Data and Graphs

Unit 3 Overview: 8 lessons

Students sort things into three groups and count each one, then learn three ways to show what they counted: tally marks, picture graphs and bar graphs. They ask the class a question and tally the answers, turn a tally chart into a bar graph, and read graphs to find how many more, how many fewer and how many in all, which puts their adding and subtracting to work. The last lesson (sorting with a Venn diagram) is for the states that teach it in 1st grade.

THE UNIT, DAY BY DAY

Day 1	**Pre-Check**	What students already know, before the first lesson.
Day 2	**3.1** Sort and count into three groups	I can sort things and count each group.
Day 3	**3.2** Tally marks	I can read and make tally marks.
Day 4	**3.3** Ask a question, collect the answers	I can collect answers with tally marks.
Day 5	**3.4** Picture graphs	I can read a picture graph.
Day 6	**3.5** Read a bar graph	I can read a bar graph.
Day 7	**3.6** Make a bar graph from tallies	I can make a bar graph from tally marks.
Day 8	**3.7** How many more, fewer, in all	I can find how many more, fewer and in all.
Day 9	**3.8** Sort with a Venn diagram ★	I can sort pictures with a Venn diagram.
Day 10	**Unit Review**	The review, to go over together.
Day 11	**Unit Test**	Form A; Form B (other numbers) is for a retest.

★ Taught in 1st grade in some states. Skip these lessons if yours teaches them in another grade; animalmath.com/standards shows your state's list.

GET READY FOR THE UNIT

- Small things to sort in three kinds or colors (bears, buttons, cubes) and three paper plates for each pair
- Craft sticks for building tally marks, and whiteboards and dry erase markers
- Chart paper for a class tally chart, a picture graph and a bar graph, and square sticky notes
- Two hula hoops or yarn circles and label cards for the Venn diagram lesson

HOW EACH LESSON GOES

1. Warm up (5 min)
2. Teach (10 min)
3. Try it together (10 min)
4. Practice (15 min)
5. Exit ticket (5 min): a quick check on the lesson.

Each lesson page ends with the Animal Math sheets, makers, tools and quizzes for it. "Sheet 3" is the third worksheet of a pack; a color pack prints each sheet again in black and white.

CHECKING AS YOU GO

PRINTABLE **Pre-Check**: Day 1, with a key

PRINTABLE **Unit Review**: the day before the test

EXIT TICKET **Exit Tickets**: one a lesson, four to a page

PRINTABLE **Unit Test**: Forms A and B, with keys

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Lesson 3.1: Sort and count into three groups

GOAL Students sort a mixed group into three groups by one rule (kind, color or shape), count each group and write how many, and tell which group has the most and which has the fewest.

I can sort things and count each group.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Hold up a red bear, a blue bear and a red cube. Which two go together? Take more than one answer and name the rule each one used: color or kind.
2. **Teach** (10 min) Spill 12 things: 5 buttons, 4 shells and 3 beads. Move them one at a time onto three plates, naming each one. Count each plate and write 5, 4 and 3 on sticky notes. Ask which has the most and the fewest, then count all 12 again to show none were lost.

   > **Say:** "I sort by one rule, then count each group. The biggest number has the most."

3. **Try it together** (10 min) Pairs sort their bag onto three plates, count each plate and write the numbers on sticky notes. Then they sort the same things a new way (by color instead of kind) and count again. Have a pair with two equal groups share: no one group has the most.
4. **Practice** (15 min) Students do sheet 1 of Collecting Data: cross off each toy, draw a dot in its row and write how many. Then they sort and count a new bag and write the three numbers. Early finishers draw a pile of three kinds of shapes for a partner to sort.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.1** and circle a face beside the "I can" line. Strawberries 4, pineapples 2, grapes 5: watch who crosses off each fruit as they count, and who circles the grapes as the most.

Need help? Sort fewer than 10 things into two groups first, then add a third group.

Ready for more? Sort the same things two ways and tell how the counts change, or sort by a secret rule for a partner to guess.

GET READY

- A bag of 10 to 15 mixed things for each pair (bears, buttons, shells)
- Three paper plates for each pair
- Sticky notes

WORDS TO USE

sort: put things that are alike together

group: things that are alike, put together

most: the group with the biggest number

fewest: the group with the smallest number

ASK

- What rule did you use to sort?
- How do you know you counted every one?
- Which has the most? How do you know?

WATCH FOR

Counts a picture twice or skips one. Cross off each picture as it is counted, or move each real thing onto its plate.

Changes the rule partway, sorting some by color and some by kind. Say the rule out loud first and put a card with it above the plates.

