

× and ÷ Facts

Unit 3 Overview: 11 lessons

Students learn the rest of the facts, each family with a strategy that leans on a fact they already know: the 3s as 2 groups and 1 more, the 4s as double the 2s, the 6s as 5 groups and 1 more, the 7s as the 5s and the 2s, the 8s as double the 4s and the 9s as 10 groups minus 1. They break a fact apart with an array, group three factors to make a 10, and divide by thinking of the times fact. The unit ends with the facts from memory. Ask “which fact do you know that is close?” every day. Lesson 3.11 (facts with 11 and 12) is for the states that teach it in 3rd grade.

THE UNIT, DAY BY DAY

Day 1	Pre-Check	What students already know, before the first lesson.
Day 2	3.1 Multiply and divide by 3	I can multiply and divide by 3.
Day 3	3.2 Double the 2s to multiply by 4	I can double a 2s fact to multiply by 4.
Day 4	3.3 Break apart to multiply	I can break a fact apart into two facts I know.
Day 5	3.4 Multiply by 6 with 5 groups and 1 more	I can use 5 groups and 1 more group to multiply by 6.
Day 6	3.5 Multiply and divide by 7	I can multiply and divide by 7.
Day 7	3.6 Double the 4s to multiply by 8	I can double a 4s fact to multiply by 8.
Day 8	3.7 Multiply by 9 with 10 groups minus 1	I can use 10 groups minus 1 group to multiply by 9.
Day 9	3.8 Group three factors	I can group three factors to make multiplying easier.
Day 10	3.9 Multiplication facts from memory	I can say multiplication facts from memory.
Day 11	3.10 Division facts from memory	I can say division facts from memory.
Day 12	3.11 Facts with 11 and 12 ★	I can multiply and divide with 11 and 12.
Day 13	Unit Review	The review, to go over together.
Day 14	Unit Test	Form A; Form B (other numbers) is for a retest.

★ Taught in 3rd 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 or counters, and grid paper with crayons for each pair
- Multiplication charts, fact cards for every family, and fact triangle cards
- Whiteboards with dry erase markers, and sticky notes
- A card for each student to keep facts I know and facts to practice

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



× and ÷ Facts

Lesson 3.1: Multiply and divide by 3

GOAL Students multiply by 3 as 2 groups and 1 more group, count by 3s, and divide by 3 by thinking of the 3s fact.

About 45 minutes

I can multiply and divide by 3.

THE LESSON

- 1 Warm up** (5 min) Count by 3s together to 24, clapping on each number. Then count by 2s to 20. Which numbers did we say both times?
- 2 Teach** (10 min) Build 3 rows of 6 tiles. Cover the last row: 2 rows of 6 is the double, 12. Uncover it and add one more 6: $12 + 6 = 18$, so $3 \times 6 = 18$. Do 3×4 the same way: $8 + 4 = 12$. To divide by 3, think of the 3s fact: $9 \div 3$ asks what times 3 is 9. Then $3 \times \square = 18$ asks how many 3s make 18.
Say: "Times 3 is the double and one more group. To divide by 3, think: 3 times what?"
- 3 Try it together** (10 min) Color the 3s row on a multiplication chart and count it aloud. Partners take turns: one names a 3s fact like 3×2 or 3×6 , the other finds it as the double and one more group. Then they solve $6 \div 3$ and $3 \times \square = 12$.
- 4 Practice** (15 min) Students use 2 groups and 1 more group on the arrays of sheet 1 of Multiplication Fact Strategies, then answer its division facts. Early finishers answer 3s facts from the Math Fact Drills maker.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.1** and circle a face beside the "I can" line. Look for 9, 12, 18, 21, 27 and 30 in the count, then 12, 10, 7 and 15 in the boxes. A count that skips a 3 or adds 2 shows the step got lost; 7 for $3 \times \square = 21$ is right, while 63 multiplied the two numbers it saw.

Need help? Build the double with tiles first, then add one more row, saying the double and the new total aloud.

Ready for more? Use the 3s to find 30×3 and 3×20 : what pattern helps?

GET READY

- Square tiles or counters for each pair
- Multiplication charts and crayons
- Whiteboards and markers

WORDS TO USE

factor: a number you multiply

product: the answer when you multiply

2 groups and 1 more: 3 groups is the double and one more group

ASK

- How does the double help with times 3?
- What times 3 makes 12?
- Where do you see the 3s on the chart?

