Mathematics Instruction at Park Academy



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Evidence-based mathematics resources for educators



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STANDARDS













Fluently add and subtract within 5. subtract within 20, demonstratin g fluency for addition and subtraction within 10.

Add and



Fluently add and subtract within 5. Huently add and subtract within 20, demonstratin g fluency for addition and subtraction within 10. Fluently add and subtract based on place value, properties of operations, and/or relationships.	
--	--



Fluently add and subtract within 5. Fluently add and subtract within 5.
--



relationships. and division



within 10. operations, and/or relationships. operations. and division 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 divisionFluently add and subtract multi-digit whole numbers using the standard algorithm.Fluently and subtract multi-digit whole numbers using the standard algorithm.	Fluently add, subtract, multiply, and divide multi- digit decimals using the standard algorithm.
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Where student WEDS TO BE						
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 multi- digit decimals using the standard algorithm.



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Place Value



Recognize that in a multi-digit number, a digit in one place represents ten times what it represents in the place to its right... 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.

Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. Compose and decompose numbers from 11 to 19 into ten ones and some further ones...

> Understand that the two digits of a two-digit number represent amounts of tens and ones.

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





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Use place value understanding to round whole numbers to the nearest 10 or 100. Recognize that in a multi-digit number, a digit in one place represents ten times what it represents in the place to its right... 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.



Problem Solving



Solve real- world and mathematical problems eading to two linear equations in two variables.	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions	Solve multi- step word problems posed with whole numbers and having whole- number answers using the four operations	Use multiplication and division within 100 to solve word problems	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20	Solve addition and subtraction word problems, and add and subtract within 10	Solve real- world and mathematical problems involving the four operations with rational numbers.	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators 	Use addition and subtraction within 100 to solve one- and two-step word problems



Solve multi-Solve word Solve realstep word world and problems that problems Solve addition Use quotients of world and call for posed with and subtraction multiplication fractions, and addition of whole problems and division solve word word problems, involving the three whole numbers and and add and within 100 to numbers having wholesolve word subtract within whose sum is number operations 10... problems... division of less than or answers using of unlike equal to 20... the four numbers. operations...



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

Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20...

Mhere student 15

Use multiplication and division within 100 to solve word problems...

Where student NERDS TO BR

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

of unlike

Interpret and fractions, and solve word problems division of

Solve realworld and problems involving the numbers.

world and







Where student NEEDS TO BE Mhere Student 15 Fluently add multiwith up Fluently four-d and subtract word multiply and three Understand Fluently add within 100 dividend ems divide within Apply Jse of a that the two and subtract one-di with 100, using olication digit properties of multi-digit digits of a twostrategies multi-digit divisors, ble strate strategies such operations as division whole ased on place work, digit number whole strateg rs and strategies to as the h 100 to numbers based on represent value, numbers using wholemultiply and ts of e word using the the standard amounts of properties of ber and divide.... lems... standard tens and ones. operations, algorithm. properti s using proper multiplication and algorithm. and/or operati opera our and division... elationships. and/or ions... and divi



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

Sort
 Place on pathway



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



Use the distributive property

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

Find the least

common multiple

Explain a ratio relationship

> Sort
> Place on pathway
> Continue from yellow cards



Grade 6	Grade 7	Grade 8
 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 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 	 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 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
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EXPLICIT INSTRUCTION


xplicit Instruction		
MODELING	PRACTICE	
SUPPORTS		

Modeling	Practice
Clear	Guided
Explanation	Practice
Planned	Independent
Examples	Practice

Supports

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



Goal and importance



"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."



Modeling

Clear Explanation

> Planned Examples

Goal and importance

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.



Modeling

Clear Explanation

> Planned Examples

Goal and importance

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, 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 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."



Modeling

Clear Explanation

Planned Examples

Examples

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

24/6 28÷7 35)5





With examples

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

24/6 $28 \div 7$ 35)5

With non-examples

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



Modeling	Practice
Clear	Guided
Explanation	Practice
Planned	Independent
Examples	Practice

Supports

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



Practice

Guided Practice

Independent Practice











Modeling	Practice
Clear	Guided
Explanation	Practice
Planned	Independent
Examples	Practice

Supports

- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
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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



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."

"In your math journal, draw a picture to help you remember to term *parallelogram*."



