Factors and Multiples

Unit 3 Overview: 9 lessons

Students see multiplication as comparing: 30 = 6 × 5 means 30 is 6 times as many as 5. They solve times as many stories with strip diagrams, multiplying to find the larger amount and dividing to find the smaller amount or the number of times, and tell times as many from how many more. Then they find factor pairs from rectangles of squares, list every factor pair of a number to 100, find multiples, and sort numbers into prime and composite. The facts come back all unit, and factors and multiples set up multi-digit multiplying and dividing, and later equivalent fractions. Lessons 3.1 (facts through 12 × 12) and 3.9 (common factors and the greatest common factor) are for the states that teach them in 4th grade.

THE UNIT, DAY BY DAY

Day 1	**Pre-Check**	What students already know, before the first lesson.
Day 2	**3.1** Facts through 12 × 12 ★	I can multiply and divide with 11s and 12s.
Day 3	**3.2** Multiplication as comparison	I can write a times as many sentence as an equation.
Day 4	**3.3** Times as many stories	I can solve times as many stories.
Day 5	**3.4** Times as many or how many more?	I can tell times as many from how many more.
Day 6	**3.5** Factor pairs and rectangles	I can find factor pairs from rectangles.
Day 7	**3.6** All the factor pairs	I can find every factor pair of a number.
Day 8	**3.7** Multiples	I can tell if a number is a multiple of another.
Day 9	**3.8** Prime and composite numbers	I can tell if a number is prime or composite.
Day 10	**3.9** Common factors and the GCF ★	I can find the greatest common factor.
Day 11	**Unit Review**	The review, to go over together.
Day 12	**Unit Test**	Form A; Form B (other numbers) is for a retest.

★ Taught in 4th 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

- Square tiles, about 30 for each pair, and centimeter grid paper
- Multiplication charts to 12 × 12 and hundreds charts, with crayons
- Connecting cubes in two colors for building comparisons
- Strip diagram templates: two bars to compare
- Whiteboards and dry erase markers

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, two to a page

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

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Factors and Multiples

Lesson 3.1: Facts through 12 × 12

GOAL Students learn the 11s and 12s from facts they know: 11 groups is 10 groups and 1 more, 12 groups is 10 groups and 2 more. They divide by thinking of the times fact.

I can multiply and divide with 11s and 12s.

About 45 minutes

★ Taught in 4th grade in some states

THE LESSON

1. **Warm up** (5 min) Count by 11s and then by 12s together, as far as the class can go. What pattern do the 11s make?
2. **Teach** (10 min) Draw an array of 11 rows of 6 and a line under the tenth row: 10 × 6 = 60 and 1 × 6 = 6, so 11 × 6 = 66. Then 12 rows of 4: 10 × 4 = 40 and 2 × 4 = 8, so 12 × 4 = 48. To divide, think of the times fact: 48 ÷ 12 asks what times 12 makes 48. The answer is 4, because 12 × 4 = 48.

   > **Say:** "For 11s, I take 10 groups and add 1 more group. For 12s, I take 10 groups and add 2 more groups."

3. **Try it together** (10 min) Partners color the 11s and 12s rows of the multiplication chart and take turns: one names a fact from those rows, the other solves it by breaking apart 10 and 1 or 10 and 2, then names its division fact.
4. **Practice** (15 min) Students write the facts for the arrays on sheets 2 and 5 of Multiplication Arrays to 12, then do a drill of 11s and 12s from the Multiplication Fact Drills maker. Early finishers make a mixed 11s and 12s drill for a partner.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.1** and circle a face beside the "I can" line. On question 1, look for 36 and 55. On question 2, look for 6 and 9; an answer bigger than 72 means they multiplied.

Need help? Lay a strip of paper under the 10s row of the multiplication chart to see the 1 or 2 more groups.

Ready for more? Find 11 × 15 and 12 × 15 by breaking apart. What pattern do you see?

GET READY

- Multiplication charts to 12 × 12 and crayons
- Square tiles or grid paper
- Whiteboards and markers

WORDS TO USE

factor: a number you multiply

product: the answer to a multiplication

break apart: split a factor into parts you know: 12 is 10 and 2

ASK

- How does 10 × 6 help with 11 × 6?
- What times 12 makes 48?
- What pattern do you see in the 11s?

WATCH FOR

Adds instead of multiplying: 11 × 6 = 17. Build 11 rows of 6, or use 10 groups and 1 more group.