WATCH FOR

Adds 3 to the factor: $3 \times 6 = 9$. Build it: 3 rows of 6 tiles, then count the rows and how many in each.

Loses the count while skip counting by 3s. Count on fingers, one finger for each 3, and stop at the factor.

Multiplies when dividing: $9 \div 3 = 27$. Ask: what times 3 makes 9? The answer is smaller than 9.

ON ANIMAL MATH

PRINTABLE

Multiplication Fact Strategies: sheet 1

MAKER

Mixed Math Fact Drills: Multiplication and Division, Times Tables: 3s

TOOL

Multiplication Chart: Skip Count Highlight 3s

QUIZ

Multiplication Quiz: the 3s and 4s level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.1

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Lesson 3.2: Double the 2s to multiply by 4

GOAL Students multiply by 4 by doubling the 2s fact (4 groups is 2 groups and 2 groups again) and divide by 4 by thinking of the 4s fact.

About 45 minutes

I can double a 2s fact to multiply by 4.

THE LESSON

- 1 Warm up** (5 min) Double these quickly on whiteboards: 5, 10, 3 and 12. Then write the 2s fact for each double.
- 2 Teach** (10 min) Build 4 rows of 5 tiles and lay a paper strip across the middle: 2 rows of 5 on top, 2 rows of 5 below. $2 \times 5 = 10$, so 4×5 is double 10: $10 + 10 = 20$. Do 4×3 : $2 \times 3 = 6$, and $6 + 6 = 12$. Show $4 \times 10 = 20 + 20 = 40$. To divide by 4, think of the 4s fact: $20 \div 4$ asks what times 4 is 20.
| Say: "Times 4 is double the 2s. Find the 2s fact, then double it."
- 3 Try it together** (10 min) Partners build a 4s fact with tiles, split it with a paper strip and write the 2s fact and the double. Use 4×2 , 4×5 and 4×10 , then 4×1 . For each one, the partner writes the division fact that goes with it, like $40 \div 4$.
- 4 Practice** (15 min) Students double the 2s on the arrays of sheet 2 of Multiplication Fact Strategies and answer its division facts, then practice the 4s table on sheet 5 of Multiplication Fact Drills.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.2** and circle a face beside the "I can" line. Look for $2 \times 8 = 16$ and $4 \times 8 = 16 + 16 = 32$, then 6, 7, 9 and 4 in the boxes. A student who writes 18 for 4×8 added 2 instead of doubling; 28 in the box of $\square \times 4 = 28$ copied the product.

Need help? Build the 2s fact with tiles, then build it again under it and count both.

Ready for more? Double the 4s to find the 8s: if $4 \times 5 = 20$, what is 8×5 ?

GET READY

- Square tiles for each pair
- Paper strips to fold in half
- Whiteboards and markers

WORDS TO USE

double: twice as many; 2 groups of the same number

halves: two equal parts: 4 rows split into 2 rows and 2 rows

related fact: a times fact with the same numbers as a division fact

ASK

- What is the 2s fact inside this 4s fact?
- How do you double 10?
- What times 4 makes 40?

WATCH FOR

Doubles the wrong number: doubles the factor, not the 2s product. Write the 2s fact first, then double its product.

Adds 2 to the 2s fact instead of doubling. Fold the array: the two halves are the same, so add the 2s product to itself.

Cannot double a two-digit number. Double the tens, double the ones, then add.

ON ANIMAL MATH

PRINTABLE

Multiplication Fact Strategies: sheet 2

PRINTABLE

Multiplication Fact Drills: sheet 5

MAKER

Mixed Math Fact Drills: Multiplication and Division, Times Tables: 4s

QUIZ

Multiplication Quiz: the 3s and 4s level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.2

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Lesson 3.3: Break apart to multiply

GOAL Students break a hard fact apart into two facts they know: they split an array with a line, find each part and add ($9 \times 8 = 9 \times 5 + 9 \times 3$).

About 45 minutes

I can break a fact apart into two facts I know.

