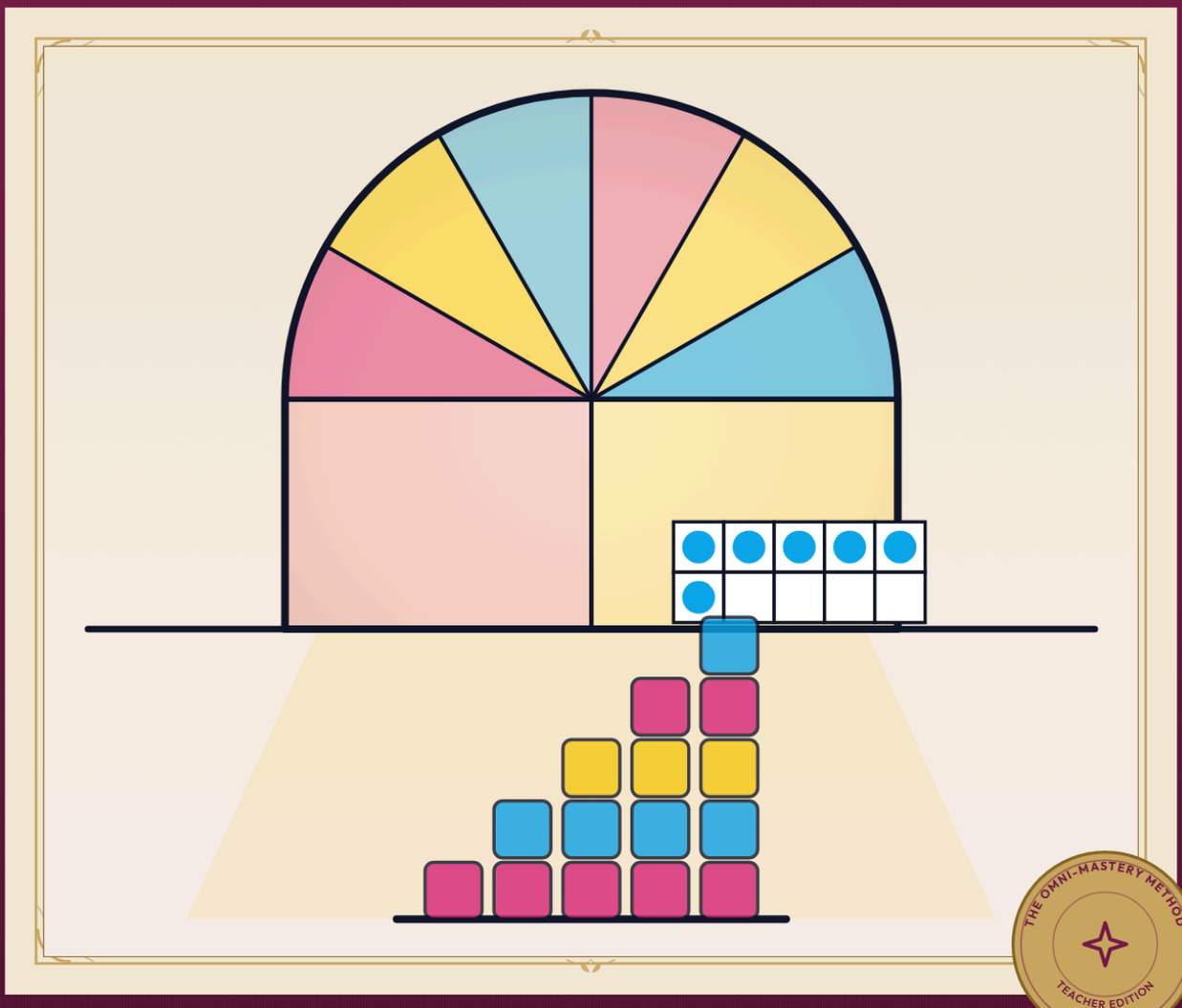
Grade K Math

Counting, Comparing, Adding and the First Shapes

EARLY LEARNING · KINDERGARTEN

TEACHER AND PARENT EDITION



THE OMNI-MASTERY METHOD
TEACHER EDITION

By Dani Carl

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Grade K Math

Counting, Comparing, Adding and the First Shapes

Dani Carl

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Grade K Math: Counting, Comparing, Adding and the First Shapes

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How to Use This Book

This is the teacher and parent edition. It carries everything in the student book, plus four sections the student book does not print:

- **Chapter at a Glance** — the strand, difficulty level and earlier topics each chapter builds on.
- **Outcomes and Milestones** — what mastery looks like, the misconception to watch for, and the single task that verifies readiness.
- **On Standardized Tests** — the question styles a kindergartner is likely to meet for the topic on a computer-based diagnostic test.
- **At the Table** — the coaching script: what to put on the table, the Socratic questions in order, and what to say when a student is stuck.

Answers to *Try It on Paper* print inline here; in the student book they are in the back.

Work through the lesson, study the examples, and then solve the independent practice. This teacher edition adds guidance for teaching and checking understanding.

Try This First opens with a short activity or question. Use it to connect what you already know to the new idea.

The Big Idea explains the concept in plain words. **Words to Know** is the short list you will come back to.

Think first, then calculate. Predict an answer, sketch a model, solve, and check. Where a chapter has a Math Lab, try the prompt before reading its explanation, and cover the check while you work.

Worked Examples and Your Turn pairs every solved problem with a mirror of it. Solve the mirror before moving on. If you cannot, reread the example — that is the whole loop.

What If...? explores special cases. **Try It on Paper** is independent practice.

Three checks frame the year. The **Readiness Check**, a few pages on, is a short read-aloud check of what the child brings to Kindergarten, and its table says which chapter to take slowly. A **Mixed Review** closes Chapters 3, 6

and 9 and mixes questions from every chapter so far; each answer names the chapter to go back to. The **End-of-Year Assessment**, after Chapter 9, checks every chapter before Grade 1.

This is a read-aloud book. A grown-up reads each part with the child, and the child does the counting, moving and drawing with real things: blocks, buttons, fingers, a ten frame. Keep a handful of small objects on the table for every chapter. In each chapter, the last paragraph of **The Big Idea**, marked *For the grown-up*, explains where the idea leads.

A Letter to Teachers and Tutors

Dear teacher or tutor,

This edition carries the student book in full, with the answers to *Try It on Paper* printed under each item, and adds a coaching script for every chapter. Use it at the table with one child or a small group; the student book is the one the child writes in.

A session is fifteen minutes, not more. Sit side by side with a handful of small objects on the table: blocks, buttons, dried beans. Read the chapter aloud a paragraph at a time; the child does the touching, moving, counting and drawing. One worked example and its *Your Turn*, or five *Try It on Paper* items, is a full session. Stop while it is still going well.

When the child is stuck, go back to the objects. Do not explain the answer; put the things on the table and ask the child to show you. If the counting goes wrong, count together, touching each thing once. If the child guesses, ask "How do you know?" and wait. A wrong answer said with confidence is the most useful thing that can happen in a session, because now you both know what to work on tomorrow.

Use the Mixed Reviews and the End-of-Year Assessment as check-ups, not tests. A Mixed Review closes chapters 3, 6 and 9 and mixes the skills of every chapter so far; the End-of-Year Assessment follows the last chapter. Give them a week or two after the chapter, with no help. An item the child misses names the chapter to revisit; three or four correct in a row means the skill has stuck.

Move on when the child can show you, not just tell you. Each chapter ends with fourteen *Try It on Paper* items (fifteen in Chapter 9, and Chapter 5 adds two rows of quick facts); eleven or more of the fourteen right on a fresh day, marked against the answers in this edition, means the next chapter. If not, repeat the *Your Turn* items with real objects, using the *At the Table* questions in order, then try again. The **Outcomes and Milestones** section names the single task that verifies readiness for each chapter.

The checklist on the next page is the parent's copy of the year; send a copy home and ask for it to be ticked at home as well as at school.

What Your Child Can Do by June

Tick each line when your child can do it without help. Every line is one chapter of this book; the Mixed Reviews and the End-of-Year Assessment tell you whether the tick still holds a month later.