Thinks every 11s fact has a double digit. The pattern stops after 9 groups: 10 groups of 11 is 110.

Forgets the 2 more groups in a 12s fact. Say "10 groups and 2 more groups" every time until it is quick.

ON ANIMAL MATH

- PRINTABLE — **Multiplication Arrays to 12**: sheets 2 and 5
- MAKER — **Multiplication Fact Drills**: Times Tables: 11s, then 12s, then All Facts to 12 × 12
- MAKER — **Division Fact Drills**: Times Tables: 11s or 12s
- TOOL — **Multiplication Chart**: Table Size 12 × 12
- QUIZ — **Multiplication Quiz**: the All Facts level
- EXIT TICKET — **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.1

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Factors and Multiples

Lesson 3.2: Multiplication as comparison

GOAL Students read a multiplication as a comparison: 30 = 6 × 5 means 30 is 6 times as many as 5, and also 5 times as many as 6. They write equations for comparison sentences and sentences for equations.

I can write a times as many sentence as an equation.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Show a tower of 3 red cubes. Build a blue tower 5 times as tall. How many blue cubes?
2. **Teach** (10 min) Draw a bar of 5 and, under it, 6 bars of 5. The bottom is 6 times as many as 5: 30 = 6 × 5. Read the same equation the other way: 30 is 5 times as many as 6. Write the sentence and the equation side by side. Then turn a sentence into an equation: 100 is 4 times as many as 25, so 100 = 4 × 25.

   > **Say:** ""Times as many" means multiply. The bigger amount is the number of times, times the smaller amount."

3. **Try it together** (10 min) Pairs build towers: one builds 6 cubes, the other a tower 3 times as tall. They write the sentence and the equation both ways. Then they match sentence cards to equation cards.
4. **Practice** (15 min) Students match and write comparisons on sheets 1 and 3 of Times as Many, then sheet 1 of Multiplicative Comparison Word Problems with bigger numbers. Early finishers draw a strip diagram for one of their sentences.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.2** and circle a face beside the "I can" line. On question 1, look for 72 = 4 × 18 (factors in either order); 72 = 4 + 18 means "times" was read as "more". On question 2, look for "45 is 3 times as many as 15" (or 15 times as many as 3).

Need help? Build both amounts with cubes and line them up before writing the equation.

Ready for more? Write a comparison sentence for each factor pair of 50, such as 50 is 5 times as many as 10.

GET READY

- Connecting cubes in two colors
- Strip diagram templates
- Whiteboards and markers

WORDS TO USE

times as many: a comparison that multiplies: 6 times as many as 5 is 30

comparison: telling how two amounts are related

equation: a number sentence with an equal sign: 30 = 6 × 5

ASK

- Which number is the bigger amount?
- How else can you read 30 = 6 × 5?
- Which words tell you to multiply?

WATCH FOR

Writes the sentence backwards: 5 is 6 times as many as 30. The bigger amount comes first: which number is the total?

Writes a plus sign for "times as many". Build it: 6 times as many is 6 towers the same, not 6 more cubes.

Thinks a comparison goes only one way. Show 30 as 6 rows of 5 and as 5 rows of 6.

ON ANIMAL MATH

PRINTABLE **Times as Many**: sheets 1 and 3

PRINTABLE **Multiplicative Comparison Word Problems**: sheet 1

QUIZ **Factors and Multiples Quiz**: the Times as Many level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.2

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Factors and Multiples

Lesson 3.3: Times as many stories

GOAL Students solve times as many stories with strip diagrams: they multiply to find the larger amount, and divide to find the smaller amount or how many times as many.

I can solve times as many stories.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) A snail crawls 15 inches. A beetle crawls 2 times as far. Sketch it and find how far the beetle crawls.
2. **Teach** (10 min) Three stories, one diagram each. A hose is 15 feet long and a path is 4 times as long: 4 bars of 15, so 4 × 15 = 60 feet. A tree is 30 feet tall, 6 times as tall as a bush: the tree is 6 bars, so one bar is 30 ÷ 6 = 5 feet. A movie lasts 120 minutes and a cartoon lasts 20: 120 ÷ 20 = 6, so the movie is 6 times as long.

   > **Say:** "If the larger amount is unknown, I multiply. If the smaller amount or the number of times is unknown, I divide."

