Third—Fourth Grade Lesson Sequence
(66 Lessons)

Patterns and Connections

Lesson Two Learn to relate A-B patterns to materials. Students create and share A-B patterns. Students also learn to check their neighbors to ensure that everybody understands.
- Topic Pattern Blocks and A-A-B.
- Topic Power Blocks and A-A-B.
- Topic Pattern Blocks and A-A-A-B.
- Topic Power Blocks and A-A-A-B.
- Topic Other materials and A-B patterns.

Lesson Three Learn how to record patterns. Students record patterns and use the recordings of others to reproduce and extend the patterns.
- Topic Pattern Block A-B patterns recorded.
- Topic Pattern Block A-B patterns copied and extended.
- Topic Power Block A-B patterns recorded.
- Topic Power Block A-B patterns copied and extended.

Lesson Four Learn to look for patterns in numbers. Students look at number charts for patterns and describe the patterns they see.
- Topic 00-99 matrix.
- Topic 10 X 10 multiplication matrix.
- Topic Pascal's triangle.

Beginning Number

Lesson Two Learn to look for patterns in the counting numbers. We post numbers for students to search for patterns.
- Topic Search the numbers from 0 to 100 for patterns.
- Topic Look at the 00-99 matrix once again.

Lesson Four Learn the fiveness of five. We surround our students with the concept of numbers from three to as far as we decide to go.
- Topic 3 with wooden cubes.
- Topic 4 with wooden cubes.
- Topic 5 and more with wooden cubes.

Lesson Five Record the number concepts learned in Lesson Four.
- Topic Recording 3 with wooden cubes.
- Topic Recording 4 with wooden cubes.
- Topic Recording 5 and more with wooden cubes.

Lesson Seven Learn the families of addition facts. Students look for ways to make number combinations with Unifix Cubes using two different sets of rules.
- Topic The first set of rules leads to flash cards that go home.
- Topic Creating number combinations with Unifix Cubes and Rule One.
- Topic Creating flash cards to accompany Rule One.
- Topic Explore number patterns with Unifix Cubes and Rule Two.

Lesson Eight Learn to link number to area. Learn to prove answers found. Students prove Power Block areas before creating shapes on their geoboards and proving areas of their created shapes. Adds to the wooden cube experiences from Lessons Four and Five. Provides more beginning number experiences for the older child.
- Topic Power Block S-1 square has an area of one, what are the areas of all the other shapes?
- Topic Geoboards—ways to make 2, without then with recording.
- Topic Reviewing other people's "2's".
- Topic Ways to make 3.
- Topic Ways to make 4 or more, while proving areas found.

Sorting, Classifying, Expanding Language

Lesson One Learn to sort by attributes. Students sort objects into groups in a variety of ways. Teacher or students list the ways.

- Topic Each new material produces a variation of the basic lesson.
- Topic Sorting buttons, making lists.
- Topic Sorting keys, making lists.
- Topic Sorting whatever else is available in quantity.
- Topic Students trade lists and add to others' written lists.

Lesson Two Learn to be aware of attributes everywhere. Students take sorting walks to learn to see what is already there.

- Topic Sorting walks. Students keep written lists of what is seen.
- Topic Each walk taken is a different topic.

Lesson Three Use sorting and classification knowledge to create informal definitions of words. We sort shapes, words, or objects as students create definitions for the sorts.

- Topic We use this lesson when we have a definition we wish to teach.
- Topic Shapes—quadrilaterals, triangles, squares, etc.
- Topic Nouns, verbs, prepositions, adjectives, etc.
- Topic What other definitions might we choose to use?

Lesson Five Learn to see the attributes in ourselves. Students describe themselves using attributes that define them as unique. For students who can write, we read their descriptions aloud.

- Topic Students descriptions of themselves are read aloud.
- Topic Each new set of descriptions is a separate topic.

Lesson Six Learn the process of using individual attributes to categorize. Students use their attributes to develop categories that uniquely describe everyone in class.

- Topic The teacher leads the class in sorting itself into successively smaller sub-categories.
- Topic New categories are used on subsequent days.

Lesson Eight Learn the meaning of selected words. In a lesson that takes five minutes now and then, we ask the class as a whole to demonstrate the meaning of selected words.

- Topic Both-and.
- Topic If-then.
- Topic Either-or, neither-nor.
- Topic Other words we choose.

