Measuring Length

Unit 8 Overview: 8 lessons

Students compare two lengths by lining up the ends, put three things in order, and compare two things that cannot be put side by side by using a string. Then they measure with cubes and paper clips laid end to end with no gaps and no overlaps, and find that a bigger unit takes fewer. Lining up the ends is the habit the whole unit rests on, so ask for it every day. The last two lessons (the inch ruler, and weight and capacity) are for the states that teach them in 1st grade.

THE UNIT, DAY BY DAY

Day 1	**Pre-Check**	What students already know, before the first lesson.
Day 2	**8.1** Longer and shorter	I can tell which one is longer or shorter.
Day 3	**8.2** Order three things by length	I can order things by length.
Day 4	**8.3** Compare two lengths using a third	I can use a string to compare two lengths.
Day 5	**8.4** Same-size units, no gaps, no overlaps	I can measure with no gaps and no overlaps.
Day 6	**8.5** Measure with cubes and paper clips	I can measure with cubes and paper clips.
Day 7	**8.6** Bigger unit, smaller count	I can tell that a bigger unit gives a smaller count.
Day 8	**8.7** Measure with an inch ruler ★	I can measure with an inch ruler.
Day 9	**8.8** Compare weight and capacity ★	I can tell which is heavier and which holds more.
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

- Linking cubes and paper clips (all one size) in a tub for each table, and masking tape for a start line on each desk
- Things to measure: pencils, crayons, markers, spoons, keys, ribbons and paper strips cut to a whole number of cubes
- String or yarn and scissors, for comparing things that cannot be moved
- For the last two lessons: an inch ruler for each student, a pan balance, and cups, bowls and jars with rice to pour

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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Measuring Length

Lesson 8.1: Longer and shorter

GOAL Students compare two lengths by lining up one end of each at the same place and looking at the other ends, and say which is longer and which is shorter.

I can tell which one is longer or shorter.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Hold up a long pencil and a short one. Students stretch their arms wide for longer and hold their hands close for shorter as you point to each.
2. **Teach** (10 min) Hold a crayon and a marker with their ends at different places, so the crayon looks longer. Then lay both on the desk with their ends on the tape line and look at the other ends: the marker is longer. Do the same with a curled ribbon: straighten it first.

   Say: "First I line up the ends. Then I look at the other ends."
3. **Try it together** (10 min) Partners take turns picking two things from the tub, lining them up at the tape and saying "The ____ is longer than the ____." Include a thick marker beside a thin pencil that is longer, and a ribbon that has to be straightened.
4. **Practice** (15 min) Students circle the longer one and the shorter one on sheet 1 of Comparing and Ordering Lengths, then circle the taller one on sheet 3 of Fall Measuring. Early finishers find one thing longer and one shorter than their pencil and draw them.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.1** and circle a face beside the "I can" line. The second question asks for the shorter one: watch for students who circle the long snake out of habit.

Need help? Compare things that are very different in length first (a paper clip and a ruler), with the start line taped on the desk.

Ready for more? Find three things longer than a pencil and three shorter, or compare heights: who is taller, standing back to back?

GET READY

- Pairs of things to compare in a tub (two pencils, a crayon and a marker, two ribbons)
- Masking tape for a start line on each desk

WORDS TO USE

longer: goes farther; its end sticks out past the other one

shorter: does not go as far; it stops first

line up: put the ends in the same place, like at a start line

ASK

- How do you know which one is longer?
- Why do we line up the ends first?
- The ribbon is longer than the crayon. Which one is shorter?

WATCH FOR

Looks only at the right ends when the left ends are not lined up. Slide both to the start line, then look again.

Picks the bigger or fatter thing as longer. Line them up at the tape: longer means the end goes farther, not the thing is bigger.

Circles the longer one when asked for the shorter. Say the sentence both ways: the ribbon is longer than the crayon, the crayon is shorter than the ribbon.

ON ANIMAL MATH

PRINTABLE **Comparing and Ordering Lengths**: sheet 1

PRINTABLE **Fall Measuring**: sheet 3 (circle the taller one)

QUIZ **Measuring Length Quiz**: the Compare level

EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.1

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Measuring Length

Lesson 8.2: Order three things by length

GOAL Students put three things in order from shortest to longest, and from longest to shortest, by lining up their ends and comparing two at a time.

