6 \\ +\quad 7 \\ \hline\end{array}$ |  | $\begin{array}{r}6 \\ +\quad 5 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ +\quad 2 \\ \hline\end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
| $\begin{array}{r} 4 \\ +\quad 8 \\ \hline \end{array}$ | $\begin{array}{r}9 \\ +\quad 9 \\ \hline\end{array}$ | $\begin{array}{r}0 \\ +\quad 6 \\ \hline\end{array}$ | $\begin{array}{r}7 \\ +\quad 1 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ +\quad 7 \\ \hline\end{array}$ |
| $\begin{array}{r} 5 \\ +\quad 8 \\ \hline \end{array}$ | $\begin{array}{r}3 \\ +\quad 6 \\ \hline\end{array}$ | $\begin{array}{r}9 \\ +\quad 5 \\ \hline\end{array}$ |  | $\begin{array}{r}6 \\ +\quad 9 \\ \hline\end{array}$ |
| $\begin{array}{r} 6 \\ +\quad 8 \\ \hline \end{array}$ | $\begin{array}{r}7 \\ +\quad 5 \\ \hline\end{array}$ | $\begin{array}{r}4 \\ +\quad 3 \\ \hline\end{array}$ | $\begin{array}{r}4 \\ +\quad 7 \\ \hline\end{array}$ | $\begin{array}{r}5 \\ +\quad 4 \\ \hline\end{array}$ |
| $\begin{array}{r} 9 \\ +\quad 7 \\ \hline \end{array}$ | $\begin{array}{r}3 \\ +\quad 5 \\ \hline\end{array}$ | $\begin{array}{r}9 \\ +\quad 3 \\ \hline\end{array}$ | $\begin{array}{r}3 \\ +\quad 7 \\ \hline\end{array}$ | $\begin{array}{r}8 \\ +\quad 9 \\ \hline\end{array}$ |

## Worksheets with Graphing

## DURING

1. Students answer facts for $1-2$ minutes
2. Students graph highest score of day or week


My beginning of the quarter fluency score: $\qquad$
My end of the quarter fluency score: $\qquad$

## Magic Squares

## BEFORE

1. Create sets of magic squares
2. See templates
http://www.sarahpowellphd.com/presentations.html

## DURING

1. Place sum or product in bottom right corner


Write the facts:
2. In bottom row, create a fact with a sum or product of bottom right corner
3. In right column, create a fact with a sum or product of bottom right corner
4. Create two columns with a sum or product of bottom number
5. Create two rows with a sum or product of right column number
6. Write created facts

## Magic Squares



## Playing Cards

## BEFORE

1. Select numbered playing cards from a deck of cards

## DURING

1. Divide deck in half
2. Students place set of cards face down
3. Each student flips over top card
4. First student to add, subtract, or multiply the cards gets to keep both cards; cards go back in student's set
5. Students continue until one student has all the cards

This game is similar to War.


## Dice Roll

## DURING

1. Student rolls two die
2. Student adds, subtracts, or multiplies
3. Student writes facts


## Dominoes

DURING

1. Student select domino
2. Student adds, subtracts, or multiplies
3. Student writes fact


## Wrap-Ups

## DURING

1. Student wraps string behind key and places around top left notch
2. Student answers fact by wrapping string in front of key and around to answer notch
3. Student brings string around the back to next left notch
4. Student continues
5. At end, student checks facts by comparing string to raised pattern on back of key


## Mobi

## DURING

1. Students begin with a specific number of blue tiles; the white tiles can be used at anytime
2. Students create a set of equations that build off of one another (each student makes their own set of equations)
3. Students draw more blue tiles after blue tiles are used; students rearrange and add to equation set

This game is similar to Bananagrams.

## SMATH

## DURING

1. Students use tiles to create equations on a game board
2. Students take turns and build off of one another's tiles

This game is similar to Scrabble.


## Technology

## Individual activity

## BEFORE

1. Select game that will practice small sets of facts
2. Select game that will track and monitor student progress
3. Select game that will provide feedback to student (especially when student makes mistake)


## Other Ideas

Tic-Tac-Toe (with facts)
Connect Four (with numbers)
Chutes and Ladders (with numbers)

Add to this list!

## Computation

## Autumn

## Traditional

- Work right to left (start in ones column)



## Lydia

## Partial Sums

- Work left to right
А. 74
$\begin{array}{r}78 \\ +\quad 18 \\ \hline 82\end{array}$
$\begin{array}{r}82 \\ +12 \\ \hline 92\end{array}$
B.
725
765
$+\quad 360$
1,000
80
$\begin{array}{r}+\quad 10 \\ \hline 1,090\end{array}$


## Victoria

## Opposite Change

- Round one number to nearest ten
- Amount added is subtracted from other number

в. $\quad 725 \xrightarrow{+5} 730$
$+365^{-5} \xrightarrow{\frac{T}{1}, 990}$



## Julie

Traditional Method

- Work right to left (start in ones column)

$$
\text { A. } \begin{array}{r}
5 \\
\quad 62 \\
-\quad 17 \\
\hline 45
\end{array}
$$

B.

$$
\begin{array}{r}
29 \\
\not 2 \phi 15 \\
-\quad 96 \\
\hline 209
\end{array}
$$

## Janie

## Partial Differences

- Work left to right



## Eric

Same Change

- Change subtrahend to end in 0
A. $\quad 62 \xrightarrow{+3} 65$

$$
-17 \xrightarrow{+3} \frac{-20}{45}
$$

8. $305 \xrightarrow{+4} 309$
$-\quad 96 \xrightarrow{+4}-100$

## Beth

Add-Up



## Angie

Traditional

- Work right to left (start in ones column)



## Carlos

Partial Products


Cathy

Area


Scott

Lattice Method $(383 \times 27)$
A.