Geometry, Shapes, Relationships and Constructions

Lesson One Provide a background in geometry equally for boys and girls, rich and poor while exploring shapes in geometry. Students build as our questions focus their discoveries.

- Topic Today is building day, let's see what you can build.
- Topic Lego blocks, Tinker Toys, Geoblocks, Pattern Blocks, Power Blocks, straws, toothpicks and clay. Each material used for building is a topic.

Lesson Two Expand the exploration of shape. Students explore the properties of shapes guided by the questions that we ask.

- Topic Geoboards, make shapes with 3 sides. 4 sides. 5 sides. More sides.
- Topic Which shapes can be made with Power Blocks & duplicated on a geoboard? Which shapes cannot?

Lesson Three Learn to recognize reflective symmetry in shapes. Students explore lines of symmetry with materials and mirrors.

- Topic Free exploration with mirrors.
- Topic Pattern Blocks and mirrors - exploring symmetry.
- Topic Power Blocks and mirrors - exploring symmetry.
- Topic Lines of symmetry in the room - make a list.
- Topic Free exploration with hinged mirrors.
- Topic Symmetry with Pattern Blocks and hinged mirrors.
- Topic Symmetry with Power Blocks and hinged mirrors.

Lesson Seven Learn what an angle is and how to measure it. Students learn to use angles in giving instructions. They learn to measure angles and use a protractor as a measuring device.

- Topic Each new question asked or material explored is like a lesson of its own.
- Topic Students direct each other using paces and turns.
- Topic Students find right angles in the room.
- Topic Angles are measured with straws and sticks, as lists of successively larger angles are made.
- Topic Protractors are explored.

Lesson Nine Learn to be aware of the geometry in our lives. We ask our students to look more closely at what they already see.

- Topic What shall we look for today? Why are the things that we see the shape that they are?

Lesson Ten The purpose is a teacher purpose. Our assignment is to find the opportunities. We make ourselves aware of the opportunities for geometric experiences that exist. We use the opportunities that we find.

- Topic Opportunities that we find.

Beginning Addition and Subtraction

Lesson One Learn to create and check addition problems. Students create addition problems that they can check by counting.

- Topic Creating addition problems with handsful of squares and checking the answers with calculators.

Lesson Two Learn to apply the skills of addition. We give our students problem-solving questions and number patterns to explore with squares and Unifix Cubes.

- Topic Problems in the middle of a stream.
- Topic Start with, go bys.
- Topic Start with, go bys, both.
- Topic Consecutive whole numbers.
- Topic Odd and even numbers.

Lesson Three Learn to create and check subtraction problems. Students create subtraction problems that they can check by counting.

- Topic Creating subtraction problems with handsful of squares and checking the answers with calculators.

Lesson Four Learn to apply skills of subtraction. We give our students problem-solving questions and number patterns to explore.

- Topic Starting with 100.
- Topic Problems in a stream, a negative flow.

Lesson Five Learn the families of addition facts above ten. Students practice number facts, through flash cards and number games. There are no tests of speed.

- Topic Flash cards.
- Topic Blackjack.
- Topic Dominoes.
- Topic Shaker dice.

Lesson Six Learn to solve word problems that the teacher creates. Students learn to draw the necessary numbers from the stories that we tell.

- Topic Word problems for adding.
- Topic Word problems for adding, extraneous information added in.
- Topic Word problems for subtracting.
- Topic Word problems for subtracting, extraneous information added in.
- Topic Adding and subtracting mixed.

Lesson Seven Learn to create and solve story problems. Students create their own stories to go along with numbers. First the teacher provides numbers, then numbers are taken from student lives.

- Topic Students create addition stories to share.

Topic Stories are shared before the next addition creations are produced.
Topic Students create subtraction stories to share.
Topic Stories are shared before the next subtraction creations are produced.
Topic Addition and subtraction are mixed.

Lesson Eight Learn to think about the reasonableness of answers. Students learn to ask: "Does the answer I have found make sense?"
Topic How did you get your answer and how do you know it is reasonable?
Topic We pose problems to help our students understand "reasonable".

Lesson Nine Learn to connect school math to life. We look for problems that exist around us for our students to solve.
Topic Twenty problems or just one.