I can order things by length.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Call three students of different heights to stand back to back. The class tells who is tallest and who is shortest, then puts them in order.
2. **Teach** (10 min) Line up a crayon, a pencil and a ribbon at the tape. Find the shortest and put card 1 by it, then the longest gets 3, and the one left gets 2. Then order the same three from longest to shortest and show that the cards turn around.

   Say: "Shortest first, then longest. The one left goes in the middle."
3. **Try it together** (10 min) Each pair lines up a bag of three things, labels them 1, 2, 3 and trades bags. Include a bag where two things are close in length, so students look carefully at the ends, and ask for one order from longest to shortest.
4. **Practice** (15 min) Students write 1, 2, 3 on sheet 2 of Comparing and Ordering Lengths (the bottom half goes from longest to shortest) and on sheet 4 of Fall Measuring. Early finishers order four things on the top half of sheet 5 of Ruler Practice.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.2** and circle a face beside the "I can" line. The first question goes from shortest to longest: a student who writes 1 by the paintbrush ordered it the other way.

Need help? Order three cube trains that are very different (2, 5 and 9 cubes) before ordering things.

Ready for more? Order four or five things, or order the table's pencils from longest to shortest along a strip of tape.

GET READY

- Bags of three things: a crayon, a pencil, a ribbon
- Masking tape for a start line
- Cards that say 1, 2 and 3

WORDS TO USE

shortest: shorter than all the others

longest: longer than all the others

order: put things in a row by size, one after another

ASK

- Which one did you find first? Why?
- Why does the pencil go in the middle?
- What changes when we order from longest to shortest?

WATCH FOR

Writes 1 by the longest when the sheet asks shortest first. Point to the "1 = shortest" tag before each half.

Orders by the right ends when the left ends are not lined up. Line up the ends first, at the tape or the dashed line.

Puts the middle one first or last. Compare two at a time: longer than this one, shorter than that one, so it goes between.

ON ANIMAL MATH

- PRINTABLE **Comparing and Ordering Lengths**: sheet 2
- PRINTABLE **Fall Measuring**: sheet 4
- PRINTABLE **Ruler Practice: Measure, Mark, Compare**: sheet 5, the top half (order four things)
- QUIZ **Measuring Length Quiz**: the Compare level
- EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.2

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Measuring Length

Lesson 8.3: Compare two lengths using a third

GOAL Students compare two things that cannot be put side by side by comparing each with the same string: if the desk is longer than the string and the string is longer than the book, the desk is longer than the book.

I can use a string to compare two lengths.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Ask: is the teacher's table longer than the reading table? Neither one can be carried to the other. Take guesses with a show of hands.
2. **Teach** (10 min) Lay a string along a desk: the desk is longer than the string. Lay it along a book: the string is longer than the book. So the desk is longer than the book. Bring the book to the desk to check. Then use a string to settle the two tables from the warm up.

   > **Say:** "The desk is longer than the string, and the string is longer than the book. So the desk is longer than the book."

3. **Try it together** (10 min) Pairs cut a paper strip, then find one thing longer than the strip and one shorter, and tell which of those two is longer without putting them together. Ask about a case where both things are longer than the strip: then the strip cannot tell.
4. **Practice** (15 min) Students circle the answers on sheet 3 of Comparing and Ordering Lengths, reading the two sentences under each picture. Early finishers write their own: "The ___ is longer than the string. The string is longer than the ___."
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.3** and circle a face beside the "I can" line. Ask a student who circles the right answers how the string helped: the reason is the point of the lesson.

Need help? Compare with a cube train first: build it as long as one thing, then carry it to the other.

Ready for more? Use one string to put three things in order that cannot be moved, or find two things the same length as the string.

GET READY

- A ball of string or yarn and scissors
- Two tables far apart in the room
- Paper strips for each pair

WORDS TO USE

compare: look at two things to find which is longer

same length: the ends match up

in between: longer than one thing and shorter than the other

ASK

- How did the string help you?
- The book is shorter than the string and the string is shorter than the desk. Which is shorter, the book or the desk?
- If both things are longer than the string, can you tell which is longer?

WATCH FOR

Picks the string as the answer. Cover the string: the answer is one of the two things.

Answers from which drawing looks bigger. Read the two sentences with a finger on each picture, then say them as one.

Lays the string so it does not start at the end. Hold one end of the string on the end of the thing with a thumb, then pull it straight.

