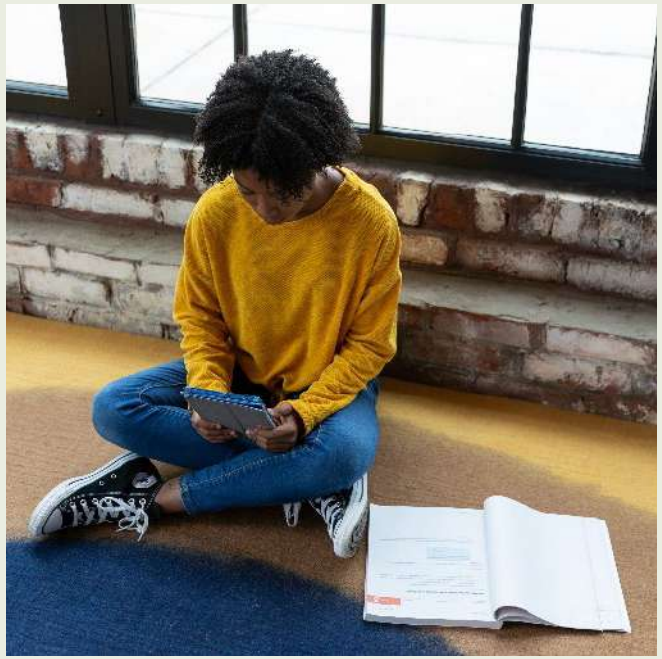
EUREKA MATH²™

Exponentially Greater

Breaking Down Readability Barriers in Mathematics

Christine Hopkinson

GREAT MINDS™



Goals

- Identify **literacy barriers** to mathematical content.
- **Co-construct a vision for an equitable mathematics** classroom in which all students can access the text.
- Learn and apply techniques for **improving readability**.
- **Consider classroom techniques** that increase accessibility to math text.

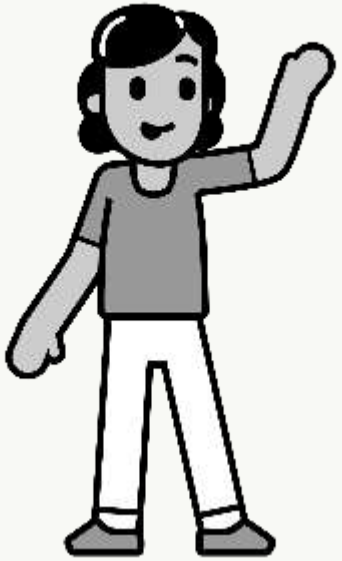
1. **Read the math story and make a simple math drawing with labels. Solve the problem with an equation.**

   There are 16 hedgehogs playing in the forest, but then 4 hedgehogs burrow underground. How many hedgehogs are still playing in the forest?

Talking Tool

I Can Share My Thinking 	My drawing shows . . . . I did it this way because . . . . I think ____ because . . . .
I Can Agree or Disagree 	I agree because . . . . I disagree because . . . . I did it a different way. I . . . .
I Can Ask Questions 	How did you . . . ? Why did you . . . ? Can you explain . . . ?
I Can Say It Again 	I heard you say . . . . ____ said . . . . Can you say it another way?

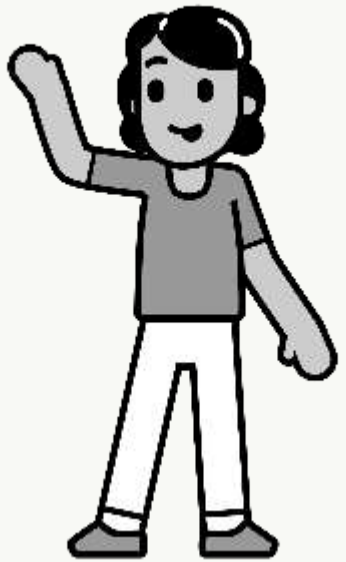
What are the barriers to the mathematical content?



1. **Read the math story and make a simple math drawing with labels. Solve the problem with an equation.**

   There are 16 hedgehogs playing in the forest, but then 4 hedgehogs burrow underground. How many hedgehogs are still playing in the forest?

How do these barriers affect students' math identities?