Graphing, Probability and Statistics

Lesson One Learn to use graphing as a tool for finding answers to questions. Students learn to turn their curiosity into data to graph. Graphs made now will be used again in Lesson Four.
Topic Students make graphs in response to questions asked or curiosity expressed that leads to numbers that can be represented pictorially.

Lesson Two Learn how to display information in a variety of ways. Students invent more ways to graph data than they had thought to use before.
Topic Examples of different kinds of graphs are shared as students think of ways to graph they have not used before.

Lesson Three Learn how to ask questions for a graph. We assemble unseen graphs to guide students in learning how to ask what it is they want to know.
Topic A graph is assembled behind a shield as students ask questions about data that remains unseen.

Lesson Four Learn to ask questions for the graphs that students make and see. Students learn to add written questions to their graphs. The lesson on asking questions is also a lesson on learning to speak math and learning to ask math questions.
Topic Students add questions to graphs already made.

Measurement, Estimation and Time

Lesson One Learn that measurement is a part of everything we do. We create a measuring environment in our room by making measurements a tool for finding out.
Topic Measurement is in the environment we create.
Topic Measurement is in the questions that we ask.
Topic Measurement is in "Is taller than...".

Lesson Two Learn to make and read maps. Students make maps and use and critique maps made by others to refine their own map making techniques.
Topic Record geoboard shapes on paper.
Topic Repeatedly making and critiquing maps to get from here to there.
Topic Drawing and critiquing maps of class.

Lesson Four Learn about time. In general, we teach time buy using it.
Topic Time is an experience. It is taught all day long, all the time.

Lesson Five Learn how to make good estimates. Students estimate length, surface area, weight and volume while learning what estimation means, but we do not teach estimation and then move on. Estimation is a thinking skill our students use and use. We make estimation a part of all the lessons we teach by the questions that we ask.
Topic How much?
Topic How high?
Topic How many?
Topic How far?
Topic How soon?
Topic What else?

Beginning Multiplication and Division

Lesson One Learn what it means to multiply. Learn to search for patterns in multiplication arrays. Students learn to create and record (individually and in matrices) multiplication problems. Matrices are searched for patterns.

- Topic Making and recording rectangles with squares.
- Topic Recording rectangle patterns on matrices.
- Topic Examining matrices for patterns.
- Topic Unifix matrices made and searched for patterns.
- Topic Geoboard matrices made and searched for patterns.
- Topic Add the matrix to the wall charts for pattern searches endlessly.
- Topic If needed, more matrices are made.

Lesson Two Learn to create multiplication and division problems, with and without remainders. Students create and solve problems in a sideways L and answer three basic questions that we ask.

- Topic Create problems, ignore remainder. Create problems for each other. Create problems, remainder not ignored. Remainder recorded as a fraction.
- Topic Create times problems with hands full of squares, remainders are ignored.
- Topic Answer three questions for the sideways L, no remainders yet.
- Topic Remainders added in.
- Topic Three questions asked again.
- Topic Remainders recorded as fractions.

Lesson Three Learn to look for non numeric patterns. Learn to connect the non numeric patterns to numeric patterns seen before. Students create patterns with Unifix Cubes, break the patterns apart and study the "break-aparts" for patterns. Students connect the cube patterns to patterns in multiplication and on the 0-99 chart.

- Topic Break-apart pattern searches.
- Topic Look again at the matrices on the wall for patterns.

Lesson Four Learn the multiplication number facts. Students use flash cards to commit number facts to memory and examine a matrix for patterns to reduce the number of facts to be learned from 100 to 36.

- Topic Flash cards are used to put the multiplication facts in each student's head.

Lesson Five Learn to think about what the numbers in multiplication and division problems represent. We create multiplication and division problems that our students solve, as they identify what the numbers in their answers represent.

- Topic Multiplication word problems created with people and objects in the room.
- Topic The problems can be recorded in matrix form.
- Topic Division word problems created with people and objects in the room.
- Topic The problems can be recorded in matrix form.

Lesson Six Learn to create stories for multiplication and division problems. Learn to see the stories in numbers everywhere. Students write or draw stories for numbers we provide. Students look for number stories in their own lives.

- Topic Students write stories or draw illustrations to accompany multiplication and division problems.
- Topic Selected stories written one day are read as creative inspiration the next.
- Topic Students write stories or draw illustrations to accompany multiplication and division problems that they provide.
- Topic If we choose to, we select some student stories as problems for the class to solve.