3. **Try it together** (10 min) Pairs solve three story cards with a strip diagram and an equation with a letter: a kite string 16 meters long and a fishing line 3 times as long; 51 stickers, 3 times as many as a friend has; a crate of 50 apples and a bag of 10.
4. **Practice** (15 min) Students solve the strip diagram stories on sheets 2 and 4 of Times as Many, then sheets 2 and 3 of Multiplicative Comparison Word Problems, where any of the three numbers can be unknown. Early finishers write one story of each kind.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.3** and circle a face beside the "I can" line. On question 1, look for c = 65 inches; 18 means 5 was added to 13. On question 2, look for 3 times; 26 means 13 was taken from 39 instead of dividing.

Need help? Give diagrams with the bars drawn: students write the numbers and the letter in the bars before solving.

Ready for more? Write three stories with the numbers 4, 25 and 100, one for each number as the unknown.

GET READY

- Strip diagram templates
- Story cards
- Whiteboards and markers

WORDS TO USE

larger amount: the amount that is so many times as much

smaller amount: the amount it is compared to

how many times: the larger amount divided by the smaller

ASK

- Which amount is larger? Which is smaller?
- Is the unknown the larger amount, the smaller amount or the number of times?
- Does your answer make sense in the story?

WATCH FOR

Multiplies in every times as many story. Mark the unknown in the diagram first. If it is one bar or the number of bars, divide.

Adds the number of times: 4 times as long as 15 feet is 19 feet. Draw the 4 bars of 15 and add them, then see that it is 4 × 15.

Writes the wrong unit, such as "times" for a length. Reread the question and write its unit with the answer.

ON ANIMAL MATH

PRINTABLE **Times as Many**: sheets 2 and 4

PRINTABLE **Multiplicative Comparison Word Problems**: sheets 2 and 3

QUIZ **Factors and Multiples Quiz**: the Times as Many level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.3

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Factors and Multiples

Lesson 3.4: Times as many or how many more?

GOAL Students tell a times as many comparison (multiply) from a how many more comparison (add), with pairs of stories that use the same numbers, and draw a strip diagram for each.

I can tell times as many from how many more.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Build a tower of 5 cubes. Build one 3 cubes taller, then one 3 times as tall. Which is taller? Why?
2. **Teach** (10 min) Read a pair of stories. Kim has 16 marbles; Ray has 3 more than Kim. Ray has 16 + 3 = 19. Kim has 16 marbles; Lu has 3 times as many as Kim. Lu has 3 × 16 = 48. Draw both: Ray's bar is Kim's bar and a piece of 3; Lu's is 3 bars of 16. Same numbers, different stories, different answers.

   > **Say:** ""More than" adds a piece to the bar. "Times as many" makes copies of the bar."

3. **Try it together** (10 min) Pairs sort story cards that use the same numbers, such as 6 and 3, into "more than" and "times as many", draw both diagrams and solve both. Then they write a pair of their own.
4. **Practice** (15 min) Students circle add or multiply and solve the story pairs on sheet 5 of Times as Many and sheet 5 of Multiplicative Comparison Word Problems. Early finishers write a pair of stories with the numbers 5 and 14.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.4** and circle a face beside the "I can" line. On question 1, look for 15 shells (12 + 3); 36 means they multiplied. On question 2, look for 36 shells (3 × 12); 15 means "times as many" was read as "more".

Need help? Build each story with cubes: a tower and a few more, or several towers the same.

Ready for more? Write a pair of stories with the same two numbers whose answers are 15 and 50.

GET READY

- Connecting cubes in two colors
- Strip diagram templates
- Pairs of story cards with the same numbers

WORDS TO USE

more than: add: 5 more than 6 is 11

times as many as: multiply: 5 times as many as 6 is 30

compare: tell how two amounts are different

ASK

- Is the second amount a piece more, or copies?
- Which words in the story tell you?
- Which answer is bigger, and why?

WATCH FOR

Multiplies whenever a story compares. Look for "more than" or "times as many" and draw the bars before solving.

Adds the number of times: 3 times as many as 16 is 19. Draw 3 copies of the bar of 16 and add them.

Mixes up which amount is compared to which. Underline the amount after "than" or "as": it is the one compared to.

ON ANIMAL MATH

- PRINTABLE **Times as Many**: sheet 5
- PRINTABLE **Multiplicative Comparison Word Problems**: sheet 5
- QUIZ **Factors and Multiples Quiz**: the Times as Many level
- EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.4

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Factors and Multiples

Lesson 3.5: Factor pairs and rectangles

GOAL Students build every rectangle they can from a number of square tiles and see that each one shows a factor pair: 16 tiles make 1 by 16, 2 by 8 and 4 by 4, so 16 has the factor pairs 1 and 16, 2 and 8, 4 and 4.