$13 \times 27=$

Pam

Traditional Method

- Work Left to Right


Amanda

Partial Quotients

## Julie

Lattice Division


## 28 R 18 <br> 8. $3 4 \longdiv { 9 7 0 }$ <br> $34\left[\begin{array}{l}9 \\ 9,9 \\ 9 \\ 2 \times 29\end{array}\right]$ <br> 

$13 \times 27=$

## PROBLEM SOLVING

Problem Solving
Three Things to Remember

Attack Strategies

## Don't tie key words to operations

## Do have an attack strategy




Students need to understand key words. But, key words should not be directly tied to operations.


## LONG DIVISION WORD PROBLEMS

1. Zookeeper Al wants to give each monkey at the zoo an equal number of bananas. There are 37 monkeys in the zoo and 567 bananas. How many bananas does each monkey get? And How many are left over for him to eat himself?
2. Belty has 427 oranges and needs to pack them up equally in 23 boxes. How many oranges go in each box and how much does she have left over?
3. Miss King has 1376 pages of scrap paper, She wants to make them into scrap paper packets for her 32 students. How many pages will each packet have? How many extra pages will she have left over?
4. Mr. Chong has 1,440 pages of scrap paper. He instead wants to make packets of 40 pages each but forgets to check if that will be enough for his 37 students. Will there be enough packets per student? if not how much more scrap paper does he need?

## Don't tie key words to operations

## Do have an attack strategy



## RIDGTHS

Read the problem.
I know statement.
Draw a picture.
Goal statement.
Fquation development.
Solve the equation.


## RIDE

Read the problem. Identify the relevant information.
Determine the operation and unit for the answer.
Enter the correct numbers and calculate, then check the answer.


| S | slowly and carefully READ the problem. |
| :--- | :--- |
| H | highlight or underline key information. |
| I | identify the question by drawing a circle around it. |
| N | now solve the problem with numbers, pictures, and words. Show <br> your work. |
| E | examine your work for precision, accuracy, and clarity. |
| S | share your answer by writing a sentence. |



## RUN!

1. Read the problem.
2. Underline the labels.
3. Name the problem type.


## SIGNS

Survey questions
Identify key words
Graphically draw problem
Note operations
Solve and check

## SOLVE

Study the problem.
Organize the facts.
Line up the plan.
Verify the plan with computation.
Examine the answer.

## Problem-Solving Model

| Step | Description of Step |
| :---: | :--- |
| $\mathbf{1}$ | Analyze the given information. <br> -Summarize the problem in your own words. <br> -Describe the main idea of the problem. <br> -Identify information needed to solve the problem. |
| $\mathbf{2}$ | Formulate a plan or strategy. <br> -Draw a picture or a diagram. <br> -Find a pattern. <br> -Guess and check. <br> -Act it out. <br> -Create or use a chart or a table. <br> -Work a simpler problem. <br> -Work backwards. <br> -Make an organized list. <br> -Use Iogical reasoning. <br> -Brainstorm. <br> -Write a number sentence or an equation. |
| 3 | Determine a solution. <br> -Estimate the solution to the problem. <br> -Solve the problem. |
| 4 | Justify the solution. <br> -Explain why your solution solves the problem. |
| 5 | Evaluate the process and the reasonableness <br> of your solution. <br> -Make sure the solution matches the problem. <br> -Solve the problem in a different way. |

## R-CUBES

## Read the problem.

 Circle key numbers. Underline the question. Box action words. Evaluate steps. Solve and check.

## Don't tie key words to operations

## Do have an attack strategy



## Additive Schemas

## Schemas

## Total

## Difference

## Change

## Equal Groups

## Comparison

## Ratios/Proportions

| Problem <br> type | Definition | Examples |  |  | Equation | Graphic organizer |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Total |  |  |  |  |  |  |

## Total

## Parts put together into a total

- Autumn saw 4 cardinals and 5 blue jays. How many birds did Autumn see?
- $4+5=$ ?
- Autumn saw 9 birds. If 4 of the birds were cardinals, how many were blue jays?
- 4 + ? = 9
- Autumn r saw 9 birds. 5 of the birds were blue jays, how many were cardinals?
- 5 + ? = 9


## Total

## "Are parts put together for a total?"

## Total

## P1 $+$ P2 $=\quad \mathrm{T}$



## Total

Megan baked $2 / 8$ sugar cookies and 24 chocolate chip cookies. Enter the total number of cookies Megan baked in all.

$$
\begin{aligned}
& P 1+P 2=T \\
& 28+24=? \\
& 28+24=62 \\
& ?=52 \text { cookies }
\end{aligned}
$$

## Difference

Greater and less amounts compared for a difference

- Lydia has 9 apples. Carol has 4 apples. How many more apples does Lydia have? (How many fewer?)
- $9-4=$ ?
- Lydia has 5 more apples than Carol. If Carol has 4 apples, how many does Lydia have?
- ? - 4 = 5
- Carol has 5 fewer apples than Lydia. Lydia has 9 apples. How many apples does Carol have?
- $9-$ ? = 5


## Total

## "Are parts put together for a total?"

## Difference

"Are amounts compared for a difference?"

