*Math in Focus: Singapore Math* National Institute
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# Welcome!

Beth Ardell

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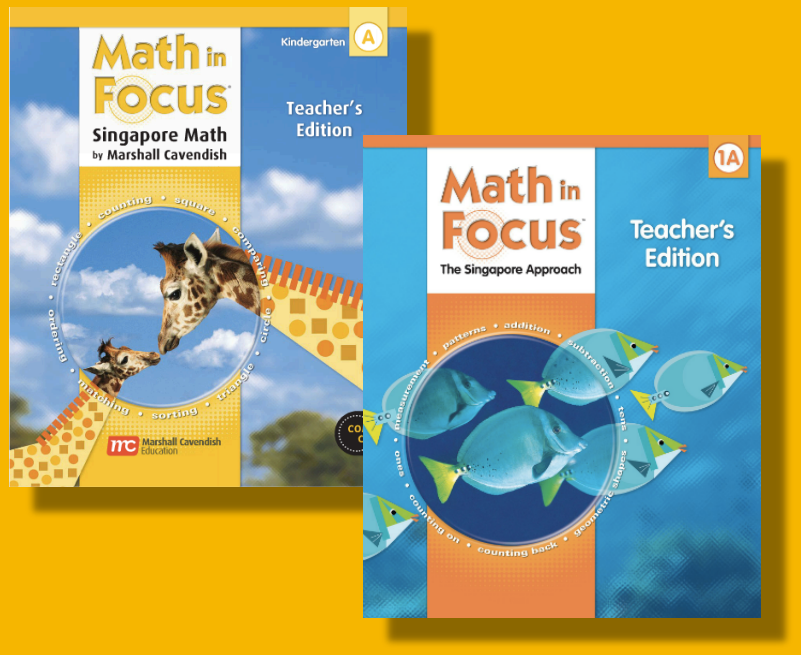
# Math in Focus

## Math Talk and Storytelling for Grades K-1



# Evidence of Mathematical Practices

- Make sense of problems and persevere
- Reason abstractly and quantitatively
- Construct viable arguments and critique reasoning of others
- Model with mathematics
- Use appropriate tools  strategically
- Attend to precision
- Look for and make use of structure

# How does Storytelling or Word Problems contribute to the development of a Mathematically Proficient Student?

- Mathematizes real-world situations
- Provides opportunities for children to repeat mathematical situations with a variety of stories
- Promotes understanding of operations since action is actually experienced in context
- Allows for content practice of language
- Encourages children to pose their own problems

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# What "Big Language Ideas" from Kindergarten and Grade One do we want to emphasize through Storytelling?

- The language of comparison
- The language of equality
- The language of operations

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**What language can we support through the use of "Sentence Stems" for students to read?**

**The concepts underlying the language that students will encounter and apply in word problems:**

- ___is fewer than ___.
- ___is more than ___.
- 1 more than ___ is ___.
- 1 less than ___is ___.
- ___more than ___is ___.
- ___less than ____is___.
- ___and___make____.



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**What questions can be asked to elicit thinking and mathematical conversations?**

# Questions to Develop Language:

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How many more to make____?
What do you add to ___ to make __?
What is the whole amount?
What are the parts?
How many different ways can you read this addition/subtraction sentence?
How can you break this whole apart?
Do our numbers match our story?
Where did this__ come from? What does it represent?
What does this number tell us?
Do you think your answer will be greater than these parts? less than?

# Questions to Elicit Thinking:

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How do you know?
How did your mind think about this?
Are you sure? Prove to us. Convince us.
How do you know your answer is correct?

# Learning Number

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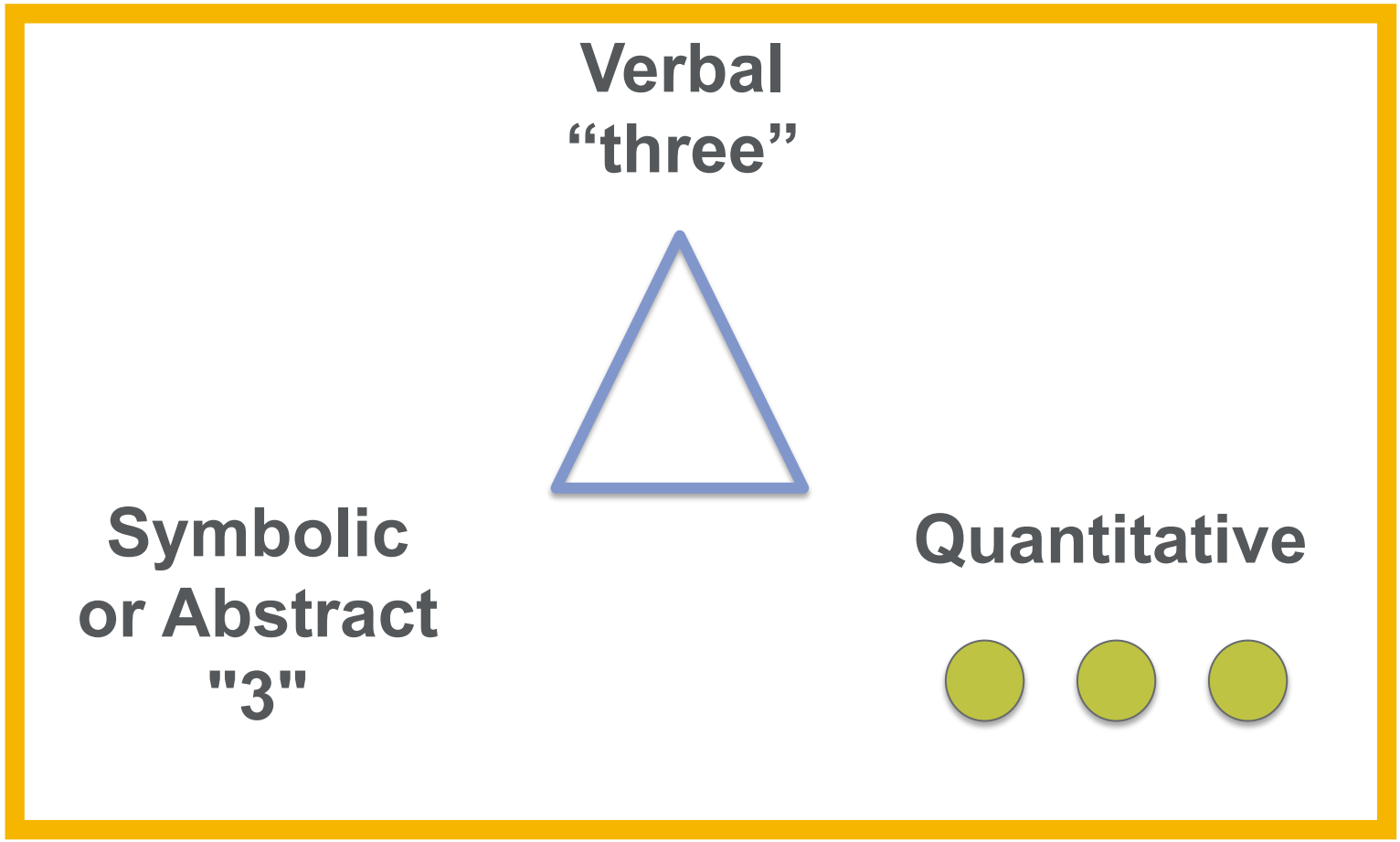

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Once numbers have structure and a visual for the quantity, one can start to decompose them.

Let's look at these small quantities.

# Ch. 1, Lesson 5
# Kindergarten

- What quantities do you see?
- Tell your friend.
- How can we create a concrete experience related to this scene?


