Student Handbook

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Mathematical Practices

There are eight math habits that will help make your math thinking grow stronger. We use our math thinking to figure out all kinds of problems, even hard ones from real life.

Habit 1
Solve Problems

Habit 2
Think and Reason

Habit 3
Show and Explain

Habit 4
Use Math in the Real World

Habit 5
Choose a Tool

Habit 6
Be Clear and Precise

Habit 7
Zoom In and Zoom Out

Habit 8
Use Patterns

Keep practicing!

You'll be learning to think like a math pro!

Then you'll be ready to take on any problem!

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Habit 1

Solve problems.

Keep looking for clues until you solve the problem.

MATHEMATICAL PRACTICES

SMP 1 Make sense of problems and persevere in solving them.

For some math problems, you may not know where to start. You may have to try more than one way to find the answer. But the answer you get should always make sense.

To solve problems . . .

Ask yourself

- Can I say what the problem is asking for?
- Can I ask questions to understand it better?
- Can I try a different way if I need to?

Then, discuss with a partner

- I made sure I understood the problem when I . . .
- I know my answer makes sense because . . .

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Habit 2

Think and reason.

MATHEMATICAL PRACTICES

SMP 2 Reason abstractly and quantitatively.

Make sense of the words and the numbers in a problem.

Reasoning is thinking about how ideas go together. If you know one thing, then you know another thing. Reasoning is using math rules and common sense together.

To use reasoning to solve a problem . . .

Ask yourself

- Can I use addition to solve a subtraction problem?
- Can I write an equation to find the answer to a problem?
- Can I try out my answer to see if it makes sense in the story?

Then, discuss with a partner

- I turned the problem into numbers when I wrote . . .
- I checked my answer by . . .

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Habit 3

Show and explain.

MATHEMATICAL PRACTICES

SMP 3 Construct viable arguments and critique the reasoning of others.

Share your math ideas to help others understand you.

Explaining math ideas to others helps you understand them even better. And that helps you solve other problems later. It also helps to listen to other people. You can get new ideas too!

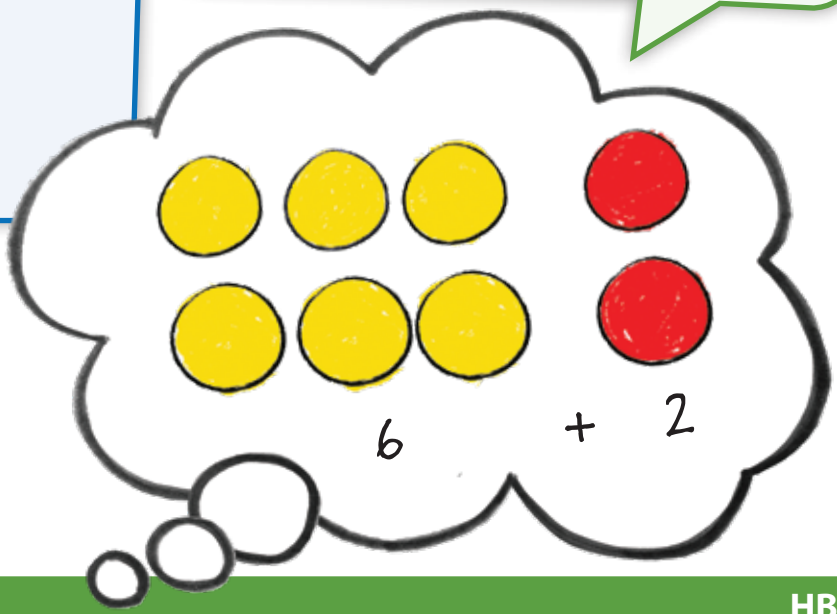
To help explain your ideas or listen to others . . .

Ask yourself

- Can I use words to show how to solve the problem?
- Can I use pictures or act out the problem with objects?
- Can I ask questions to understand another person's ideas better?

Then, discuss with a partner

- I drew pictures to show . . .
- I explained my ideas when I said . . .



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Habit 4

Use math in the real world.

MATHEMATICAL PRACTICES
SMP 4 Model with mathematics.

Solve problems in real life.

One of the best ways to use your math thinking is to solve real problems. Words tell the story for the problem. Math can turn the words into a model, like a picture or numbers.

You can use models to solve problems about shopping, sports, or . . . almost anything!