## Difference



## Difference

Jana has 107 wooden beads and 68 glass beads. How many more wooden beads than glass beads does Jana have?

$$
\begin{aligned}
& C-L=D \\
& 107-68=B \quad-\quad 107 \quad 68 \\
& 107-68=39 \\
& B=39 \text { more beads }
\end{aligned}
$$

## Change

## An amount that increases or decreases

- Victoria had \$4. Then she earned \$3 for cleaning her room. How much money does Victoria have now?
- $4+3$ =?
- Victoria has \$4. Then she earned money for cleaning her room. Now Victoria has \$7. How much money did she earn?
- 4 + ? = 7
- Victoria had some money. Then she made \$3 for cleaning her room. Now she has $\$ 7$. How much money did Victoria start with?
- ? $+3=7$


## Total

"Are parts put together for a total?"

Difference
"Are amounts compared for a difference?"

## Change

"Does an amount increase or decrease?"

## Change



$$
+/-
$$


(start) (change) (end)


## Change

A bus had $1 / 3$ passengers. At the next stop, more passengers got on the bus. Now, there are 28 passengers. How many passengers got on the bus?

$$
\begin{array}{ll}
S T+C=E \\
13+?=28 & \\
& \\
13+16=28 & -13 \\
& +? \\
\hline 28
\end{array}
$$

$?=15$ passengers

## Total

Ramon has a total of 815 sheep in two fields. He has 348 sheep in one of the fields. How many sheep does Ramon have in the other field?

## Change

## Angelina looked in her closet and saw a container of markers. She took 42 markers out of the container and counted 88 left. How many markers were in the container when she found it in the closet?

## Difference

The grocery store had 517 jars of crunchy peanut butter and 434 jars of creamy peanut butter. How many more jars of crunchy peanut butter were there?

## Total

## G.The animal park has 12 zebras, 25 monkeys, and some giraffes. If the total number of animals is 50 , how many giraffes are there?

$$
P 1+P 2+P 3=T
$$

## Change

## H. Mrs. Lanier saved \$617 in January. In February, she spent $\$ 249$ of the money she saved. She saved $\$ 291$ more in March. How much has Mrs. Lanier saved by the end of March?

$$
S T-C+C=E
$$

## Let's Review

What's a Total problem?
What's a Difference problem?
What's a Change problem?

## Schema Quiz Time!

## Difference

The graph below shows the number of pounds of plastic the Keller family recycled for five months.

Recycled Plastic


Based on the graph, how many more pounds of plastic did the family recycle in July than in April?

## Total

Roland's family drove $4 \frac{6}{10}$ kilometers from their home to the gas station. They drove $2 \frac{30}{100}$ kilometers from the gas station to the store.

Which expression can be used to determine the number of kilometers Roland's family drove altogether?

## Change

At the beginning of June, a bean plant was $3 \frac{4}{5}$ inches tall.
By the beginning of July, the plant was $6 \frac{2}{5}$ inches tall.
How many inches did the plant grow during June? Enter your answer in the response box.

## Multiplicative Schemas

| Problem type | Definition | Examples |  |  | Equation | Graphic <br> organizer |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Equal Groups |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Comparison |  |  |  |  |  |  |
| Combinations |  |  |  |  |  |  |
| Ratios and |  |  |  |  |  |  |
| Proportions |  |  |  |  |  |  |

## Equal Groups

Groups multiplied by number in each group for a product

- Scott has 2 bags of apples. There are 6 apples in each bag. How many apples does Scott have altogether?
- $2 \times 6=$ ?
- Scott has 12 apples. He wants to share them equally among his 2 friends. How many apples will each friend receive?
- $2 \times$ ? $=12$
- Scott has 12 apples. He put them into bags containing 6 apples each. How many bags did Scott use?
- ? $\times 6=12$


## Equal Groups

## "Are there groups with an equal number in each group?"

## Equal Groups

## G $\times$ N $=$



## Equal Groups

Ms. Thompson sold 6 cartons of cherries at the Farmers' Market. Each carton holds 25 cherries. How many cherries did she sell?

$$
\begin{aligned}
& G \times N=? \\
& 6 \times 25=? \\
& 6 \times 25=150 \\
& ?=150 \text { cherries }
\end{aligned}
$$

## Comparison

## Set multiplied by a number of times for a product

- Julie picked 6 apples. Amy picked 2 times as many apples as Marcie. How many apples did Lisa pick?
- $6 \times 2=$ ?
- Amy picked 12 apples. She picked 2 times as many apples as Julie. How many apples did Julie pick?
- ? $\times 2=12$
- Amy picked 12 apples, and Julie picked 6 apples. How many times as many apples did Amy pick?
- $6 \times$ ? $=12$


## Equal Groups

"Are there groups with an equal number in each group?"

## Comparison

"Is a set compared a number of times?"

