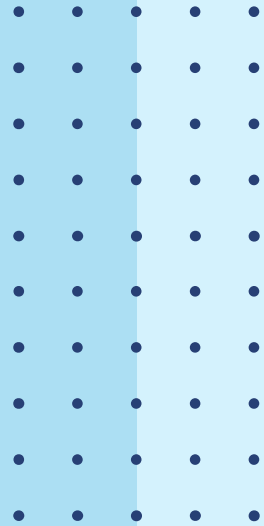


Connecting Word Problems Vertically in K-5



About Me!

I am Lily Horak - Teacher, data nerd, lover of all things fun!

Teacher at Roanoke Elementary since 2023

- 2023-2024 - 3rd Grade Self Contained
- 2024-2025 - 4th Grade Math and Science
- 2025-2026 - 5th Grade Math and Reading, Bilingual

If you connect the dots... Vertical alignment has turned into my passion project over the last 3 years.





ALEXANDER DEN HEIJER
@judo-jourchess

Northwest ISD
Professional Learning Expectations
A Culture of Learning

P

PARTICIPATE POSITIVELY



L

LISTEN FOR AND SHARE
DIFFERENT PERSPECTIVES
WITH RESPECT



N

NAVIGATE LEARNING
WITH A GROWTH MINDSET



I

IDENTIFY HOW YOU WILL APPLY
THIS LEARNING TO YOUR WORK



S

SET GOALS AND PLAN NEXT STEPS

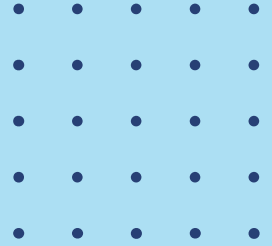


D

DEMONSTRATE PROFESSIONALISM



Today's Goals



01.

**Vertical TEK
Strand**

03.

**Connecting to
Problem
Solving**

02.

**Connecting the
Dots (Meeting
Rigor)**

04.

**Resources /
Questions!**

Math

"Effective teaching not only acknowledges the importance of both conceptual understanding and procedural fluency but also ensures that the learning of procedures is developed over time, on a **strong foundation of understanding** and the use of student-generated strategies in solving problems."

National Council of Teachers of Mathematics. *Principles to Actions: Ensuring Mathematics Success for All*. NCTM Inc, 2014.

The Math RBIS

1		3	4
Balance Conceptual & Procedural	Depth of key concepts	Coherence of Key Concepts	Productive Struggle
Pursue rigor by balancing conceptual understanding, procedural skill and fluency . Apply this balanced understanding to mathematical applications as required by the standards in the TEKS.	Focus on math content that aligns to and meets the rigor of the TEKS for each grade level, while concentrating time and effort on going deep on the most important topics for the grade level.	Connect concepts within and across grades along a strategic progression of learning so that new understandings are built on previous foundations. Mathematics tells a continuous, connected story .	Students engage in productive problem solving, engaging in multiple opportunities for practice, discussion, representations, and writing that requires them to explain and revise their thinking.

Representing, Solving, and Application With Word Problems

K.3(C)	explain the strategies used to solve problems involving adding and subtracting within 10 using spoken words, concrete and pictorial models, and number sentences
1.3(F)	generate and solve problem situations when given a number sentence involving addition or subtraction of numbers within 20
2.4(C)*	solve one-step and multi-step word problems involving addition and subtraction within 1,000 using a variety of strategies based on place value, including algorithms
3.4(A)	solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction
3.5(B)	represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations
4.5(A)	represent multi-step problems involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity
5.4(B)	represent and solve multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity

On a Sticky Note:

“The math story for this concept
begins with _____,

grows through _____,

and prepares students for _____.”

.
. .
. .
. .
. .

TEK DIG



1. Place each standard with the grade level it is associated with.
2. Analyze the questions and match them to the correct standard.
3. Answer the following for each question and standard.

Vocabulary?

Prior Knowledge?

New Learning?

Sabrina is buying a cellphone for \$132 dollars. She is also buying headphones for \$16 dollars. How much will she spend?

2

solve one-step and multi-step word problems involving addition and subtraction within 1,000 using a variety of strategies based on place value, including algorithms

There are 8 grapes in the lunch box. 3 are green. The rest are purple. How many grapes are purple?