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

Planned and organized



Modeling	Practice
Clear	Guided
Explanation	Practice
Planned	Independent
Examples	Practice

Supports

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









Example		
MODELING	PRACTICE	
https://www.youtube.com/watc h?v=IJMIrvSkPE8&feature=yout u.be	https://www.youtube.com/watch ?v=KHQgpa8DjYs&feature=youtu. be	
SUPPORTS		
		powellphd.com

FLUENCY AND COMPUTATION











Fluency	
Addition	Subtraction
Multiplication	Division

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Addition Facts

100 addition basic facts

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

	5	(<u>addend</u>)
+	4	(addend)
	g	(sum)



Addition: Part-Part-Whole (Total)

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





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** = **?**



Part-Part-Whole Versus Join

3 + 9 = ____ 7 + 4 = ____

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	(minuend)
<u> </u>	(subtrahend)
8	(<u>difference</u>)



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?

<u>9 - 2 = ?</u>


Difference

Greater and less amounts compared for a difference

- 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





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	(<u>factor</u>)
×	3	(factor)
	6	(<u>product</u>)



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







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 × 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 × 2 = ?



Equal Groups versus Comparison

2 × 5 = ____ 4 × 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



Division: Equal Groups (Partitive Division) Show the dividend, divide equally among divisor, count quotient



 $6 \div 3 = 2$



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 × ? = 12
- Carlos has 12 apples. He put them into bags containing
 6 apples each. How many bags did Carlos use?
 - ? × 6 = 12



Partitive versus Measurement

10 ÷ 5 = ____ 12 ÷ 4 = ____



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) (everyday)



Cover, Copy, Compare

BEFORE

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

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

Cover, Copy, Compare				
9		8		
× 6		× 6		
54		48		
7		6		
× 8		× 5		
56		30		
9		7		
× 9		× 9		
81		63		
6		8		
× 7		× 5		
42		40		
8		7		
× 8		× 7		
64		49		



File Folder

BEFORE

1. Create sheet with 15-25 answered facts

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

File Folder	
6 + 3 =	9
1 + 7 =	8
6 + 4 =	10
7 + 3 =	10
2 + 7 =	9
5 + 6 =	11
4 + 7 =	11
7 + 8 =	15
6 + 7 =	13
7 + 9 =	16
7 + 6 =	13
8 + 7 =	15
7 + 0 =	7
9 + 6 =	15
6 + 0 =	6
6 + 8 =	14



Taped Problems

BEFORE

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

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

Taped Problems					
6	8	7	6		
× 5	× 6	× 9	× 8		
9	8	7	6		
× 8	× 5	× 8	× 6		
7	6	5	8		
<u>× 7</u>	× 9	× 9	× 4		
9	6	9	8		
× 4	× 9	× 5	× 7		
6	8	4	5		
× 7	× 8	× 8	× 7		



Flash Cards with Constant Time Delay

BEFORE

1. Collect small set of flash cards

- 1. Show student flash card for 3 seconds
- 2. Student answers
 - 1. If correct, state correct answer and place back in pile
 - 2. If incorrect, state correct answer and have student repeat it; place back in pile
- 3. 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
 - 1. If correct, place in correct pile
 - 2. If incorrect, review fact
- 3. Time for 1-2 minutes
- 4. Count total score
- 5. Graph total score
- 6. Could opt to try to beat score for another 1-2 minutes
- 7. 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
 - 1. If student answer correctly, go to next flash card
 - 2. If student answers incorrectly, read fact with answer and ask student to read with you
 - 3. Work on cards until student answers correctly within 2 seconds
- 4. Add in 1 known fact flash card; continue with 3 cards
- 5. Keep adding in known fact flash cards until student achieves fluency with unknown card
- 6. Select new unknown fact and repeat process



Worksheets

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

8	6	4	6	8
<u>+ 3</u>	<u>+ 7</u>	<u>+ 9</u>	<u>+ 5</u>	<u>+ 2</u>
4	9	0	7	8
<u>+ 8</u>	<u>+ 9</u>	+ 6	<u>+ 1</u>	<u>+ 7</u>
5	3	9	6	6
<u>+ 8</u>	<u>+ 6</u>	<u>+ 5</u>	<u>+ 4</u>	<u>+ 9</u>
6	7	4	4	5
<u>+ 8</u>	<u>+ 5</u>	<u>+ 3</u>	<u>+ 7</u>	<u>+ 4</u>
9	3	9	3	8
<u>+ 7</u>	<u>+ 5</u>	<u>+ 3</u>	<u>+ 7</u>	<u>+ 9</u>