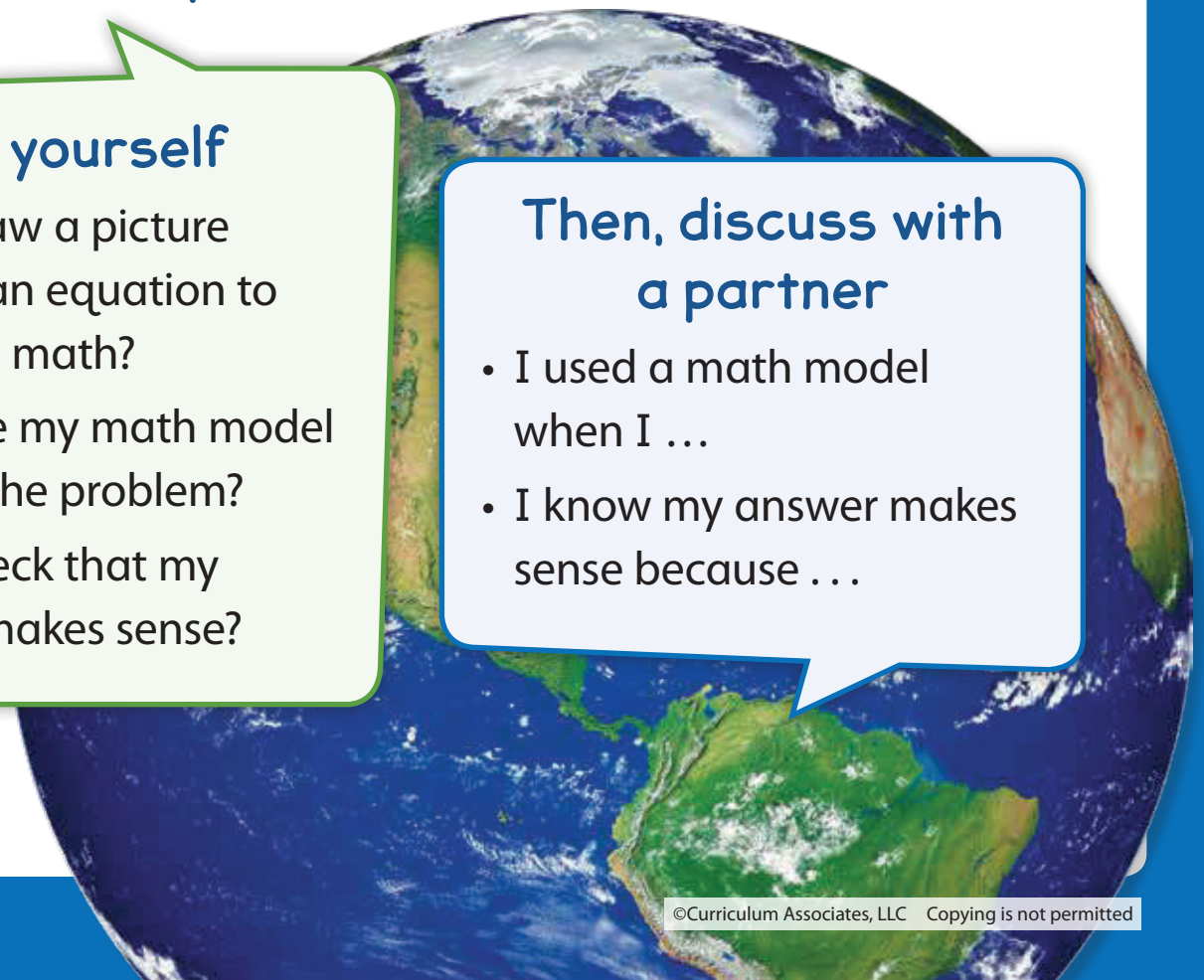
To solve a real-life problem . . .

Ask yourself

- Can I draw a picture or write an equation to show the math?
- Can I use my math model to solve the problem?
- Can I check that my answer makes sense?

Then, discuss with a partner

- I used a math model when I …
- I know my answer makes sense because . . .



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Habit 5

Choose a tool.

Decide when to use tools like counters, a pencil, or mental math.

