

Level

D



The Key Elements to Mathematics Success

Teacher's Edition

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The following reviewers contributed to this edition,
and we gratefully thank them for all their suggestions
for improvements and clarifications.

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ISBN#978-157290-448-4

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The Key Elements to Mathematics Success Description of Teacher's Guide

Essential Questions are provided at the beginning of each lesson to provide the framework for the lesson and guide the learning process. The essential questions are used not only at the beginning of the lesson, but are also an important part of the lesson closure. Each essential question ties into a SOLVE problem which is used as an introduction and closure tool in each lesson.

Each lesson concept is bracketed with the SOLVE problem solving method. Along with the essential question, the "S" step of SOLVE is introduced at the beginning of the lesson. This helps to guide the learning of the student as they progress through the lesson. At the end of the lesson, the SOLVE problem introduced at the beginning of the lesson is revisited. The student completes the additional steps of SOLVE, applying the lesson concept in a problem solving situation.

Mathematics Success – Level D

T557

LESSON 19: Subtract Mixed Fractions - Like Denominators

[OBJECTIVE]

The student will subtract mixed fractions with like denominators.

[PREREQUISITE SKILLS]

subtracting fractions with like denominators

[MATERIALS]

Student pages **S181–S189**
Transparencies **T568, T570, T572, T574, T576, and T578**
2 sets of overhead fraction strips
Fraction Kits 1–3
Colored pencils
Foldable from Lesson 15

[ESSENTIAL QUESTIONS]

1. How does building with concrete materials help us understand fractions?
2. How does drawing fractions as pictures help our understanding of mixed fractions?
3. How can we subtract mixed fractions with like denominators?

[WORDS FOR WORD WALL]

improper fraction, mixed fraction, numerator, denominator, minuend, subtrahend, difference, simplest form

[GROUPING]

Cooperative Pairs (CP), Whole Group (WG), Individual (I)

*For Cooperative Pairs (CP) activities, assign the roles of Partner A and Partner B to students. This allows each student to be responsible for designated tasks within the lesson.

[LEVELS OF TEACHER SUPPORT]

Modeling (M), Guided Practice (GP), Independent Practice (IP)

[MULTIPLE REPRESENTATIONS]

SOLVE, Verbal Description, Pictorial Representation, Concrete Representation, Graphic Organizer

[WARM-UP] (5 minutes – IP, CP, WG) S181 (Answers on T567.)

- Have students turn to S181 in their books to begin the Warm-Up. Students will work with legal trading, improper fractions, and mixed fractions. Monitor students to see if any of them need help during the Warm-Up. Give students 3 minutes to complete the problems and then spend 2 minutes reviewing the answers as a class. {Verbal Description, Pictorial Representation, Concrete Representation}

[HOMEWORK] (5 minutes)

Take time to go over the homework from the previous night.

[LESSON] (60 minutes – M, GP, IP, CP, WG, I)

Each lesson begins with a warm up activity which connects previously learned skills and concepts to the current topic. The warm-up sets the stage for new concepts being introduced in each lesson.

Lessons have been designed for a 60 minute class. Suggested times are provided as a guideline for each section of the lesson, indicating the instructional time needed for each section of the lesson.

Multiple representations of the concept are incorporated in each lesson. These representations include concrete, pictorial, algebraic formula, verbal descriptions, graphs, tables, graphic organizers and a problem solving paradigm. The multiple representations provide students with different learning styles and abilities the opportunity to acquire and apply knowledge of the lesson concept.

Each lesson contains "modeling boxes" which contain step by step instructions on how to model each concept. Modeling steps are provided for concrete, pictorial and procedural steps of the lesson.

T558

LESSON 19: Subtract Mixed Fractions - Like Denominators

Mathematics Success – Level D

SOLVE Problem

(3 minutes – GP, WG) T568, S182 (Answers on T569.)

Have students turn to S182 in their books, and place T568 on the overhead. The first problem is a SOLVE problem. You are only going to complete the S step with students at this point. Tell students that during the lesson they will learn how to subtract mixed fractions. They will use this knowledge to complete this SOLVE problem at the end of the lesson. {SOLVE, Graphic Organizer}

Subtract Mixed Fractions – Concrete

(10 minutes – M, GP, IP, CP, WG) T568, S182 (Answers on T569.)

5 minutes – GP, M, WG, CP: Have students turn to S182 in their books, and place T568 on the overhead. Have students work in partners. Assign the roles of Partner A and Partner B. Each partner will need Fraction Kits 1–3. Use two sets of overhead fraction strips and the following activity to help students investigate subtracting mixed fractions. {Concrete Representation, Verbal Description, Graphic Organizer}

MODELING

Subtract Mixed Fractions – Concrete

Step 1: Direct students' attention to Problem 1. Ask the students in each pair to work together to show $1\frac{3}{5}$ as shown below. Model on the overhead using the overhead fraction strips.



- Partner A, explain how to show subtraction of $\frac{1}{5}$. (Take away a $\frac{1}{5}$ fraction strip.)

- Partner B, identify what fraction the model shows after subtracting $\frac{1}{5}$. ($1\frac{2}{5}$) Record.



Take time to go over the homework from the previous night.