Worksheets with Graphing

DURING

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

Name:								1 st Qu	uarter
				2) 2) 2)	GY	<u>FR</u>	P		
100									
95									
90									
85									
80									
75									
70									
65									
60									
55									
50									
45									
40									
35									
30									
25									
20									
15									
10									
5									
	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8	week 9

My beginning of the quarter fluency score:

My end of the quarter fluency score: _____



Magic Squares

Magic Squares			
		(place sum or product from baggie here)	

BEFORE

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

DURING

- 1. Place sum or product in bottom right corner
- 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

See demonstration on next slide.

white the locis.	



Magic Squares

	(<u>place</u> sum or product from baggie here)







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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

- 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)







Partial Sums

• Work left to right

Β. 725 + 365 1,000 80 10 0 1,0



Victoria

Opposite Change

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

725 ⁺⁵→ + 365 ⁻⁵→ 730 + 360 В. Α. 74 + 18



	Addition and Subtraction Computation			
	227 + 185 =	232 - 164 =	l	
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Julie

Traditional Method

• Work right to left (start in ones column)





Janie

Partial Differences

• Work left to right





Same Change

• Change subtrahend to end in 0

$$\begin{array}{r} ^{A} & 62 \xrightarrow{+3} & 65 \\ - & 17 \xrightarrow{+3} -20 \\ \hline 45 \end{array}$$





Add-Up

A.
$$62 \ 17$$

 $-17 \ 60 \ 40 \ -96 \ 300 \ 200 \ 300 \ 200 \ 305 \ +5 \ 209 \ 45 \ 209 \ 305 \ 45 \ 209 \ 309 \ 209 \ 3$



	Addition and Subtraction Computation			
	227 + 185 =	232 - 164 =	l	
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Angie

Traditional

• Work right to left (start in ones column)





Carlos

Partial Products







Area





Scott

Lattice Method (383 \times 27)





Multiplication and D		
13 x 27 =	135 ÷ 5 =	
L		
		n at talls had a con-
		powenpna.com



Traditional Method

• Work Left to Right







Partial Quotients







Lattice Division





Multiplication and D		
13 x 27 =	135 ÷ 5 =	
L		
		n at talls had a con-
		powenpna.com

PROBLEM SOLVING



Problem Solving	
Three Things to Remember	
Attack Stratogics	
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Don't tie key words to operations



Do teach word-problem schemas





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





education

More worksheets at: education.com/worksheets

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sources for educators

nd.Com

LONG DIVISION WORD PROBLEMS

 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?

 Betty 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?

 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?



More worksheets at www.education.com/worksheets





Don't tie key words to operations



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RIDGES

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



RIDE

Read the problem.

dentify the relevant information.

Determine the operation and unit for the answer.

Enter the correct numbers and calculate, then check the answer.



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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 your work.
- E **examine your work** for precision, accuracy, and clarity.
- S share your answer by writing a sentence.





RUN!

- 1. <u>Read</u> the problem.
- 2. <u>Underline the labels.</u>
- 3. <u>Name</u> the problem type.



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

SIGNS

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			
1	Analyze the given information.			
	 Summarize the problem in your own words. Describe the main idea of the problem. Identify information needed to solve the problem. 			
2	Formulate a plan or strategy.			
	 Draw a picture or a diagram. Find a pattern. Guess and check. Act it out. Create or use a chart or a table. Work a simpler problem. Work backwards. Make an organized list. Use logical reasoning. Brainstorm. Write a number sentence or an equation. 			
3	Determine a solution.Estimate the solution to the problem.Solve the problem.			
4	Justify the solution.			
	•Explain why your solution solves the problem.			
5	Evaluate the process and the reasonableness of your solution.			
	Make sure the solution matches the problem.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 teach word-problem schemas



Additive Schemas



Schemas





Problem	Definition	Examples		Equation	Graphic organizer		
Total		Total unknown	Part unknown				
Difference		Difference unknown	Greater unknown	Lesser unknown			Additive Word
Change (increase)		End unknown	Start unknown	Change unknown			Problems
Change (decrease)		End unknown	Start unknown	Change unknown			


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?



"Are parts put together for a total?"



Total







Megan baked 2/8 sugar cookies and 2/4 chocolate chip cookies. Enter the total number of cookies Megan baked in all.