MATHEMATICAL PRACTICES

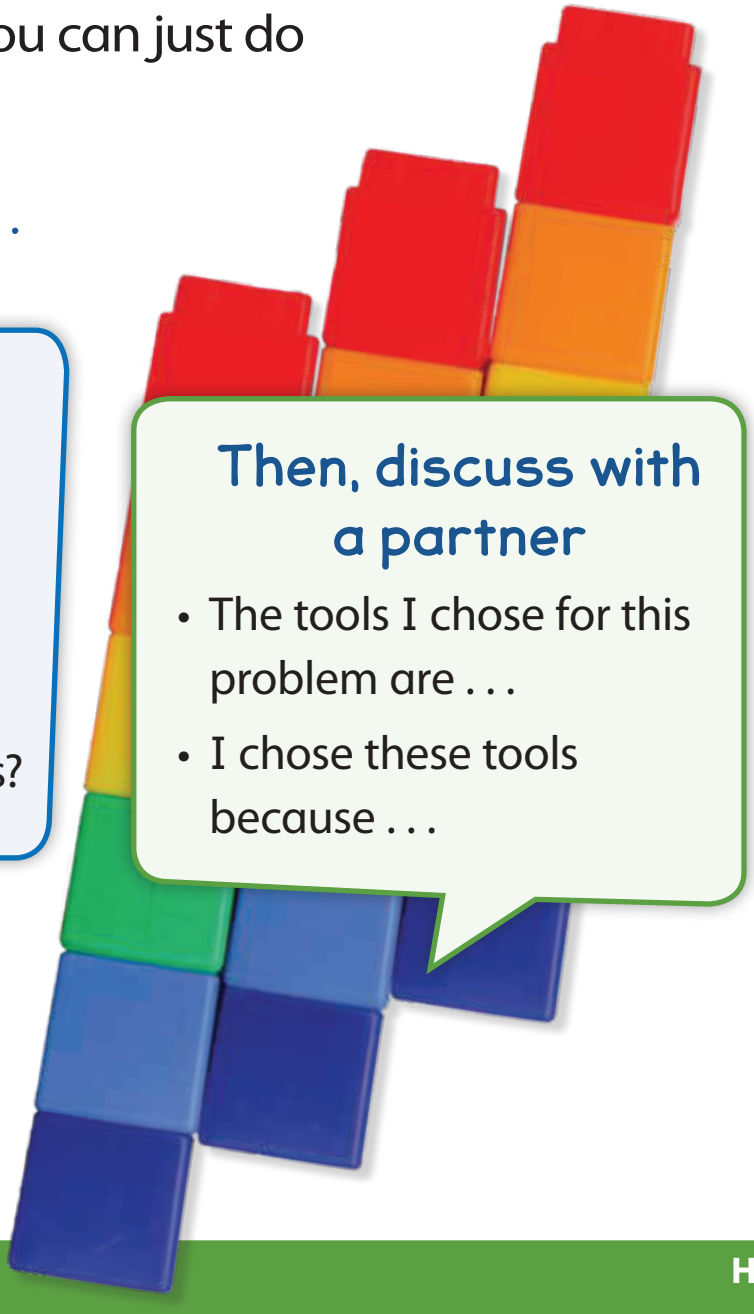
SMP 5 Use appropriate tools strategically.

There are many tools to use in math. You can use a pencil to do a lot of math. Sometimes you can use connecting cubes or base-ten blocks. Often you can just do the math in your head.

To choose the best tools . . .

Ask yourself

- Can I do any part of the problem in my head?
- Can I write the problem on paper?
- Can I use base-ten blocks?



Then, discuss with a partner

- The tools I chose for this problem are . . .
- I chose these tools because . . .

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Habit 6

Be clear and precise.

MATHEMATICAL PRACTICES
SMP 6 Attend to precision.

Try to be exactly right in what you say and do.

Everybody likes to be right when they do math. But sometimes people make mistakes. So it's good to check your work. And it's good to say exactly what you mean when you talk about your math ideas.

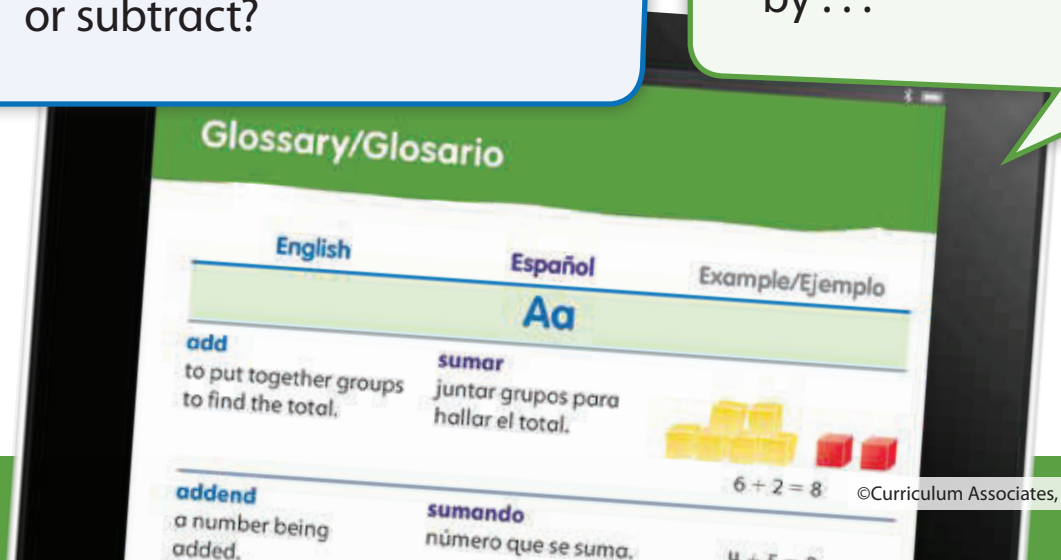
To be exactly right . . .