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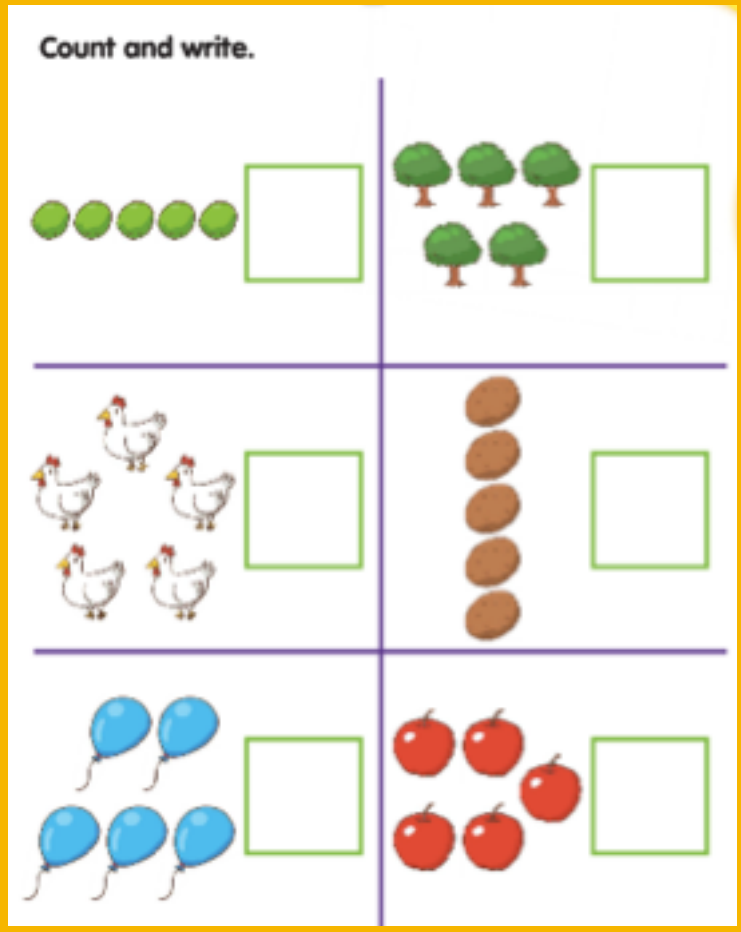
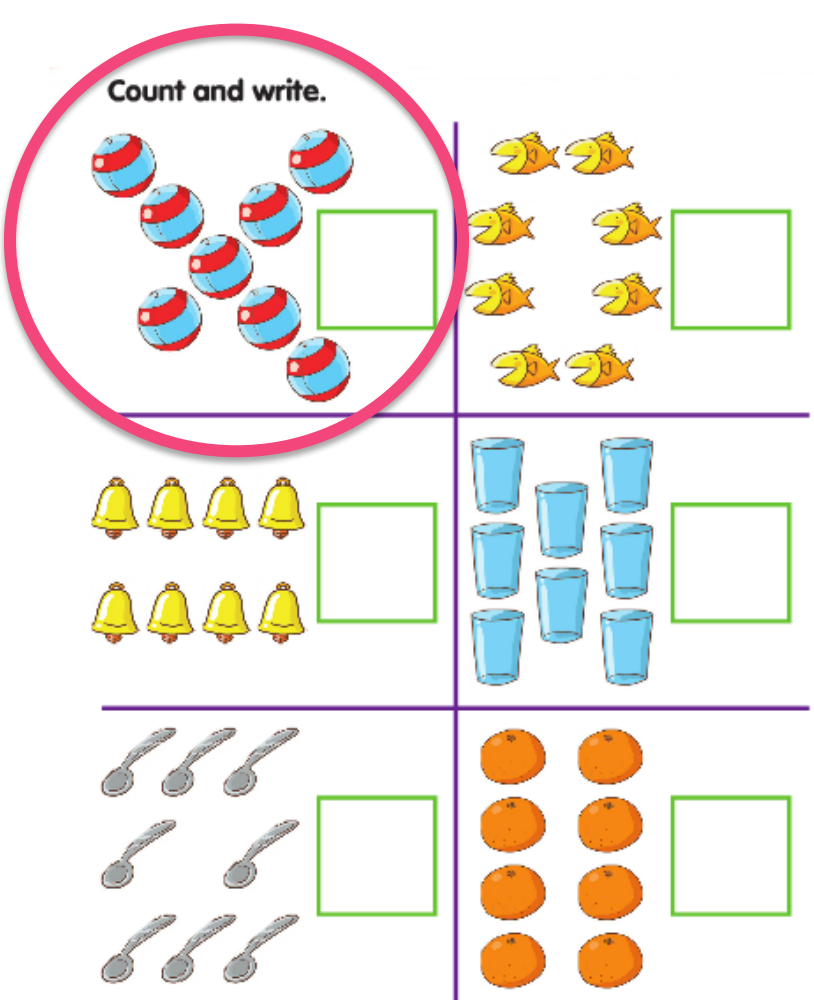
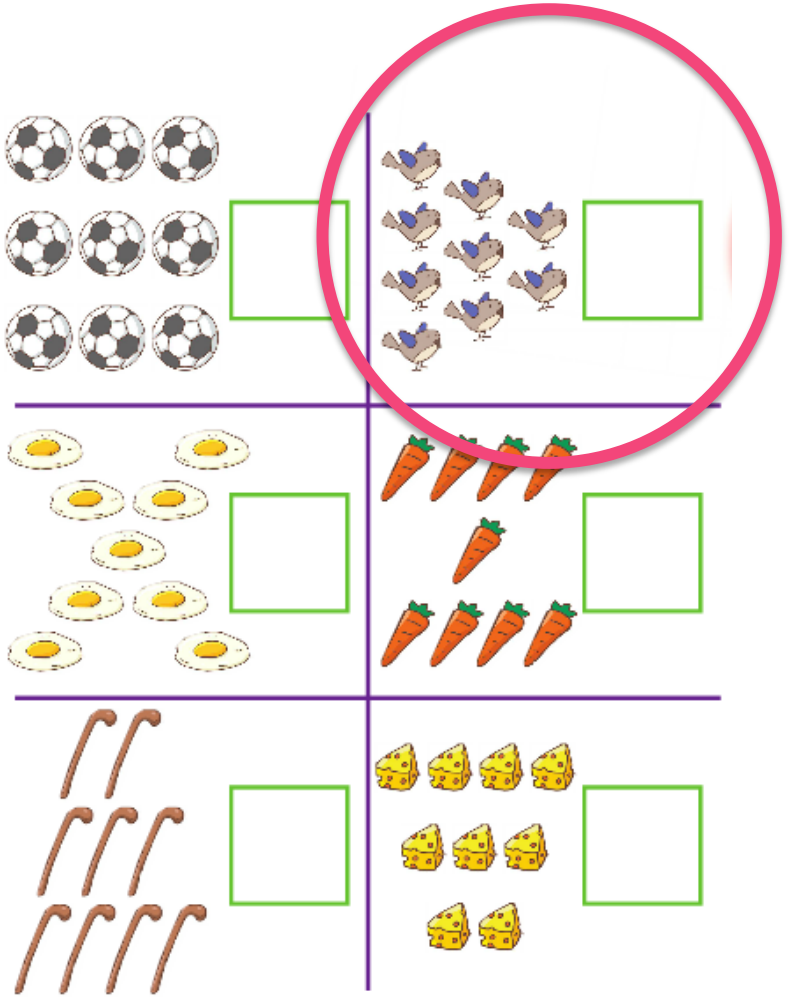
# Apply

- How will you count these?
- Which one is your favorite to count?
- Can you build this arrangement?
- What story can you tell about your group of 5?



**Recreate any of these pictures with cubes.**
**How will you count them? Tell your friend a story.**





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# Chapter 1, Lesson 1
# Grade 1

- Find something to count.
- Can you find another group that has 1 more?
- What story could you tell about this picture?


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# The part-whole concept in Kindergarten

- What might this look like in a word problem? Tell your friend a story using the tree storyboard.