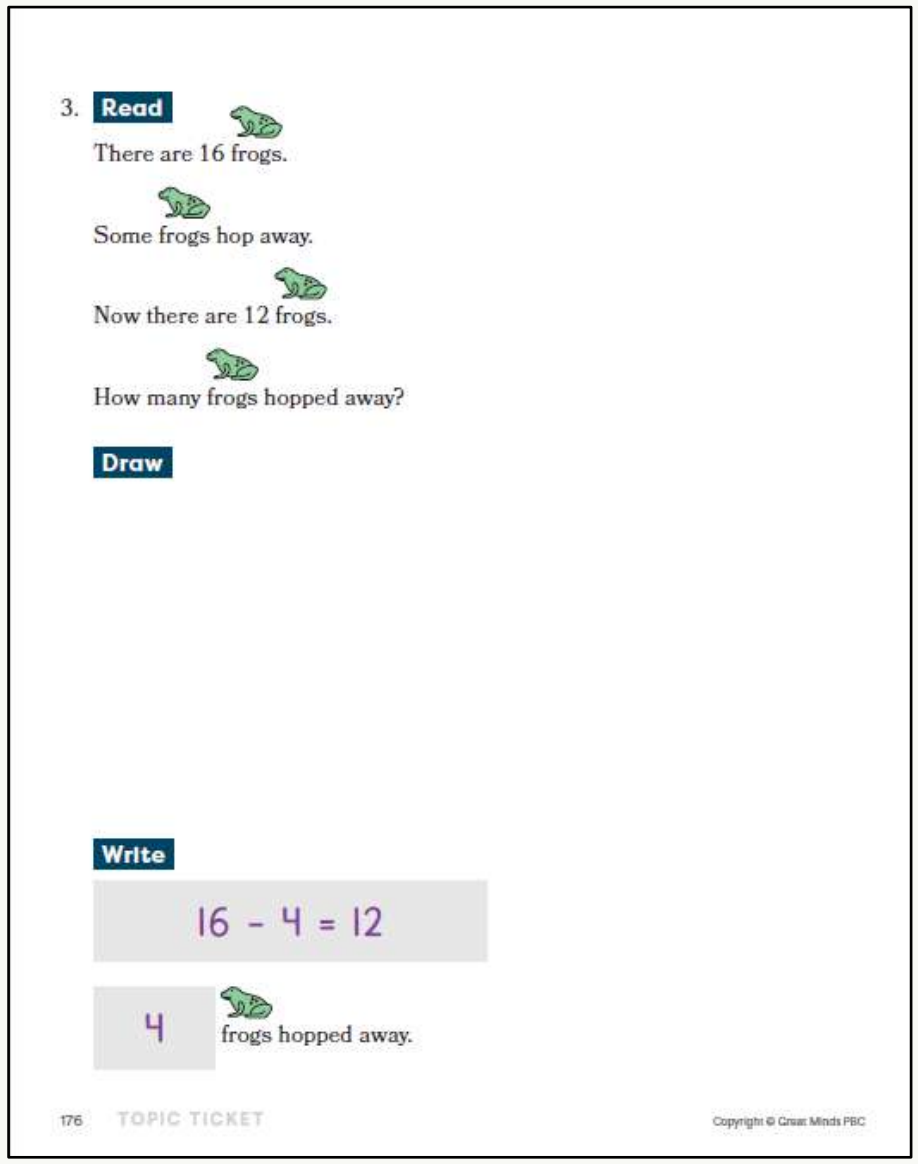
EUREKA MATH²

> “Research has shown that mathematics texts contain more concepts per sentence and paragraph than any other type of text. They are written in a very compact style; each sentence contains a lot of information, with little redundancy. …Finally, many texts are written above the grade level for which they are intended.”

Kenny, et al.,
Literacy Strategies for Improving Mathematics Instruction, 11–12

How might the text impede the quality of instruction?

Simplified Context



3. **Read**

There are 16 frogs.

Some frogs hop away.

Now there are 12 frogs.

How many frogs hopped away?

Draw

Write

16 - 4 = 12

4 frogs hopped away.

176 TOPIC TICKET

Readable Words

Same Mathematical Rigor

Plan for Variability and Accessibility

"Make everything as simple as possible, but not simpler." - Albert Einstein

Words should not stand in the way of **learning math** — **or anything for that matter!** Though for many kids they do. Especially if materials are designed without actively considering the perspective of struggling readers, especially students with dyslexia.

We've thought about those students with every step we've taken in *Eureka Math*^{2}. We've reduced words—eliminated some entirely. We've been intentional in our choice of words and sentence length. Our use of models and protocols has always aided all learners, particularly struggling readers.

We're proud of this work because we know it helps us to achieve the vision that we know is true: <u>every child is capable of greatness.</u>

– **Lynne Munson**, *founder and CEO of Great Minds*

The Vision

- Empower readers of all ages and abilities to access rich, rigorous mathematical content.
  - Students who are learning to read
  - Readers who need support
  - Readers with dyslexia
  - Multilingual learners
- Increase student independence, confidence, and joy while doing math!
- Provide teachers the opportunity to engage with students as they work independently.

Text Revision Strategies

- Sentence length
- Word choice
- Decodability
- Layout

4. **Read**

Mel has 6 red shoes.

Max has 4 green shoes.

Val has 2 yellow shoes.

How many shoes do they have?

Draw

Write

They have _____ shoes.