Picks the group with the biggest things as the most. Line the groups up side by side, or compare the numbers written.

ON ANIMAL MATH

PRINTABLE **Collecting Data: Sort, Count and Vote**: sheet 1 (four kinds of toys)

PRINTABLE **Sort the Animals: Sorting and Classifying**: sheet 1 (sky, water or land), for students who need help

EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.1

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Lesson 3.2: Tally marks

GOAL Students make one tally mark for each thing they count, draw every fifth mark across the four before it to make a bundle, and read tallies to 20 by counting the bundles by 5s and the rest by 1s.

I can read and make tally marks.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Count by 5s to 20 with hands held up, then count on by 1s from 10: 10, 11, 12, 13.
2. **Teach** (10 min) Lay down craft sticks one at a time as the class counts: four standing, then the fifth across them. Draw the same on the board. Then draw 12 as two bundles and 2 marks and count it: 5, 10, 11, 12. Show that the fifth mark always goes across.

   > **Say:** "Each mark is one. The fifth mark goes across, so I can count by 5s."

3. **Try it together** (10 min) Call out numbers for students to draw on whiteboards: 4, 5, 8, 11, 15 and 19. Then draw tallies on the board for them to read aloud, including 10 and 16.
4. **Practice** (15 min) Students cross off and tally the baskets on sheet 1 of Tally Charts and Surveys, then count and draw tally marks on sheet 4. Early finishers draw tallies for a partner to read.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.2** and circle a face beside the "I can" line. Check the 19 they draw: three bundles and four more marks, with every fifth mark across.

Need help? Build tallies with craft sticks before drawing them, to 10 at first.

Ready for more? Draw and read tallies to 30, or count a tally of 23 by 1s and by 5s and tell which is faster.

GET READY

- 20 craft sticks for each pair
- Whiteboards and dry erase markers
- A three-row tally chart on chart paper

WORDS TO USE

tally mark: a line that stands for one thing

bundle: five tally marks: four standing up and one across them

total: how many in all, written as a number

ASK

- How can you count these marks fast?
- Why does the fifth mark go across?
- How many more make a bundle?

WATCH FOR

Draws five marks standing, then a sixth across them. Build it with sticks: four stand, the fifth lies across. Count a bundle together: 5.

Reads 11 as 3, counting each bundle as one. Touch each bundle and say 5, 10, then count on the single marks: 11.

Starts a new bundle before the last one is full. Count the marks in the bundle first, and cross only at 5.

ON ANIMAL MATH

- PRINTABLE — **Tally Charts and Surveys**: sheets 1 and 4
- PRINTABLE — **Collecting Data: Sort, Count and Vote**: sheet 4 (a tally of the weather)
- MAKER — **Tally Marks**: Mode Count Tallies or Draw Tallies, Number Range Within 20
- QUIZ — **Graphs and Data Quiz**: the Tally Charts level
- EXIT TICKET — **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.2

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Lesson 3.3: Ask a question, collect the answers

GOAL Students ask a question with three answers to choose from, make one tally mark for each answer, write the totals, and check that all the marks together match the number of people asked.

I can collect answers with tally marks.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Ask: "How many windows are in our room?" and "Which fruit do we like best?" Which one can we find out by counting, and which do we have to ask?
2. **Teach** (10 min) Ask "Which pet do you like best: dog, cat or fish?" Call on students one at a time. Each one answers, you make one tally mark in that row, and they check off their name. Write the totals, then count all the marks: if 18 children voted, there are 18 marks.

   > **Say:** "One person, one answer, one mark. All the marks together are everyone who voted."

3. **Try it together** (10 min) Pairs choose a question card (a favorite color, snack or season, three choices), ask 10 classmates and tally the answers. They check that there are 10 marks in all. Save one chart for lesson 3.6.
4. **Practice** (15 min) Students tally the vote cards on sheet 3 of Tally Charts and Surveys and answer its questions. Then they write their own question on sheet 5 and ask 10 friends during the week.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.3** and circle a face beside the "I can" line. The last question asks how many answered: 11. A 3 means they counted the kinds, not the cards.

Need help? Tally the answers of 5 friends to a yes or no question, then add a third choice.

Ready for more? Ask the same question in another class and compare: did the same answer get the most votes?

GET READY

- A three-row tally chart on chart paper
- A question card for each pair with three picture choices
- A class list for checking off names

WORDS TO USE

survey: asking a lot of people the same question

vote: one person's answer

data: the answers or counts we collect

ASK

- How do you know you did not miss anyone?
- Why does each person get only one mark?
- What could we ask next? What three answers would it have?