ACTIVITY 3

## Explore

**Math Focus:** Extend the concept of how numbers can be composed of other lesser numbers.

**Materials:** Connecting cubes, 30 per group and 30 for teacher (15 yellow and 15 blue)

**Classroom Setup:** Children work in small groups with teacher direction.

1. **Begin** the day by ***inviting*** children to gather around a table.
2. ***Model*** the activity to the children.
3. ***Tell*** children that you are going to build towers of 5 connecting cubes, but by using different combinations of cubes.
4. ***Start*** off by building a tower of 5 yellow cubes.
5. ***Count*** out the cubes. ***Ask:***
   - Do I need any blue cubes to complete this tower? (No)
   - How many blue cubes do I need to complete this tower? (0)
6. ***Say:*** 5 yellow cubes and 0 blue cubes make 5 cubes.
7. ***Place*** the tower aside.
8. Then, build a tower of 4 yellow cubes.
9. ***Count*** out the cubes. ***Ask:*** How many blue cubes do I need to complete this tower of 5? (1)
10. ***Fix*** on the 1 blue cube. Say: 4 yellow cubes and 1 blue cube make 5 cubes.
11. ***Place*** the tower aside.
12. ***Repeat*** steps 8 to 11 using the following combinations:
    - 3 yellow cubes and 2 blue cubes
    - 2 yellow cubes and 3 blue cubes
    - 1 yellow cube and 4 blue cubes
    - 0 yellow cubes and 5 blue cubes

**Best Practices** Do not alternate the colors of the cubes in the tower as this will make it difficult for children to see two distinct sets of cubes within the same tower.

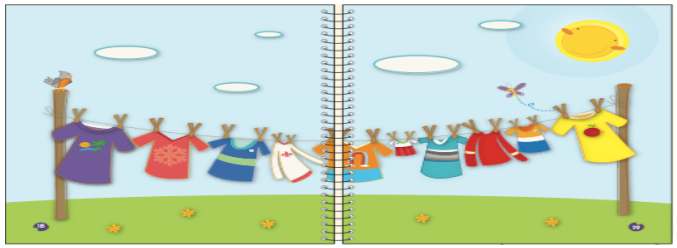
13. ***Distribute*** materials to the children.
14. ***Ask*** them to do the same activity for towers of 4 cubes, 3 cubes and 2 cubes.
15. While children engage in the activity, **end** the day by asking check questions such as:
    - What were some ways you made up 4?
    - What were some ways you made up 2?

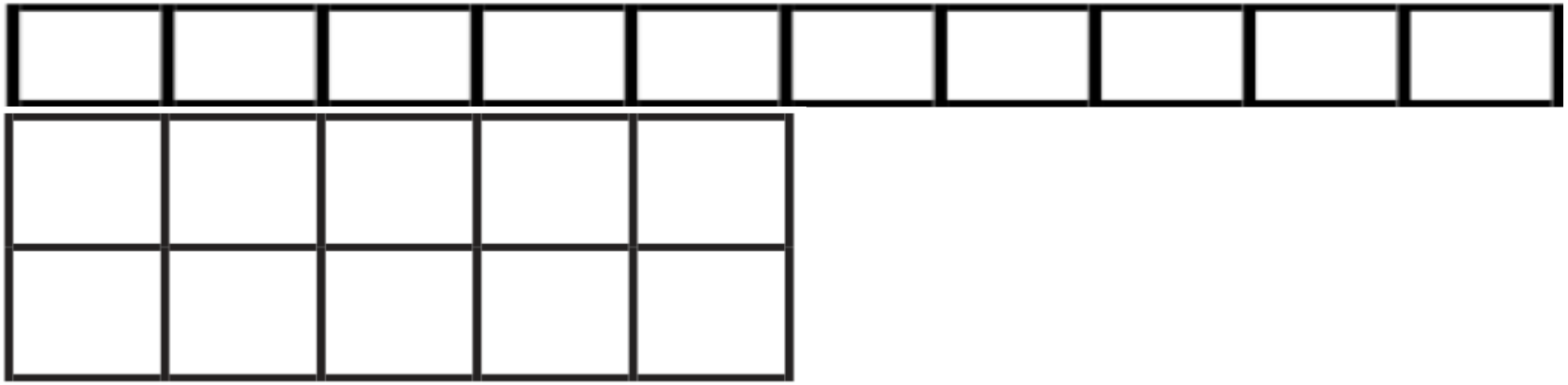
# Chapter 4
# Kindergarten

Finding how many more are needed…
the missing addend


# Working with Ten in Kindergarten – Chapters 12 and 14

How many more to make to ten?





**C-P-A**

**____ is more than ____.**
**____ is less than ____.**
**____ is ____ more than ____.**
**____ is ____ less than ____.**
**5 is ____ and ____.**
**____ and ____ makes 10.**



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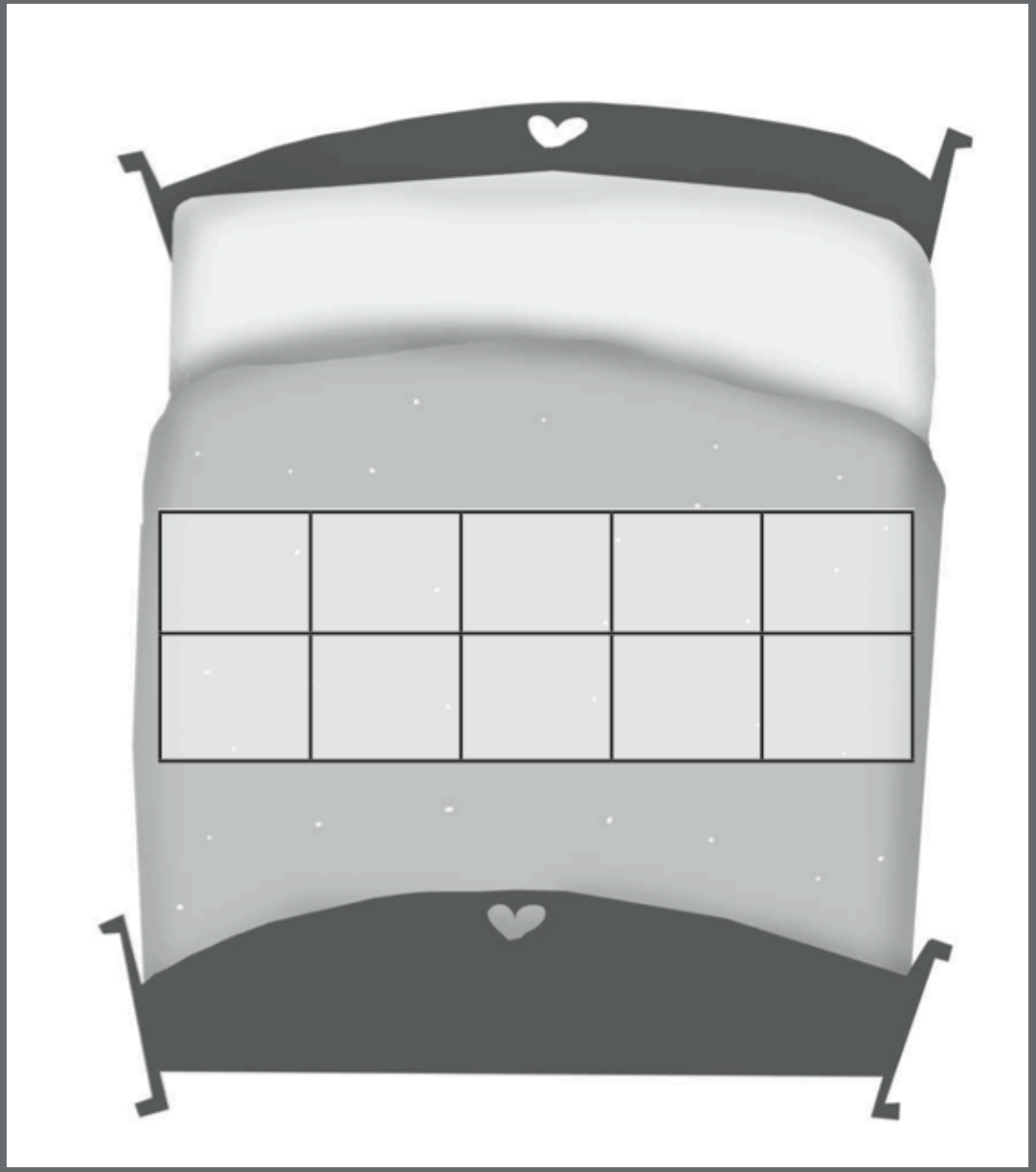
Kindergarten
TR 21