## Comparison

x



## Comparison

## Isabella has 2 times as many DVDs as Emma. Emma has 6 DVDs. How many DVDs does Isabella have?



$$
?=12 \mathrm{DVDS}
$$

## Ratios/Proportions

Description of relationships among quantities


## Equal Groups

## "Are there groups with an equal number in each group?"

## Comparison

"Is a set compared a number of times?"

## Ratios/Proportions

"Are there relationships among quantities -
if this, then this?"

## Ratios/Proportions

There are $17 / 6$ slices of bread in 8 loaves. If there are the same number of slices in each loaf, how many slices of bread are in 5 loaves?


THEN


## Equal Groups

Isaiah put 301 floor tiles in 7 rows. Each row had the same number of tiles. How many tiles did Isaiah put in each row?

## Ratios/Proportions

On average, thunder is heard in Tororo, Uganda, 251 days each year. What is the probability that thunder will be heard in Tororo on any day? (1 year $=365$ days)

## Comparison

Susan has 3 times as many books as Mary. Mary has 18 books. Which equation can be solved to figure out how many books Susan has?

## Let's Review

What's an Equal Groups problem? What's a Comparison problem?
What's a Ratios/Proportions problem?

## Schema Quiz Time!

## Ratios/Proportions

Ethan correctly answers $80 \%$ of the total questions on his history test. He correctly answers 32 questions.

## Equal Groups

Ryan makes 6 backpacks. He uses $\frac{3}{4}$ yard of cloth to make each backpack. What is the total amount of cloth, in yards, Ryan uses to make all 6 backpacks?
A. $1 \frac{1}{2}$
B. $2 \frac{1}{4}$
C. $4 \frac{1}{2}$
D. $6 \frac{3}{4}$

## Comparison

Danielle's full-grown dog weighs 10 times as much as her puppy. The puppy weighs 9 pounds.

Enter the number of pounds the full-grown dog weighs.

## Schemas

## Total

## Difference

## Change

## Equal Groups

## Comparison

## Ratios/Proportions

## Don't tie key words to operations

## Do have an attack strategy



## MULTIPLE REPRESENTATIONS







Two-dimensional images



Modeling Fractions with Cuisenaire Rods



Numerals and symbols

$$
2+8=10
$$

## $34=3$ tens and 4 ones

$$
x-6=8
$$

$$
\begin{array}{r}
4,179 \\
+\quad 569 \\
\hline
\end{array}
$$

## Multiple Representations

> | 1.25 | 2.05 |
| ---: | ---: |
| $-\quad 0.96$ | -1.37 |

$\frac{5}{6}+\frac{1}{2}$

$$
\frac{2}{3}+\frac{3}{4}
$$

## KEYMATH

## KeyMathz

## Diagnostic

 Assessment
## PRARSON

Table A.7a Grade Equivalents Corresponding to Subtest Raw Scores (Continuec)