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?)

• <u>9</u> – <u>4</u> = ?

- Lydia has 5 more apples than Carol. If Carol has 4 apples, how many does Lydia have?
 - ? <mark>4</mark> = 5
- Carol has 5 fewer apples than Lydia. Lydia has 9 apples. How many apples does Carol have?



"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?



B = 39 more beads



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





"Are parts put together for a total?"

Difference

"Are amounts compared for a difference?"

Change

"Does an amount increase or decrease?"





Change

A bus had 1/3 passengers. At the next stop, more passengers got on the bus. Now, there are 2/8 passengers. How many passengers got on the bus?



? = 15 passengers



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?



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?



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?

P1 + P2 + P3 = 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?





Let's Review

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



Schema Quiz Time!





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

Recycled Plastic r March April May June July means 20 pounds. Each

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

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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 organizer]
Equal Groups							
Comparison							Multiplicative Wo
Combinations							ord Problems
Ratios and Proportions							



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 × 6 = ?
- Scott has 12 apples. He wants to share them equally among his 2 friends. How many apples will each friend receive?

• 2 × ? = 12

- Scott has 12 apples. He put them into bags containing 6 apples each. How many bags did Scott use?
 - ? × 6 = 12



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







н.

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





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 × 2 = ?

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



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

Comparison

"Is a set compared a number of times?"



Comparison





Comparison

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



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Ratios/Proportions

Description of relationships among quantities





"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 176 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?





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. $6\frac{3}{4}$



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







Don't tie key words to operations



Do teach word-problem schemas



MULTIPLE REPRESENTATIONS











Three-dimensional objects













Two-dimensional images













Two-dimensional images





Modeling Fractions with Cuisenaire Rods







Numerals and symbols

2 + 8 = 10 34 = 3 tens and 4 ones

$$x - 6 = 8$$
 4,179
+ 569





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Diagnostic Assessment Manual Forms A and B

PsychCorp

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hool			Orate	acher o	ex.r 🗖 🕴	
aminer			Classific	ation/Diagnos	ile.	
ason for Asses	sment		, Chassing	auou Diagnos		
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CORE SU	IMMAR	Used	Agr Confider	Subtest 68%	Area and T Confide	otal Test 99%
iubtest/Area	Raw Score	Scale Score (Tables A.1–A.3)	Confidence-Interval Value (Tables A.4-A.6)	Confidence Interval	Grade /Age Equivalent (Tables A.7-A.8)	Percentile Rank (Table A.9)
umeration			+	-		
loehra			+			
			+ .			
leometry						
leasurement			÷			
Aata Analysis nd Probability			÷			
ASIC CONCEPTS	\bigcirc	Area Raw Score Standard Score (Tables A.1-A.3)	1	-		
fental Computation	1		+	-		
ddition and			+			
ubtraction fultiplication						
nd Division			<u> </u>			
PERATIONS	Q	Area Raw Score				
		Standard Score	+	-		
oundations of			+			
roblem Solving						
ppiled roblem Solving			÷			
	6	Area Raw Score				
PPLICATIONS	+					
		Standard Score	+	-		