WATCH FOR

Makes two marks for one answer, or skips one. Cross off each card or name as it is tallied, then check that the marks and the names match.

Asks a question with too many answers ("What is your favorite food?"). Help them choose three answers to pick from.

Puts a mark in the wrong row. Point to the picture at the start of the row and say it before marking.

ON ANIMAL MATH

PRINTABLE **Tally Charts and Surveys**: sheets 3 and 5

PRINTABLE **Collecting Data: Sort, Count and Vote**: sheets 2, 3 and 5

QUIZ **Graphs and Data Quiz**: the Tally Charts level

EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.3

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Lesson 3.4: Picture graphs

GOAL Students read a picture graph where each picture stands for one: they count each row, write how many, and find which has the most and the fewest.

I can read a picture graph.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Each student draws their favorite of three fruits (apple, banana or grapes) on a sticky note.
2. **Teach** (10 min) Build a class picture graph: each student puts a sticky note in the next box of their fruit's row, starting at the left with no gaps. Count each row and write the number at its end. Find the longest and shortest rows. Point out the title and the key: each picture is 1.

   Say: "Each picture is one. The longest row has the most."
3. **Try it together** (10 min) Show a graph with rows of 7, 3 and 5. Partners take turns asking how many in a row, which has the most and which the fewest. Then show the same data drawn with gaps and pictures of different sizes, and talk about why it is hard to read.
4. **Practice** (15 min) Students read two graphs on sheet 1 of Picture Graphs, make a graph from a tally chart on sheet 3 (one circle for each animal), and count the vegetables to color a graph on sheet 4.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.4** and circle a face beside the "I can" line. Robots 5, dinosaurs 7, trains 3: watch that they count each row from its first box, and circle the train as the fewest.

Need help? Build the graph with real things in a grid of boxes first, then with pictures, to 5.

Ready for more? Make a picture graph from a class vote and write two questions it answers, for a partner.

GET READY

- A square sticky note for each student
- An empty three-row graph on chart paper
- Crayons

WORDS TO USE

picture graph: a graph with one picture for each thing

key: tells what each picture stands for

title: the name of the graph: what it is about

ASK

- How many apples? How did you count them?
- Which row has the most? How can you tell without counting?
- What does the key tell you?

WATCH FOR

Counts the label picture as one more. Cover the label with a finger and count only the boxes.

Says the row of biggest pictures has the most. Line the rows up, one picture a box, and count.

Leaves gaps when making a graph. Start at the first box and draw one picture in each box, in order.

ON ANIMAL MATH

- PRINTABLE **Picture Graphs for 1st Grade**: sheets 1, 3 and 4
- PRINTABLE **My First Picture Graphs**: sheets 2 and 4, for students who need help
- PRINTABLE **Halloween Graphing**: sheets 1-2
- QUIZ **Graphs and Data Quiz**: the Picture Graphs level
- EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.4

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Lesson 3.5: Read a bar graph

GOAL Students read a bar graph by following the end of each bar across to its number on the scale, and tell how many are in each group and which has the most and the fewest.

I can read a bar graph.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Stand cube trains of 3, 6 and 8 side by side. Which has the most? How can you tell without counting?
2. **Teach** (10 min) Lay the trains on a grid, one cube in each box, then show the same counts as a bar graph with a scale from 0 to 10. Put a paper strip at the end of the 6 bar and follow it across to the scale: 6. Show that every bar starts at 0. If a scale counts by 2s, a bar that ends between 4 and 6 shows 5.

   > **Say:** "I find the end of the bar and look across to the number. That is how many."

3. **Try it together** (10 min) Partners read the class bar graph: one points to the end of a bar, the other reads its number on the scale. Then they ask each other which has the most and the fewest. Include a bar that ends at 10 and one that ends between two numbers.
4. **Practice** (15 min) Students answer the questions on sheets 2, 4 and 5 of Bar Graph, Animals to 5, then sheets 1, 2 and 5 of Bar Graph, Fruits to 10, which has four bars and a scale by 2s. Each bar has its number on top: have them find it on the scale first.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.5** and circle a face beside the "I can" line. Carrots 10, corn 3, broccoli 6: a 9 for carrots means they counted the lines inside the bar, not the scale.

Need help? Build each bar with cubes beside a paper scale from 0 to 5, then read the number at the top cube.

Ready for more? Read bar graphs that go across with four bars, or write a question about a graph for a partner.