| $\begin{gathered} \text { Grate } \\ \text { Equivalest } \end{gathered}$ | Numeration | Apotra | Geometry | Measurement | Data Arolyis ned Probability | $\begin{gathered} \text { Mental } \\ \text { Compurision } \\ \text { and Estimation } \\ \hline \end{gathered}$ | Addifion and Suttraction | Multiplicaion and Division | Foundritions of Problem Soving | Appled <br> Problem <br> Solving | $\begin{gathered} \text { Grade } \\ \text { Equitient } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4.9 | - | - | - | - | - | - | - | 11 | - | - | 4.9 |
| 4.8 | 23 | 17 | 20 | 21 | - | 19 | 22 | - | 15 | 18 | 4.8 |
| 4.7 | - | - | - | - | 20 | - | - | - | - | - | 4.7 |
| 4.6 | - | - | - | - | - | - | - | 10 | - | - | 4.5 |
| 4.5 | 22 | - | - | 20 | 19 | 18 | 21 | - | - | - | 4.5 |
| 4.4 | - | - | - | - | - | - | - | 9 | - | - | 4.4 |
| 4.3 | - | - | - | - | - | - | - | - | - | - | 4.3 |
| 4.2 | - | 16 | 19 | 19 | 18 | - | 20 | 8 | 14 | 17 | 4.2 |
| 4.1 | 21 | - | - | - | - | 17 | - | - | - | - | 4.1 |
| 4.0 | 20 | - | 10 | - | - | - | 19 | - | - | - | 4.0 |
| 3.9 | - | - | - | 18 | 17 | - | - | 7 | - | 16 | 3.9 |
| 3.8 | - | 15 | 17 | - | - | 16 | 18 | - | 13 | - | 3.8 |
| 37 | 19 | - | - | 17 | 16 | - | - | - | - | - | 37 |
| 36 | - | 14 | - | - | - | - | - | 6 | - | - | 3.6 |
| 35 | 18 | - | - | - | - | 15 | 17 | - | 12 | 15 | 3.5 |
| 34 | - | - | - | 16 | 15 | - | - | 5 | - | - | 3.4 |
| 33 | - | 13 | - | - | - | 14 | - | - | - | - | 3.3 |
| 32 | - | - | 16 | - | - | - | 16 | 4 | 11 | 14 | 32 |
| 3.1 | 17 | 12 | - | 15 | 14 | 13 | - | - | - | - | 3.1 |
| 30 | - | - | 15 | - | - | - | 15 | - | - | 13 | 3.0 |
| 29 | - | - | - | 14 | - | 12 | - | - | - | - | 2.9 |
| 28 | 16 | 11 | 14 | - | 13 | - | 14 | 3 | 10 | - | 28 |
| 27 | - | - | - | 13 | - | 11 | - | - | - | 12 | 27 |
| 26 | - | 10 | - | - | - | - | 13 | 2 | - | - | 2.6 |
| 25 | 15 | - | - | - | 12 | 10 | - | - | 9 | 11 | 2.5 |
| 24 | - | 9 | - | 12 | - | - | 12 | 1 | - | - | 2.4 |
| 23 | - | - | - | - | - | 9 | 11 | - | - | - | 23 |
| 22 | 14 | 8 | 13 | - | 11 | - | 10 | - | 8 | 10 | 22 |
| 2.1 | - | - | - | 11 | - | 8 | - | - | - | - | 21 |
| 20 | 13 | - | - | 10 | 10 | - | 9 | - | - | 9 | 20 |
| 19 | - | - | - | - | - | 7 | - | - | - | - | 1.9 |
| 18 | 12 | 7 | 12 | - | 9 | - | 8 | 0 | 7 | - | 1.8 |
| 17 | - | - | - | 9 | - | 6 | - | - | - | 8 | 1.7 |
| 15 | 11 | - | - | - | - | - | 7 | - | - | - | 1.6 |
| 15 | - | 6 | 11 | 8 | 8 | 5 | - | - | 6 | 7 | 1.5 |
| 1.4 | 10 | - | - | - | - | - | 6 | - | - | - | 1.4 |
| 13 | - | - | - | 7 | - | - | - | - | - | - | 1.3 |
| 12 | 9 | 5 | 10 | - | 7 | 4 | 5 | - | 5 | 6 | 1.2 |
| 1.1 | - | - | - | - | - | - | - | - | - | - | 1.1 |
| 1.0 | 8 | - | - | 6 | - | 3 | 4 | - | - | - | 1.0 |
| K9 | - | - | - | - | - | - | - | - | - | - | $k 9$ |
| K8 | 7 | 4 | 9 | 5 | 6 | - | 3 | - | 4 | 5 | K8 |
| K 7 | - | - | - | - | - | - | - | - | - | - | K7 |
| K 6 | - | - | - | - | - | - | - | - | - | - | K6 |
| KS | 6 | - | 8 | 4 | 5 | 2 | 2 | - | - | 4 | K.5 |
| K4 | - | 3 | - | - | - | - | - | - | - | - | K.4 |
| K3 | - | - | - | 3 | - | - | - | - | - | - | K3 |
| K2 | 5 | - | 7 | - | 4 | 1 | 1 | - | 3 | 3 | K. 2 |
| K 1 | - | - | - | - | - | - | - | - | - | - | K. 1 |
| a $0_{0}$ | 0-4 | 0-2 | $0-6$ | 0-2 | 0-3 | 0 | 0 | - | 0-2 | 0-2 | Q0 |