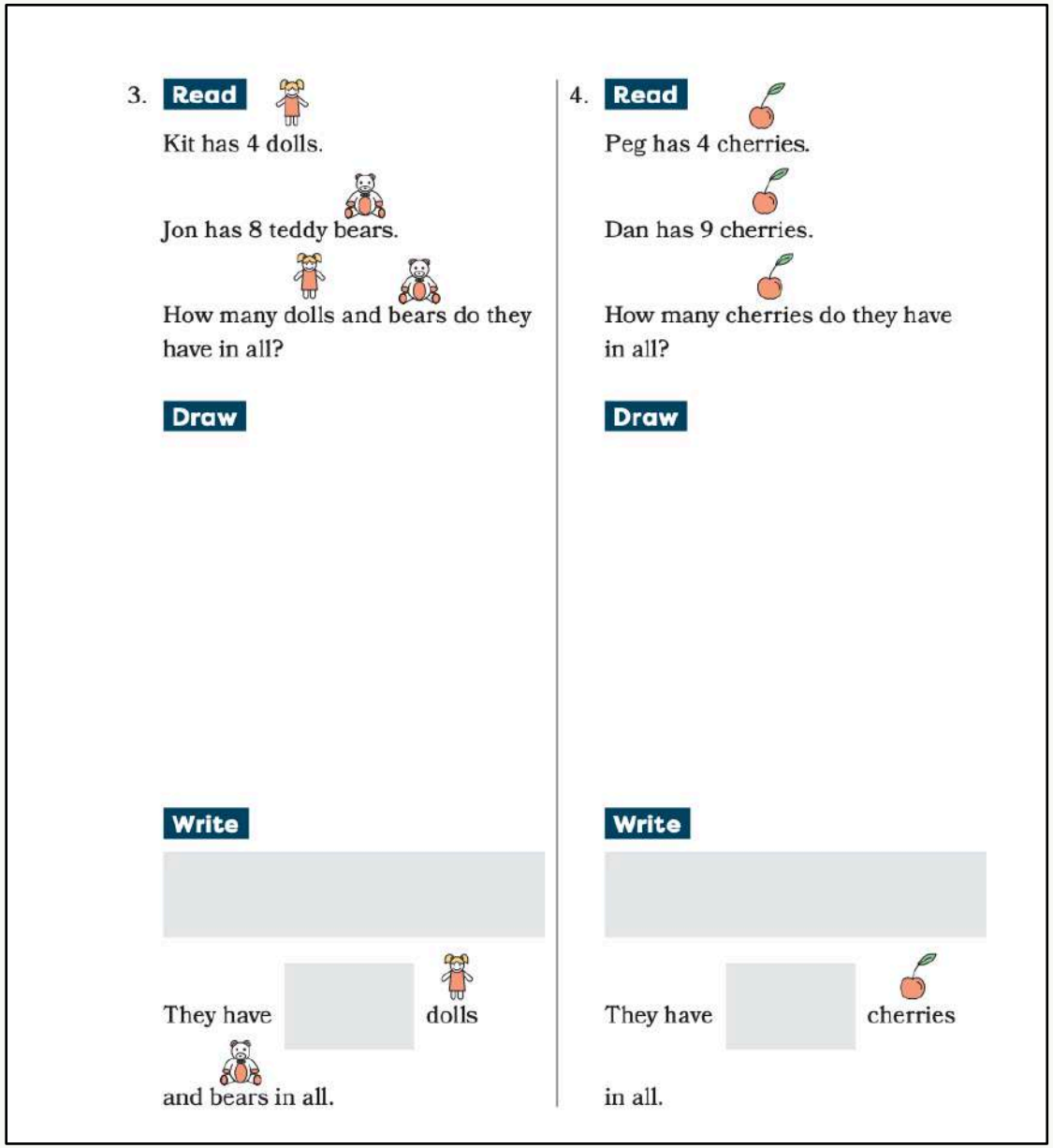
Text Revision Strategies: Before

- Sentence length
- Word choice
- Decodability
- Layout

Amira has 4 marbles in her collection. Her brother gives her 8 more marbles. How many marbles does she have now? Show how you make ten and write the simpler 10+ fact.

Text Revision Strategies: After

- Sentence length
- Word choice
- Decodability
- Layout



3. **Read**

Kit has 4 dolls.

Jon has 8 teddy bears.

How many dolls and bears do they have in all?

Draw

Write

They have _____ dolls and bears in all.

4. **Read**

Peg has 4 cherries.

Dan has 9 cherries.

How many cherries do they have in all?

Draw

Write

They have _____ cherries in all.

Text Revision Strategies: Before (Primary)

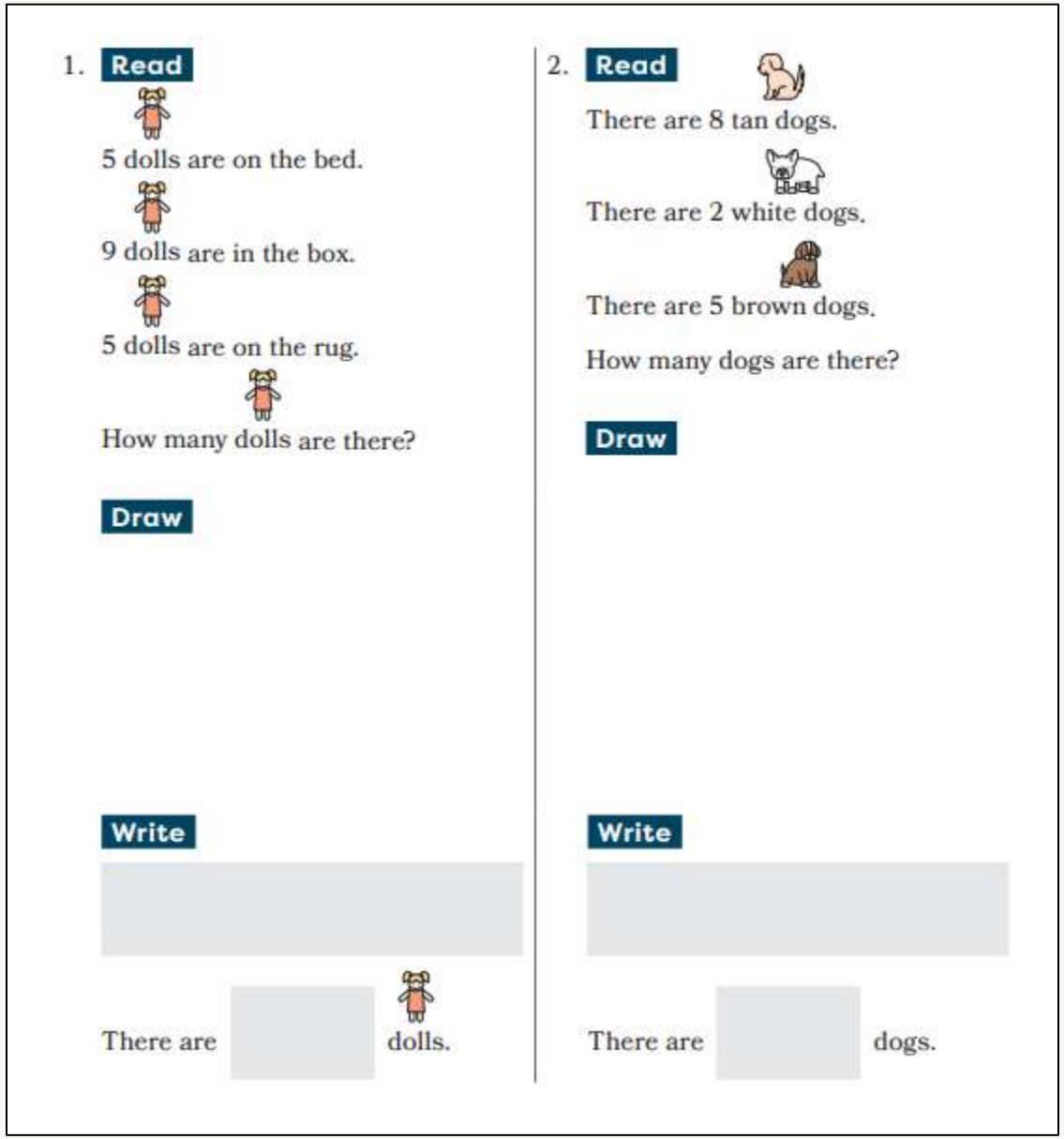
- Sentence length
- Word choice
- Decodability
- Layout