- ☐ Count a group of up to 20 things, touching each one once, and write the numbers 0 to 20 (Chapter 1)
- ☐ Count to 100 by ones and by tens, and count on from any number, such as 78 to 83 (Chapter 2)
- ☐ Say which of two groups has more, fewer or the same, and which of two numbers up to 10 is bigger (Chapter 3)
- ☐ Add within 10 by counting on, write it as a number sentence such as $5 + 3 = 8$, and find every way to split 5 into two parts (Chapter 4)
- ☐ Take away within 10 by counting back, and use adding to check: $7 - 2 = 5$, so $5 + 2 = 7$; and know the adding and taking-away facts to 5 without counting (Chapter 5)
- ☐ Build and read teen numbers as ten and some more, such as $16 = 10 + 6$ (Chapter 6)
- ☐ Compare two things by length, height and weight, lining them up at the same edge first (Chapter 7)
- ☐ Sort a mixed collection by color, shape or size, count each group, and say which has the most (Chapter 8)
- ☐ Name circles, triangles, squares, rectangles and hexagons, and cubes, spheres, cones and cylinders, and use position words such as above, below, beside, in front of and behind (Chapter 9)

Name: _____ *Date all nine were ticked:* _____

Readiness Check

This check looks at what a child usually brings to Kindergarten. A grown-up reads each item aloud, and the child answers by saying, pointing, showing with counters or fingers, or drawing. No reading is needed. It takes about 20 minutes. Have ready about 10 counters in two colors, a pencil, a crayon, a book, a sock, a cup, three spoons and a block. It is not graded: it tells you which chapters to take slowly. Words in *italics* are for the grown-up to do, not to read.

1. Say the counting words from one to ten.
2. *Put* 5 *counters in a row.* Touch each counter as you count it. How many counters?
3. *Hold up* 3 *fingers for about two seconds, then hide them.* How many fingers did you see?
4. *Put about* 10 *counters in a pile.* Give me 4 counters.
5. I will count: one, two, three, four. What number comes next?
6. *Put* 2 *counters in one row and* 5 *counters in another row.* Which row has more?
7. *Put* 3 *counters in one row and* 3 *counters in another row, one under each.* Does one row have more, or are they the same?
8. You have 2 crackers. I give you 1 more. How many crackers now? *Act it out with counters.*
9. *Put out* 4 *counters.* I take 1 away. *Take one.* How many are left?
10. Show me five fingers. Now show me ten fingers.
11. *Hold up a pencil and a crayon side by side, with their ends even.* Which one is longer?
12. *Put a book in one of the child's hands and a sock in the other.* Which one is heavier?
13. *Mix* 3 *red counters and* 3 *blue counters.* Put all the red ones together.
14. *Put out* 3 *spoons and* 1 *block.* Which one does not belong? Why?
15. *Draw a circle, a square and a triangle.* Point to the triangle. Now point to the circle.
16. *Put a counter and a book on the table.* Put the counter on the book. Now put it under the book.

Readiness Check Answers

1. One, two, three, four, five, six, seven, eight, nine, ten: in order, none skipped, none said twice.
2. 5. One touch for each counter, one number for each touch, and the last number said tells how many.
3. 3, said without counting one by one. Seeing a small group at a glance is where counting on starts.
4. Exactly 4 counters, and the child stops at four. Grabbing a handful, or counting past four, means "how many" is not yet tied to the count.
5. Five. The child says the next number without starting again from one.
6. The row of 5. Five is more than two.
7. The same. Every counter has a partner under it, and none is left over.
8. 3 crackers. Two and one more is three.
9. 3 are left. Four, take one away: three.
10. One whole hand for five. Both whole hands for ten.
11. The one that sticks out farther at the other end, usually the pencil. Any clear comparing word is fine: longer, bigger, taller.
12. The book. The hand that is pulled down more holds the heavier thing.
13. All 3 red counters in one group. The blue ones stay out, or go in a group of their own.
14. The block. The others are all spoons. Any reason that uses a rule counts: "It is not a spoon," or "You can't eat with it."
15. The child points to each shape. Saying the names is a bonus; Chapter 9 teaches them.
16. The counter goes on top of the book, then under it. On and under are the first position words.

What to Revisit

Missing a few items is normal at the start of Kindergarten. Every skill here is taught again in the chapter named below; the table says where to slow down and what to do first.

If you missed	Revisit before	What to do
1 or 2	Chapter 1	Count real things every day for a week (stairs, spoons, grapes), touching each one as you say its number, until the child can count 10 things with one number for each.
3 or 4	Chapter 1	Play “quick look” with 1 to 5 fingers or counters, then “give me” with small numbers, for a few minutes a day. Spend extra time on that chapter’s Example 2, and keep playing “quick look” until small groups are named without counting.
5	Chapter 2	Stop partway up the stairs and ask for the next number. Practice “what comes next” up to ten.
6 or 7	Chapter 3	Line up two rows of things, one under the other (cups and spoons at a meal), and ask which row has extra.
8	Chapter 4	Act out “one more” stories with snacks: add one and say the new total, until the child says it without starting again from one.
9	Chapter 5	Act out “one goes away” stories with toys and count what is left.
10	Chapter 6	Show five and ten on fingers every day, and fill an egg carton cut to ten cups with one object per cup.
11 or 12	Chapter 7	Compare pairs of things with their ends even (spoons, shoes), and hold two things to feel which is heavier, saying longer, shorter, heavier and lighter out loud.
13 or 14	Chapter 8	Sort laundry or toys by one rule (color, or kind of thing) and say the rule out loud.
15 or 16	Chapter 9	Hunt for circles, squares and triangles around the house, and play “put it on, put it under” with a toy.

What a Ready Student Can Do

By June, a student ready for Grade 1 can:

- Count to 100 by ones and by tens, and count on from any number below 100
- Count a set of up to 20 objects, write the numeral, and count out a given number from a larger pile
- Say which of two groups has more, fewer, or the same, and compare two written numerals from 1 to 10
- Act out, draw and write joining stories within 10 as number sentences, and know the pairs that make 10
- Act out, draw and write take-away stories within 10, and use the matching addition to check
- Build any teen number as ten and some ones, and write it as $10 + n$
- Compare two objects directly by length, height and weight, using the same starting edge
- Sort a collection by one rule, count each group, and say which has the most
- Name circles, triangles, squares, rectangles, hexagons, cubes, spheres, cones and cylinders, and tell flat from solid

The Year, Mapped

Weeks	Unit / Ch	Title	Domain	Standards
1–5	1	Counting to 20	Counting and Cardinality	K.CC.3–5
5–9	2	Counting to 100 by ones and tens	Counting and Cardinality	K.CC.1–2
9–12	3	More, fewer, the same	Counting and Cardinality	K.CC.6–7
12–16	4	Adding within 10	Operations and Algebraic Thinking	K.OA.1–4
16–20	5	Taking away within 10	Operations and Algebraic Thinking	K.OA.1–2, K.OA.5
20–23	6	Teen numbers: ten and some more	Number and Operations in Base Ten	K.NBT.1
23–26	7	Longer, taller, heavier	Measurement and Data	K.MD.1–2
26–29	8	Sorting and counting groups	Measurement and Data	K.MD.3
29–33	9	Flat shapes and solid shapes	Geometry	K.G.1–6
33–36	—	Review, spring i-Ready window, gaps	Mixed	All

Master Topic Matrix

Seq	Topic Title	Strand	Level (1–5)	Builds on
1	Counting to 20	Foundations	1	—
2	Counting to 100 by ones and tens	Foundations	1	Counting to 20
3	More, fewer, the same	Foundations	1	Counting to 20
4	Adding within 10	Foundations	1	Counting to 20
5	Taking away within 10	Foundations	1	Adding within 10
6	Teen numbers: ten and some more	Foundations	1	Counting to 20
7	Longer, taller, heavier	Applied	1	—
8	Sorting and counting groups	Applied	1	Counting to 20
9	Flat shapes and solid shapes	Pure — Shapes	1	—

Level places each topic on the five-step scale the whole series shares, from 1 (first foundations) to 5 (AP and college level).