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# Ch. 9, Lesson 4
# Kindergarten


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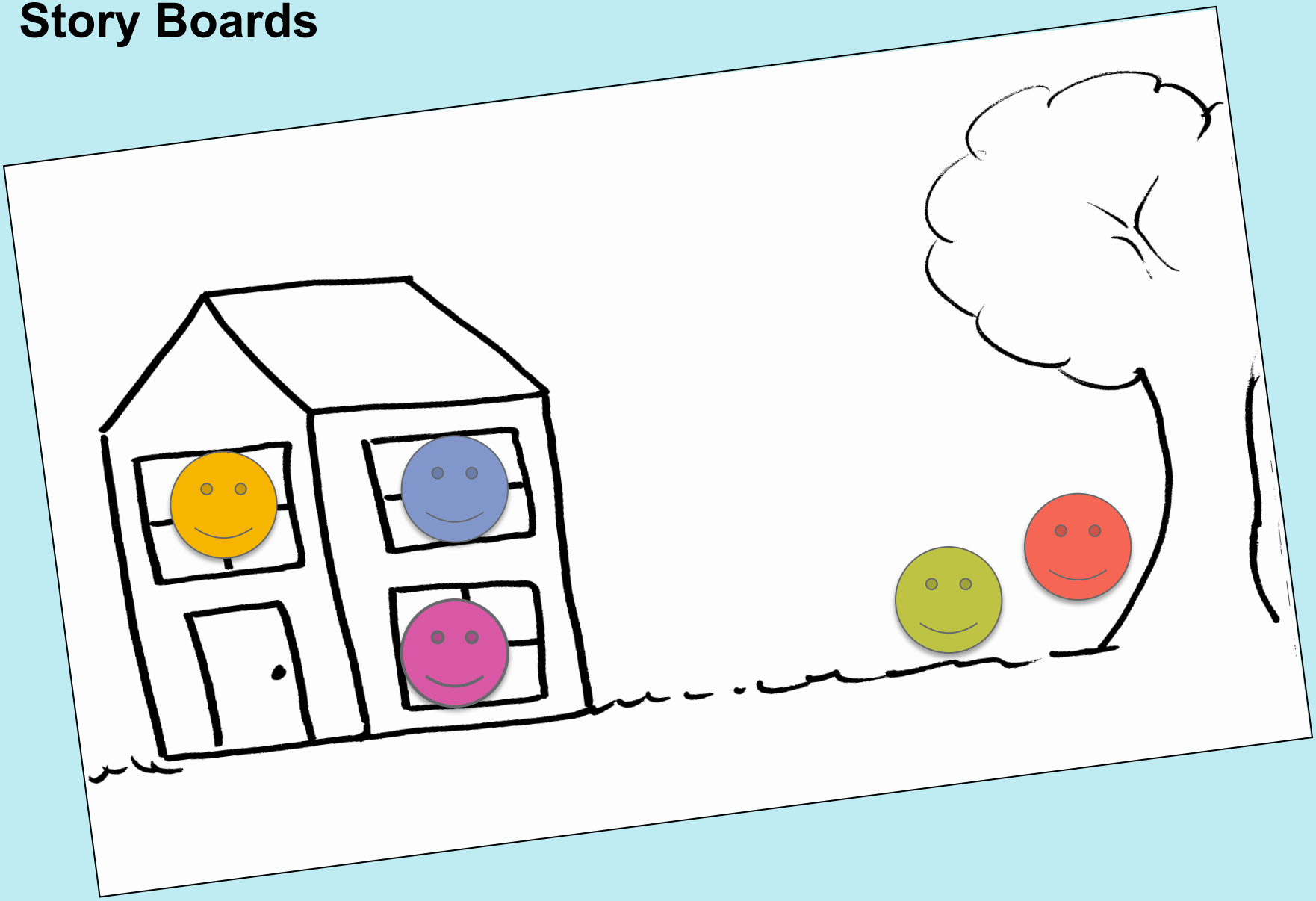
# Story Boards



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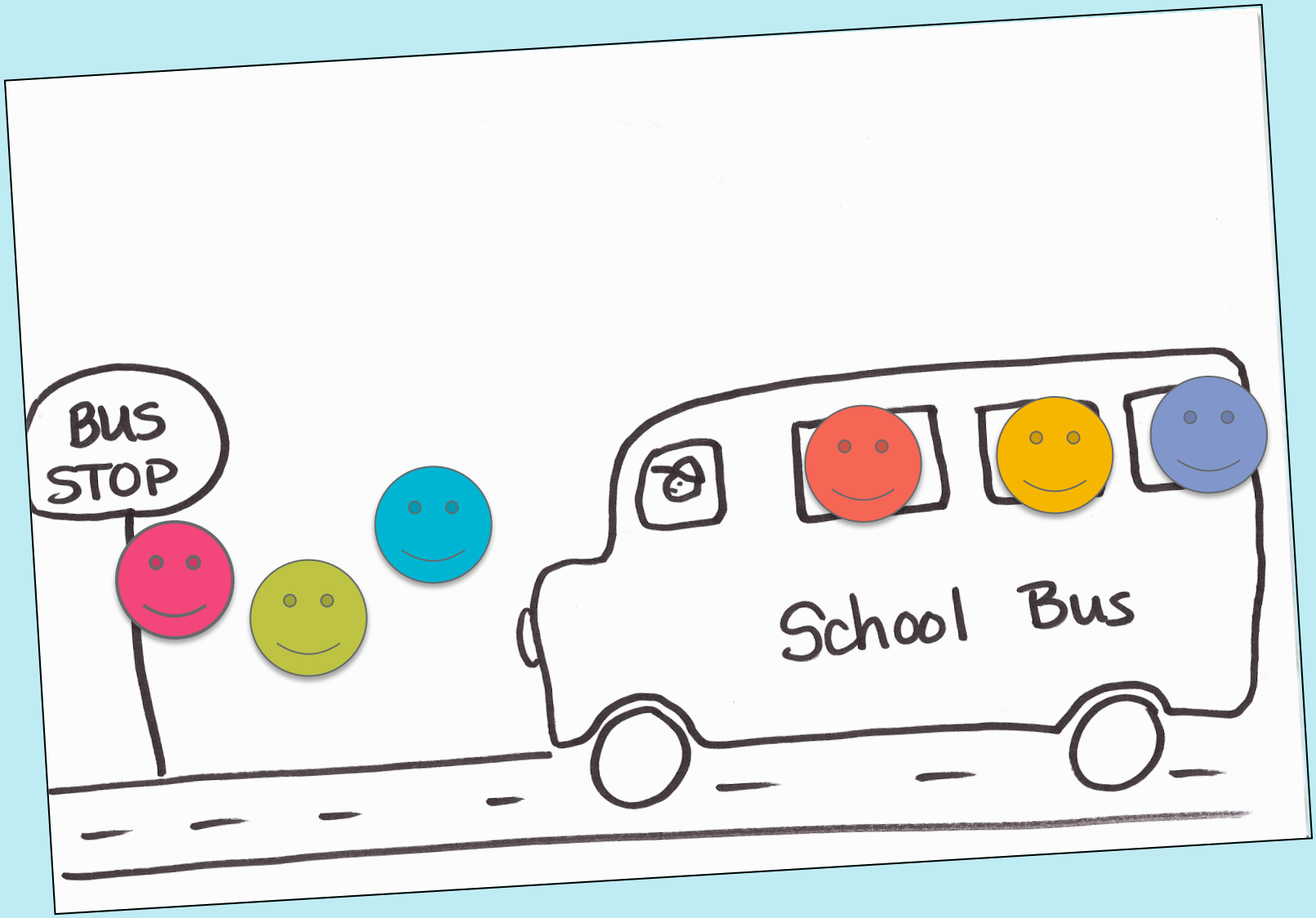
# Story Boards