THE LESSON

- 1 Warm up** (5 min) Quick facts on whiteboards: 9×5 , 9×3 and 3×10 . Which of these do you know fast?
- 2 Teach** (10 min) Draw 9 rows of 8 squares on grid paper. Draw a line after the fifth column: 9 rows of 5 on the left, 9 rows of 3 on the right. $9 \times 5 = 45$ and $9 \times 3 = 27$, so $9 \times 8 = 45 + 27 = 72$. Then break 3×12 apart into 3×10 and 3×2 : $30 + 6 = 36$. Breaking at 5 or at 10 works well because those facts are easy.
Say: "Break the hard fact into two facts you know. Find each part, then add the parts."
- 3 Try it together** (10 min) Partners draw 4 rows of 9 on grid paper, choose where to draw the line, and write the two facts and the sum. Compare: did everyone split it the same way? Do all the ways give the same product?
- 4 Practice** (15 min) Students find both parts and add on sheet 1 of Break Apart to Multiply, then draw their own lines on sheet 2. Early finishers fill in the blanks on sheet 4.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.3** and circle a face beside the "I can" line. Look for $6 \times 5 = 30$, $6 \times 2 = 12$ and $6 \times 7 = 30 + 12 = 42$, then 4 in the box. A student who writes 42 in a part box skipped the parts; 2 in the box split the 7 ($5 + 2$) instead of the 9 ($5 + 4$).

Need help? Cut the array apart along the line with scissors, count each part, then put them back together.

Ready for more? Break 6×16 apart into 6×10 and 6×6 .

GET READY

- Grid paper, crayons and a ruler for each student
- Square tiles
- Whiteboards and markers

WORDS TO USE

break apart: split a factor into two smaller numbers

part: one piece of the array after the split

add the parts: the two parts together make the whole array

ASK

- Where will you draw the line? Why there?
- What are the two facts you know?
- How do you know the parts add to the whole?

WATCH FOR

Splits the rows and the columns at once. Draw one line only, so there are just two parts.

Adds the factors instead of the parts: $5 + 3$. Write each part as a fact, find its product, then add the products.

Breaks the factor into numbers that do not add up to it. Check: 5 and 3 must make 8.

ON ANIMAL MATH

PRINTABLE

Break Apart to Multiply: sheets 1-2

PRINTABLE

Break Apart to Multiply: sheet 4, for early finishers

MAKER

Multiplication Arrays: Equation Type Multiplication, Maximum Factor Up to 10

QUIZ

Multiplication Quiz: the 6s to 9s level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.3

× and ÷ Facts

Lesson 3.4: Multiply by 6 with 5 groups and 1 more

GOAL Students multiply by 6 as 5 groups and 1 more group ($6 \times 4 = 5 \times 4 + 4$) and divide by 6 by thinking of the 6s fact. **About 45 minutes**

I can use 5 groups and 1 more group to multiply by 6.

THE LESSON

- 1 Warm up** (5 min) Count by 5s to 50 on fingers. Then answer 5×4 , 5×3 and 5×10 .
- 2 Teach** (10 min) Build 6 rows of 4 tiles. Cover the last row: 5 rows of 4 is 20. Uncover it and add one more 4: $20 + 4 = 24$, so $6 \times 4 = 24$. Do 6×3 the same way: $15 + 3 = 18$, and $6 \times 10 = 50 + 10 = 60$. To divide by 6, think of the 6s fact: $24 \div 6$ asks what times 6 is 24.
| **Say:** "Times 6 is the 5s fact and one more group."
- 3 Try it together** (10 min) Partners take cards for 6×1 , 6×4 and 6×10 . One finds the 5s fact, the other adds one more group, and they write the whole fact. Then each writes the division fact that goes with it, like $18 \div 6$.
- 4 Practice** (15 min) Students use 5 groups and 1 more group on the arrays of sheet 3 of Multiplication Fact Strategies and answer its division facts, then practice the 6s on sheet 5 of Halloween Multiplication Drills and sheet 5 of Halloween Division Drills.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.4** and circle a face beside the "I can" line. Look for $5 \times 7 = 35$ and $6 \times 7 = 35 + 7 = 42$, then 8, 54, 30 and 2. A student who writes 36 added 1 instead of one more group of 7; 48 in the box of $6 \times \square = 48$ copied the product.

Need help? Build the 5s fact with tiles in one color and the extra group in another, then count all of it.

Ready for more? Find 6×12 as 5×12 and one more group of 12.

GET READY

- Square tiles or counters for each pair
- Multiplication charts
- Whiteboards and markers

WORDS TO USE

5 groups and 1 more: 6 groups is the 5s fact and one more group

quotient: the answer when you divide

times 6: six groups of a number

ASK

- What is the 5s fact inside this 6s fact?
- How big is one more group?
- What times 6 makes 60?