Read the problem. Draw a picture and label it. Circle ten and solve the problem.

Amy buys fruit at the market. She buys 3 peaches, 7 bananas, and 5 mangos. How many pieces of fruit does Amy buy?

Text Revision Strategies: After

- Sentence length
- Word choice
- Decodability
- Layout



1. **Read**

5 dolls are on the bed.

9 dolls are in the box.

5 dolls are on the rug.

How many dolls are there?

Draw

Write

There are _____ dolls.

2. **Read**

There are 8 tan dogs.

There are 2 white dogs.

There are 5 brown dogs.

How many dogs are there?

Draw

Write

There are _____ dogs.

Text Revision Strategies: Before (Intermediate)

- Sentence length
- Word choice
- Decodability
- Layout

Travel Soccer Team

Siobhan is very excited about joining a travel soccer time for the spring season. She wants to determine how much money she should save for expenses related to her new team. Players are required to pay for uniforms, travel expenses, and meals.

a. If Siobhan buys 5 uniform shirts at a time, she gets a $10 discount so that the total cost of 5 shirts would be 55 dollars. Write an algebraic equation that represents the regular price of one shirt. Solve the equation.

Text Revision Strategies: After

- Sentence length
- Word choice
- Decodability
- Layout

Amira buys 5 different shirts at the same price. She has a $10 gift card. After using the gift card, Amira's bill is $55. What is the price of 1 shirt?

Show your thinking.

Text Revision Strategies: Before (Secondary)

- Sentence length
- Word choice
- Decodability
- Layout

You just downloaded an app for a new music streaming service. You want to put together a playlist that has 1,000 songs, and the average song length is 4 minutes. Would you want to display the total time of the playlist in minutes, hours, or days of music?

Text Revision Strategies: After

- Sentence length
- Word choice
- Decodability
- Layout

You wonder how long you can listen to your favorite music before you hear the same song twice.

You have 1000 songs, and the average song length is 4 minutes.

Would you want to display the time in minutes, hours, or days of music?

Text Revision Strategies

Name _____ Date _____

Use the vertical form, your place value chart, and place value disks to add. Remember to bundle a ten when necessary. Try to solve some problems mentally!

a. 45 + 5 = _____ 45 + 6 = _____

b. 36 + 4 = _____ 36 + 5 = _____

c. 64 + 13 = _____ 64 + 18 = _____

d. 57 + 23 = _____ 57 + 26 = _____

e. 35 + 46 = _____ 35 + 42 = _____

f. 48 + 13 = _____ 48 + 35 = _____

g. 59 + 27 = _____ 53 + 46 = _____

Name _____

8

Use place value disks to add.