Grade Equivalents Form A

Table A.7 Grade Equivalents

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

Grade Equivalent	Numeration	Algebra	Geometry	Measurement	Data Analysis and Probability	Mental Computation and Estimation	Addition and Subtraction	Multiplication and Division	Foundations of Problem Solving	Applied Problem Solving	Grade Equivalent
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	-	-	4.6
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	-	18	-	_	-	19	-	-	-	4.0
3.9	_	-		18	17	-	-	7	-	16	3.9
3.8	_	15	17	_	_	16	18	-	13	-	3.8
3.7	19	_	_	17	16	-	_	-	-	-	3.7
3.6		14	-	-	-	-	-	6	-	-	3.6
3.5	18	_	_		_	15	17	_	12	15	3.5
34	_	_	_	16	15	_	_	5	_	_	3.4
3.3	-	13	-	-	_	14	-	-	-	-	3.3
3.2	_	_	16	_	_	_	16	4	11	14	3.2
3.1	17	12	_	15	14	13	_	-	-	-	3.1
3.0		_	15	-	-	-	15	-	-	13	3.0
29	_	_	_	14	_	12	-	-	-	-	2.9
2.8	16	11	14	_	13	_	14	3	10	-	2.8
27		-	-	13	-	11	-	-	-	12	2.7
2.6	_	10	_	_	_	_	13	2	-	-	2.6
2.5	15	_	_	-	12	10	_	-	9	11	2.5
2.4		9	-	12	-	-	12	1	-	-	2.4
2.3	-	_	_	_	_	9	11	-	-	-	2.3
22	14	8	13		11	-	10	-	8	10	2.2
2.1	-	-	-	11	-	8	-	-	-	-	2.1
2.0	13	-	_	10	10	-	9	-	-	9	2.0
1.9	_	_	_	-	-	7	_	-	-	-	1.9
1.8	12	7	12	-	9	-	8	0	7	-	1.8
1.7	_	_	_	9	-	6	-	-	-	8	1.7
1.6	11	_	_	-	-	-	7	-	-	-	1.6
1.5	-	6	11	8	8	5	-	-	6	7	1.5
1.4	10	-	-		-	-	6	-	-	-	1.4
1.3	_	-	-	7	-	-	-	-	-	-	1.3
1.2	9	5	10	-	7	4	5	-	5	6	1.2
1.1	-	-	-	-	-	-	-	-	-	-	1.1
1.0	8	-	-	6	-	3	- 4	-	-	-	1.0
K.9	-	-	-	-	-	-	-	-	-	-	K.9
K.8	7	4	9	5	6	-	3	-	4	5	K.8
K.7	-	-	-	-	-	-	-	-	-	-	K.7
K.6	-	-	-	-	-	-	-	-	-	-	K.6
KS	6	-	8	4	5	2	2	-	-	4	K.5
K.4	-	3	-	-	-	-	-	-	-	-	K.4
K3	-	-	-	3	-	-	-	-	-	-	K.3
K.2	5	-	7	-	4	1	1	-	3	3	K.2
K1	-	-	-	-	-	-	-	-	-	-	K.1
sK.0	0-4	0-2	0-6	0-2	0-3	0	0	-	0-2	0-2	≤K.0



.

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Age Equivalents Form A

Table A.8 Age Equivalents

Age Equivalent	Numeration	Algebra	Geometry	Measurement	Data Analysis and Probability	Mental Computation and Estimation	Addition and Subtraction	Multiplication and Division	Foundations of Problem Solving	Applied Problem Solving	Age Equivalent
≥16:0	41-49	30-39	31-36	35-40	34-40	33-40	31-35	23-31	25-27	28-35	≥16:0
15:11	_	-	- 1	- 1	- 1	- 1	- 1	- 1	- 1	-	15:11
15:10	-	-	-	-	-	-		-	-	-	15:10
15:9	_	-	-	-	-	-	-	-		-	15:9
15:8	-	- 1	- 1	34	-	- 1	-	- 1	- 1	- 1	15:8
15:7	_	-	-	-	-	-	- 1	-	- 1	- 1	15:7
15:6	_	-	-	-	-	-	-	-	-	-	15:6
15:5	40	29	30	- 1	33	32	30	22	24	27	15:5
15:4	_	-	-	33	- 1	_	-	_	_	-	15:4
15:3	-	-	-	-	-	-	-	-	-	-	15:3
15:2	-	-	- 1	-	-	-	-		_	_	15:2
15:1	_	-	-	-	-	-	-	-	-	_	15:1
15:0	39	-	-	-	-	-	-	-	-	-	15:0
14:11	_	28	29	32	32	31	29	-	-	26	14:11
14:10		-			_	-	-	_	-	_	14:10
14:9	-	-	-	-	-	-	-	-	-	-	14.9
14:8		-	- 1	-	_	-	-	21	-	_	14.8
14:7	_	-	-	-	-	_	-	_	_	_	147
14:6	38	-	-	-	-	-	-	-	-	_	14:6
14.5	-	27	-	-	31	30	_	_	23	_	145
14:4	_	_	_	_	_	_	-	_	_	_	14-4
14:3	_	-	-	-	-	-	-	-		_	14:3
14.2	_	_	_	_	-	_	_	_	_	_	14-2
141	37	_	_	_	_	_	_	_	_	_	14-1
14:0	_	-	-	-	-	-	-	-	-	-	14:0
13:11	_	26	28	31	30	29	28	_	_	25	19-11
13:10	36	_	_	_	_	_	_	20	_	_	12-10
13.9	_	-	-	-	_						12-0
13.8	_	_	_	_	_	_	_	_	_	_	13-8
13.7	_	_	_	_	_	_	_	_	_	_	19.7
13:6	-	-	-	-	_						19-6
13:5	35	25	27	30	29	28	_	_	22	24	19-5
13:4	_	_	_	_			_	_	**	24	19.4
13:3	34	-	_	_							19.9
13.2	_	_	_	_		_	_	_	_	_	10.0
131	_	_	_	29	28	97	97	19	_	_	19.4
13:0	33	_	_		20		£7	18			12.0
12:11	_	24	_	_	_	_	_	_	_	_	10.0
12:10	_	23	26		_	_	_	_	_	_	12.11
12.9	_			_							12.10
12.8	_	_	_		_	_	_	_	_	_	12.9
127	32	_	_	28	97	26	_	18	_	_	12.0
12.6	-				61	20		10	_	_	12.7
125	_	_	_	_	_	_		17	25		12.0
124	_			_	_	_	20		21	63	12.9
123	_										12.4
12-2	31	22	25	_	_	_	_	-	-	-	12.3
12-1	30		23	97		~	-	-	-	-	12.2
12-0	~	_	_	21	20	23	-		-	-	12.1
16.0		_		_	_	-	-	10			12.0