WATCH FOR

Adds 1 instead of one more group: $6 \times 4 = 21$. Uncover the last row of tiles: it holds 4, not 1.

Uses 5 groups and stops. Count the rows: 6 rows need one more group.

Divides by 6 by guessing. Count by 6s on fingers until you reach the number.

ON ANIMAL MATH

- PRINTABLE** **Multiplication Fact Strategies:** sheet 3
- PRINTABLE** **Halloween Multiplication Drills:** sheet 5
- PRINTABLE** **Halloween Division Drills:** sheet 5
- MAKER** **Mixed Math Fact Drills:** Multiplication and Division, Times Tables: 6s
- QUIZ** **Multiplication Quiz:** the 6s to 9s level
- EXIT TICKET** **3rd Grade Multiplication and Division Facts Exit Tickets:** Exit Ticket 3.4

× and ÷ Facts

Lesson 3.5: Multiply and divide by 7

GOAL Students multiply by 7 as the 5s fact and the 2s fact (7 groups is 5 groups and 2 groups), divide by 7 by thinking of the 7s fact, and write a 7s fact family.

About 45 minutes

I can multiply and divide by 7.

THE LESSON

- 1 Warm up** (5 min) Quick facts on whiteboards: 5×3 , 2×3 , 5×6 and 2×6 . Add each pair of products.
- 2 Teach** (10 min) Build 7 rows of 3 tiles. Draw a line under the fifth row: 5 rows of 3 is 15, and 2 rows of 3 is 6. $15 + 6 = 21$, so $7 \times 3 = 21$. Do 7×5 : $25 + 10 = 35$. Then write a fact triangle with 7, 10 and 70 and its four facts: $7 \times 10 = 70$, $10 \times 7 = 70$, $70 \div 10 = 7$ and $70 \div 7 = 10$. To divide by 7, think: $56 \div 7$ asks what times 7 is 56.
Say: "Times 7 is the 5s and the 2s added together. To divide by 7, think: 7 times what?"
- 3 Try it together** (10 min) Partners take a triangle card with 7, 2 and 14 and write the fact family, then one with 7, 7 and 49: why does it have only two facts? Then they find 7×5 as the 5s and the 2s, and $49 \div 7$ by thinking of the 7s.
- 4 Practice** (15 min) Students break 7 into 5 and 2 on the arrays of sheet 4 of Multiplication Fact Strategies, then write fact families on sheet 1 of Multiplication and Division Fact Families. Early finishers practice the 7s on sheet 6 of Halloween Multiplication Drills.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.5** and circle a face beside the "I can" line. Look for 56 and 42 in the boxes, then $7 \times 9 = 63$, $9 \times 7 = 63$, $63 \div 7 = 9$ and $63 \div 9 = 7$ in any order. A student who writes $63 \div 9 = 9$ mixed up the divisor and the quotient; 15 for 8×7 added the factors.

Need help? Build the 7s fact with 5 rows in one color and 2 rows in another, then count each color.

Ready for more? Write the fact family for 7, 12 and 84.

ON ANIMAL MATH

PRINTABLE Multiplication Fact Strategies: sheet 4

PRINTABLE Multiplication and Division Fact Families: sheet 1

PRINTABLE Halloween Multiplication Drills: sheet 6, for early finishers

MAKER

Mixed Math Fact Drills: Multiplication and Division, Times Tables: 7s

QUIZ

Division Quiz: the Divide by 3 to 9 level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.5

GET READY

- Square tiles or counters for each pair
- Fact triangle cards
- Whiteboards and markers

WORDS TO USE

fact family: the times and division facts made from the same three numbers

5s and 2s: 7 groups is 5 groups and 2 more groups

divisor: the number you divide by

ASK

- How do the 5s and the 2s help with times 7?
- Which three numbers are in this family?
- What times 7 makes 70?

WATCH FOR

Writes a family fact like $3 \div 21$. The biggest number goes first in a division fact: it is the whole.

Forgets to add the two parts. Point to both parts of the array: the product counts them all.

Mixes up 7s and 8s products near 50. Check with the 5s and 2s: 7×7 is 35 and 14.

× and ÷ Facts

Lesson 3.6: Double the 4s to multiply by 8

GOAL Students multiply by 8 by doubling the 4s fact (8 groups is 4 groups and 4 groups again) and divide by 8 by thinking of the 8s fact.

About 45 minutes

I can double a 4s fact to multiply by 8.