1. 35 + 5 = 40

2. 35 + 6 = 41

3. 69 = 54 + 15

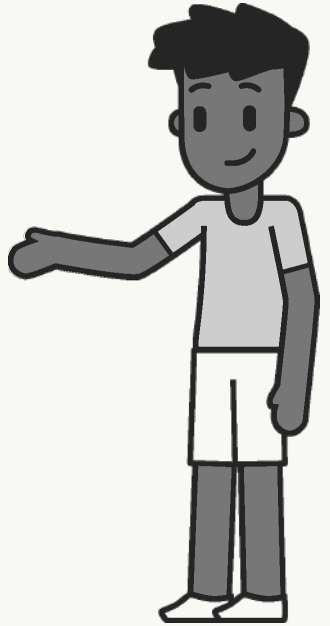
4. 82 = 54 + 28

5. 58 + 23 = 81

6. 67 + 25 = 92

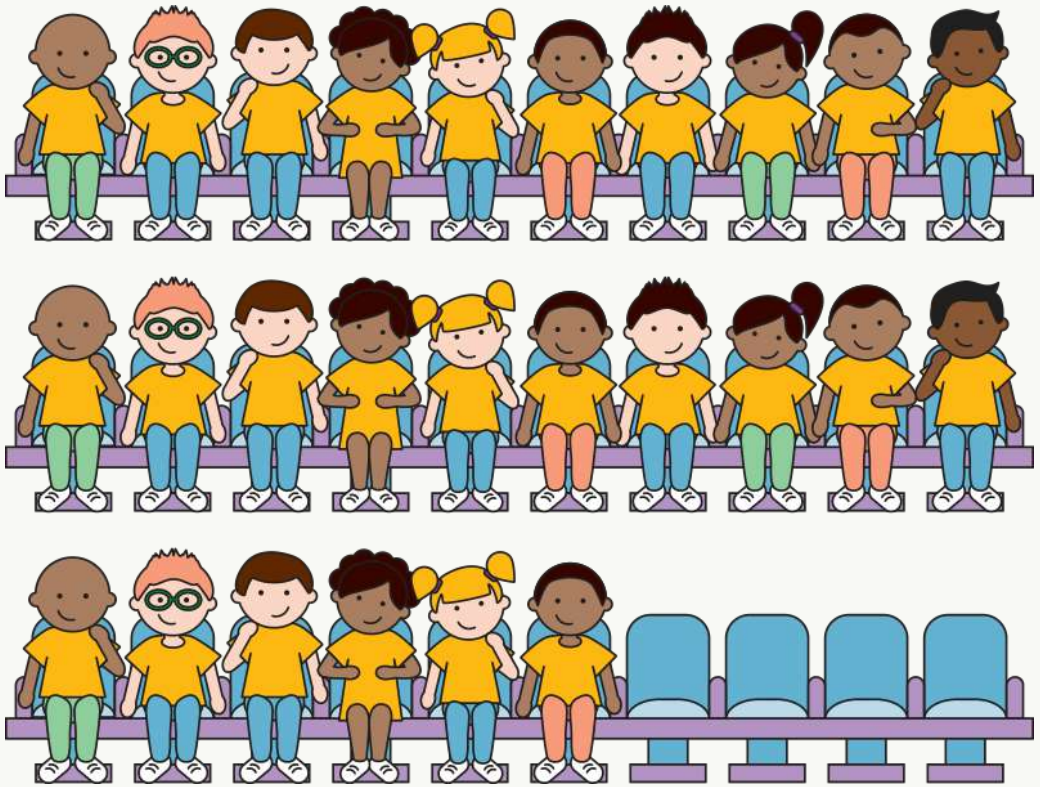
Classroom Tools and Strategies

- Visuals
- Co-construction routine
- Shared reading



Visuals

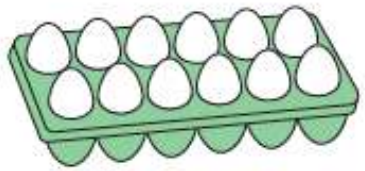
26 students are in the auditorium. 9 students go back to get a snack. How many students are still in the auditorium?