Ask yourself

- Can I use words that will help everyone understand my math ideas?
- Can I find different ways to check my work when I add or subtract?

Then, discuss with a partner

- I was careful to use the right words when I . . .
- I checked my answer by . . .



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Habit 7

Zoom in and zoom out.

MATHEMATICAL PRACTICES

SMP 7 Look for and make use of structure.

Look for what's the same and what's different.

Math has rules. Look at these problems:

$2 + 0 = 2$

$3 + 0 = 3$

Zoom out to see what's the *same* about problems. Any number plus 0 is that number.

Zoom in to see what's *different* about problems. The numbers added to 0 are different.

To zoom in and zoom out . . .

Ask yourself

- Can I see how different numbers are made from tens and ones?
- Can I see what happens when I add numbers in any order?

Then, discuss with a partner

- I zoomed out and used a math rule when I …
- I zoomed in and found a difference when I looked at . . .

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Habit 8

Use patterns.

MATHEMATICAL PRACTICES

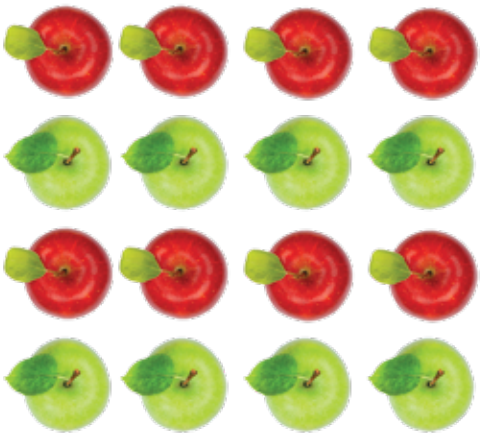
SMP 8 Look for and express regularity in repeated reasoning.

Look for patterns in math to find shortcuts.

It's important in math to pay close attention. You might find a pattern or see a math idea.

Think about the pattern you can see when you count by tens:

10, 20, 30, 40, 50 . . .



You can use the pattern to make a good guess about what comes next.

To use patterns . . .

Ask yourself

- Can I find a pattern in a math problem?
- Can I use math words to describe my pattern?
- Can I figure out what is next?

Then, discuss with a partner

- I saw a pattern in this problem when I looked at . . .
- I used the pattern to make a good guess when I . . .

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Mathematical Language Reference Tool

Use the following sentence frames throughout the units when speaking and writing about the math concepts you are learning.

Unit 1

1. When I add (or subtract), it is important to _____.
2. The strategy I used to add (or subtract) is _____.
3. Let's discuss _____ to learn about _____.
4. Create your own sentence frame.

Unit 2

1. The addition (subtraction) strategy I can choose is _____.
2. I can sort the _____ by _____.
3. Before I can solve a problem, I need to _____.
4. Create your own sentence frame.

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Unit 3

1. I discovered that _____.
2. I can explain _____ to a friend by _____.
3. When I read an analog clock, I first _____ then _____.
4. Create your own sentence frame.

Unit 4

1. When I compare two numbers, I always _____.
2. I can make a ten by _____.
3. When I prepare to solve the problem, I _____.
4. The model shows the total _____.
5. Create your own sentence frame.

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Unit 5

1. When comparing length, I can arrange items _____.
2. An important characteristic I observed about _____ is _____.
3. The process I used to sort these objects was _____.
4. The tallest (longest/shortest) _____ is _____.
5. The _____ is taller (longer/shorter) than the _____.
6. Create your own sentence frame.

Unit 6

1. _____ is used to describe a _____.
2. Shapes like _____ and _____ all have corners.
3. I noticed that something _____ and _____ have in common is _____.
4. The reason I think _____ is _____.
5. Create your own sentence frame.

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100 Mathematical Discourse Questions

Make sense of the problem.