Table A.8a Age Equivalents Corresponding to Subtest Raw Scores

| $\begin{aligned} & \text { Aon } \\ & \text { Equildent } \end{aligned}$ | Numeration | Algebra | Gommery | Measurement | $\begin{gathered} \text { Duta Analyis } \\ \text { Protabily } \\ \hline \end{gathered}$ | $\begin{array}{\|c\|} \hline \text { Mertay } \\ \text { Computation } \\ \text { and Estimution } \\ \hline \end{array}$ | Adstion and Subtraction | Multiplication and Division | Foundations of Problem Sowing | Applied Problem Soling | $\begin{gathered} \text { Age } \\ \text { Equilalent } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 216.0 | 41-49 | 30-39 | 31-36 | 55-40 | 34-40 | 33-40 | 31-35 | 23-31 | 25-27 | 23-35 | 216.0 |
| $15: 11$ | - | - | - | - | - | - | - | - | - | - | 15:11 |
| 15.10 | - | - | - | - | - | - | - | - | - | - | 15:10 |
| 159 | - | - | - | - | - | - | - | - | - | - | 15.9 |
| 15:8 | - | - | - | 34 | - | - | - | - | - | - | 158 |
| 15.7 | - | - | - | - | - | - | - | - | - | - | 157 |
| 15.6 | - | - | - | - | - | - | - | - | - | - | 15.6 |
| 15.5 | 40 | 29 | 30 | - | 33 | 32 | 30 | 22 | 24 | 27 | 155 |
| 154 | - | - | - | 33 | - | - | - | - | - | - | 154 |
| 153 | - | - | - | - | - | - | - | - | - | - | 153 |
| 152 | - | - | - | - | - | - | - | - | - | - | 152 |
| 15.1 | - | - | - | - | - | - | - | - | - | - | $15: 1$ |
| 15.0 | 37 | - | - | - | - | - | - | - | - | - | 15:0 |
| 14:11 | - | 28 | 29 | 32 | 32 | 31 | 29 | - | - | 28 | 14:11 |
| 14:10 | - | - | - | - | - | - | - | - | - | - | 14:10 |
| 14.9 | - | - | - | - | - | - | - | - | - | - | 14.9 |
| 148 | - | - | - | - | - | - | - | 21 | - | - | 148 |
| 14.7 | - | - | - | - | - | - | - | - | - | - | 147 |
| 14.5 | 38 | - | - | - | - | - | - | - | - | - | 14.6 |
| 145 | - | 27 | - | - | 31 | 30 | - | - | 23 | - | 145 |
| 14.4 | - | - | - | - | - | - | - | - | - | - | 14.4 |
| 143 | - | - | - | - | - | - | - | - | - | - | 143 |
| 14.2 | - | - | - | - | - | - | - | - | - | - | 142 |
| 14.1 | 37 | - | - | - | - | - | - | - | - | - | 14.1 |
| 14.0 | - | - | - | - | - | - | - | - | - | - | 14.0 |
| 43.11 | - | 26 | 28 | 31 | 30 | 29 | 28 | - | - | 25 | 13311 |
| 1310 | 36 | - | - | - | - | - | - | 20 | - | - | 1310 |
| 139 | - | - | - | - | - | - | - | - | - | - | 13.9 |
| 138 | - | - | - | - | - | - | - | - | - | - | 1388 |
| 137 | - | - | - | - | - | - | - | - | - | - | $13: 7$ |
| 135 | - | - | - | - | - | - | - | - | - | - | 13.6 |
| 135 | 35 | 25 | 27 | 30 | 29 | 23 | - | - | 22 | 24 | 135 |
| 134 | - | - | - | - | - | - | - | - | - | - | 13.4 |
| 133 | 34 | - | - | - | - | - | - | - | - | - | 133 |
| 132 | - | - | - | - | - | - | - | - | - | - | 132 |
| 131 | - | - | - | 29 | 28 | 27 | 27 | 19 | - | - | 13.1 |
| 130 | 33 | - | - | - | - | - | - | - | - | - | 130 |
| 1211 | - | 24 | - | - | - | - | - | - | - | - | 1211 |
| 12.10 | - | 23 | 26 | - | - | - | - | - | - | - | 1210 |
| 129 | - | - | - | - | - | - | - | - | - | - | 12.9 |
| 128 | - | - | - | - | - | - | - | - | - | - | 12.8 |
| 127 | 32 | - | - | 28 | 27 | 26 | - | 18 | - | - | 12.7 |
| 126 | - | - | - | - | - | - | - | - | - | - | 12.6 |
| 125 | - | - | - | - | - | - | \% | 17 | 21 | 23 | 125 |
| 124 | - | - | - | - | - | - | - | - | - | - | 12.4 |
| 123 | - | - | - | - | - | - | - | - | - | - | 123 |
| 12.2 | 31 | 22 | 25 | - | - | - | - | - | - | - | 122 |
| 12.1 | 30 | - | - | 27 | 26 | 25 | - | - | - | - | 121 |
| 120 | - | - | - | - | - | - | - | 16 | - | - | 120 |

## FORMATIVE ASSESSMENT

Intervention: Occurs frequently and with intensity

## Validated Intervention

Program (e.g. Tier2,
Standard Protocol,
Secondary Intervention)


Acadience" Math / Computation Level 3
Progress Monitoring 1

Total: $\qquad$

| 1. $\begin{array}{r} 77 \\ +12 \\ \hline \end{array}$ | 2. $\begin{array}{r} 638 \\ +252 \\ \hline \end{array}$ | 3. $\begin{array}{r} 9 \\ \times 8 \\ \hline \end{array}$ | 4. $\begin{array}{r} 6 \\ \times 1 \\ \hline \end{array}$ | 5. $\begin{array}{r} 23 \\ \times \quad 3 \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: |
| 6. $\begin{array}{r} 14 \\ \times \quad 6 \\ \hline \end{array}$ | 7. $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$ | 8. $\begin{array}{r} 193 \\ -\quad 61 \\ \hline \end{array}$ | 9. $3 \longdiv { 9 }$ | $\begin{array}{\|rr\|} \hline 10 . & 78 \\ & -18 \\ \hline \end{array}$ |
| 11. $\begin{array}{r} 27 \\ +25 \\ \hline \end{array}$ | 12. $2 \longdiv { 1 4 }$ | 13. $\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$ | 14. $\begin{array}{r} 496 \\ +406 \\ \hline \end{array}$ | 15. $\begin{array}{r} 90 \\ \times \quad 5 \\ \hline \end{array}$ |
| 16. $\begin{array}{r} 544 \\ -365 \\ \hline \end{array}$ | $\begin{array}{\|lr} 17 . & 76 \\ & -57 \\ \hline \end{array}$ | 18. $\begin{array}{r} 8 \\ \times 8 \\ \hline \end{array}$ | 19. $9 \longdiv { 6 3 }$ | 20. $\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$ |
| $\begin{array}{\|lr} \hline 21 . & \\ 368 \\ +337 \\ \hline \end{array}$ | 22. $\begin{array}{r} 12 \\ \times \quad 4 \\ \hline \end{array}$ | 23. $\begin{array}{r} 638 \\ -249 \\ \hline \end{array}$ | 24. $1 \sqrt{3}$ | 25. $\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$ |

## Acadience ${ }^{\text {w }}$ Math / Concepts and Applications Level 4 / Progress Monitoring 1

Total: $\qquad$

2. Compare the number in Box 1 with the number in Box 2. Fill in the blank with > (geater than), = (equal to), or < (less than):

| Box 1 | $>,=,<$ | Box 2 |
| :---: | :---: | :---: |
| 989 |  | 826 |
| 274 |  | 683 |
| 323 |  | 296 |