I can find factor pairs from rectangles.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Give each pair 6 tiles. How many different rectangles can you make? (1 by 6 and 2 by 3; turned around is the same rectangle.)
2. **Teach** (10 min) Build rectangles from 16 tiles as a class: 1 row of 16, 2 rows of 8, 4 rows of 4. Draw each on grid paper and write its factor pair. Try 3 rows: 1 tile is left over, so 3 is not a factor of 16. 5, 6 and 7 rows leave tiles over too. The square, 4 by 4, is one pair, and turning 2 by 8 into 8 by 2 makes the same pair. Then try 7 tiles: only 1 row of 7 works.

   > **Say:** "Each rectangle I can make shows a factor pair. The side lengths are the two factors."

3. **Try it together** (10 min) Pairs get 11, 14 or 15 tiles, find every rectangle and draw each on grid paper. Share: which numbers made two rectangles? Which made only one?
4. **Practice** (15 min) Students write the factor pair for each rectangle on sheet 1 of Factors and Multiples, then draw every rectangle for a number on its grid. Early finishers find a number to 30 that makes exactly four rectangles.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.5** and circle a face beside the "I can" line. On question 1, look for 3 × 7 (or 7 × 3); 21 alone or 3 + 7 means the rectangle was not read as a factor pair. On question 2, look for 1 × 38 and 2 × 19; leaving out 1 × 38 is the most common slip.

Need help? Build each rectangle with tiles before drawing it, and count the rows aloud.

Ready for more? Find a number between 30 and 50 that makes only one rectangle.

GET READY

- About 30 square tiles for each pair
- Centimeter grid paper and crayons
- Whiteboards and markers

WORDS TO USE

factor: a number that multiplies with another to make a product

factor pair: two factors that make a number: 2 and 8 make 16

rectangle: rows of the same length; its sides are a factor pair

ASK

- How many rows? How many in each row?
- Can you make a rectangle with 3 rows? Why not?
- Is 2 by 8 a new pair, or the same as 8 by 2?

WATCH FOR

Forgets the one-row rectangle. Start every list with 1 and the number itself.

Counts 2 by 8 and 8 by 2 as two pairs. Turn the tiles: it is the same rectangle, so the same pair.

Leaves tiles over and calls it a rectangle. Every row must be full and the same length.

ON ANIMAL MATH

PRINTABLE **Factors and Multiples**: sheet 1

MAKER **Graph Paper**: Paper Type Square Grid, Square Size 1 Centimeter

QUIZ **Factors and Multiples Quiz**: the Factor Pairs level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.5

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Factors and Multiples

Lesson 3.6: All the factor pairs

GOAL Students find every factor pair of a number to 100 in a T-chart, trying each number from 1 until the factors repeat, and decide whether one number is a factor of another.

I can find every factor pair of a number.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Is 3 a factor of 46? Is 2? How do you know?
2. **Teach** (10 min) Find every factor pair of 50 in a T-chart. Try each number from 1: 1 × 50 and 2 × 25. 3 and 4 are not factors: 50 ÷ 3 and 50 ÷ 4 leave some over. 5 × 10 works. 6, 7, 8 and 9 do not, and 10 is already in the chart, so stop: the factors have started to repeat. Is 4 a factor of 50? No, it is not in the chart.

   > **Say:** "I try each number in order, starting with 1. When I reach a factor I already have, I have found them all."

3. **Try it together** (10 min) Pairs make T-charts for 51 and 100: which has more factor pairs? Then they test with a multiplication chart: is 4 a factor of 60? Is 7 a factor of 60?
4. **Practice** (15 min) Students fill the T-charts, test factors and solve the factor-pair puzzles on sheet 2 of Factors and Multiples. Early finishers find a number to 100 with six factor pairs.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.6** and circle a face beside the "I can" line. On question 1, look for 1 × 42, 2 × 21, 3 × 14 and 6 × 7, in any order (one row stays empty); a missing pair usually means a number was skipped. On question 2, look for No for 6 and 92, and Yes for 8 and 56.

Need help? Use a multiplication chart: find the number inside it, and read the row and column for each pair.

Ready for more? Find a number with an odd number of factors. What kind of rectangle does it make?