1

generate and solve problem situations when given a number sentence involving addition or subtraction of numbers within 20

explain the strategies used to solve problems involving adding and subtracting within 10 using spoken words, concrete and pictorial models, and number sentences

K

6 dogs are playing in the dog park. 3 more dogs come to play in the dog park.

solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction

represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations

At the weekend carnival, 254 lemonades were sold on Saturday. On Sunday, they sold 36 lemonades less than Saturday. How many lemonades did they sell on Saturday and Sunday?

3

represent multi-step problems involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity

4

5. Jason buys a shirt for \$12.99 and a candy bar for \$2.57. He used a coupon that took \$3 off the total. How much did he spend?

represent and solve multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity

4. A bakery made 248 cupcakes. They sold 125 of them in the morning. In the afternoon, the bakery sold the rest of the cupcakes in 5 equal boxes.

Which equation can be used to find the number of cupcakes, 'x', in each box?

A. $(248-125) \div 5 = x$

B. $(248+125) \div 5 = x$

C. $248 - (125 \div 5) = x$

D. $248 \div 5 - 125 = x$

5

3rd Grade

Addition and Subtraction of Whole Numbers

33

Multiplication and Division of Whole Numbers

74

3.4(A) solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction

3.5(B) represent and solve one- and two-step multiplication and division problems within 100 using arrays, strip diagrams, and equations

Kasey bought two bags of beads.

- One bag contained 250 beads.
- The other bag contained 400 beads.

Kasey used all but 36 of the total number of beads for an art project.

What was the total number of beads that Kasey used for the art project?

Eva's flower shop has 72 flowers.

- Eva places an equal number of flowers in 8 vases.
- She sells 3 vases from the flower shop.

Which equation can be used to find how many flowers Eva sells?

At a weekend bake sale, 295 cookies were sold on Saturday. On Sunday 88 more cookies were sold than were sold on Saturday.

What was the total number of cookies sold on Saturday and Sunday?

4th Grade

Decimals

40

Whole Number Operations

62

4.5(A)

represent multi-step problems involving the four operations with whole numbers using strip diagrams and equations with a letter standing for the unknown quantity

There are 187 people on a school trip.

- There are 152 students.
- There are 11 teachers.
- The rest of the people on the trip are parents.

Which representations can be used to find the number of parents, p , on the school trip?

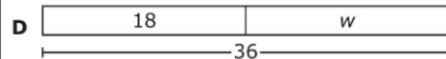
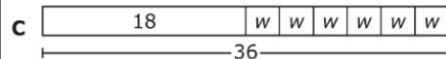
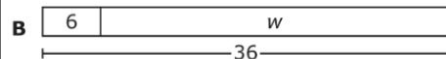
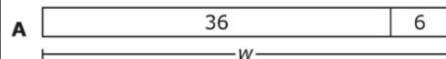
Select **TWO** correct answers.

Carolyn and David each own a flower shop. Carolyn has 156 red tulips and 142 yellow tulips in her shop. Carolyn has 39 more tulips in her shop than David has in his shop.

Create an equation that can be used to find the number of tulips, t , David has in his shop.

Alexa had a total of 36 bottles of water. She drank half of the bottles of water last week. Alexa will drink the remaining water bottles during the next 6 days. She will drink the same number of bottles each day.

Which strip diagram shows a way to find w , the number of water bottles Alexa will drink during each of the next 6 days?



5th Grade

Decimals

103

Whole Number Operations

25

5.4(B)

represent and solve multi-step problems involving the four operations with whole numbers using equations with a letter standing for the unknown quantity

Lucas spends \$127 at the store.

- He spends \$55 on a remote-control car.
- He spends \$31 on a pair of headphones.
- He spends the rest of the money on a video game.

Which equation can be used to find m , the amount of money in dollars that Lucas spends on the video game?

Kendra earned a total of \$625 selling jewelry.

- She sold 7 necklaces for \$55 each.
- She sold 8 rings.
- Each ring was sold for the same price.

The equation shown can be used to find r , the amount of money in dollars she earned for each ring sold.

$$r = [625 - (7 \times 55)] \div 8$$

An equation is shown.

$$n = 1,368 \div 18 + 1$$

What is the value of n ?

(A) 72

(B) 77

(C) 76

(D) 1,351

Using Student Work To Your Advantage:

Understanding Student Thinking

- ★ What does this student's work show about their understanding of the concept?
- ★ What misconceptions or partial understandings do you notice?
- ★ How is this student making sense of the problem?

Mathematical Reasoning & Communication

- ★ How clearly does the student explain their reasoning?
- ★ In what ways does the student justify their solution?
- ★ How could we support this student in expressing their reasoning more completely?