3. List three numbers that are mulsiples of 3:
4. Vera found 34 rocks at the beach yesterday and 29 rocks today. Greta found 18 rocks total. How many more rocks did Vera find than Greta? rocks.
5. Compare the decimal in Box 1 with the decimal in Box 2. Fil in the blank with > (greater than), $=$ (equal to), or < (less than):

| Box 1 | $>,=,<$ | Box 2 |
| :---: | :---: | :---: |
| 0.69 |  | 0.93 |
| 0.51 |  | 0.37 |
| 0.14 |  | 0.28 |

## 

## Acadience ${ }^{\text {w }}$ Math / Concepts and Applications

 Level 4 / Progress Monitoring 1
10. Compare the fraction in Box 1 with the fraction in Box 2 . Fill in the blank with $>$ (greater than), $=$ (equal to), or $<$ (less than):

| Box 1 | $>,=,<$ | Box 2 |
| :---: | :---: | :---: |
| $\frac{4}{6}$ |  | $\frac{2}{3}$ |
| $\frac{1}{2}$ |  | $\frac{3}{10}$ |

11. Convert liters into milliters. 1 Lter $=1000$ mililiters:

| Liters | Militers |
| :---: | :---: |
| 9 |  |
| 7 |  |
| 4 |  |

12. Draw two line segments that are perpendicular:
13. Write the following in expanded form: 47,378

## Acadience ${ }^{\text {w }}$ Math / Concepts and Applications

 Level 4 / Progress Monitoring 114. Tina rowed the boat for 5 hours and 50 minutes. Then she rowed for 48 more minutes. What is the total number of minutes that Tina rowed? $\qquad$ minutes.
15. Write the fractions as a decimat

$$
\frac{92}{100}=
$$

$\qquad$
$\qquad$
16. Ari bought dinner for $\$ 13.63$. He gave the clerk $\$ 20.00$. How much change did he get back? $\$$
17. Prime or composite: 34, 95, 59, 23
Write which are prime numbers:
Write which are composite numbers: $\qquad$
18. Emma walked her dog 8 times. Each time she went $\frac{1}{2}$ of a mie. How many total mies did she walk?
miles.
19. The pencl is $3 \frac{1}{2}$ inches long and the pen is $9 \frac{3}{4}$ inches long. Exactly how much longer is the pen than the pencil? inches.


20. Yang is building a deck. The area of the deck is 28 square feet. The length is 7 feet. How wide is the deck? feet.

## Decision Making

```
Maria's Progress
```

```0
```



```
\begin{tabular}{llllll}
1 & 2 & 3 & 4 & 5 & 6
\end{tabular}
7
8
Is Maria making adequate progress?
```



```
-
```

$\qquad$

```
-
```

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## Graphing



## Some examples...

## Lincoln's Progress

## Some examples...



## Some examples...

## Lincoln's Progress



## Setting Goals

Once the scores are graphed, it's time to set goals.

## Maria's Progress

50
45
40
35
30
25
20
15
10
10
5

## Setting Goals

Several options for setting goals

## Slope (ROI)

## Intra-individual

## Benchmark

1. Identify appropriate grade-level benchmark
2. Mark benchmark on student graph with an $X$
3. Draw goal-line from baseline progress monitoring scores to $X$

## Benchmark

1. Identify appropriate grade-level benchmark

| Grade | Computation | Concepts and <br> Applications |
| :---: | :---: | :---: |
| 1 | 20 digits | 20 points |
| 2 | 20 digits | 20 points |
| 3 | 30 digits | 30 points |
| 4 | 40 digits | 30 points |
| 5 | 30 digits | 15 points |
| 6 | 35 digits | 15 points |

## Benchmark

1. Identify appropriate grade-level benchmark

| Grade | Computation | Concepts and <br> Applications |
| :---: | :---: | :---: |
| 1 | 20 digits | 20 points |
| 2 | 20 digits | 20 points |
| 3 | 30 digits | 30 points |
| 4 | 40 digits | 30 points |
| 5 | 30 digits | 15 points |
| 6 | 35 digits | 15 points |

> Maria: $2^{\text {nd }}-$ grade student using Computation

## Benchmark

2. Mark benchmark on student graph with an $X$
3. Draw goal-line from baseline progress monitoring scores to $X$


## Setting Goals

Several options for setting goals

## Benchmark

## Slope (ROI)

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)
2. Multiply ROI by number of weeks left in intervention
3. Add to baseline of progress monitoring scores
4. Mark goal on student graph with an X
5. Draw goal-line from baseline progress monitoring scores to $X$

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)

| Grade | Computation—Slope <br> for Digits <br> Correct | Concepts and <br> Applications - <br> Slope for Points |
| :---: | :---: | :---: |
| 1 | 0.35 | No data available |
| 2 | 0.30 | 0.40 |
| 3 | 0.30 | 0.60 |
| 4 | 0.70 | 0.70 |
| 5 | 0.70 | 0.70 |
| 6 | 0.40 | 0.70 |