ON ANIMAL MATH

PRINTABLE **Comparing and Ordering Lengths**: sheet 3

QUIZ **Measuring Length Quiz**: the Compare level

EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.3

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Measuring Length

Lesson 8.4: Same-size units, no gaps, no overlaps

GOAL Students measure by laying same-size units end to end from one end to the other, with no gaps and no overlaps, and spot a measure that has gaps or overlaps.

I can measure with no gaps and no overlaps.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Show a pencil with three cubes spread out under it and ask: is the pencil 3 cubes long? Thumbs up or down, then tell why.
2. **Teach** (10 min) On the Measuring Tool with Snap Units Together off, measure a marker with cubes three ways: with gaps, overlapping, and starting past the end. Each count is different, and the tool names the mistake. Then measure it the right way: start at the end, cubes touching, stop at the other end.

   > **Say:** "Start at the end. No gaps, no overlaps. Then count."
3. **Try it together** (10 min) Partners measure three things from the tub with cubes. One lays the cubes and the other checks the start, the gaps and the overlaps, then they switch. Students take turns at the board fixing a row the tool marks wrong.
4. **Practice** (15 min) Students circle the right way and write the length on sheet 2 of Measuring with Different Units, then cut out the ladybugs on sheet 1 of Cut and Measure and measure with them. Early finishers draw a wrong way for a partner to fix.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.4** and circle a face beside the "I can" line. In the first question A starts past the end and B has gaps: picking A means the start was not checked.

Need help? Measure with cubes snapped into a train, so there can be no gaps or overlaps, before using loose cubes.

Ready for more? Measure the same thing with gaps on purpose and with no gaps, and explain why the counts are different.

GET READY

- Cubes, all one size, and things to measure
- Masking tape for a start line
- The Measuring Tool on the board

WORDS TO USE

unit: one of the same-size things we measure with, like one cube

gap: an empty space between two units

overlap: one unit lying on top of another

end to end: each unit touches the next one

ASK

- Where do you put the first cube? Why there?
- Why is the count wrong with gaps?
- What happens to the count when the cubes overlap?

WATCH FOR

Leaves gaps, so the count is too small. Push the cubes together until they touch, or snap them into a train.

Starts the first cube past the end. Put a finger on the end of the thing and set the first cube against it.

Mixes cubes and clips in one row. A unit is one size: count all cubes or all clips, never both.

ON ANIMAL MATH

- PRINTABLE **Measuring with Different Units**: sheet 2
- PRINTABLE **Cut and Measure with Nonstandard Units**: sheet 1
- TOOL **Measuring Tool**: Measure With Cubes, Snap Units Together off
- QUIZ **Measuring Length Quiz**: the Cubes and Clips level
- EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.4

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Measuring Length

Lesson 8.5: Measure with cubes and paper clips

GOAL Students measure things with cubes and with paper clips laid end to end, and write each length as a number and a unit: "The pencil is 8 cubes long."

I can measure with cubes and paper clips.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Show a crayon with a cube train under it. Count the cubes together, then say it as a sentence: the crayon is 5 cubes long.
2. **Teach** (10 min) Measure a pencil with cubes: start at the end, cubes touching, count 8. Write "8 cubes long" and show that "8" alone does not tell 8 of what. Then hook paper clips end to end under the same pencil and count them the same way.

   Say: "The pencil is 8 cubes long. I say the number and the unit."
3. **Try it together** (10 min) Pairs measure four things from the tub, each with cubes and then with clips, and write both lengths with their units. One partner measures and the other checks the start and the ends, then they switch.
4. **Practice** (15 min) Students cut out the strips on sheet 3 of Measuring with Different Units and measure in cubes and clips, then count the cubes on sheet 4 of Comparing and Ordering Lengths. Early finishers measure and order on sheet 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.5** and circle a face beside the "I can" line. The worm is 7 cubes long and the pencil 5 paper clips: a count one off usually means a unit was skipped or counted twice.

Need help? Measure with a cube train first, then loose cubes, then clips.

Ready for more? Measure something longer than 20 cubes, like a desk, or measure two things and tell how many cubes longer one is.

GET READY

- Cubes, paper clips and scissors for each pair
- Paper strips cut to a whole number of cubes and of clips
- A recording sheet: thing, cubes, clips

WORDS TO USE

measure: find how long by counting units

length: how long something is, from end to end

cubes long: how we say a length: the number and the unit, like 7 cubes long

ASK

- How many cubes long is it? How do you know?
- Why do we say "cubes" after the number?
- Did you start at the end? Show me.