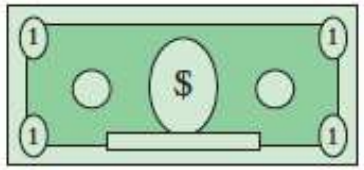
Visuals

Using Rates to Convert Units

_____ eggs per dozen



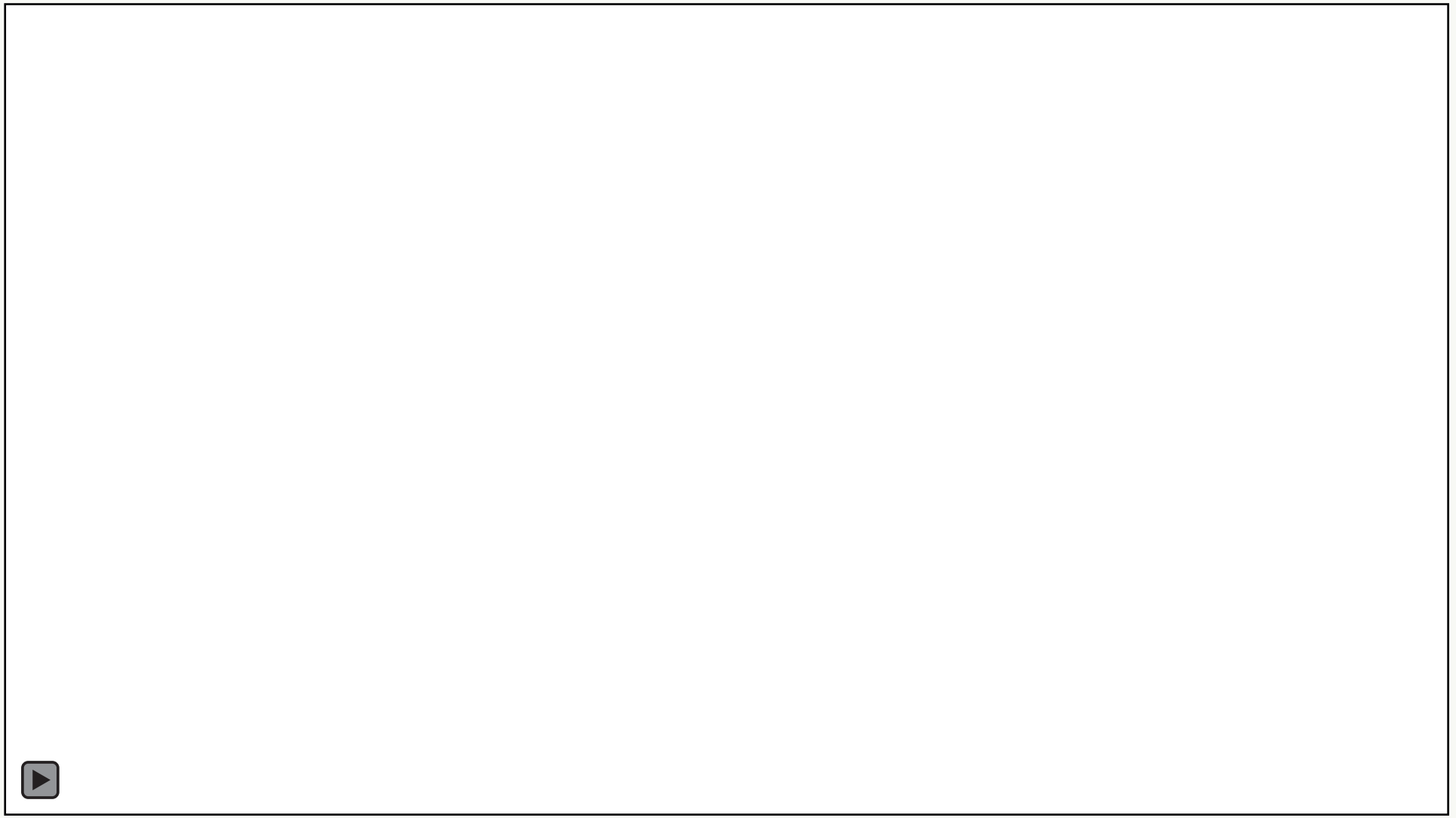
_____ pennies per dollar



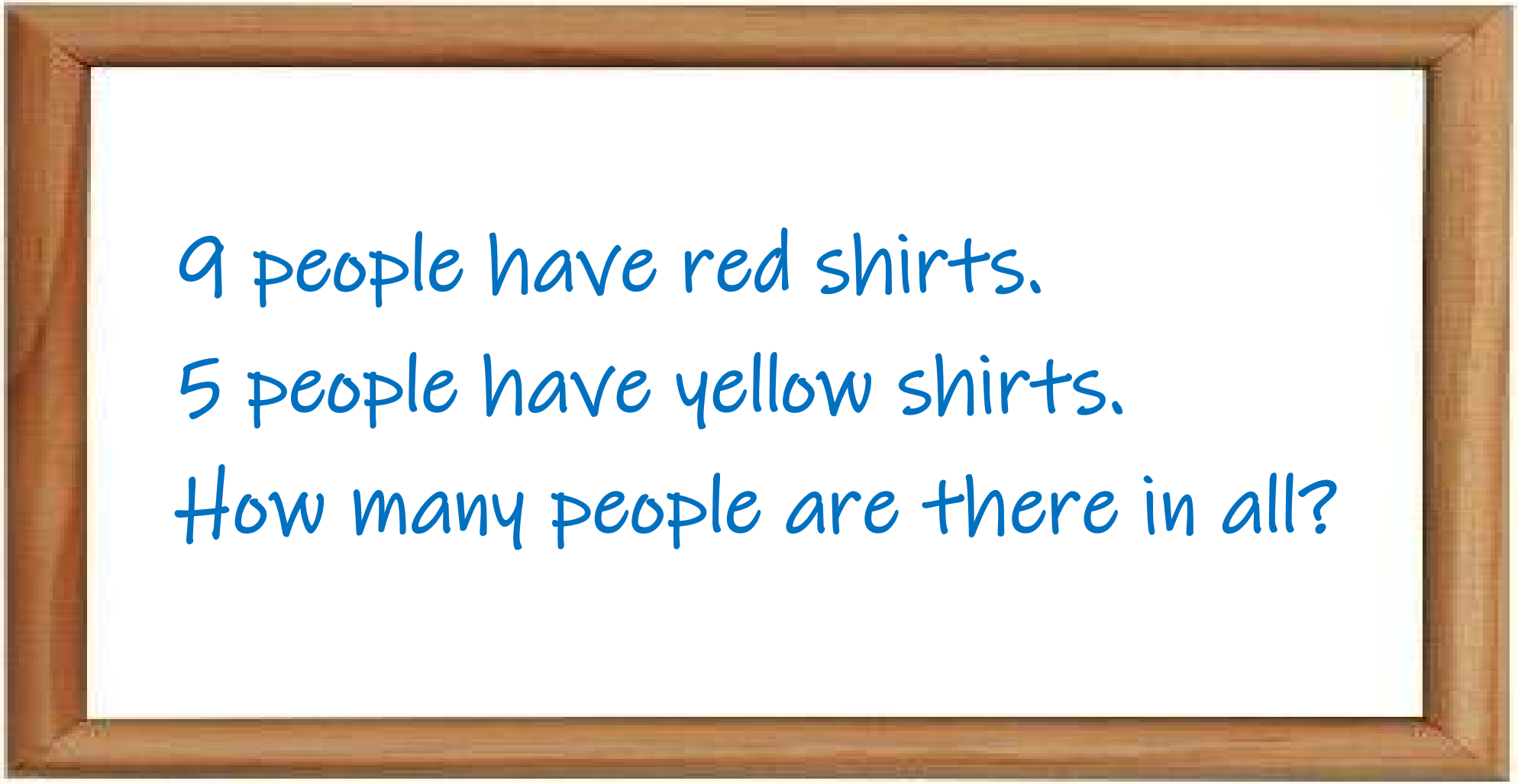
_____ quarts per gallon

_____ meters per kilometer

Co-Construction Routine



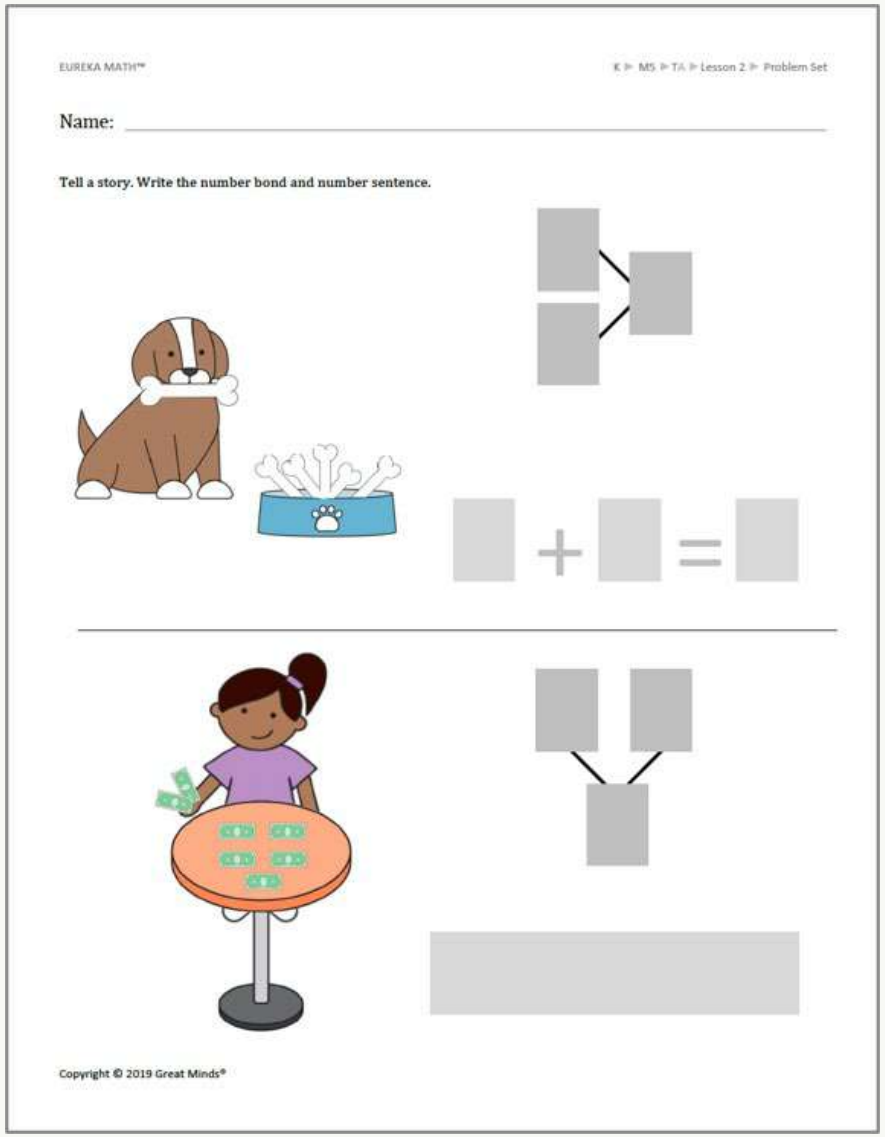
Co-Construction Routine



Co-Construction Routine

- Present the context.
- Notice and wonder.
- Write what you know.
- Ask a math question.
- Read the problem.

Co-Construction Routine



EUREKA MATH™ K ▶ M5 ▶ TA ▶ Lesson 2 ▶ Problem Set