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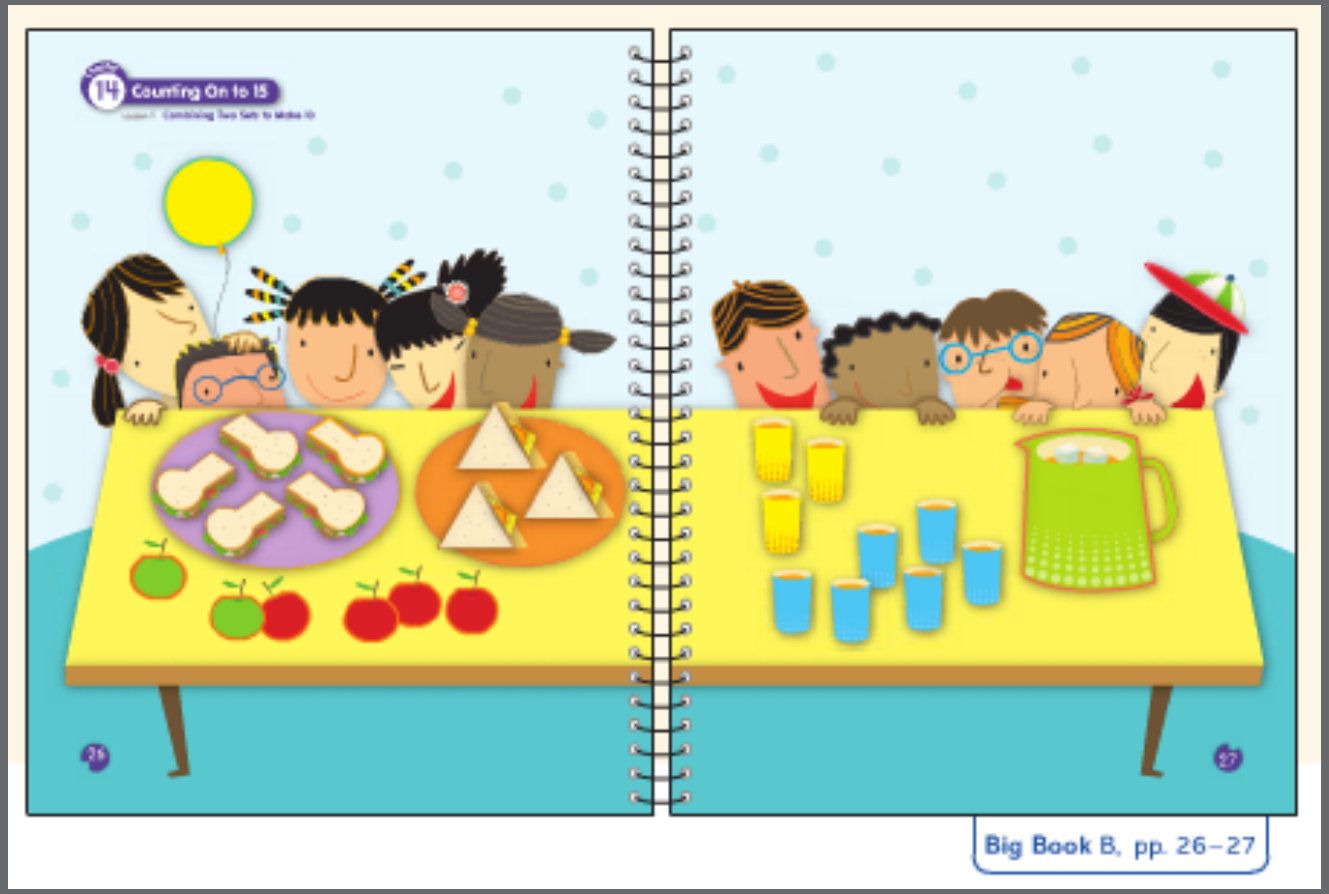
# Ch. 14, Lesson 2
# Kindergarten




Big Book B, pp. 26–27

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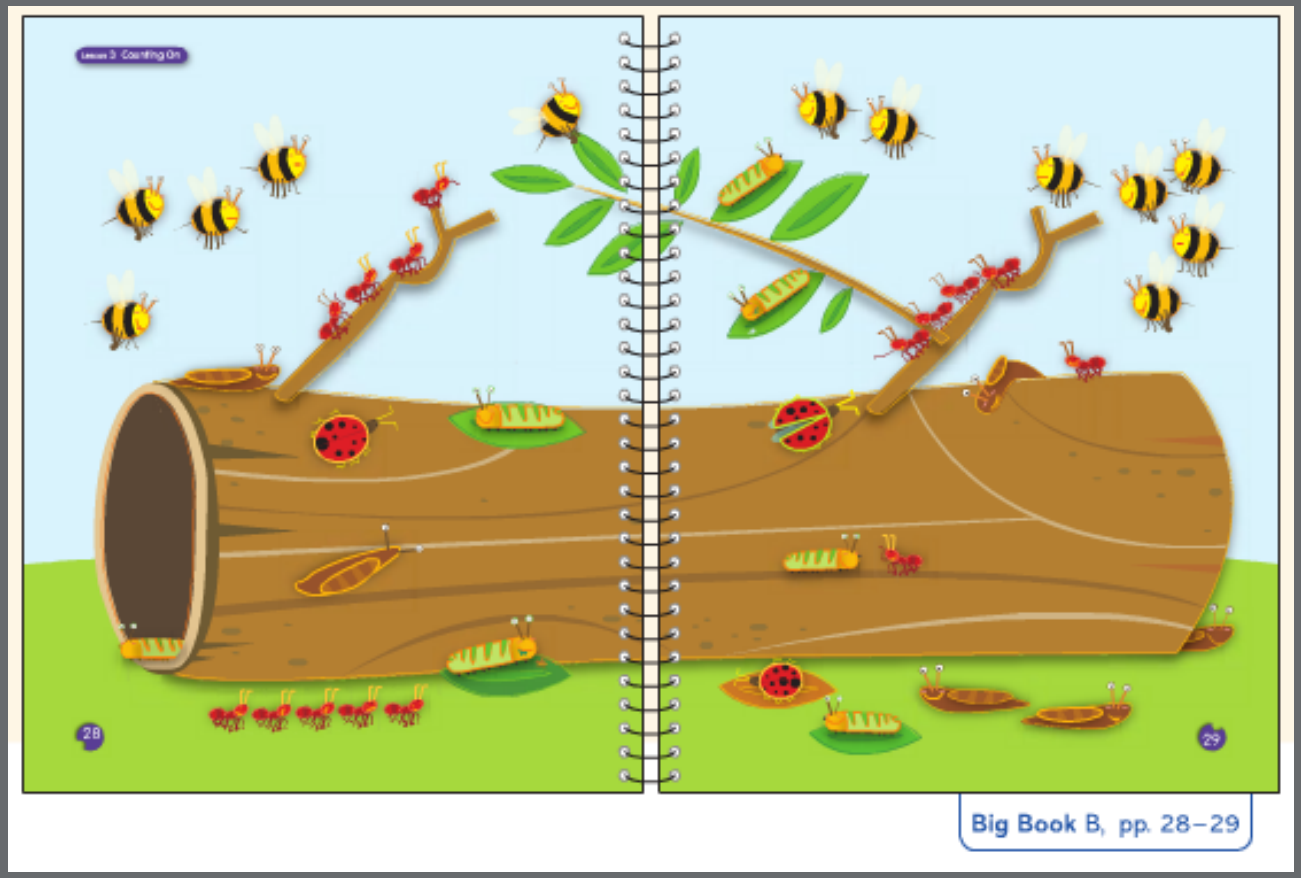
# Ch. 14, Lesson 4
# Kindergarten




Big Book B, pp. 28–29

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# One more…
# One less…

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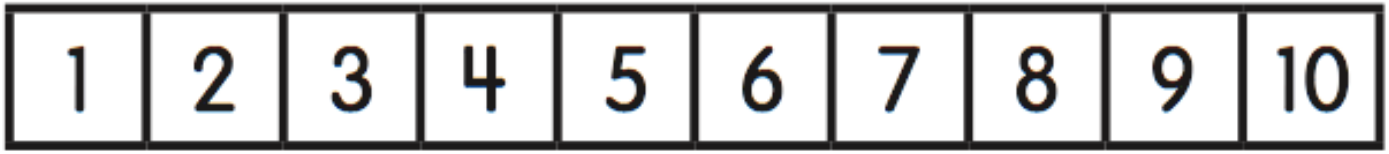


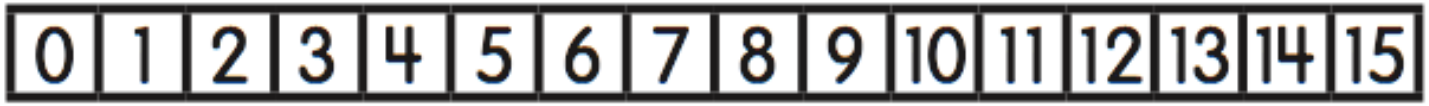


How can we make connections to the Number Train in Kindergarten with our stories?