Lesson Seven Learn that problems to be solved are everywhere around. Students seek the multiplication and division problems that already exist in their lives.

- Topic Students describe number situations that exist. Finding the answers to the situations is not required yet.
- Topic Selected problems from the situations found are solved by the class.

Fractions, Ratios, Money, Decimals and Percent

Lesson One Learn about fractions informally. Learn the words to say and the numbers to write. Students explore Power Blocks, guided by the questions that we ask. We teach words and numbers that describe the fractions.

- Topic Freely exploring, with learning directed through questions asked.
- Topic Which pieces make into other pieces?
- Topic S-1 = 1, T-1 = 1.
- Topic S-5 = 1.
- Topic Matrix for everything = 1.
- Topic Learning the words to say for fractions.

Lesson Two Learn to find areas of shapes on geoboards. Learn to prove the areas of found shapes. Students make shapes on their geoboards and learn specific techniques for proving areas. Areas of triangles are searched specifically for patterns.

- Topic Make shapes with areas of 2 1/2 and prove areas.
- Topic Make shapes with areas of 3 1/2 and prove areas.
- Topic Make shapes with areas of any size and prove areas.
- Topic Make right triangles and prove areas.
- Topic Find areas for and search for patterns in triangles with bases on the bottom row.

Lesson Three Learn that fractions are special numbers describing part/whole relationships. Learn to add and subtract simple fractions. Students learn to use people in the room to create simple fractions, then addition and subtraction problems. They also learn to create stories to accompany fractional numbers.

- Topic Fractions are created with people in the class.
- Topic Students create their own addition problems.
- Topic Students create their own subtraction problems.

Lesson Four Learn to be aware of fractions in life. We ask our students to think about the sharing, cutting and dividing fractions in their lives.

- Topic Teacher lead discussion on the sharing, cutting and dividing that lead to fractions in our lives.

Lesson Five Learn about equivalencies. Students use paper folding and Power Blocks to generate lists of equivalencies, which they then search for patterns.

- Topic Folding paper, recording the equivalencies formed.
- Topic Finding and recording Power Block equivalencies.

Lesson Seven Learn to see fractions as a part of measurement. Learn to estimate fractions of a length. Students use strips of paper to estimate, then measure. We teach techniques for determining fractional lengths.

- Topic Estimate lengths. Calculate the fractions involved.
- Topic Estimating and calculating techniques are improved with practice and with time.

Lesson Twelve We use real money and real money situations to teach our students how to find real money answers.

- Topic Milk money, restaurant menus, classroom store, fundraising events: any opportunities that arise provide the framework for the money lessons that we teach.

Advanced Addition and Subtraction

Lesson One Learn to search for patterns in bases other than ten. Student record and examine plus one and minus one patterns in different bases.

- Topic Squares and cups: base 4, base 5, base 6, if needed base 3. Then squares, cups and bowls as the base cycle is repeated. Then Base ten.
- Topic + and - 1 with squares and cups, base 4.
- Topic + and - 1 with squares and cups, base 5.
- Topic + and - 1 with squares and cups, base 6.
- Topic + and - 1 with squares and cups, base 3.
- Topic + and - with squares, cups and bowls, base 4.
- Topic + and - with squares, cups and bowls, base 5.
- Topic + and - with squares, cups and bowls, base 6.
- Topic + and - with squares, cups and bowls, base 3.

Topic + and - with squares, cups and bowls, base ten.

Lesson Two Learn about adding or subtracting numbers greater than one in different bases. Students play racing-up and racing-back place-value trading games.

Topic Racing up in base 4, winner is the first up.
Topic Racing up in base 5, winner is the last up.
Topic Racing up in base 6, winner is the first up.
Topic Racing up in base 3, winner is the last up.
Topic Racing up in base ten, winner is either the first or last up, decided in advance.
Topic Racing back in base 4, winner is the first back.
Topic Racing back in base 5, winner is the last back.
Topic Racing back in base 6, winner is the first back.
Topic Racing back in base 3, winner is the last back.
Topic Racing back in base ten, winner is either the first or last up, decided in advance.

Lesson Three Learn the concept of place value. Students learn a game that teaches them the value places have.