GET READY

- Multiplication charts
- T-chart templates
- Whiteboards and markers

WORDS TO USE

T-chart: two columns to list factor pairs in order

divisible: splits into equal groups with none left over

factor: a number that divides another with nothing left over

ASK

- Which number do you try next?
- How do you know you have found every pair?
- Is 2 a factor of every even number?

WATCH FOR

Skips numbers and misses a pair. Try every number in order: 1, 2, 3, 4, 5 and so on.

Keeps going past where the factors repeat. Stop when the next number is already in the chart.

Says 4 is a factor of 50 because 50 is even. Even means 2 is a factor. Divide by 4 to check: 2 are left over.

ON ANIMAL MATH

PRINTABLE **Factors and Multiples**: sheet 2

TOOL **Multiplication Chart**: find the number inside the chart

QUIZ **Factors and Multiples Quiz**: the Factor Pairs level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.6

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Factors and Multiples

Lesson 3.7: Multiples

GOAL Students list multiples by skip counting and decide whether a number is a multiple of another: 51 is a multiple of 3 because 3 × 17 = 51.

I can tell if a number is a multiple of another.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) Skip count by 4s to 40 together, clapping on each number. Will we say 50? How do you know?
2. **Teach** (10 min) Shade the multiples of 11 on a hundreds chart: 11, 22, 33 and on. They are the products in the 11s row of the multiplication chart. Is 51 a multiple of 3? Divide or skip count: 3 × 17 = 51, so yes. Is 100 a multiple of 3? 3 × 33 = 99, so 100 is 1 more: no. And since 51 is a multiple of 3, 3 is a factor of 51.

   > **Say:** "A multiple of 3 is a number I say when I count by 3s. If a number divides by 3 with nothing left over, it is a multiple of 3."

3. **Try it together** (10 min) Pairs list the first ten multiples of 3 and of 4 and circle the numbers in both lists. Then they sort number cards into "multiple of 5" and "not a multiple of 5".
4. **Practice** (15 min) Students list and circle multiples on sheet 3 of Factors and Multiples (the shared multiples part is a stretch), with sheet 4 of Arithmetic Patterns as a step back. Early finishers find the smallest number that is a multiple of 2, 3, 4 and 5.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.7** and circle a face beside the "I can" line. On question 1, look for 33, 39, 42 and 48 in the blanks; a wrong blank usually means a jump that did not add 3. On question 2, look for Yes for 84 and 7, and No for 94 and 6; Yes for 94 means every even number was taken as a multiple of 6.

Need help? Color the multiples on a hundreds chart while counting, then look for the number.

Ready for more? Find all the multiples of 6 between 100 and 150.

GET READY

- Hundreds charts and crayons
- Multiplication charts
- Whiteboards and markers

WORDS TO USE

multiple: a number times a whole number: 5, 10 and 15 are multiples of 5

skip count: count on by the same number each time

factor and multiple: 3 is a factor of 51; 51 is a multiple of 3

ASK

- How can you tell if 51 is a multiple of 3 without counting from 3?
- What is the difference between a factor and a multiple?

WATCH FOR

Mixes up factor and multiple. Factors make the number; multiples come from counting by it.

Calls every even number a multiple of 4. Divide to check: 50 ÷ 4 leaves 2 over.

Loses count when skip counting past 100. Use the multiplication chart, or add on paper each time.

ON ANIMAL MATH

- PRINTABLE — **Factors and Multiples**: sheet 3
- PRINTABLE — **Arithmetic Patterns**: sheet 4
- MAKER — **Skip Counting**: Skip Count By 3s or 4s, Starting Number 0, Style Boxes
- TOOL — **Multiplication Chart**: Skip Count Highlight 3s or 4s
- QUIZ — **Factors and Multiples Quiz**: the Multiples level
- EXIT TICKET — **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.7

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Factors and Multiples

Lesson 3.8: Prime and composite numbers

GOAL Students sort numbers as prime (exactly two factors, 1 and itself) or composite (more than two factors) with rectangles and factor pairs, and learn that 1 is neither.

I can tell if a number is prime or composite.

About 45 minutes

THE LESSON

1. **Warm up** (5 min) With tiles, build every rectangle for 11 and for 15. Which number makes only one rectangle?
2. **Teach** (10 min) A number that makes only one rectangle, 1 row, is prime: 11 has the factors 1 and 11 only. A number that makes more is composite: 15 also makes 3 rows of 5, so it has more factors. Test 47: try 2, 3, 4, 5, 6 and 7 rows. None of them uses up the tiles with none left over, so 47 is prime. 1 is neither: it has only one factor.