In Grade 1, Number Bonds explore the parts of the whole and provide students with opportunities to partition in Chapter 2.

- What word problems might you use to support this concept?
- How might students act this out?
- What would a journal entry look like?


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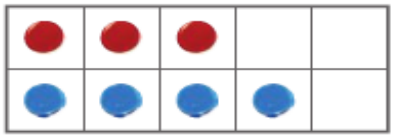
Chapter 3, Lesson 1
Grade 1

## Guided Practice

**Count on from the greater number.**
**Complete the addition sentence.**

3



, , , 

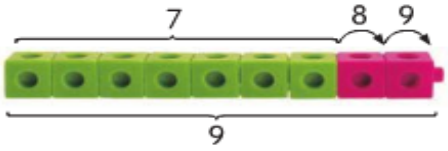
+ = 

Learn

**You can count on to find how many more.**

What is 2 **more than** 7?

**More than** means **added on to.**




9 is 2 more than 7.

**7**, 8 , 9

2 added on to 7 is 9.

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3 kids are outside playing and 2 more are in the house.
How many kids are there? What is 2 more than 3?

Now there are 2 kids outside playing and 3 more in the house.
How many kids are there? What is 3 more than 2?

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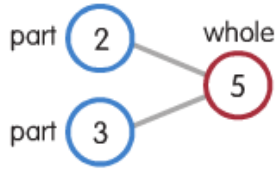
Chapter 3, Lesson 1
Grade 1

Learn

**Number bonds can help you add.**

How many toy cars are there in all?


3 + 2 = 5




2 + 3 = 5

There are 5 toy cars in all.

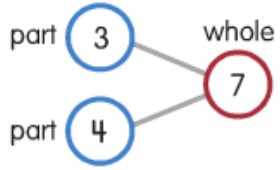
You can add in any order.

3 + 2 = 2 + 3

## Guided Practice

**Add. Use number bonds to help you.**

6 How many paper clips are there in all?


__ + __ = __ __ + __ = __

There are __ paper clips in all.

4 + 3 = __ + __

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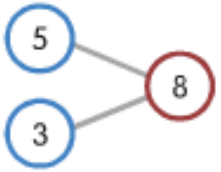
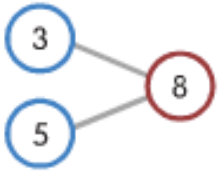
Chapter 3, Lesson 1
Grade 1

Learn

**Number bonds can help you add.**

How many lemons are there in all?



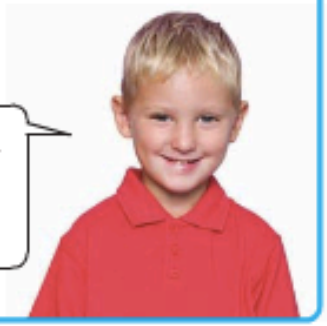

$5 + 3 = 8$

$3 + 5 = 8$

There are 8 lemons in all.

You can add in any order.

$5 + 3 = 3 + 5$

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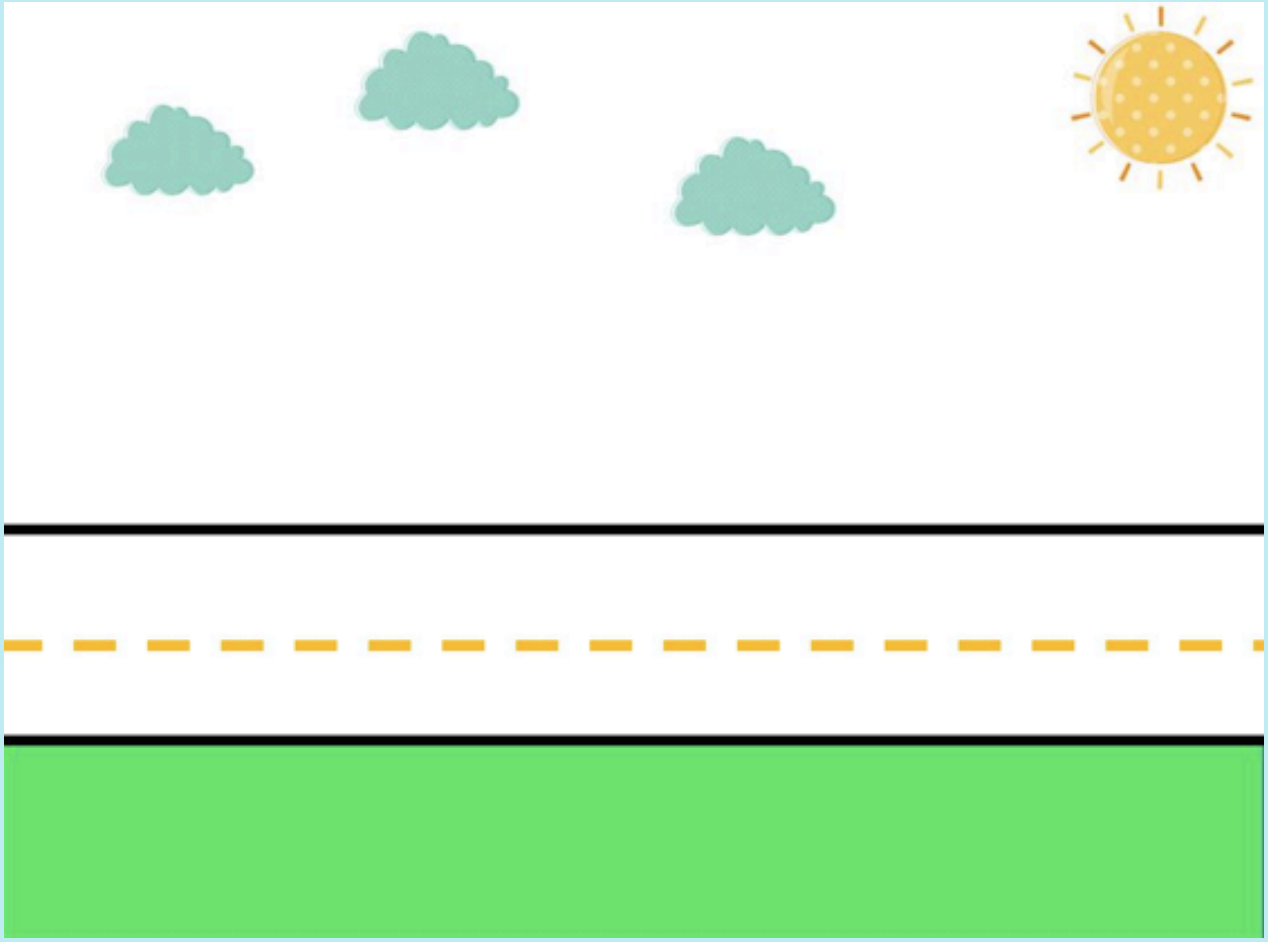
3 cars on are the road and 2 are parked on the grass.
How many cars are there?

How many cars are there
if 2 cars are on the road and 3 are parked?