PART I

Counting and Comparing

1 Counting to 20

2 Counting to 100 by ones and tens

3 More, fewer, the same

CHAPTER

1

Counting to 20

IN THIS CHAPTER

1.1 Chapter at a Glance
1.2 Before Opening This Chapter
1.3 Try This First
1.4 The Big Idea
1.5 Words to Know
1.6 Outcomes and Milestones
1.7 Worked Examples and Your Turn
1.8 What If...?
1.9 On Standardized Tests
1.10 At the Table
1.11 Cut and Count
1.12 Write the Numbers
1.13 Try It on Paper

Chapter at a Glance 1.1

- **Chapter:** 1
- **Strand:** Foundations
- **Difficulty:** Level 1 of 5
- **Builds on:** nothing earlier in this book

1.2 Before Opening This Chapter

Start with what you already know:

- **Check**: Say the number words in order from one to ten: one, two, three, four, five, six, seven, eight, nine, ten.
- **Check**: Show three fingers. Show five fingers. A whole hand is five.

1.3 Try This First

Try this short activity before reading the lesson.

> *Tip a handful of buttons or blocks onto the table, no more than about twelve. Touch each one and say a number as you touch it. Say the last number again, loudly. Now spread them out and ask: how many now? You do not have to count again. It is still that number.*

1.4 The Big Idea

Counting is touching things and saying number words, one word for each thing. Touch, say. Touch, say. If you touch one twice, or skip one, the count goes wrong. So move each thing to a new pile as you count it.

The last word you say is the answer. If you count "one, two, three, four, five" and stop, then there are five. You do not need to count again to know how many.

Moving the things around does not change how many there are. Five blocks in a row and five blocks in a heap are both five. The number belongs to the group, not to the shape it makes.

For the grown-up: Counting is the first mathematics a child owns: say one number word for each object, and the last word said is how many there are. Students count sets to 20, match a count to a written numeral, and count out a given number of objects from a larger pile. Every number idea that follows, from place value to fractions, rests on this one-to-one count and the idea that the count does not change when the objects are moved.

Words to Know 1.5

- **count**: To touch each thing once and say the next number word each time.
- **how many**: The last number you said when you counted. Five blocks: the last word was *five*, so there are five.
- **numeral**: The written number. The numeral for seven is 7.

Outcomes and Milestones 1.6

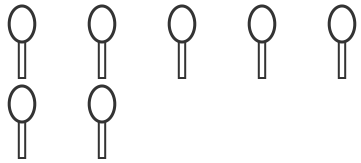
- **Students can**: count a set of up to 20 objects saying one number word per object, write the numeral, and count out a given number from a larger pile.
- **Watch for**: skipping or double-tapping objects while counting; saying the sequence correctly but not knowing the last word is the answer; recounting from one after the objects are rearranged.
- **Ready when**: they count out 14 blocks from a pile of 20, write 14, and say without recounting that there are still 14 after the blocks are spread out.

Worked Examples and Your Turn 1.7

Study each example, then try the paired problem.

Example 1: Count a small group

Problem: There are some spoons on the table. How many spoons?

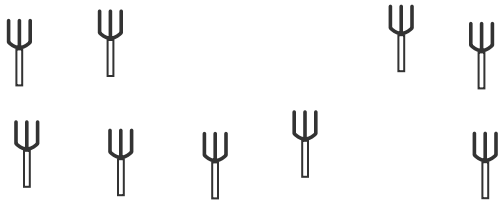


Solution:

Step	Working and reasoning
1	Touch the first spoon and say “one”. Slide it to the side. Why: a spoon that has moved has been counted, so it cannot be counted twice.
2	Touch the next and say “two”. Slide it over. Keep going: three, four, five, six, seven.
3	There are no spoons left in the first pile. The last word was *seven*. So there are 7 spoons.

Answer: 7 spoons

> ***Notice**: Slide each thing as you count it. Then the counted pile and the not-yet pile can never mix.*

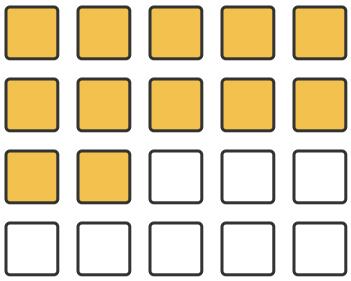


Your Turn:

- **Prompt**: Put out 9 forks in a messy heap and count them by sliding each one across.
- **Answer**: 9. The last word said is the answer.

Example 2: Count out some from a pile

Problem: There is a big pile of 20 blocks. Count out 12 blocks for a tower.



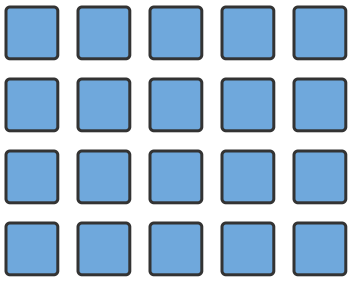
12 counted out, 8 left

Solution:

Step	Working and reasoning
1	Say the target first: "I need twelve." Why: knowing where to stop is the whole job here.
2	Take one block at a time into a new pile, saying the number as it lands: one, two, three, four, five, six, seven, eight, nine, ten, eleven, twelve.
3	Stop at twelve. Leave the rest. Check by counting the new pile again: twelve.

Answer: A pile of 12 blocks, with 8 left behind.

> ***Check***: *Count the new pile a second time. If the last word is twelve again, it is right.*

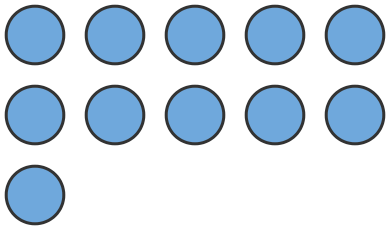


Your Turn:

- **Prompt**: From the same pile, count out 15 blocks.
- **Answer**: 15 in the new pile. Stopping at fifteen is the skill.

Example 3: Write the numeral

Problem: Count the dots. Write the number.



Solution:

Step	Working and reasoning
1	Count, sliding a finger under each dot: one to eleven. The last word is *eleven*.
2	Eleven is written with two digits: a 1 and then another 1. Write 11.

Answer: 11

> ***Notice**: Numbers past nine need two digits. Ten is* 10, *eleven is* 11, *twelve is* 12. *Say the word, then write the numeral, so the two stay glued together.*

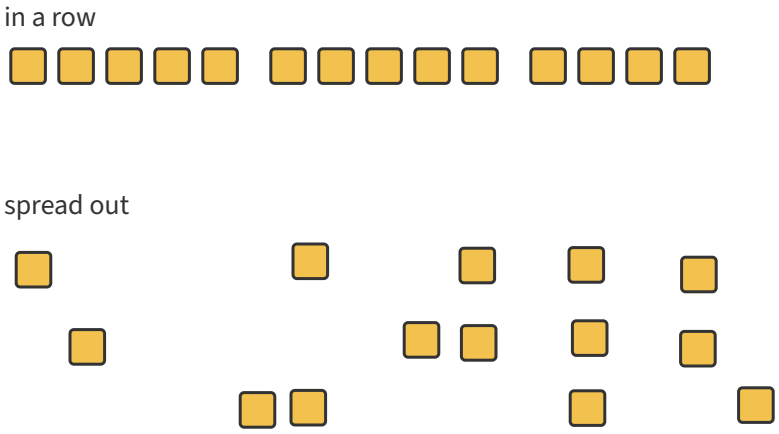


Your Turn:

- **Prompt**: Count the stars in the picture. Write the number.
- **Answer**: 16

Example 4: The trap: counting again after moving

Problem: Ruby counts 14 blocks in a row. Her grown-up spreads the blocks out across the whole table. How many blocks are there now?



Solution:

Step	Working and reasoning
1	What many children do: start again at one and count all fourteen a second time, sometimes skipping one or touching one twice and getting 13 or 15.
2	What to do instead: stop and think. Nobody added a block. Nobody took a block away. Moving does not change how many.
3	So there are still 14. Say it without counting. Then, if you like, count to prove it.

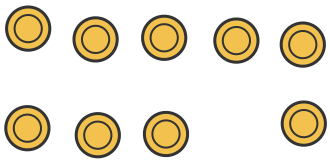
Answer: 14 blocks, the same as before.