(Continued on next page)



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FORMATIVE ASSESSMENT









Acadience[™] Math / Computation Level 3 Progress Monitoring 1

				Total:
1. 77 <u>+12</u>	2. 638 <u>+252</u>	3. 9 <u>×8</u>	4. <u>X1</u>	5. 23 <u>x 3</u>
6. 14 <u>x 6</u>	7. 9 <u>x3</u>	8. 193 <u>- 61</u>	9. 3 9	10. 78 <u>-18</u>
11. 27 <u>+25</u>	12. 2 14	13. <u>x2</u>	14. <u>496</u> <u>+406</u>	15. 90 <u>x 5</u>
16. 544 <u>-365</u>	17. 76 <u>-57</u>	18. <u>×8</u>	19. 9 63	20. <u>8</u> <u>x3</u>
21. 368 <u>+337</u>	22. 12 <u>x 4</u>	23. 638 <u>-249</u>	24. 1 3	25. <u>4</u> <u>x2</u>

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Acadience [™] Math / Concepts and Applications	
Level 4 / Progress Monitoring 1	

							Total:	
Is the symm Write ' space shape	dotted line a etry for each 'yes" or "no" provided be b.	line of shape? in the low each					``````````````````````````````````````	
. Comp	are the num	ber in Box 1 v	with the number	in Box 2. Fil	l in the blank v	vith > (greater th	han), = (equal to), or < (less than)	:
ſ	Box 1	>. =. <	Box 2					
ľ	989		826					
ľ	274		683					
ľ	323		296					
find th	han Greta? _		rocks.					
5. Comp	are the decir	mal in Box 1	with the decimal	in Box 2. Fi	I in the blank	vith > (greater t	han), = (equal to), or < (less than)):
	Box 1	>, =, <	Box 2					
[DOAT							
	0.69		0.93					
	0.69		0.93					
	0.69 0.51 0.14		0.93 0.37 0.28					



Acadience[™] Math / Concepts and Applications Level 4 / Progress Monitoring 1

8. Round t	to the nea	nest		B		
8. Round t	to the nea	nearest hum		A	F	
N	lumber	nearest hun				
	4967		dred	nearest ten	nearest thousand]
	4007					
	8474]
	-					1
 Coral is 	7 years o	old. Marie is 63	years old. H	low many times ok	der is Marie than Coral? _	times older.
		ation in Devid	inter all an effect		the block with a fear day	about the state of
10. Compa	are the fra	action in Box 1 v	with the frac	ction in Box 2. Fill in	n the blank with > (greater	than), = (equal to), or < (less than):
	Box 1	> = <	Bax 2	1		
. E	DOM 1	~, -, <	DUNE			
	4		2			
	6		3	_		
		1 1	2			
	-	1 1	10			
L	-		10			
11. Conver	rt liters int	o milliliters, 1 Lit	ter = 1000 i	milliliters:		
_			_			
	Liters	Milliliters				
	9					
- F	7		_			
- F			_			
L	4					
12. Draw t	two line s	egments that a	re perpen	dicular:		
		-				
13. Write t	the followi	ng in expanded	form: 47,37	78		
			and a state of the	-		



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Acadience[™] Math / Concepts and Applications Level 4 / Progress Monitoring 1