GET READY

- Cube trains of 3, 6 and 8 in three colors
- A bar graph on chart paper, scale 0 to 10
- A paper strip for each student

WORDS TO USE

bar graph: a graph that uses bars to show how many

bar: a long box; a longer bar shows more

scale: the numbers beside the bars, from 0 up

ASK

- How many in this bar? Show me how you know.
- Which bar is longest? What does it tell you?
- Where does every bar start?

WATCH FOR

Reads the next number up or down. Lay a paper strip from the end of the bar across to the scale.

Counts 0 as one and gets one too many. Point to 0 and say "nothing yet," then read the number at the end of the bar.

Reads a bar that ends between 4 and 6 as 4. Ask which number is halfway between 4 and 6: 5.

ON ANIMAL MATH

- PRINTABLE **Bar Graph - Animals to 5**: sheets 2, 4 and 5
- PRINTABLE **Bar Graph - Fruits to 10**: sheets 1, 2 and 5
- MAKER **Bar Graphs**: Activity Read the Graph, Number of Categories 3, Max Value on Axis 10, Questions per Graph 3
- QUIZ **Graphs and Data Quiz**: the Bar Graphs level
- EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.5

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Lesson 3.6: Make a bar graph from tallies

GOAL Students turn a tally chart into a bar graph: they count each row of tallies, write the total, and color one box for each mark so each bar ends at its number on the scale.

I can make a bar graph from tally marks.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Show a tally chart of 7, 4 and 9. Students count each row by 5s and 1s and write the totals on whiteboards.
2. **Teach** (10 min) Use the same chart: 7 soccer balls, 4 basketballs and 9 footballs. Write the totals. Color the soccer ball bar one box at a time, counting from the bottom until you reach 7, and check that it ends at 7 on the scale. Do the other two bars, then add a title and labels.

   Say: "One box for each tally mark. My bar stops at the total."
3. **Try it together** (10 min) Pairs build bars with sticky notes on a big grid from the class survey chart of lesson 3.3, then check each bar's end against the scale. Include a row of more than 5 so the bar goes past the first bundle.
4. **Practice** (15 min) Students count, tally and color the graph on sheet 4 of Three Sisters Garden Math, then on sheets 3 and 4 of Halloween Graphing. A Make the Graph maker sheet gives more practice.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.6** and circle a face beside the "I can" line. Soccer balls 6, basketballs 3, baseballs 5: check that each bar starts at the first box and stops at its number.

Need help? Use totals to 5, and build each bar with cubes on the graph before coloring it.

Ready for more? Run a survey, tally it, and make the bar graph with a title, labels and three questions about it.

GET READY

- An empty bar graph on chart paper
- The class survey chart from lesson 3.3
- Square sticky notes and crayons

WORDS TO USE

tally chart: a chart of tally marks

label: the picture or word under a bar

title: the name at the top of the graph

ASK

- How do you know where to stop coloring?
- Which bar is the longest? Which row of tallies does it match?
- How do the chart and the graph show the same thing?

WATCH FOR

Colors one box too many or too few. Write the total first, then count the boxes out loud while coloring and stop at that number.

Starts a bar partway up, leaving empty boxes at the bottom. Every bar starts at 0: put a finger on the first box before coloring.

Colors the bar for one row above another row's label. Match the picture under the bar with the row of the tally chart first.

ON ANIMAL MATH

PRINTABLE **Three Sisters Garden Math**: sheet 4

PRINTABLE **Halloween Graphing**: sheets 3–4

MAKER **Bar Graphs**: Activity Make the Graph, Number of Categories 3, Max Value on Axis 10

QUIZ **Graphs and Data Quiz**: the Bar Graphs level

EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.6

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Lesson 3.7: How many more, fewer, in all

GOAL Students compare two groups on a graph to find how many more and how many fewer, by matching or subtracting, and put the groups together to find how many in all.

I can find how many more, fewer and in all.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Hold up cube trains of 7 and 4 and stand them side by side. Which is longer? How many cubes stick out?
2. **Teach** (10 min) Show a picture graph: dogs 8, cats 5, fish 3. Match the dog and cat rows: 5 match and 3 dogs have no partner, so there are 3 more dogs than cats. Write 8 – 5 = 3. Say it the other way: 3 fewer cats than dogs. For in all, count on from the biggest row: 8, then 13, then 16.

   > **Say:** "Match them up and count the extras. Fewer is the same number, said the other way."