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Chapter 3, Lesson 3
Grade 1

LESSON 3

# Real-World Problems: Addition

**Lesson Objectives**

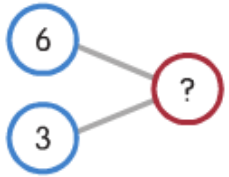
- Write addition sentences.
- Solve real-world problems.

Learn

## Read and understand a word problem.

6 girls are playing.
3 boys are playing with them.
How many children are playing in all?

6 + 3 = 9




9 children are playing in all.

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Chapter 4, Lesson 1
Grade 1

Take away Subtraction

LESSON 1

# Ways to Subtract

**Lesson Objectives**

- Take away to subtract.
- Count on to subtract.
- Count back to subtract.
- Use number bonds to subtract.
- Write and solve subtraction sentences.

**Vocabulary**

| |
|---|
| take away |
| subtract |
| minus (-) |
| subtraction sentence |
| less than |

Learn

**You can subtract by taking away.**

9 spiders are having breakfast.
6 spiders walk away.
How many spiders are left?

Crossing out 6 spiders **takes away** 6 spiders.

You subtract one part from the whole to find the other part.

9 – 6 = 3
whole part part

3 spiders are left.

– is read as **minus**.
It means **subtract**.

9 – 6 = 3 is a **subtraction sentence**.

Read it as nine minus six is equal to three.

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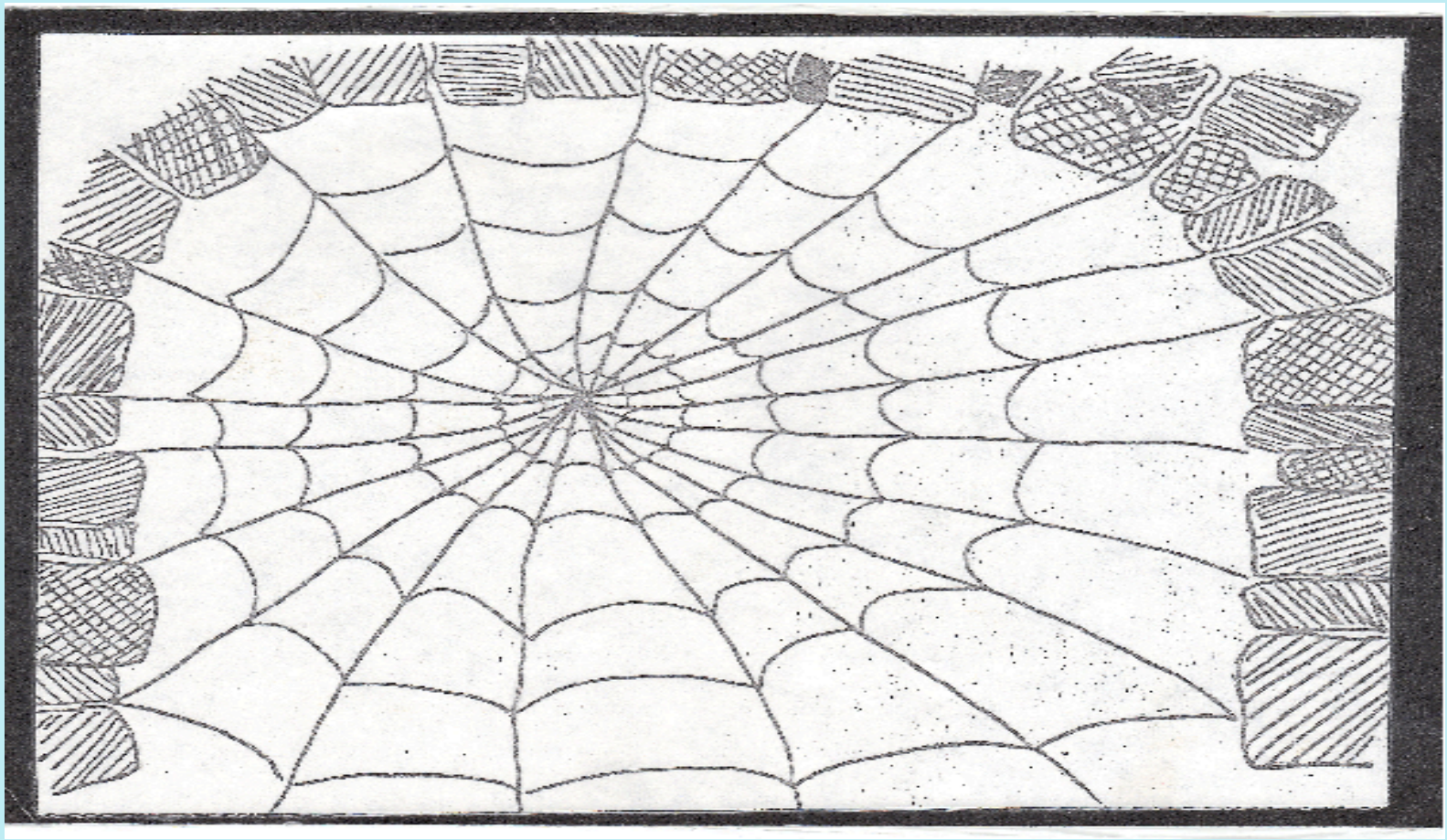
6 spiders were on the web and now there are 2 fewer.
How many are now on the web?



6 spiders are on the web. 4 are babies.
How many are not?

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Chapter 4, Lesson 4
Grade 1

# Relating Addition and Subtraction

LESSON 4

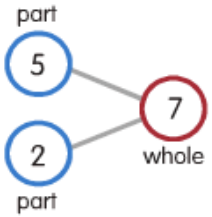
## Making Fact Families

**Lesson Objectives**

- Recognize related addition and subtraction sentences.
- Write fact families.
- Use fact families to solve real-world problems.

**Vocabulary**
fact family

Learn **Addition and subtraction are related.**




How many balls of wool are yellow?

$7 - 2 = 5$

How many balls of wool are blue?

$7 - 5 = 2$

How many balls of wool are there in all?

$2 + 5 = 7$ or $5 + 2 = 7$

$7 - 2 = 5$ $\quad 7 - 5 = 2$ $\quad 2 + 5 = 7$ $\quad 5 + 2 = 7$

This is a **fact family**.

Each fact in a fact family has the same parts and whole.



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# Unfolding Word Problems

- Sandra has some cubes.



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# Unfolding Word Problems

- Sandra has some cubes.

- She puts some in a bag.



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# Unfolding Word Problems

- Sandra has some cubes.
- She puts some in a bag.
- She has some left.



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# Unfolding Word Problems

- Sandra has some cubes.
- She puts 5 in a bag.
- She has 6 left.

How many cubes did she have?



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# Relational Thinking

Learn **You can use related addition facts to solve subtraction sentences.**

Sandra has some .
She puts 5 in a bag.
3 are left.
How many did Sandra have?

__ – 5 = 3

5 + 3 = 8 is the related addition fact.
So, 8 – 5 = 3.
Sandra had 8 .


## Guided Practice

**Solve.**

4 Sal has some granola bars.
He gives 4 to his brother.
Sal has 5 left.
How many granola bars did Sal have?

__ – 4 = 5

4 + 5 = __ is the related addition fact.

So, __ – 4 = 5

Sal had __ granola bars.