> ***Notice**: Spread out, bunched up, in a circle or a line: the number stays. Only adding or taking away changes it.*

in a line



in a heap

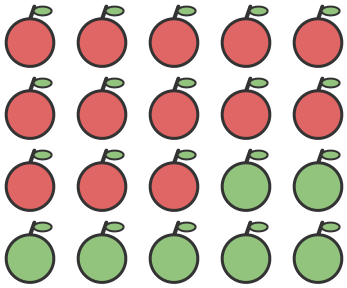


Your Turn:

- **Prompt**: Count out 9 coins in a line. Push them into a heap. How many now?
- **Answer**: Still 9. No coin came or went.

Example 5: Two counts, one answer

Problem: A basket holds 20 apples. Some are red and some are green. Counting the red ones gives 13. How many are green? Count them out to find out.

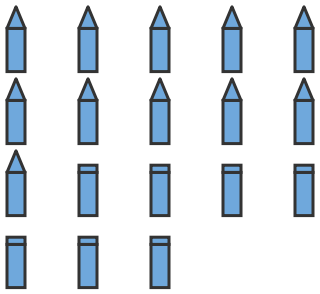


Solution:

Step	Working and reasoning
1	Start by taking out the 13 red apples, counting each one as it comes out: one to thirteen. Why: once the red ones are out, only green ones are left.
2	Now count what is left in the basket: one, two, three, four, five, six, seven. The last word is *seven*.
3	Check by counting on from thirteen with the green ones: fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, twenty. Twenty is the whole basket, so it fits.

Answer: 7 green apples

> ***Notice***: *You do not always have to start at one. You can count on from a number you already know. Grade 1 lives here.*
>
> ***Check***: 13 *red and* 7 *green together must count up to* 20. *Counting on from* 13 *by seven lands on* 20.



Your Turn:

- **Prompt**: A box holds 18 crayons. 11 are sharp. Count out the sharp ones, then count the rest. How many are not sharp?
- **Answer**: 7. Counting on from 11 by seven reaches 18.

What If...? 1.8

Explore these special cases:

- **Case**: Count an empty plate.
  - **Resolution**: Zero. There is nothing to touch, so no number word is said, and the answer is 0.
- **Case**: The things are all different: a shoe, a cup, a leaf, a coin.
  - **Resolution**: Still 4. Counting does not care what the things are, only how many.
- **Case**: Count the same row from the other end.
  - **Resolution**: The same number. Left to right or right to left, every thing gets touched once.
- **Case**: Twenty exactly.
  - **Resolution**: Nineteen and one more is twenty, written 20. Two digits, a 2 and a 0.

1.9 On Standardized Tests

- **On standardized tests**: The i-Ready Diagnostic shows a picture of objects and asks “How many?”, with the numerals as choices. It reads the question aloud. It also shows a numeral and asks which picture matches, and asks which number comes next in a short count. Pictures are sometimes in a line and sometimes scattered, on purpose.

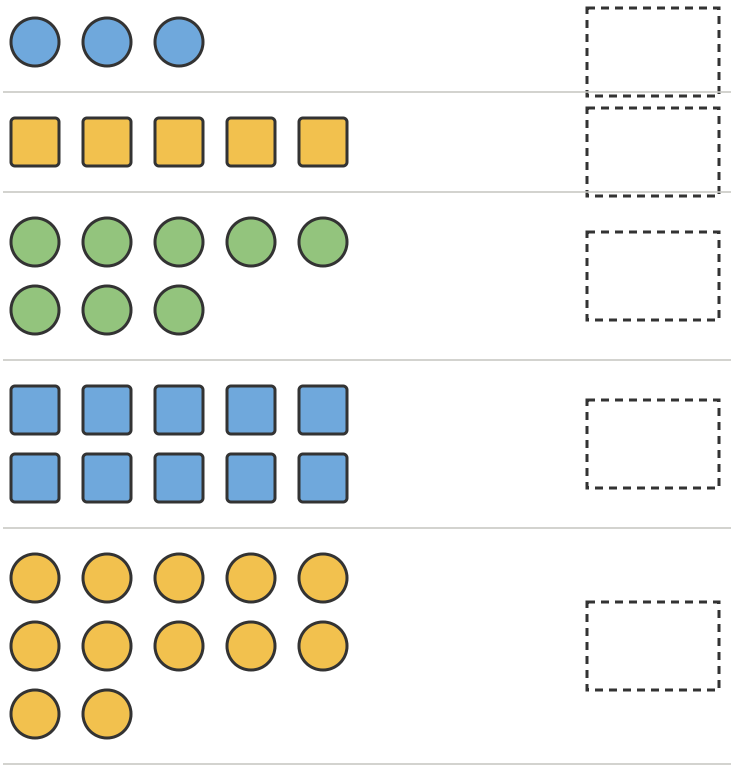
1.10 At the Table

- **Start Here**: Anything small and plentiful: dried pasta, buttons, blocks. Count together, your hand over theirs so each touch gets one word. Then let them count alone while you watch for a skip or a double tap. Ask “so how many?” the moment the count ends and wait for the last number to come back, not a recount.
- **Questions to ask, in order**:
  1. “Touch one and say one. Now touch the next. What do you say?”
  2. “You stopped at eight. So how many are there?”
  3. “I am going to spread them out. Do you need to count again? Why not?”
  4. “Can you count out exactly six for me and stop?”
- **When a Student Is Stuck**: A skip or a double tap means the hand is faster than the mouth. Slow both down: move each thing to a new spot as it is counted, so counted and uncounted never touch. If the last number does not come back as “how many”, ask “what was the last word you said?” and let that be the answer.

1.11 Cut and Count

Teacher note: the groups are 3, 5, 8, 10 and 12. Watch for double-touching in the rows of five; a child who lands on 9 for the third group has counted one twice.

Count each group. Touch each thing once and say the number. Then photocopy or print this page (or copy the five numbers onto a scrap of paper), cut out the five number cards below the groups, and put each card in the box beside the group it matches. Glue it down when every card has a home.



Cut along the dashed lines.