WATCH FOR

Writes the number with no unit. Ask "8 what?" and have them say the whole sentence.

Counts the start line or the end as one more. Touch each cube as you count it, and count only cubes.

Lets the clips slide apart while counting. Hook the clips together or tape the row down, then count.

ON ANIMAL MATH

- PRINTABLE **Measuring with Different Units**: sheet 3
- PRINTABLE **Comparing and Ordering Lengths**: sheets 4-5
- PRINTABLE **Cut and Measure with Nonstandard Units**: sheets 2-3
- TOOL **Measuring Tool**: Measure With Cubes, then Paper Clips
- QUIZ **Measuring Length Quiz**: the Cubes and Clips level
- EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.5

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Measuring Length

Lesson 8.6: Bigger unit, smaller count

GOAL Students measure the same thing with cubes and with paper clips and see that the bigger unit gives the smaller count: the thing did not change, only the unit did.

I can tell that a bigger unit gives a smaller count.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Walk heel to toe across the rug while the class counts your feet, then have a student do it. Ask why the counts are different.
2. **Teach** (10 min) On the Measuring Tool with Cubes and Paper Clips, measure a pencil 8 cubes long: 8 cubes, and 4 clips. Ask why the numbers are different when the pencil is the same. Hold a clip against two cubes: a clip is longer, so it takes fewer clips.

   Say: "A bigger unit covers more, so I need fewer of them."
3. **Try it together** (10 min) Pairs measure one thing both ways and write both counts on the class chart. Talk about the chart: in every row, are there more cubes or more clips? Have a pair guess the count before they measure the next thing.
4. **Practice** (15 min) Students measure two ways and circle the unit they needed more of on sheet 1 of Measuring with Different Units, then do the top of sheet 4 and the more or fewer questions on sheet 5. Skip the bottom of sheet 4: it changes clips into cubes, which is past 1st grade.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.6** and circle a face beside the "I can" line. The carrot is 6 cubes and 3 clips long: a student who circles clips for "I needed more" may think a bigger unit means a bigger count.

Need help? Measure a cube train with single cubes and then with sticks of two cubes, so the bigger unit is plainly two small ones.

Ready for more? Measure with a third unit (crayons) and put the three units in order from the most needed to the fewest.

GET READY

- Cubes and paper clips for each pair
- One thing for each pair to measure both ways (a book, a paper strip)
- A class chart with two columns: cubes and clips

WORDS TO USE

bigger unit: a longer thing to measure with, like a paper clip

smaller unit: a shorter thing to measure with, like a cube

fewer: not as many

ASK

- Why did you need more cubes than clips?
- Is the book longer when we count 10 cubes than when we count 5 clips?
- If we measured with pencils, would we need more or fewer?

WATCH FOR

Thinks the thing with the bigger number is longer. Lay the cube row and the clip row under it: they end at the same place.

Says the bigger unit needs more. Hold one clip against two cubes and ask which covers more of the pencil.

Mixes cubes and clips in one count. Measure with one unit, write it down, clear it away, then measure with the other.

ON ANIMAL MATH

PRINTABLE **Measuring with Different Units**: sheets 1 and 5, the top of sheet 4

TOOL **Measuring Tool**: Measure With Cubes and Paper Clips

EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.6

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Measuring Length

Lesson 8.7: Measure with an inch ruler

GOAL Students measure with an inch ruler: line up the end of the thing with the 0, read the number at the other end, and write the length in inches.

I can measure with an inch ruler.

About 45 minutes

★ Taught in 1st grade in some states

THE LESSON

1. **Warm up** (5 min) Measure a paper strip with cubes together: 4 cubes. Ask: what if the cubes were stuck together in one long stick with numbers on it?
2. **Teach** (10 min) On the Measuring Tool with Cubes and an Inch Ruler, lay cubes under a crayon and the ruler under them: each cube fills one inch. Line the end of the crayon up with the 0. It ends at 4, so it is 4 inches long. Show two mistakes: starting at 1, and starting at the edge of the ruler.

   > **Say:** "I line up the end with the 0. The number at the other end tells how many inches."