THE LESSON

- 1 Warm up** (5 min) Double the 4s on whiteboards: double 12, double 20, double 40. Which 4s facts gave 12, 20 and 40?
- 2 Teach** (10 min) Build 8 rows of 3 tiles. Lay a strip across the middle: 4 rows of 3 on top, 4 rows of 3 below. $4 \times 3 = 12$, so $8 \times 3 = 12 + 12 = 24$. Do 8×5 : $4 \times 5 = 20$, and $20 + 20 = 40$. A 2s fact can be doubled twice: $2 \times 3 = 6$, then 12, then 24. To divide by 8, think: $40 \div 8$ asks what times 8 is 40.
| Say: "Times 8 is double the 4s. Find the 4s fact, then double it."
- 3 Try it together** (10 min) Partners take cards for 8×1 , 8×5 and 8×10 . One writes the 4s fact, the other doubles it, and they check by doubling three times from the 2s. Then they write the division fact for each, like $80 \div 8$.
- 4 Practice** (15 min) Students double the 4s on the arrays of sheet 5 of Multiplication Fact Strategies and answer its division facts, then practice the 8s table on sheet 6 of Multiplication Fact Drills and the 8s on sheet 6 of Halloween Division Drills.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.6** and circle a face beside the "I can" line. Look for $4 \times 7 = 28$ and $8 \times 7 = 28 + 28 = 56$, then 9, 32, 48 and 2. A student who writes 32 for 8×7 added 4 to the 4s fact; 4 in the box of $\square \div 8 = 4$ copied the quotient.

Need help? Write the 2s, 4s and 8s facts in a ladder for one number, each one double the one above.

Ready for more? Double the 8s to find the 16s: what is 16×3 ?

GET READY

- Square tiles for each pair
- Paper strips
- Whiteboards and markers

WORDS TO USE

double: twice as many

double, double, double: 8 is 2 doubled, doubled again: 2, 4, 8

times 8: eight groups of a number

ASK

- What is the 4s fact inside this 8s fact?
- How do you double 20?
- What times 8 makes 80?

WATCH FOR

Doubles the 2s fact once and stops. Count the doubles: 2s, then 4s, then 8s.

Makes a mistake doubling a two-digit number. Double the tens, double the ones, then add.

Divides the wrong way: $8 \div 40$. Read it as how many 8s fit in 40.

ON ANIMAL MATH

PRINTABLE Multiplication Fact Strategies: sheet 5

PRINTABLE Multiplication Fact Drills: sheet 6

PRINTABLE Halloween Division Drills: sheet 6

MAKER

Mixed Math Fact Drills: Multiplication and Division, Times Tables: 8s

QUIZ

Multiplication Quiz: the 6s to 9s level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.6

× and ÷ Facts

Lesson 3.7: Multiply by 9 with 10 groups minus 1

GOAL Students multiply by 9 as 10 groups minus 1 group ($9 \times 3 = 30 - 3$), see the 9s pattern, and divide by 9 by thinking of the 9s fact.

About 45 minutes

I can use 10 groups minus 1 group to multiply by 9.

THE LESSON

- 1 Warm up** (5 min) Quick 10s facts on whiteboards: 10×3 , 10×5 and 10×1 . Then take away 3, 5 and 1 from each product.
- 2 Teach** (10 min) Build 10 rows of 3 tiles: 30. Take away one row of 3: $30 - 3 = 27$, so $9 \times 3 = 27$. Do 9×5 : $50 - 5 = 45$. Color the 9s on a multiplication chart: the tens digit goes up by 1 and the ones digit goes down by 1, and the digits always add to 9. To divide by 9, think: $45 \div 9$ asks what times 9 is 45.
| Say: "Times 9 is the 10s fact take away one group."
- 3 Try it together** (10 min) Partners take cards for 9×1 , 9×3 and 9×5 . One writes the 10s fact, the other takes away one group, and they check that the digits add to 9. Then they write the division fact for each, like $27 \div 9$.
- 4 Practice** (15 min) Students take one group away from the 10s fact on sheet 6 of Multiplication Fact Strategies, count by 9s and find the pattern, then practice dividing by 9 on sheet 6 of Division Fact Drills.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.7** and circle a face beside the "I can" line. Look for $10 \times 9 = 90$ and $9 \times 9 = 90 - 9 = 81$, then 4, 63, 54 and 2. A student who writes 89 took away 1 instead of one group of 9; 36 in the box of $\square \times 9 = 36$ copied the product.