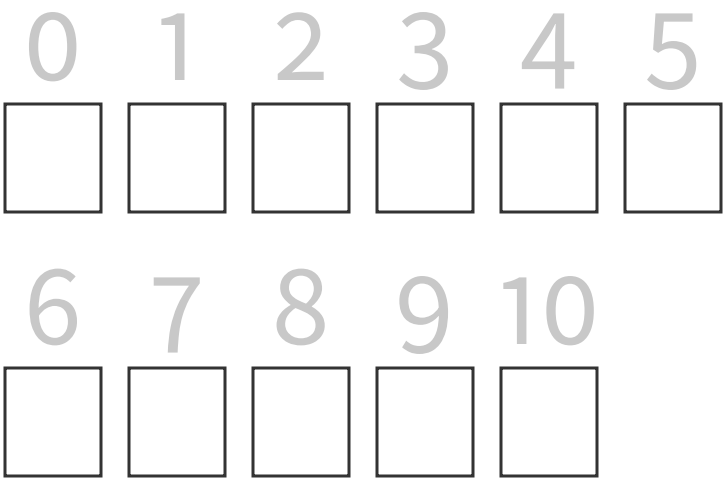


Write the Numbers

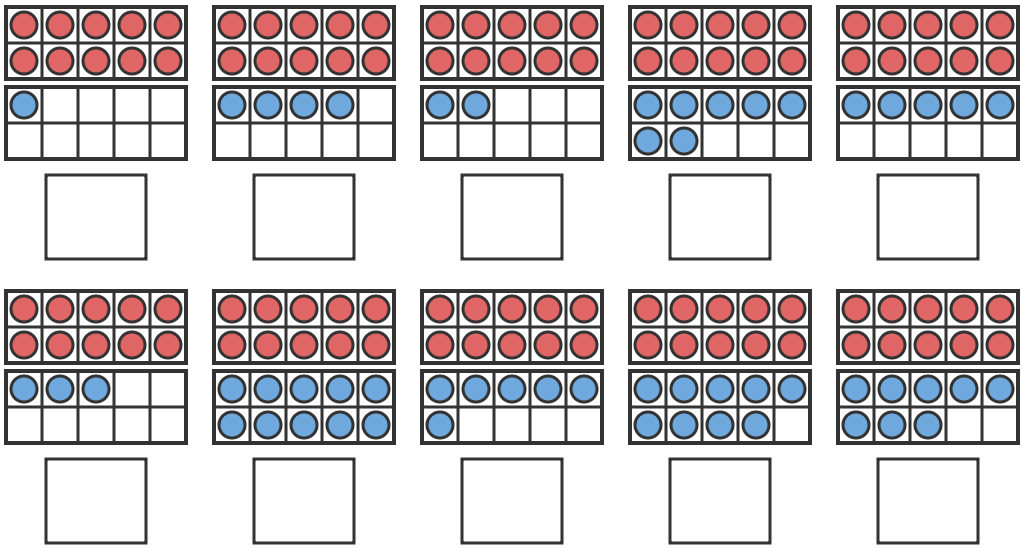
1.12

Teacher note: the dot boxes show, in order, 11, 14, 12, 17, 15, 13, 20, 16, 19 and 18. Reversed 2, 3, 5, 7 and 9 are normal at five: say "start at the top" and trace the model again rather than rubbing out. Writing 17 as 71 is common too, because "seventeen" says the seven first. Point to the full ten frame and say "the ten is written first".

Trace each number with a finger, then with a pencil, starting at the top. Then write it once on your own in the box below it.



Now count the dots. The red frame is always a full ten. Write the number in the box below each one.



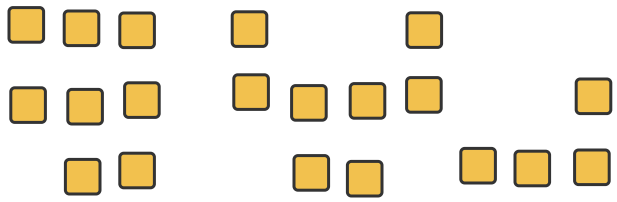
1.13 Try It on Paper

1. **Problem:** Count the cups. How many?



- **Answer and working:** 5

2. **Problem:** Count out 8 blocks from a big pile.



- **Answer and working:** Eight blocks in the new pile; stop at “eight”.

3. **Problem:** Write the numeral for thirteen.
   - **Answer and working:** 13

4. **Problem:** Ten pennies are in a row. Push them into a heap. How many now?



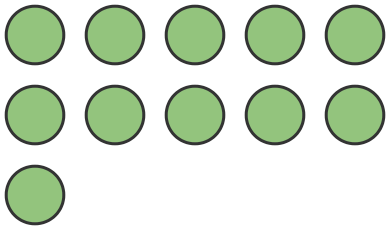
- **Answer and working:** 10. Moving does not change how many.

5. **Problem:** What number comes right after 16 when you count?

12	13	14	15	16	

- **Answer and working:** 17

6. **Problem:** Count the dots. How many dots?



- **Answer and working:** 11 dots. Touch each dot once as you say its number.

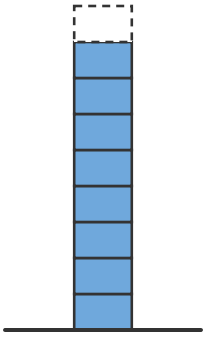
7. **Problem**: Draw 9 circles. Count them from left to right, then from right to left. Do you get the same number?
   - **Answer and working**: Yes, 9 both times. Counting in a different order does not change how many.

8. **Problem**: Say the next three numbers after 14.



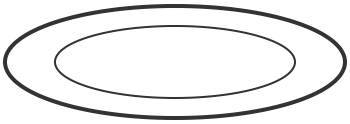
   - **Answer and working**: 15, 16, 17

9. **Problem**: There are 8 blocks in a tower. You add one more block. How many blocks now?



   - **Answer and working**: 9 blocks. One more than 8 is the next counting number, 9.

10. **Problem**: A plate has no crackers on it. How many crackers? Write the number.



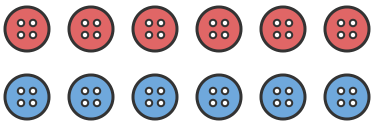
   - **Answer and working**: 0 crackers. We write “none” as 0.

11. **Problem:** Count the stars from left to right. Then count them from right to left. Do you get the same number?



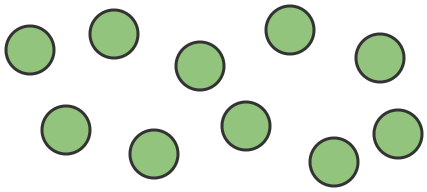
- **Answer and working:** Yes. 7 both ways. The order of counting does not change how many.

12. **Problem:** Count the buttons. How many? Write the number.



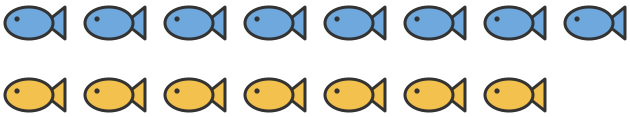
- **Answer and working:** 12 buttons.

13. **Problem:** Count out 6 dots from the pile and circle them. Count the circled dots again to check.



- **Answer and working:** Any 6 dots circled. The last number said is six.

14. **Problem:** Count the fish. Write the number.



- **Answer and working:** 15 fish. 8 in the top row and 7 in the bottom row.

CHAPTER

9

Flat shapes and solid shapes

IN THIS CHAPTER

9.1 Chapter at a Glance

9.2 Before Opening This Chapter

9.3 Try This First

9.4 The Big Idea

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9.12 Mixed Review: Chapters 1–9

9.13 Mixed Review Answers

9.14 End-of-Year Assessment

9.15 End-of-Year Assessment Answers

Chapter at a Glance 9.1

- **Chapter:** 9
- **Strand:** Pure — Shapes
- **Difficulty:** Level 1 of 5

- **Builds on**: nothing earlier in this book

9.2 Before Opening This Chapter

Start with what you already know:

- **Check**: Count to six: one, two, three, four, five, six.
- **Check**: Point to a corner of the table. A corner is where two edges meet.

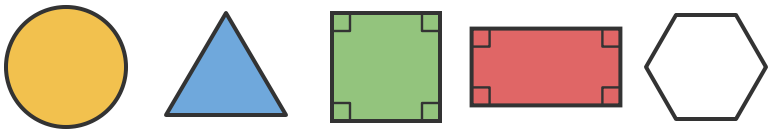
9.3 Try This First

Try this short activity before reading the lesson.

> *Go on a shape hunt around the room. Find something round, something with four corners, something with three. Then find something you can pick up that rolls, and something that stacks. Trace around the bottom of a cup on paper. What flat shape did the cup make?*

9.4 The Big Idea

Flat shapes lie on the paper. A circle is round, with no straight sides and no corners. A triangle has three straight sides and three corners. A square has four sides that are all the same length and four square corners, like the corner of this page. A rectangle has four square corners too, and its opposite sides, the ones across from each other, are the same length; often two sides are long and two are short. A hexagon has six straight sides and six corners.



circle triangle square rectangle hexagon

Solid shapes take up room; you can hold them. A sphere is a ball. A cube is a box with six square faces, like a die. A cylinder is a can: two circles and a curved side. A cone has one circle and comes to a point, like a party hat.



sphere cube cylinder cone

A shape is still the same shape when it is turned. A triangle pointing down is a triangle. A square standing on a corner is a square. Count the sides and corners, not the way it sits.

For the grown-up: Flat shapes lie on a page: circles, triangles, squares, rectangles and hexagons. Solid shapes take up space: cubes, spheres, cones and cylinders. Students name shapes whatever their size or turn, describe them by counting sides and corners, tell flat from solid, and put small shapes together to make bigger ones. Naming a shape by its sides rather than its look is the first step in geometry. The chapter ends with position words (above, below, beside, in front of, behind, next to), which children use to describe where objects are.