3. **Try it together** (10 min) Pairs build cube trains for two rows of a graph (9 and 5), stand them side by side and count the extra cubes. They answer a more, a fewer and an in all question for each graph. Include rows that differ by 1 and two rows that are equal.
4. **Practice** (15 min) Students find more, fewer and in all on sheet 2 of Picture Graphs and sheet 2 of Tally Charts and Surveys, then circle true or false on sheet 5 of Picture Graphs. Early finishers read bar graphs on sheets 1 and 2 of Horizontal Bar Graph to 10.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.7** and circle a face beside the "I can" line. Bears 6, owls 2, snakes 5: 4 more, 3 fewer, 13 in all. A 6 or 8 for "more" means they gave a row or added.

Need help? Compare two cube trains within 10, cube to cube, before using a graph.

Ready for more? Write a graph question whose answer is 3 more, or find how many more on a bar graph to 10.

GET READY

- Cube trains of 9 and 5 in two colors
- A three-row picture graph on chart paper
- Whiteboards and markers

WORDS TO USE

how many more: the extras one group has

how many fewer: how many less one group has

in all: all the groups put together

ASK

- Show me the extras. How many more?
- There are 3 more dogs than cats. How many fewer cats than dogs?
- How many in all? How did you check?

WATCH FOR

Gives the bigger row: 8 more dogs than cats. Line up the rows and cover the matches; count only what sticks out.

Adds when asked how many more (8 + 5). Ask: are we putting them together or comparing? Match first, then count the extras.

Answers "how many fewer" with the smaller row. Ask how many more the smaller row needs to catch up. That is how many fewer.

ON ANIMAL MATH

- PRINTABLE **Picture Graphs for 1st Grade**: sheets 2 and 5
- PRINTABLE **Tally Charts and Surveys**: sheet 2
- PRINTABLE **Horizontal Bar Graph to 10**: sheets 1, 2, 4 and 5
- MAKER **Bar Graphs**: Activity Read the Graph, Number of Categories 3, Max Value on Axis 10, Questions per Graph 4
- TOOL **Number Line**: Jump from the smaller number to the bigger one
- QUIZ **Graphs and Data Quiz**: the Picture Graphs level
- EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.7

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Data and Graphs

Lesson 3.8: Sort with a Venn diagram

GOAL Students sort pictures into a Venn diagram with two labels, putting a thing that fits both labels in the middle where the circles cross, and tell how many are in each part.

I can sort pictures with a Venn diagram.

About 45 minutes

★ Taught in 1st grade in some states

THE LESSON

1. **Warm up** (5 min) Put one hoop on the floor labeled Wearing Blue. Students wearing blue stand inside, the rest outside. Ask: what if we had a second hoop for Wearing Stripes?
2. **Teach** (10 min) Lay two hoops so they overlap, labeled Red and Fruit. Hold up a red car: red, not a fruit, so it goes in Red only. A banana: a fruit, not red. An apple: red and a fruit, so it goes in the middle. For each thing, ask: does it fit the first label? The second?

   Say: "If it fits both labels, it goes in the middle, inside both circles."
3. **Try it together** (10 min) Students take turns placing a thing in the hoops and saying why: "It is red and it is a fruit, so it goes in the middle." Include one that fits neither (the pencil) and decide where it goes: outside both hoops.
4. **Practice** (15 min) Students cut and glue the pictures on sheets 1 to 3 of Venn Diagram Picture Sort, then count the pictures in each part. Early finishers do sheet 4 or 5, which add a space for Neither.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.8** and circle a face beside the "I can" line. Toys and Round: a line from the soccer ball into one circle only shows who checks one label and stops.

Need help? Sort real things into one hoop first (in or out), then into two hoops that do not touch, before they overlap.

Ready for more? Sort pictures with a Neither space, or make a Venn diagram of the class: has a pet, has a brother or sister.

GET READY

- Two hula hoops or yarn circles that overlap, with label cards
- Things to sort (an apple, a banana, a red car, a red crayon, a pencil)
- Scissors and glue sticks

WORDS TO USE

Venn diagram: two circles that cross, for sorting things

label: the word that tells what goes in a circle

both: fits both labels; it goes in the middle where the circles cross

ASK

- Why does the apple go in the middle?
- Is the banana red? Where does it go?
- How many things fit both labels?

WATCH FOR

Puts a thing that fits both labels in one circle. Ask both questions out loud for each picture. Two yeses go in the middle.

Thinks the middle is for things that fit neither. Put a thing that fits neither outside both hoops; the middle is inside both.

Glues a picture on a line between two parts. Glue it well inside one part, so anyone can tell where it goes.

ON ANIMAL MATH

PRINTABLE **Venn Diagram Picture Sort**: sheets 1-3, then 4-5 (with a Neither space)

EXIT TICKET **1st Grade Data and Graphs Exit Tickets**: Exit Ticket 3.8

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