Need help? Build the 10s fact with tiles, then slide one row away and count what is left.

Ready for more? Use 10 groups minus 1 to find 9×12 and 9×20 .

GET READY

- Square tiles for each pair
- Multiplication charts and crayons
- Whiteboards and markers

WORDS TO USE

10 groups minus 1: 9 groups is the 10s fact take away one group

pattern: something that repeats or grows the same way

digits: the numerals that make up a number, like the 3 and the 6 in 36

ASK

- What is the 10s fact? What group do you take away?
- Do the digits of your product add to 9?
- What times 9 makes 45?

WATCH FOR

Takes away 1 instead of one group: $9 \times 3 = 29$. Take away one row of tiles: it has 3, not 1.

Takes away 9 instead of the group size. Say it: 10 groups of 3, take away a group of 3.

Uses the digit pattern on a fact past the 9s table, like 9×12 . The pattern works for the 9s facts to 10 groups only.

ON ANIMAL MATH

PRINTABLE Multiplication Fact Strategies: sheet 6

PRINTABLE Division Fact Drills: sheet 6

MAKER Mixed Math Fact Drills: Multiplication and Division, Times Tables: 9s

TOOL Multiplication Chart: Skip Count Highlight 9s

QUIZ Multiplication Quiz: the 6s to 9s level

EXIT TICKET 3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.7

× and ÷ Facts

Lesson 3.8: Group three factors

GOAL Students multiply three factors by grouping two of them first, and see that the product stays the same whichever two they group: $(5 \times 5) \times 2 = 5 \times (5 \times 2)$.

About 45 minutes

I can group three factors to make multiplying easier.

THE LESSON

- 1 **Warm up** (5 min) Which pairs make 10? Students write as many as they can: 2×5 , 5×2 , 10×1 , 1×10 .
- 2 **Teach** (10 min) Write $5 \times 5 \times 2$. Group the first two: $(5 \times 5) \times 2 = 25 \times 2$, a double: 50. Group the last two: 5×2 makes 10, and $5 \times 10 = 50$. Both ways are 50, and the 10 made it easier. Then show $2 \times 2 \times 6$ with cubes: towers of 2 cubes, 2 towers a group, 6 groups. $(2 \times 2) \times 6 = 4 \times 6 = 24$, and $2 \times (2 \times 6) = 2 \times 12 = 24$.
Say: "Look for two factors that make 10 or an easy fact. Multiply those first."
- 3 **Try it together** (10 min) Partners take cards like $6 \times 2 \times 3$, $2 \times 3 \times 7$ and $4 \times 5 \times 5$. One multiplies the first two first, the other groups a different pair, and they check that the products match. Then they circle the easier way.
- 4 **Practice** (15 min) Students find both sides of each grouping on sheet 2 of Properties of Operations and circle the easier way, then use the properties on sheet 5.
- 5 **Exit ticket** (5 min) Students do **Exit Ticket 3.8** and circle a face beside the "I can" line. Look for $(2 \times 2) \times 9 = 4 \times 9 = 36$ and $2 \times (2 \times 9) = 2 \times 18 = 36$, then 18 and 32. A student who gets two different products for the same factors made a fact mistake; 8 or 10 added the factors.

Need help? Build the problem with cubes: towers for the first fact, then copies of the towers for the third factor.

Ready for more? Find $3 \times 4 \times 5 \times 2$ in the easiest order you can.

GET READY

- Square tiles or cubes for each pair
- Whiteboards and markers
- Cards with three factors

WORDS TO USE

group: put two factors in parentheses to multiply them first

parentheses: the marks () that show what to do first

grouping property: changing which two you multiply first does not change the product

ASK

- Which two factors will you multiply first? Why?
- Did both ways give the same product?
- Can you find two factors that make 10?

WATCH FOR

Adds the three factors. Read the times signs aloud: times, times.

Multiplies only two of the factors and stops. Cross off each factor as it is used; all three must be crossed off.

Thinks the product changes when the grouping changes. Build both ways with cubes and count.

ON ANIMAL MATH

PRINTABLE

Properties of Operations: sheets 2 and 5

QUIZ

Multiplication Quiz: the All Facts level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.8

× and ÷ Facts

Lesson 3.9: Multiplication facts from memory

GOAL Students practice the multiplication facts until they know them from memory, sort the facts they know fast from the ones to practice, and use a strategy for a slow fact.