Words to Know 9.5

- **side**: One straight edge of a flat shape. A triangle has three.
- **corner**: Where two sides meet in a point. A square has four.
- **flat shape**: A shape drawn on paper: circle, triangle, square, rectangle, hexagon.
- **solid shape**: A shape you can hold: sphere, cube, cylinder, cone.
- **face**: One flat side of a solid shape. A cube has six faces, and each is a square.
- **square corner**: A corner like the corner of a page. A square and a rectangle each have four.
- **position words**: Words that tell where a thing is: above, below, beside, next to, in front of, behind.

Outcomes and Milestones 9.6

- **Students can**: name circles, triangles, squares, rectangles and hexagons, and cubes, spheres, cones and cylinders; count sides and corners; tell flat from solid; put shapes together to make bigger shapes; tell where a thing

is with position words: above, below, beside, in front of, behind, next to.

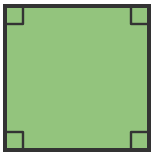
- **Watch for**: not recognizing a triangle that points down or a square turned on its corner; calling a cube a square; confusing a cone with a cylinder.
- **Ready when**: they name a tilted triangle, say a rectangle has 4 corners, pick a cube as the solid from a list of shapes, and say two squares side by side make a rectangle.

9.7 Worked Examples and Your Turn

Study each example, then try the paired problem.

Example 1: Name it by counting

Problem: A flat shape has 4 straight sides, all the same length, and 4 square corners. What is it?

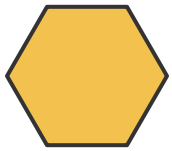


Solution:

Step	Working and reasoning
1	Count the sides: four. Count the corners: four. Why: the counts are what name a shape, not its color or size.
2	Four sides all the same length and four square corners: that is a square. If the corners were square but two sides were longer than the other two, it would be a rectangle.

Answer: A square.

> ***Notice**: Sides and corners always match in number: three and three, four and four, six and six.*

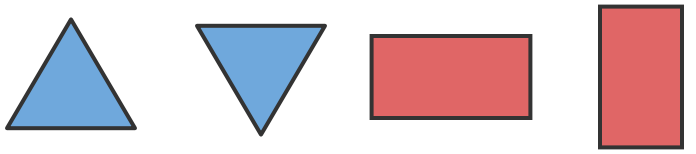


Your Turn:

- **Prompt**: A flat shape has 6 sides and 6 corners. What is it?
- **Answer**: A hexagon.

Example 2: Turned, still the same

Problem: Draw a triangle with its point at the top. Now turn the paper upside down. Is it still a triangle? How many corners does a rectangle have if you turn it on its side?

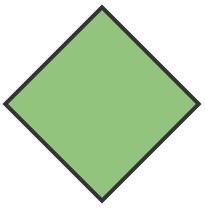


Solution:

Step	Working and reasoning
1	Count the sides of the upside-down shape: three. Count the corners: three. Three and three is a triangle. Why: turning the paper moved nothing on the shape; every side and corner is still there.
2	Turn a rectangle on its side. Count corners: four. Still four. It is still a rectangle, just standing tall instead of lying long.

Answer: Yes, still a triangle. A rectangle turned on its side still has 4 corners.

> ***Notice**: Turn any shape and count again. The counts never change, so the name never changes.*

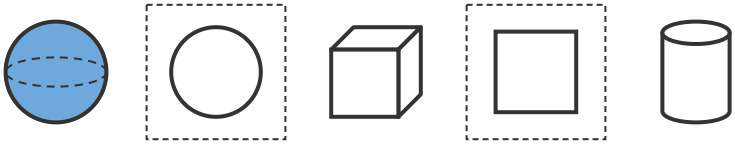


Your Turn:

- **Prompt**: A square is drawn standing on one corner, like a diamond. How many sides does it have? What is it?
- **Answer**: 4 sides, all the same length, and four square corners. It is still a square.

Example 3: Flat or solid

Problem: Here are some things: a ball, a drawing of a circle, a die, a drawing of a square, a can of beans. Which are solid shapes? Name them.



Solution:

Step	Working and reasoning
1	Ask of each: can I hold it, or is it drawn on paper? Why: solid shapes take up room; flat shapes lie on a page.
2	The ball is a sphere. The die is a cube. The can is a cylinder. Those three are solid.
3	The drawn circle and the drawn square are flat.

Answer: Solid: the ball (sphere), the die (cube), the can (cylinder). Flat: the circle and the square drawings.



party hat drawing orange

Your Turn:

- **Prompt**: A party hat, a drawing of a triangle, an orange. Which are solid? Name them.
- **Answer**: The party hat (cone) and the orange (sphere) are solid. The triangle drawing is flat.

Example 4: The trap: a cube is not a square

Problem: Pick up a die. A child says "it is a square." What is it really, and how are the two connected? Then tell a cone from a cylinder.



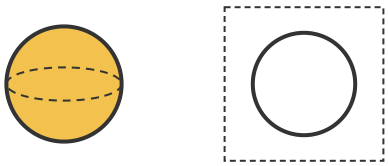
cube one face cone cylinder

Solution:

Step	Working and reasoning
1	What many children say: "square", because each face they look at is a square. But a square is flat, and you cannot pick up a flat shape. The die is solid.
2	What to do instead: count its faces by turning it: one, two, three, four, five, six. Six square faces make a cube. So a cube is a solid made of squares. Say "the faces are squares; the shape is a cube."
3	Cone or cylinder: a cylinder has two circle ends and rolls straight. A cone has one circle and a point, and rolls around in a curve. A party hat is a cone; a can is a cylinder.

Answer: It is a cube, with six square faces. A cone has one circle and a point; a cylinder has two circles and no point.

***Notice**: Flat shapes live on the faces of solid shapes. Naming the face is not naming the solid.*



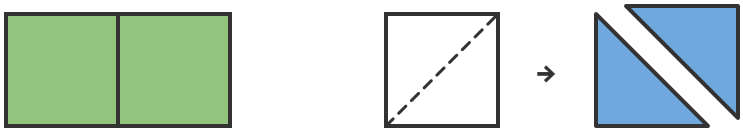
basketball drawing

Your Turn:

- **Prompt**: A basketball: sphere or circle? Why?
- **Answer**: Sphere. You can hold it, so it is solid. A circle is its flat shadow.

Example 5: Build a bigger shape

Problem: Take two squares of paper the same size and put them side by side so one whole edge touches. What shape did you make? Then cut a square along a corner-to-corner line. What two shapes do you get, and can they make the square again?



two squares: a rectangle cut two triangles

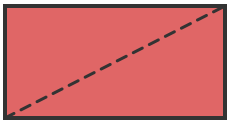
Solution:

Step	Working and reasoning
1	Start by putting the two squares together, edge to edge. Count the outside sides of the new shape: four. Count the corners: four. Two sides are longer than the other two. Why: two square sides in a line make one long side.
2	Four square corners, two long sides across from each other and two short sides across from each other: a rectangle.
3	Now the cut: a square cut from corner to corner gives two triangles, each with three sides. Turn them back together along the cut, and they make the square again.

Answer: Two squares side by side make a rectangle. A square cut corner to corner makes two triangles, which fit back into the square.

***Notice**: Shapes are made of shapes. Put together or cut apart, and the sides and corners change. Grade 1 cuts shapes into halves and quarters, and Grade 3 counts the little squares inside a rectangle to find its area.*

***Check**: Trace around the two joined squares and count the corners of the outline: four, not eight. The corners where they meet are not corners of the new shape.*



cut corner to corner



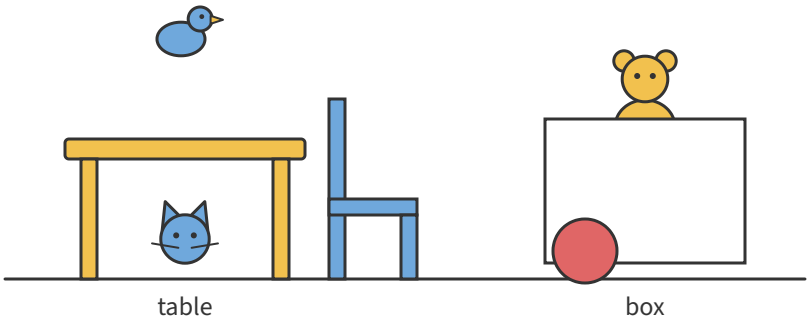
three squares in a row

Your Turn:

- **Prompt**: Cut a paper rectangle from corner to corner. Put the two triangles back together along their longest sides. What shape can you make? Put three squares in a row. What shape?
- **Answer**: The two triangles make the rectangle again. Three squares in a row make a longer rectangle.