Name: _____

Tell a story. Write the number bond and number sentence.

Copyright © 2019 Great Minds®

Co-Construction Routine

Students study
sentence.

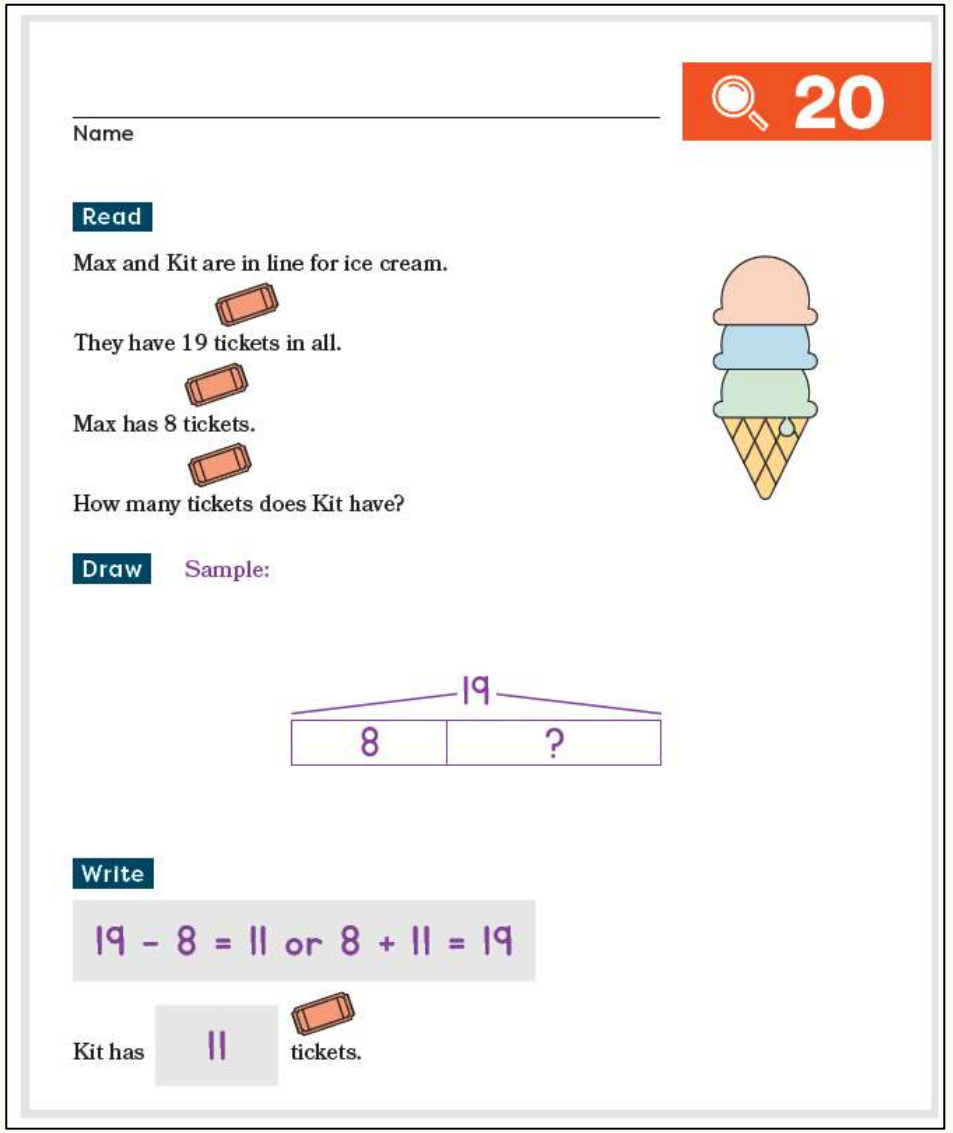
Gather students
Display *The Migr*
by Jacob Lawrer
about the painti
wonder about th

If necessary, stim

- What do you tl
- Why do you thi
- What question

Shared Reading

- **Read** aloud and visualize
- Think–pair–share–clarify
- Choral reread
- Reread and **draw …**
- **Write**



20

Name

Read

Max and Kit are in line for ice cream.