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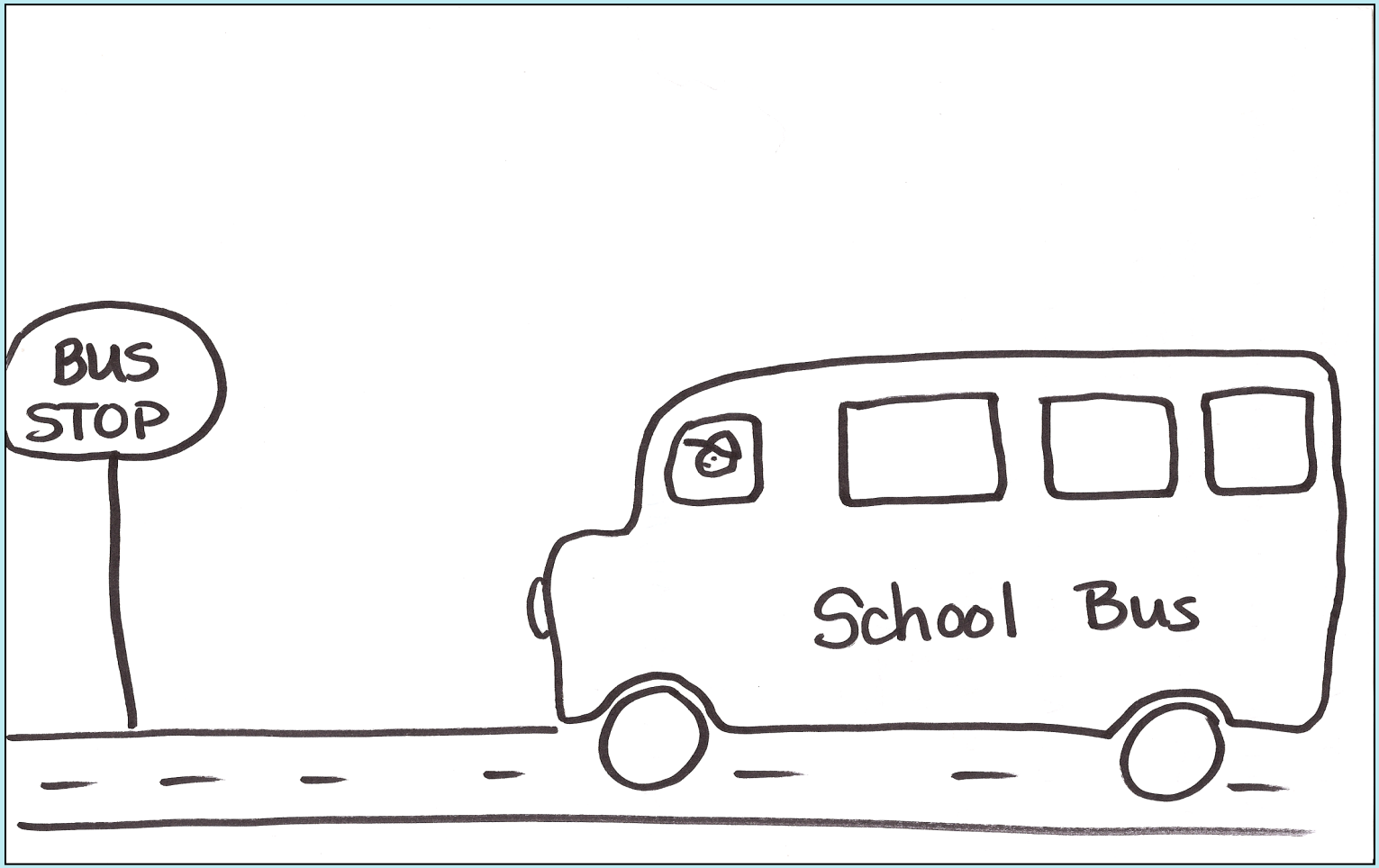
5 kids got off the bus and now there are 2 left on the bus. How many kids were on the bus at first?

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# Direct Instruction / Guided Practice

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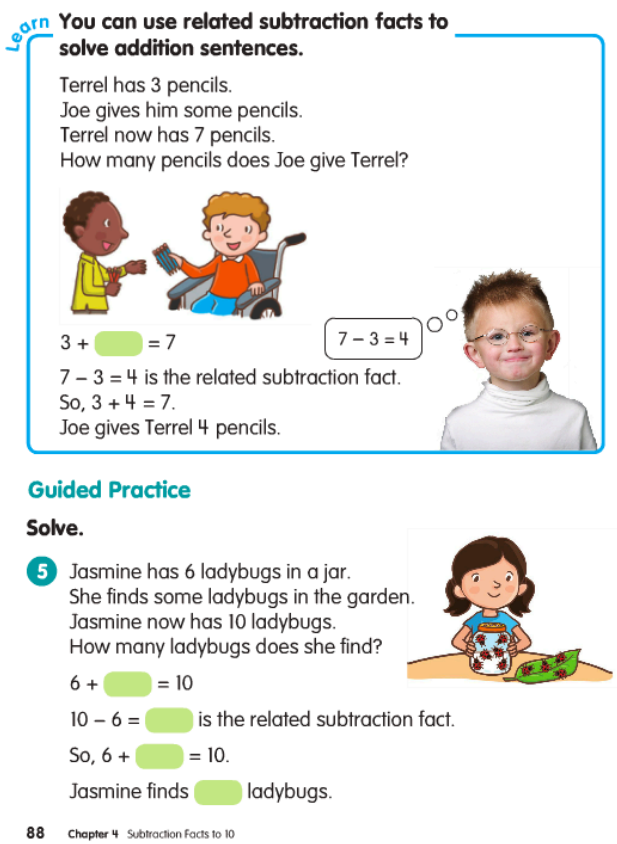
Encourage thinking and understanding



Learn **You can use related subtraction facts to solve addition sentences.**

Terrel has 3 pencils.
Joe gives him some pencils.
Terrel now has 7 pencils.
How many pencils does Joe give Terrel?

3 + ☐ = 7

7 − 3 = 4 is the related subtraction fact.
So, 3 + 4 = 7.
Joe gives Terrel 4 pencils.

7 − 3 = 4

**Guided Practice**

**Solve.**

5 Jasmine has 6 ladybugs in a jar.
She finds some ladybugs in the garden.
Jasmine now has 10 ladybugs.
How many ladybugs does she find?

6 + ☐ = 10

10 − 6 = ☐ is the related subtraction fact.

So, 6 + ☐ = 10.

Jasmine finds ☐ ladybugs.

88 Chapter 4 Subtraction Facts to 10

# Unfolding Word Problems

- Terrell has some pencils.



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# Unfolding Word Problems

- Terrell has some pencils.

- His friend gives him some more.

What question might you ask?



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# Unfolding Word Problems

- Terrell has 3 pencils.
- His friend gives him some more.
- He now has 7 pencils.

What question might you ask?



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# Unfolding Word Problems

- Terrell has 3 pencils.
- His friend gives him some more.
- He now has 7 pencils.

How many pencils did his friend give him?



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# Common Core Word Problem Situations

**Glossary**

**Table 1 Common addition and subtraction situations[1]**

| | Result Unknown | Change Unknown | Start Unknown |
|---|---|---|---|
| **Add to** | Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?<br>2 + 3 = ?<br>(K) | Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?<br>2 + ? = 5<br>(1st) | Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?<br>? + 3 = 5<br>(2nd) |
| **Take from** | Five apples were on the table. I ate two apples. How many apples are on the table now?<br>5 – 2 = ?<br>(K) | Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?<br>5 – ? = 3<br>(1st) | Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3<br>(2nd) |
| | **Total Unknown** | **Addend Unknown** | **Both Addends Unknown[2]** |
| **Put Together/ Take Apart[3]** | Three red apples and two green apples are on the table. How many apples are on the table?<br>3 + 2 = ?<br>(K) | Five apples are on the table. Three are red and the rest are green. How many apples are green?<br>3 + ? = 5, 5 – 3 = ?<br>(K) | Grandma has five flowers. How many can she put in her red vase and how many in her blue vase?<br>5 = 0 + 5, 5 = 5 + 0<br>5 = 1 + 4, 5 = 4 + 1<br>5 = 2 + 3, 5 = 3 + 2<br>(1st) |
| | **Difference Unknown** | **Bigger Unknown** | **Smaller Unknown** |
| **Compare[4]** | ("How many more?" version):<br>Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?<br>(1st)<br><br>("How many fewer?" version):<br>Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?<br>2 + ? = 5, 5 – 2 = ?<br>(1st) | (Version with "more"):<br>Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?<br>(1st)<br><br>(Version with "fewer"):<br>Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have?<br>2 + 3 = ?, 3 + 2 = ?<br>(1st) | (Version with "more"):<br>Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?<br>(1st)<br><br>(Version with "fewer"):<br>Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have?<br>5 – 3 = ?, ? + 3 = 5<br>(2nd) |