Example 6: Where is it? Position words

Problem: Look at the picture. Where is the bird? Where is the cat? Where is the chair? Then look at the box. Where is the ball, and where is the teddy bear?

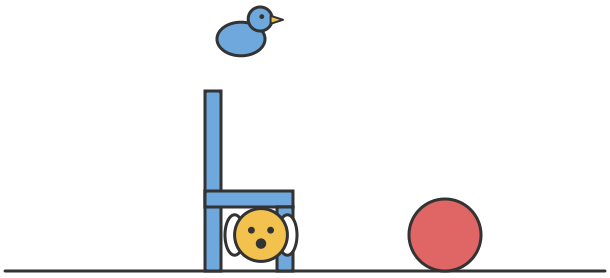


Solution:

Step	Working and reasoning
1	Find the table first. Why: a position word tells where a thing is compared with something else, so choose that something else first.
2	The bird is higher than the table: the bird is *above* the table. The cat is lower, under it: the cat is *below* the table.
3	The chair is at the side of the table: the chair is *beside* the table. You can also say it is *next to* the table.
4	Now the box. The ball is closer to you and covers part of the box: the ball is *in front of* the box. Only the bear's head shows over the top, because the box hides the rest: the bear is *behind* the box.

Answer: The bird is above the table, the cat is below the table, and the chair is beside (next to) the table. The ball is in front of the box, and the bear is behind the box.

> ***Notice**: A position word always compares two things: above the table, behind the box. Say both.*



Your Turn:

- **Prompt**: Look at the picture of the chair. Is the bird above or below the chair? Where is the dog? Where is the ball?
- **Answer**: The bird is above the chair. The dog is below (under) the chair. The ball is beside (next to) the chair.

What If...? 9.8

Explore these special cases:

- **Case**: A very long thin rectangle.
  - **Resolution**: Still a rectangle: four square corners, four straight sides, and the sides across from each other the same length. Being thin does not change the count.
- **Case**: A circle: how many sides and corners?
  - **Resolution**: No corners and no straight sides. It is the one flat shape you cannot name by counting; it is round all the way.
- **Case**: Is a square a rectangle?
  - **Resolution**: A square is a special rectangle whose sides are all the same. In kindergarten, calling it a square is just right. Grade 3 comes back to this.
- **Case**: A shape drawn with a wobbly line: three roughly straight sides.
  - **Resolution**: Count the sides and corners as if they were straight: three and three, a triangle. Hand drawings are never perfect.

9.9 On Standardized Tests

- **On standardized tests**: The i-Ready Diagnostic shows a shape and asks its name, with the names read aloud, and it often shows triangles pointing down and squares on a corner. It asks how many sides or corners a shape has, which of several objects is a cube or a cone, and which shapes are flat and which are solid. It also shows two shapes joined and asks what bigger shape they make.

9.10 At the Table

- **Start Here**: A die, a ball, a can, a party hat or ice-cream cone, and paper cut-outs of a circle, triangle, square, rectangle and hexagon. Sort into "can hold" and "on paper". Then count sides and corners on each cut-out with a finger, turning the paper as you go. Trace around the ends of the solids to find the flat shapes hiding on them.
- **Questions to ask, in order**:
  1. "How many sides? How many corners? So what is it called?"
  2. "I turned it. Count again. Did anything change?"
  3. "Can you hold it? Then it is a solid. What solid is it?"
  4. "Put these two squares together. What did you make? Count the corners of the new shape."
- **When a Student Is Stuck**: If a tilted triangle is "not a triangle", have them turn the paper until it looks right, then turn it back slowly while counting corners. If the die is a "square", ask "how many squares can you find on it?" and count the six faces. For cone and cylinder, roll both: the one that rolls in a circle is the cone.

9.11 Try It on Paper

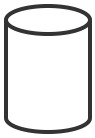
1. **Problem**: A flat shape has 3 sides. What is it?
   - **Answer and working**: A triangle.

2. **Problem:** How many corners does a square have?



- **Answer and working:** 4

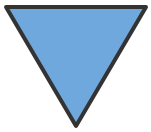
3. **Problem:** A can of soup: what solid shape is it?



soup

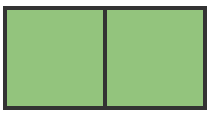
- **Answer and working:** A cylinder.

4. **Problem:** Is a triangle pointing downward still a triangle?



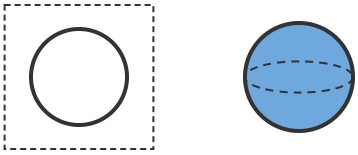
- **Answer and working:** Yes. It still has three sides and three corners.

5. **Problem:** Two squares side by side make what shape?



- **Answer and working:** A rectangle.

6. **Problem:** Which one is a solid shape: a circle or a sphere?



circle sphere

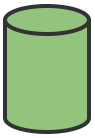
- **Answer and working:** A sphere. You can hold it; a circle is flat.

7. **Problem:** How many straight sides does a hexagon have?



- **Answer and working:** 6

8. **Problem:** How many circle ends does a cylinder have?



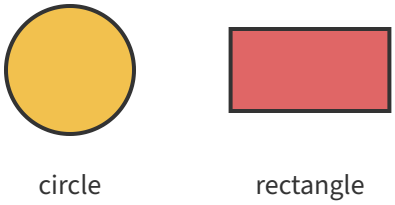
- **Answer and working:** 2. A cylinder has two circle ends and a curved side.

9. **Problem:** A flat shape has 4 sides and 4 square corners. Two sides are long and two are short. What is it?



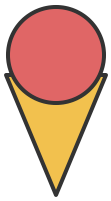
- **Answer and working:** A rectangle.

10. **Problem:** Which flat shape has no corners: a circle or a rectangle?



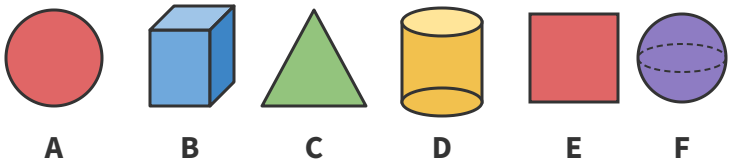
- **Answer and working:** A circle.

11. **Problem:** What solid shape is an ice cream cone?



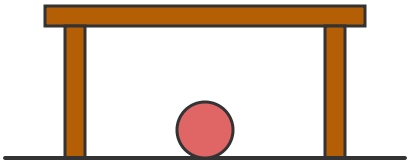
- **Answer and working:** A cone.

12. **Problem:** Which shapes are solid shapes? Write their letters.



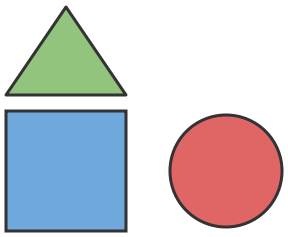
- **Answer and working:** B (a cube), D (a cylinder) and F (a sphere).

13. **Problem:** Is the ball above the table or below it?



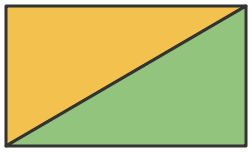
- **Answer and working:** Below the table.

14. **Problem**: Which shape is beside the square? Which shape is above the square?



- **Answer and working**: The circle is beside the square. The triangle is above it.

15. **Problem**: Two triangles are put together. What flat shape do they make?



- **Answer and working**: A rectangle.

Mixed Review: Chapters 1–9 9.12

A grown-up reads each question aloud. Keep counters, paper and a crayon nearby. The questions mix every chapter so far, on purpose: answering an older question after a break is what makes it stick.