3. **Try it together** (10 min) Students measure three things on their desks and partners check where each end lines up. On the board, show one thing that starts at 2 and ends at 6 and count the inches between: 4.
4. **Practice** (15 min) Students measure things in the room and write the lengths, then draw the inch lines on sheet 3 of Ruler Practice (questions 4 and 6; the rest are centimeters). Students who are ready do sheet 2, where things do not start at 0.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.7** and circle a face beside the "I can" line. Both things start at 0 (the leaf is 2 inches, the key 3): a student who writes 3 for the leaf counted the marks, not the spaces.

Need help? Measure with cubes laid along the ruler, so each inch is a cube to count.

Ready for more? Measure things that do not start at 0 by counting the inches between the ends, or measure with the centimeter side and compare the counts.

GET READY

- An inch ruler for each student
- Things to measure that are a whole number of inches (paper strips, crayons, keys)
- Ruler Practice printed at actual size (100%), so its rulers show real inches

WORDS TO USE

inch: a unit for length; the space from 0 to 1 on the ruler

ruler: inch units in a row, with numbers that count them for you

zero: where the first inch starts; line up the end there

ASK

- Where do you line up the end? Why there?
- How do you know it is 4 inches and not 5?
- How is a ruler like a row of cubes?

WATCH FOR

Lines up the end with 1 instead of 0. Lay cubes along the ruler: the first cube starts at 0 and ends at 1.

Lines up the end with the edge of the ruler. Put a finger on the 0 mark and slide the thing to it.

Counts the marks instead of the spaces. Count hops between the marks, as on a number line: 0 to 1 is one hop.

ON ANIMAL MATH

PRINTABLE **Ruler Practice: Measure, Mark, Compare**: sheet 3 (questions 4 and 6), sheet 2

TOOL **Measuring Tool**: Measure With Cubes and an Inch Ruler, then Inch Ruler

QUIZ **Measuring Length Quiz**: the Inch Ruler level

EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.7

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Measuring Length

Lesson 8.8: Compare weight and capacity

GOAL Students find which of two things is heavier on a pan balance, and which of two containers holds more by pouring one into the other.

I can tell which is heavier and which holds more.

About 45 minutes

★ Taught in 1st grade in some states

THE LESSON

1. **Warm up** (5 min) Pass around an apple and a feather. Students hold one in each hand and show with their arms which hand goes down.
2. **Teach** (10 min) Put a book and an apple on the balance: the book side goes down, so it is heavier. Then a balloon and a small rock: the rock is heavier, so bigger is not always heavier. Fill a tall thin glass with rice and pour it into a short wide bowl: if the bowl is not full, the bowl holds more.

   > **Say:** "The heavier side goes down. To see which holds more, fill one and pour it into the other."

3. **Try it together** (10 min) Pairs guess, then check: two things on the balance, then two containers by pouring. Include a pair where the bigger thing is lighter, and a tall container that holds less than a short wide one.
4. **Practice** (15 min) Students circle the heavier or the lighter one on sheets 1 to 3 of Heavier or Lighter (on sheet 3, a level scale means the same), then the one that holds more or less on sheets 1 and 2 of Holds More, Holds Less. Early finishers write 1, 2, 3 on sheet 5 of that pack.
5. **Exit ticket** (5 min) Students do **Exit Ticket 8.8** and circle a face beside the "I can" line. The beam tips down toward the pineapple: a student who circles the strawberry may think the side that goes up is heavier.

Need help? Hold the two things in the hands first, then check on the balance, with things that are very different in weight.

Ready for more? Order three things from lightest to heaviest with the balance, or count how many cups of rice fill a bowl.

GET READY

- A pan balance
- A small rock, a balloon, a book, an apple
- A cup, a bowl, a tall thin glass, a short wide jar
- Rice, a scoop and a tray for spills

WORDS TO USE

heavier: weighs more; that side of the balance goes down

lighter: weighs less; that side goes up

holds more: has room for more inside

ASK

- Which side went down? What does that tell you?
- Is the bigger thing always heavier? How do you know?
- How can we find out which jar holds more?

WATCH FOR

Picks the side that goes up as heavier. Press down on one pan with a hand: the heavier side is pushed down.

Thinks the bigger thing is always heavier. Weigh the balloon and the small rock again and look.

Thinks the taller container always holds more. Pour from the tall one into the short wide one and look.

ON ANIMAL MATH

PRINTABLE **Heavier or Lighter?** sheets 1-3

PRINTABLE **Holds More, Holds Less**: sheets 1, 2 and 5

EXIT TICKET **1st Grade Measuring Length Exit Tickets**: Exit Ticket 8.8

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