They have 19 tickets in all.

Max has 8 tickets.

How many tickets does Kit have?

Draw Sample:

19

8 | ?

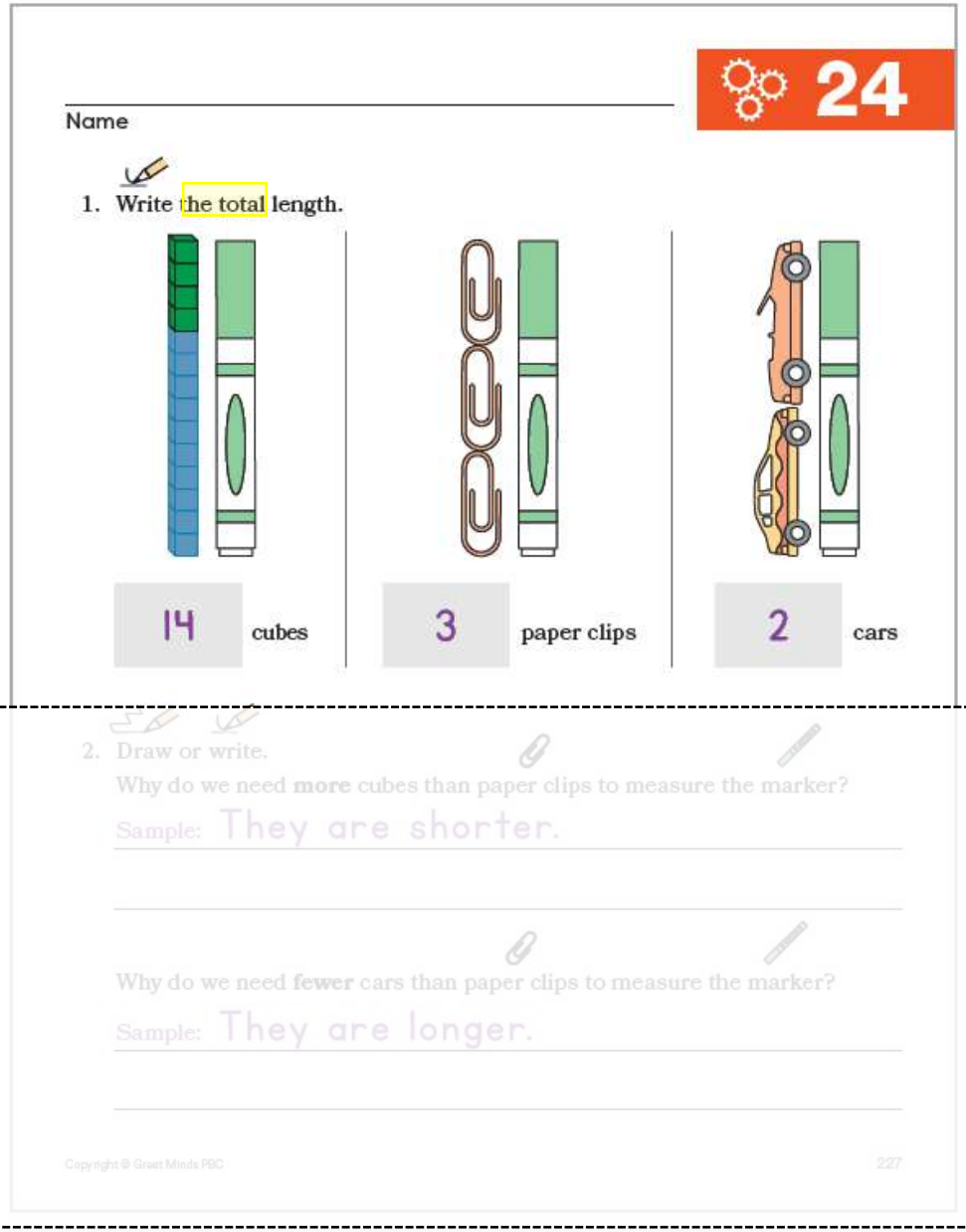
Write

19 − 8 = 11 or 8 + 11 = 19

Kit has 11 tickets.

Additional Strategies

- Fold the page.
- Cover parts of the page.
- Underline or highlight important information.
- Have students restate directions.



....

[R]ather than reading wordy directions … students access the activity and focus on the math concepts. More space is there for students to authentically share their thinking through drawings, number sentences, etc.

- Eureka Math Squared teacher

[P]ages are student friendly with more visuals and less print. This is more accessible to the students and allows them to work independently without being overwhelmed.

- Eureka Math Squared teacher

Q & A

greatminds.org/math

facebook.com/eurekamathofficial

pinterest.com/eurekamathcurriculum

twitter.com/eureka_math

Works Cited

International Dyslexia Association. "Dyslexia in the Classroom: What Every Teacher Needs to Know.” International Dyslexia Association. Accessed September 9, 2021. https://1xwltg429wbz1nv5201c3cao-wpengine.netdna-ssl.com/wp-content/uploads/2015/01/DITC-Handbook.pdf.