   > **Say:** "A prime number has exactly two factors. If I find any other factor pair, the number is composite."

3. **Try it together** (10 min) Pairs sort ten number cards into prime, composite and neither, with a factor pair for each composite: 1, 2, 10, 14, 19, 50, 51, 59, 71 and 100.
4. **Practice** (15 min) Students draw rectangles, sort numbers into prime, composite and neither, and show why with a factor pair on sheet 4 of Factors and Multiples. Early finishers color the multiples of 2, 3, 5 and 7 on a hundreds chart, but not those numbers themselves: what is left?
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.8** and circle a face beside the "I can" line. On question 1, look for 17, 31 and 89 circled; circling 95 means only 2 and 3 were tried. On question 2, look for 5 × 17 (17 × 5 is right too); 1 × 85 does not show it is composite.

Need help? Build each number with tiles and try to make a rectangle with more than one row.

Ready for more? Find all the primes between 100 and 110.

GET READY

- Square tiles
- Hundreds charts and crayons
- Whiteboards and markers

WORDS TO USE

prime: a number with exactly two factors: 1 and itself

composite: a number with more than two factors

neither: 1 has only one factor, so it is not prime or composite

ASK

- How many rectangles can you make with 47 tiles?
- What factor pair shows 51 is composite?
- Why is 2 the only even prime?

WATCH FOR

Says every odd number is prime. Test 15 and 51: each has a factor pair besides 1.

Calls 1 prime. A prime has exactly two factors; 1 has only one.

Gives 1 and the number to show a composite. Every number has 1 and itself. Find another pair.

ON ANIMAL MATH

PRINTABLE **Factors and Multiples**: sheet 4

TOOL **Hundreds Chart**: Click a Number To Color It

QUIZ **Factors and Multiples Quiz**: the Prime or Composite level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.8

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Factors and Multiples

Lesson 3.9: Common factors and the GCF

GOAL Students list the factors of two numbers, circle the factors they share (the common factors) and find the greatest one, the greatest common factor.

I can find the greatest common factor.

About 45 minutes

★ Taught in 4th grade in some states

THE LESSON

1. **Warm up** (5 min) List the factors of 12 and of 15. Which numbers are in both lists?
2. **Teach** (10 min) List the factors of 50 and of 70: 1, 2, 5, 10, 25, 50 and 1, 2, 5, 7, 10, 14, 35, 70. Circle the ones in both lists: 1, 2, 5 and 10 are the common factors. The greatest is 10, so the greatest common factor of 50 and 70 is 10. Check: 10 goes into both with nothing left over.

   > **Say:** "Common factors are in both lists. The greatest common factor is the biggest number in both lists."

3. **Try it together** (10 min) Pairs find the greatest common factor of 15 and 100, then of 14 and 70, listing the factors of each and coloring the common ones. Why is the greatest common factor of 14 and 70 the number 14 itself?
4. **Practice** (15 min) Students find common factors and the greatest common factor in the first part of sheet 5 of Factors and Multiples. Its factor trees are a stretch for early finishers.
5. **Exit ticket** (5 min) Students do **Exit Ticket 3.9** and circle a face beside the "I can" line. On question 1, look for 1, 2 and 4; 2 and 4 alone means 1 was left out. On question 2, look for 9 circled; 3 means they stopped at a smaller common factor, and 15 is a factor of 45 but not of 27.

Need help? Write the two factor lists one above the other and color the shared ones.

Ready for more? Find the greatest common factor of three numbers: 12, 64 and 100.

GET READY

- T-chart templates
- Crayons in two colors
- Whiteboards and markers

WORDS TO USE

common factor: a factor two numbers share

greatest common factor: the largest factor two numbers share, the GCF

factor list: every factor of a number, least to greatest

ASK

- Which factors do the two lists share?
- How do you know your GCF is the greatest?
- Is 1 always a common factor?

WATCH FOR

Picks the greatest factor of one number, not a shared one. Circle only the factors that are in both lists.

Misses factors, and so misses the GCF. Make each list with a T-chart so no pair is skipped.

Thinks the GCF is the product of the two numbers. The GCF divides both numbers, so it is never bigger than the smaller one.

ON ANIMAL MATH

PRINTABLE **Factors and Multiples**: sheet 5

QUIZ **Factors and Multiples Quiz**: the Factor Pairs level

EXIT TICKET **4th Grade Factors and Multiples Exit Tickets**: Exit Ticket 3.9

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