1. A crayon and a marker start at the same edge. The marker reaches farther. Which is shorter?
2. What number comes right after 69?
3. Count out 17 counters from a pile.
4. $5 + 5 = \square$
5. Find the mistake: Kai has 6 big beach balls. Ana has 8 small marbles. Kai says he has more because his balls are bigger. What went wrong?
6. How many corners does a triangle have?
7. Write the numeral for eleven.
8. There are 10 balloons. 3 float away. How many balloons are left?
9. Count by tens from 20 to 70.
10. A box has 3 red cars, 4 blue cars and 1 green car. Sort them by color. Which group has the most? How many cars are there in all?
11. Put $9, 4, 6$ in order from smallest to biggest.
12. $10 + 9 = \square$
13. Quick facts to 5. Say each answer, then write it: $3 + 1 = \square$, $5 - 4 = \square$, $2 + 2 = \square$, $4 - 3 = \square$, $5 - 0 = \square$.

Mixed Review Answers 9.13

1. The crayon. The marker reaches farther, so it is longer. (Chapter 7)
2. 70. After sixty-nine comes a new ten: seventy. (Chapter 2)
3. Exactly 17. Move each counter aside as you count it, and stop when you say “seventeen.” (Chapter 1)
4. 10. One whole hand and another whole hand. (Chapter 4)
5. Size does not count, only how many. 8 is more than 6, so Ana has more. (Chapter 3)
6. 3. (Chapter 9)
7. 11. (Chapter 1)

8. 7 balloons. $10 - 3 = 7$. Count back three from ten: nine, eight, seven. (Chapter 5)
9. $20, 30, 40, 50, 60, 70$. (Chapter 2)
10. Blue has the most, with 4. There are 8 cars in all: count every car once, whatever group it is in. (Chapter 8)
11. $4, 6, 9$. (Chapter 3)
12. 19. Ten and nine more is nineteen. (Chapter 6)
13. $4, 1, 4, 1, 5$. $3 + 1 = 4$, $5 - 4 = 1$, $2 + 2 = 4$, $4 - 3 = 1$, $5 - 0 = 5$. If any fact still needs fingers, do a row of the Quick Facts page (Chapter 5, Try It 15 and 16) again. (Chapters 4 and 5)

End-of-Year Assessment 9.14

Use this in the last weeks of the year to see all of Kindergarten at once. A grown-up reads each item aloud. The child answers by saying, showing with counters, drawing, or writing a numeral; the grown-up may write down what the child says. Give it in two or three sittings of about 15 minutes. You need 20 counters, a ten frame, paper and a crayon. Score 1 point for each item answered fully and correctly. The scoring guide follows the answers.

1. Put 13 counters in a scattered pile. Count them. How many?
2. Count by tens from 10 to 100.
3. Which number is greater, 7 or 4?
4. $4 + 3 = \square$
5. $9 - 3 = \square$
6. A full ten frame and 6 loose counters. What number is that?
7. A red ribbon and a blue ribbon start at the same edge. The blue ribbon reaches farther. Which is longer?
8. 3 spoons, 5 forks and 2 cups are mixed up on a table. Sort them by kind. How many forks?
9. A flat shape has 4 sides, all the same length, and 4 square corners. What is it?
10. Count out 9 counters from a pile of 20.
11. Count on by ones from 45 to 52.
12. Zoe has 6 stickers. Eli has 6 stickers. Who has more?
13. 2 frogs sit on a rock. 5 more frogs hop on. How many frogs are on the rock now? Write the number sentence.
14. 10 fish are in a tank. 4 are taken out. How many fish are left? Write the number sentence.
15. $14 = 10 + \square$
16. Ava is taller than Ben. Ben is taller than Cal. Who is the tallest?
17. Look again at the spoons, forks and cups from item 8. Which group has the fewest?
18. How many sides does a hexagon have?
19. Write the numeral for twenty.

20. What number comes right after 89?
21. Put $8, 3, 10$ in order from smallest to biggest.
22. $8 + \square = 10$
23. $6 - 6 = \square$
24. Write the number that is one ten and 9 ones.
25. An apple and a grape are on a balance. The side with the apple goes down. Which is heavier?
26. A yellow square, a yellow circle and a red circle. Sort them by color: how many groups? Now sort them by shape: how many circles?
27. Which solid shape has two circle ends and a curved side?
28. Line up 8 counters and count them. Now spread them far apart. How many now? Do you need to count again?
29. Fill the gap: $97, 98, \square, 100$.
30. Put out 5 red counters and 8 blue counters. Match them one to one. Which color has more? How many blue counters have no partner?
31. Show two different ways to make 6 with red and blue counters. Say a number sentence for each.
32. Kim had 8 crackers. She ate some. Now she has 5. How many did she eat? Check with an adding sentence.
33. Find the mistake: Leo writes seventeen as 71. Fix it and say why.
34. Two towers stand on the same table. One has 7 blocks and one has 4 blocks, all the same size. Which tower is taller?
35. Sort 4 big buttons and 6 small buttons by size. Which group has more? How many buttons are there in all?
36. Is a cube flat or solid? What shape is each of its faces?

9.15 End-of-Year Assessment Answers

1. 13. Move each counter as it is counted. (Chapter 1)
2. $10, 20, 30, 40, 50, 60, 70, 80, 90, 100$. (Chapter 2)
3. 7. It comes later when you count. (Chapter 3)
4. 7. Count on from four: five, six, seven. (Chapter 4)
5. 6. Count back three from nine: eight, seven, six. (Chapter 5)
6. 16. $10 + 6 = 16$. (Chapter 6)
7. The blue ribbon. (Chapter 7)

8. 5 forks. (Chapter 8)
9. A square. (Chapter 9)
10. Exactly 9 counters, stopping at nine. (Chapter 1)
11. 45, 46, 47, 48, 49, 50, 51, 52. After forty-nine comes fifty. (Chapter 2)
12. Neither. They have the same number: 6 and 6. (Chapter 3)
13. 7 frogs. $2 + 5 = 7$. (Chapter 4)
14. 6 fish. $10 - 4 = 6$. (Chapter 5)
15. 4. (Chapter 6)
16. Ava. Ava is taller than Ben, and Ben is taller than Cal. (Chapter 7)
17. The cups, with 2. (Chapter 8)
18. 6. (Chapter 9)
19. 20. (Chapter 1)
20. 90. (Chapter 2)
21. 3, 8, 10. (Chapter 3)
22. 2. $8 + 2 = 10$. (Chapter 4)
23. 0. Take all six away and none are left. (Chapter 5)
24. 19. $10 + 9 = 19$. (Chapter 6)
25. The apple. The heavier side goes down. (Chapter 7)
26. 2 groups by color (yellow and red). 2 circles by shape. (Chapter 8)
27. A cylinder. (Chapter 9)
28. Still 8. Moving counters does not change how many, so there is no need to count again. (Chapter 1)
29. 99. (Chapter 2)
30. Blue has more. 3 blue counters have no partner. (Chapter 3)
31. Any two of $5 + 1$, $4 + 2$, $3 + 3$, $2 + 4$, $1 + 5$ (and $6 + 0$ or $0 + 6$ also count). (Chapter 4)
32. 3 crackers. $5 + 3 = 8$. (Chapter 5)
33. 17. The ten is written first: one ten and seven ones. (Chapter 6)
34. The tower of 7 blocks. (Chapter 7)
35. The small buttons have more. 10 buttons in all: $4 + 6 = 10$. (Chapter 8)
36. Solid. Each face is a square. (Chapter 9)

Scoring. 32 to 36: ready for Grade 1. 26 to 31: ready, with a few spots to review over the summer: redo the Worked Examples in any chapter where an item was missed. Below 26: before Grade 1, go back to each chapter

where two or more items were missed, work its examples and Try It on Paper again, then give just those items again.

Chapter	Items
1. Counting to 20	1, 10, 19, 28
2. Counting to 100 by ones and tens	2, 11, 20, 29
3. More, fewer, the same	3, 12, 21, 30
4. Adding within 10	4, 13, 22, 31
5. Taking away within 10	5, 14, 23, 32
6. Teen numbers: ten and some more	6, 15, 24, 33
7. Longer, taller, heavier	7, 16, 25, 34
8. Sorting and counting groups	8, 17, 26, 35
9. Flat shapes and solid shapes	9, 18, 27, 36