Topic Place value game in base 4, most wins.
Topic Place value game in base 5, least wins.
Topic Place value game in base 6, most wins.
Topic Place value game in base 3, least wins.
Topic Place value game in base ten, either most or least wins, decided in advance.

Lesson Four Learn to create addition and subtraction problems in any base three through ten. Students learn how to create addition and subtraction problems and how to find and check the answers to the problems they create.

Topic Addition problems are created in base 4.
Topic Addition problems are created in base 5.
Topic Addition problems in any base 3 to 6.
Topic Subtraction problems are created in base 4.
Topic Subtraction problems are created in base 5.
Topic Subtraction problems in any base 3 to 6.
Topic Addition problems are created in base ten.
Topic Subtraction problems are created in base ten.

Lesson Five Learn to see place-value patterns within and between bases. Learn to use materials to prove answers. Students record values for different bases on a single matrix and examine the matrix for patterns. Then students use the multibase blocks (if available) to create, solve, and then check problems.

Topic Looking for patterns in 1000, 100, 10, 1.

Lesson Six Learn the names for larger numbers. Students learn to read large numbers.

Topic Learn to read large numbers.

Lesson Seven Learn that addition and subtraction are tools for finding out. Learn to apply math skills to problems in real life. We work with our students to find and then solve real problems that use the skills that our students possess. Students keep a written record of their work.

Topic Problems drawn from stories.
Topic Problems drawn from questions.
Topic Problems drawn from life.

Lesson Eight Learn to look for patterns in numbers everywhere. Students look for patterns between bases, in palindromes and in ordinary events.

Topic Compare plus one strips from different bases.
Topic Palindromes.
Topic Examine situations for patterns.

Lesson Nine Learn that creativity and inventiveness are problem-solving tools. Our students use their inventiveness to solve problems that we give and share their individual or collective inventiveness with everyone in class.

Topic Kids in class, kids in school.
Topic Thinking and mental arithmetic. Reasonableness.

Advanced Multiplication and Division

Lesson One	Learn what it means to multiply in any base. Learn to search for multiplication patterns within and between bases. Students learn to make multiplication matrices for bases three through ten as they search for patterns in each new matrix.
Topic	Base-three matrix made by the full class. Pairs of students work in pairs to make matrices fir bases four and five. For base six, students look at the previous bases for patterns that they can anticipate will appear. The process is repeated for bases seven, eight and nine. How much of base ten can be filled in from all the patterns seen in three through nine?
Topic	Base-four matrix started by the full class, finished working in pairs.
Topic	Base-five matrix in pairs, information shared collectively.
Topic	Base-six matrix made by looking at bases three, four and five.
Topic	Bases seven, eight and nine and, for some, sixteen.
Topic	Patterns is bases three through nine are used to fill in a matrix for base ten.
Lesson Three	Learn techniques for finding answers to the multiplication problems likely to be on the end-of-year standardized test. If students will not be permitted to use calculators or materials on the year-end test, we teach them how to calculate answers for the test.
Topic	An algorithm for multiplication is taught.
Lesson Four	Learn to look for patterns in multiplying numbers with zeros at the end. Learn how to find reasonable answers for multiplication problems that are large. Students use their calculators to fill in worksheets that they then examine for patterns for multiplying numbers with zeros on the right. Students use the patterns to learn to estimate reasonable answers for large problems.
Topic	Multiplying by 2, 20, 200, 2000 and so on. Patterns sought.
Topic	Reasonableness for answers to large problems.
Lesson Five	Learn to apply multiplication skills. With our students, we look for real problems to solve that use multiplication.
Topic	A problem a day is enough to pose. A problem is posed, small groups of students discuss and write down ways it might be solved, then students share their ways with the class.
Topic	Problem posed, discussed, solved, solutions shared.
Topic	Another problem is posed.
Lesson Six	Learn what it means to divide in any base. We teach dividing techniques. Our students then use dice to create division problems for themselves.
Topic	Divide in base five, then base four and base six.
Topic	Divide in base ten. Calculators check answers.
Lesson Seven	Learn to use the arithmetic skills we have. We look for real problems that use division and any other arithmetic skill. Our students look, as well, and keep a written record of the problem solving steps they use.
Topic	A single sandwich.
Topic	The daily life of a child.
Topic	Analysis.
Topic	Averages of all kinds.