About 45 minutes

I can say multiplication facts from memory.

THE LESSON

- 1 Warm up** (5 min) Fact flash: show cards for 3 seconds each (8×6 , 9×6 , 6×5 , 3×3). Students write the products on whiteboards.
- 2 Teach** (10 min) Show the multiplication chart. Color the facts the class knows well: the 0s, 1s, 2s, 5s and 10s. Every fact has a turn-around, so half the chart is already known. For a slow fact, pick a strategy: 8×6 is 8×5 and one more 8, 9×6 is 10×6 take away 6, and 3×6 is the double and one more group.
| Say: "Know it fast, or use a strategy. Then practice it until it is fast."
- 3 Try it together** (10 min) Partners play fact flip: one flips a card, the other says the product. A fact answered in 3 seconds goes in the know pile; a slow one goes in the practice pile with the strategy said aloud. Then they write their practice facts on their facts card.
- 4 Practice** (15 min) Students race the clock on sheets 1 and 2 of Multiplication Fact Drills, then solve the crossword on sheet 1 of Multiplication Crossword to 50.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.9** and circle a face beside the "I can" line. Look for 48, 72, 36, 35, 21 and 24, then 8 and 9 in the boxes. A near product (49 for 6×8) shows a fact still to practice; 24 for 7×3 shows a slip while counting by 3s.

Need help? Practice one times table at a time on the maker before mixing them.

Ready for more? Time yourself on 30 mixed facts and try to beat your time tomorrow.

GET READY

- A deck of multiplication fact cards for each pair
- A facts card for each student: facts I know and facts to practice
- Multiplication charts for checking

WORDS TO USE

fluent: knowing a fact fast without counting

strategy: a way to find a fact you do not know yet

turn-around fact: the same factors the other way round: 2×9 and 9×2

ASK

- Which facts do you know fast now?
- What strategy helps with your slowest fact?
- What is the turn-around of 2×9 ?

WATCH FOR

Counts on fingers for every fact. Pick two practice facts a day and say them with their strategy.

Mixes up facts with close products, like 7×8 and 9×6 . Practice them side by side and say the strategy for each.

Rushes and writes a near product. Check one fact with its strategy after the race.

ON ANIMAL MATH

PRINTABLE

Multiplication Fact Drills: sheets 1-2

PRINTABLE

Multiplication Crossword to 50: sheet 1

MAKER

Multiplication Fact Drills: Times Tables: All Facts to 10×10

QUIZ

Multiplication Quiz: the All Facts level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.9

× and ÷ Facts

Lesson 3.10: Division facts from memory

GOAL Students practice the division facts until they know them from memory by thinking of the multiplication fact, and find the missing number in a division fact.

About 45 minutes

I can say division facts from memory.

THE LESSON

- 1 Warm up** (5 min) Show a triangle card with 6, 3 and 18. Students write the two division facts: $18 \div 6 = 3$ and $18 \div 3 = 6$.
- 2 Teach** (10 min) Write $45 \div 9 = ?$ and under it $? \times 9 = 45$. Five 9s make 45, so $45 \div 9 = 5$. A box can be anywhere in the fact: in $\square \div 9 = 5$, the box is the dividend: $5 \times 9 = 45$, so the box is 45. In $45 \div \square = 5$, the box is the divisor: $5 \times 9 = 45$, so the box is 9.
Say: "To divide, think multiplication. The quotient is the missing factor."
- 3 Try it together** (10 min) Partners play fact flip with division cards: one flips, the other says the times fact and the quotient. Then they solve $50 \div \square = 5$ and $\square \div 9 = 3$ on whiteboards and check with a times fact.
- 4 Practice** (15 min) Students race the clock on sheets 1 and 2 of Division Fact Drills, then color sheet 4 of Mystery Pictures: Math Facts.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.10** and circle a face beside the "I can" line. Look for 9, 6, 7, 8, 5 and 2, then 7 and 42 in the boxes. A student who writes 64 for $56 \div \square = 8$ added the numbers, and 8 copied the quotient; 13 for $\square \div 6 = 7$ added them too.

Need help? Keep a multiplication chart beside the cards: find the divisor row and slide along to the dividend.

Ready for more? Write three division facts with a quotient of 7 and three with a divisor of 9.