I IPS IN PORTABLE I C	minutes. Then are rowed for 40 more minutes. What is the total number of minutes that
	minutes.
E Mhite the fractions on a	a dealerak
is. write the fractions as a	i decima:
- <u>4</u> =	
_ 92	
100	
10 Ari hawahi ɗanar far ƙ	19.69 Ma nous the clark 600.00 Mourseuch shanne did be not head?
16. An bought anner lor ş	13.55. He gave the clerk \$20.00. How much change did he get back? \$
17 Prime or composite: 34	1. 95, 59, 23
Write wh	ich are nime numbers
willio wil	an are prime numbers
Write which a	re composite numbers:
19 Emma walked has dos	e times. Each time she want ≟ of a mile, klow many total miles did she walk?
 Emma waikeu ner dog 	o umes. Each ume she went 2 or a mile. How many total miles du she waik?
miles.	
19. The pencil is $3\frac{1}{2}$ inche	is long and the pen is $9\frac{3}{4}$ inches long. Exactly how much longer is the pen than the pencil?
	k.
inches	
inches	
inches	
inches	
inches	
Inches	3 4 5 6 7 8 9 10 11 12
inches	$\frac{1}{3} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} + \frac{1}{8} + \frac{1}{9} + \frac{1}{10} + \frac{1}{11} + \frac{1}{12}$
N. Yang is building a deck	3 4 5 6 7 8 9 10 11 12
20. Yang is building a deck	a 4 5 6 7 8 9 10 11 12
20. Yang is building a deck	a 4 5 6 7 8 9 10 11 12



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Decision Making













Some examples...





Some examples...





Some examples...







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





Setting Goals

Several options for setting goals

Benchmark

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

		Concepts and
Grade	Computation	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 Applications	
1	20 digits	20 points	Maria: 2 nd -
2	20 digits	20 points	grade studer
3	30 digits	30 points	using
4	40 digits	30 points	Computatio
5	30 digits	15 points	
6	35 digits	15 points	

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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 for Digits Correct	Concepts and Applications — 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





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

Grade	Computation—Slope for Digits Correct	Concepts and Applications — Slope for Points	
1	0.35	No data available	Maria
2	0.30	0.40	grade s
3	0.30	0.60	us
4	0.70	0.70	Compi
5	0.70	0.70	
6	0.40	0.70	

http://www.rti4success.org/resource/rti-implementer-series-module-2-progress-monitoring





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

0.30



Slope (ROI)

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





Maria's Progress







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

0.30 0.30 × 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 0.30 × 10 = 3 3 +







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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 0.30 × 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

Benchmark

Slope (ROI)

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



1. Identify student's (slope)

SLOPE CALCULATION: <u>3rd median – 1st median</u> #data points – 1



1.	Intra-individual Identify student's (slope)							SLOPE CALCULATION: 3 rd median – 1 st median #data points – 1							
						Mar	ia's P	rogr	'es		<u>6.5 –</u>	<u>4.5</u>			
50					311131113						6 –	1			
45											0	A			
40											0.4	4			
35															
30	(4 ·	+ 5)	÷2=	= 4.5											
25					8										
20					(8 ·	+ 5) -	÷ 2 =	6.5							
15															
10					8										
5	5	-4	-5	<u></u>	5										
0	1	2	3	4	5 6	7	8	9	10	11	12	13	14	15	16



1. Identify student's (slope)

0.4



- 1. Identify student's (slope)
- 2. Multiply slope by 1.5

0.4 $0.4 \times 1.5 = 0.6$



- 1. Identify student's (slope)
- 2. Multiply slope by 1.5
- 3. Multiply by number of weeks in intervention

0.4 0.4 × 1.5 = 0.6 0.6 ×









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- 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



- 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





Maria's Progress





- 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



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

Maria's Progress







Several options for setting goals

Benchmark

Slope (ROI)

Intra-individual









Four most recent, consecutive scores

If at least 6 weeks of instruction have occurred:

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



Four most recent, consecutive scores



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Four most recent, consecutive scores

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.



Four most recent, consecutive scores



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Four most recent, consecutive scores

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.



Four most recent, consecutive scores

Maria's Progress



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





Maria's Progress



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- 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.



Four most recent, consecutive scores







- 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.
- If the trend-line and goal-line are fairly equal, continue monitoring progress.



Four most recent, consecutive scores



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