1. What is this problem about? What can you **tell me** about it?
2. What **numbers** are you using?
3. What do you think that **means**?
4. What is **another way** to say that?
5. What do you **need to know**? Is anything **missing** from the problem?
6. What is the problem **asking** you?
7. What do you **know** about this part?
8. Are there any **words** you don't know?
9. Which words are **most important**? Why?

Persevere in problem solving.

10. Have you tried making a **guess**? What would be a **good guess**?
11. **What other ways** have you tried?
12. What do you think would **work best**? Why?
13. What **else** can you do to show that? Can you **draw a picture** or **tell me** what you would do?

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14. Can you think of **another problem** like this one?
15. Is there an **easier way** to do the problem?
16. What do you know about this **right now**?

Reason mathematically.

17. **How did you start** to think about this problem?
18. What is **another way** you could do this problem?
19. How could you **teach me about** _____?
20. Is your answer the **same or different** from another student's answer?
21. How did you get your **answer**?
22. Can you **tell me more** about this part?
23. Does that strategy **always work**?
24. Can you think of a problem where that strategy **wouldn't work**?
25. What was the **first thing** you did? Then what did you do?

Explain and critique.

26. **What would happen if** _____?
27. What **patterns** do you see? Explain them.
28. What are some **ways to do** _____?
29. What else do you **need to know**? How would you find out?
30. How would you **check your steps** or your answer?
31. What **did not work**?

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Explain and critique.
continued

32. What did you do that was the **same** as another student?
33. What did you do that was **different from** another student?
34. How can you know if your **answer makes sense**?
35. What **number** would be too big? What **number** would be too small?
36. How could you use **pictures, words, or numbers** to show what you did?
37. How would you show **your thinking** another way?
38. Did anything make you **think really hard**? What?
39. Is there **another answer that will work**?
40. Can you show me **how another student** did the problem?
41. What **model** did another student use to do the problem?
42. Is there anything you **forgot to do**?
43. **How did you think** about the problem?
44. Is the **correct answer** the same as what you found? If not, how is it different?
45. Do you think **your answer** is correct? Why or why not?
46. **What else** would you like to know about what another student did?
47. What do you think comes **next**?

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48 Does your answer **make sense** for this problem? Why or why not?

49 How would you **tell another student** what you did to find the answer?

50 How could you find the answer **using tools**?

51 How many **different pictures can you draw** to show the problem?

Decide if something is mathematically correct.

52 Does **your answer** make sense?

53 Did your partner show you how he or she did the problem? Does it make **sense**?

54 **Tell why** you think that. How do you know?

55 What would you say to have **someone change their thinking**?

56 **How** did you decide that?

57 Does anyone want to **revise** his or her answer?

58 Does anyone want to **revise** his or her thinking?

Share your thinking.

59 What **did** you do?

60 Do you **agree**?

61 Do you **disagree**?

62 How would you answer **another student's question**?

63 Does anyone need another student to **ask his or her question again**?

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Share your thinking. *continued*

64 Could you **tell the class** what you did?

65 What part of what another student said **makes sense to you**?

66 What can you **tell** me about _____ ?

67 What can you **say to someone** to make them want to change their answer?

68 **What do others think** about what another student said? Do you agree?

69 Can you **tell us** what another student did to get his or her answer?

70 Did you **work together**? How?

71 Can you **add to what was said**?

72 Have you **talked about this** with your partner? With others?

73 Did anyone get a **different answer**?

74 **Where** would you go for **help**?

75 Did **everybody get a chance** to talk?

76 How could you help another student **without telling him or her the answer**?

77 **What would you say about this problem to** someone who missed class today?

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Make Connections.

78 What is the **relationship** between _____ and _____?

79 How is this problem like one you **solved before**? How is it **different**?

80 What is the **same** about your strategy and your partner's?

81 What is **different** about your strategy and your partner's?

82 Which **skills or concepts** did you use?

83 What **ideas** have we explored before that were useful in solving this problem?

84 How would you tell what another student said **in another way**?

85 What other problems could be **done this way**?

86 How is this like _____?

87 How is this different from _____?

88 Can you **tell a story problem** with a question like this one? What would your story problem be about?

89 What other **questions** do you have?

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Evaluate.

90 What do you need to do **next**?

91 What did you do **well**?

92 What do you still **need to practice**?

93 How well did **you listen** to your partner?

Reflect.

94 What **tools did you use**?

95 What did you **learn**?

96 Would you do the problem the **same way next time**? Why or why not?

97 What **math** did you use?

98 Why did you do the problem the **way** you did?

99 What is **different about this problem** from others you have done?

100 Which way of doing the problem is **your favorite**? Why?

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