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)

| Grade | Computation-Slope <br> for Digits <br> Correct | Concepts and <br> Applications - <br> Slope for Points |
| :---: | :---: | :---: |
| 1 | 0.35 | No data available |
| 2 | 0.30 | 0.40 |
| 3 | 0.30 | 0.60 |
| 4 | 0.70 | 0.70 |
| 5 | 0.70 | 0.70 |
| 6 | 0.40 | 0.70 |

Maria: $2^{\text {nd_ }}$ grade student using
Computation

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)
2. Multiply ROI by number of weeks left in intervention
$0.30 \times$

## Slope (ROI)

## Maria's Progress

```
4 5
4 0
35
30
25
20
15
1 0
5
Number of weeks left in intervention
5
```

$54-5+5$
$54-5+5$


## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)
2. Multiply ROI by number of weeks left in intervention
$0.30 \times 10=3$

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)
2. Multiply ROI by number of weeks left in intervention
3. Add to baseline of progress monitoring scores
$0.30 \times 10=3$
$3+$

## Slope (ROI)

## Maria's Progress

Baseline: $7+5+8=20$

$$
20 \div 3=6.7
$$

10

5


0

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |

## Slope (ROI)

1. Locate slope (i.e., rate of improvement - ROI)
2. Multiply ROI by number of weeks left in intervention
3. Add to baseline of progress monitoring scores
$0.30 \times 10=3$
$3+6.7=9.7$

## Slope (ROI)

4. Mark goal on student graph with an $X$
5. Draw goal-line from baseline progress monitoring scores to $X$

## Maria's Progress



## Setting Goals

Several options for setting goals

## Slope (ROI)

## Intra-individual

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
3. Multiply by number of weeks until end of intervention
4. Add to student's baseline score
5. Mark goal on student graph with an X
6. Draw goal-line from baseline progress monitoring scores to $X$

## Intra-individual

1. Identify student's (slope)

## SLOPE CALCULATION:

$3^{\text {rd }}$ median $-1^{\text {st }}$ median \#data points - 1

## Intra-individual

1. Identify student's (slope)

## SLOPE CALCULATION:

$3^{\text {rd }}$ median $-1^{\text {st }}$ median \#data points - 1


## Intra-individual

1. Identify student's (slope)
0.4

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
0.4
$0.4 \times 1.5=0.6$

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
3. Multiply by number of weeks in intervention
0.4
$0.4 \times 1.5=0.6$
$0.6 \times$

## Intra-individual

## Maria's Progress

```
4 5
4 0
35
30
25
20
15
1 0
5
Number of weeks left in intervention
5
```

    \(54-5\)
    \(54-5\)
    

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
3. Multiply by number of weeks in intervention
0.4
$0.4 \times 1.5=0.6$
$0.6 \times 10=6$

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
3. Multiply by number of weeks in intervention
4. Add to student's baseline score
0.4
$0.4 \times 1.5=0.6$
$0.6 \times 10=6$
6

## Intra-individual

## Maria's Progress

Baseline: $7+5+8=20$

$$
20 \div 3=6.7
$$

10



| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |

## Intra-individual

1. Identify student's (slope)
2. Multiply slope by 1.5
3. Multiply by number of weeks in intervention
4. Add to student's baseline score
0.4
$0.4 \times 1.5=0.6$
$0.6 \times 10=6$
$6+6.7=12.7$

## Intra-individual

5. Mark goal on student graph with an X
6. Draw goal-line from baseline progress monitoring scores to $X$

## Maria's Progress

|  |  |  |
| :--- | :--- | :--- |
| 5 | 4 | 5 |

## To Review

Several options for setting goals

## Slope (ROI)

## Intra-individual

## Determining Response

Four most recent, consecutive scores


Trendline

## Determining Response



If at least 6 weeks of instruction have occurred:

- If all four most recent scores fall above the goal-line, increase the goal.


## Determining Response

Four most recent, consecutive scores


## Maria's Progress



## Determining Response

If at least 6 weeks of instruction have occurred:

- If all four most recent scores fall above the goal-line, increase the goal.
- If all four most recent scores fall below the goal-line, adapt the intervention.


## Determining Response

Four most recent, consecutive scores


## Maria's Progress



## Determining Response

## $\square$

If at least 6 weeks of instruction have occurred:

- If all four most recent scores fall above the goal-line, increase the goal.
- If all four most recent scores fall below the goal-line, adapt the intervention.
- If the four most recent scores fall both above and below the goal-line, continue monitoring data.


## Determining Response

Four most recent, consecutive scores


## Maria's Progress



## Determining Response

Four most recent, consecutive scores


Trendline

## Determining Response



- If the trend-line is steeper than the goal line, then increase the goal.


## Determining Response

## Maria's Progress



## Determining Response

- If the trend-line is steeper than the goal line, then increase the goal.
- If the trend-line is flatter than the goal line, then adapt the intervention.


## Determining Response

Four most recent, consecutive scores


## Maria's Progress



## Determining Response

- If the trend-line is steeper than the goal line, then increase the goal.
- If the trend-line is flatiter than the goal line, then adapt the intervention.
- If the trend-line and goal-line are fairly equal, continue monitoring progress.


## Determining Response

Four most recent, consecutive scores

## Maria's Progress

```
5 0
4 5
4 0
35
30
2 5
20
1 5
10
5
    Clu
```


## To Review

Several options for setting goals

## Slope (ROI)

## Intra-individual

## To Review

Four most recent, consecutive scores


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