Representation & Strategy Use

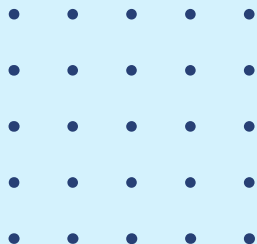
- ★ What representations does the student use to show their thinking?
- ★ Do you notice any patterns in how high-, medium-, and low-performing students are representing their work?

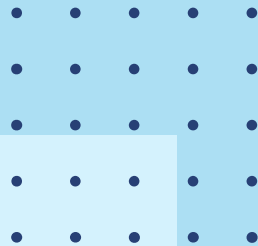
Instructional Impact

- ★ What might this work tell us about the effectiveness of our current problem-solving instruction?
- ★ What routines or structures helped this student approach the problem successfully?

Growth & Goal Setting

- ★ What would be this student's next step in mathematical reasoning?
- ★ What feedback would best support this student's growth?





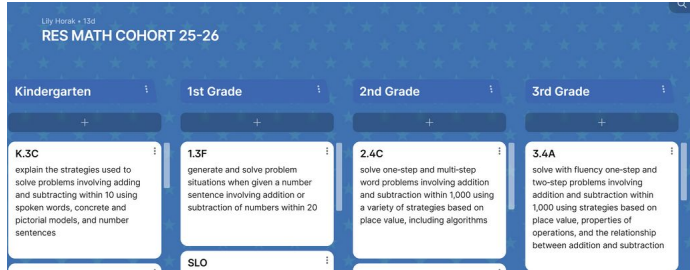
Pass the Problem:

Start with the Kindergarten example. Each person at your table will extend the problem one grade level, without changing the context of the problem.

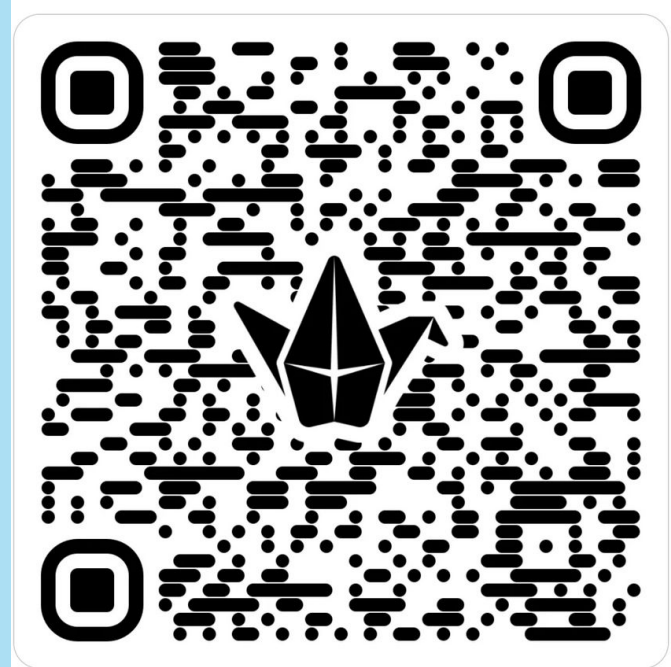
HINT: Use your TEK to be sure you are aligning the problem to the rigor of the skill.

Is the primary demand... - Computation? - Operation selection? - Multi-step? - Representation?	Across K-5, how does this problem type progress developmentally? - How would this problem look one grade below? - How would this look one grade above? - Is the misconception (or skill) new or carried over from previous years?
What is the misconception? – <u>SMALL GROUP FOCUS</u> - Did the student misunderstand the context or operation? → Misidentified Operation - Did they choose the wrong operation but compute correctly? → Misidentified Operation - Did they model the problem incorrectly? (Strip diagram, equation, picture) → Context and Visual Confusion - Did they stop after one step on a multi-step problem? → Multistep Structure - Is this a reading comprehension issue or a math issue? → Vocabulary and Context	
Action Steps: ☐ Model with strip diagram ☐ Concrete manipulatives ☐ Think-aloud for operation selection ☐ Sentence stems for unpacking a problem ☐ Color coding problem steps ☐ Vocabulary mini-lesson	Vertical Connection: - What foundational skills do we need to strengthen in younger grades? - Are we using consistent language across all grade levels?

Padlet/ Resources Access



- All resources I used over the year are linked here, along with a few formatives created for each grade level.
- Each grade level has a data tracker created.





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