GET READY

- A deck of division fact cards for each pair
- Fact triangle cards
- Multiplication charts for checking

WORDS TO USE

dividend: the number being divided

divisor: the number you divide by

think multiplication: turn a division fact into a times fact

ASK

- What times fact helps with this division?
- Is the box the dividend, the divisor or the quotient?
- How can you check your quotient?

WATCH FOR

Answers with the dividend or the divisor. Say the times fact aloud and find the missing factor.

Divides when the box is the dividend. The dividend is the biggest number: multiply to find it.

Mixes up facts like $24 \div 4$ and $24 \div 6$. Check by multiplying the quotient and the divisor.

ON ANIMAL MATH

PRINTABLE

Division Fact Drills: sheets 1-2

PRINTABLE

Mystery Pictures: Math Facts: sheet 4

MAKER

Division Fact Drills: Times Tables: All Facts to 10×10

QUIZ

Division Quiz: the All Facts level

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.10

× and ÷ Facts

Lesson 3.11: Facts with 11 and 12

GOAL Students multiply by 11 and 12: the 11s up to 99 repeat the digit, and a 12s fact breaks apart into the 10s fact and the 2s fact ($12 \times 3 = 30 + 6$).

I can multiply and divide with 11 and 12.

About 45 minutes

★ Taught in 3rd grade in some states

THE LESSON

- 1 Warm up** (5 min) Quick 10s and 2s facts on whiteboards: 10×3 and 2×3 , then 10×5 and 2×5 . Add each pair.
- 2 Teach** (10 min) Draw 12 rows of 3 on grid paper and a line under the tenth row: $10 \times 3 = 30$ and $2 \times 3 = 6$, so $12 \times 3 = 36$. Then $12 \times 2 = 20 + 4 = 24$. Show the 11s on the chart: $11 \times 2 = 22$, $11 \times 3 = 33$, $11 \times 5 = 55$; up to 99 the digit repeats. 11×10 is 110, and 11×11 is 10 groups of 11 and one more: 121. To divide, think of the fact: $36 \div 12$ asks what times 12 is 36.
Say: "Times 12 is the 10s and the 2s. Times 11 repeats the digit up to 99."
- 3 Try it together** (10 min) Partners take cards for 12×1 , 12×10 and 11×7 . One breaks 12 into 10 and 2 or says the 11s pattern, the other checks on the chart. Then they solve $24 \div 12$ and $55 \div 11$.
- 4 Practice** (15 min) Students write the facts for the arrays on sheet 5 of Multiplication Arrays to 12, where 5 of the 9 arrays have an 11 or a 12, and then the 11s and 12s on sheets 2 and 3, which mix in other facts. Then they practice on a Math Fact Drills sheet from the maker.
- 5 Exit ticket** (5 min) Students do **Exit Ticket 3.11** and circle a face beside the "I can" line. Look for $10 \times 6 = 60$, $2 \times 6 = 12$ and $12 \times 6 = 60 + 12 = 72$, then 99 and 4. A student who writes 62 broke 12 apart but added 2 instead of 2×6 ; 90 for 11×9 is 10 nines without the one more 9.

Ready for more? Find 12×12 two ways: as 12×10 and 12×2 , and as 10×12 and 2×12 .

GET READY

- Square tiles and grid paper for each pair
- Multiplication charts to 12×12
- Whiteboards and markers

WORDS TO USE

break apart: split 12 into 10 and 2

repeat: the 11s up to 99 write the digit twice: 11×3 is 33

12s: the 10s and the 2s added together

ASK

- What two facts make a 12s fact?
- Why does 11×5 have two 5s?
- What times 12 makes 24?

WATCH FOR

Uses the repeating digit for 11×12 . The pattern stops at 99: break 12 apart instead.

Adds 2 instead of 2 groups. Point to the 2 rows under the line: each has the whole factor.

Breaks 12 into 1 and 2: $12 \times 3 = 3 + 6$. The 1 in 12 is a ten: 10 rows of 3 above the line, then 2 rows.

Need help? Build the 10s and the 2s with tiles in two colors before writing the facts.

ON ANIMAL MATH

PRINTABLE

Multiplication Arrays to 12: sheets 5, 2 and 3

MAKER

Multiplication Arrays: Equation Type Multiplication, Maximum Factor Up to 12

MAKER

Mixed Math Fact Drills: Multiplication and Division, Times Tables: 11s or 12s

TOOL

Multiplication Chart: Table Size 12×12

EXIT TICKET

3rd Grade Multiplication and Division Facts Exit Tickets: Exit Ticket 3.11