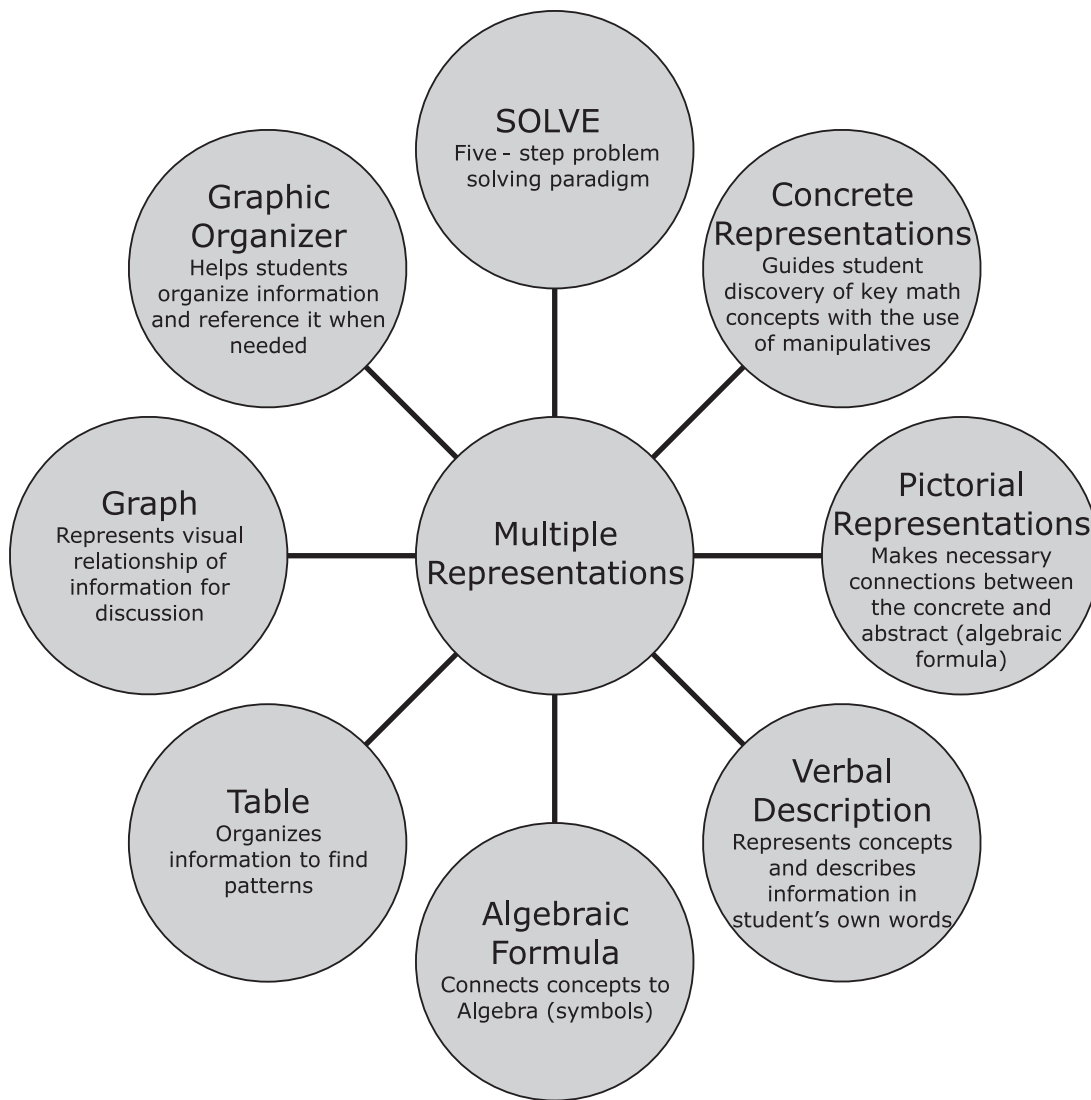
[LESSON] (60 minutes – M, GP, IP, CP, WG, I)

Each lesson begins with a warm up activity which connects previously learned skills and concepts to the current topic. The warm-up sets the stage for new concepts being introduced in each lesson.

Lessons have been designed for a 60 minute class. Suggested times are provided as a guideline for each section of the lesson, indicating the instructional time needed for each section of the lesson.

Multiple representations of the concept are incorporated in each lesson. These representations include concrete, pictorial, algebraic formula, verbal descriptions, graphs, tables, graphic organizers and a problem solving paradigm. The multiple representations provide students with different learning styles and abilities the opportunity to acquire and apply knowledge of the lesson concept.

Each lesson contains "modeling boxes" which contain step by step instructions on how to model each concept. Modeling steps are provided for concrete, pictorial and procedural steps of the lesson.



SOLVE

SOLVE is a 5-step problem-solving paradigm taught in the first lesson of *The Key Elements to Mathematics Success* and throughout the program. SOLVE is an acronym which gives students step-by-step strategies for finding the solutions to word problems. The ultimate goal of *teaching* SOLVE is to provide students with a problem-solving strategy that can be applied to any concept they will encounter in algebra. The steps are as follows:

S Study the Problem

Underline the question.

Answer the question, “What is this problem asking me to find?” in your own words.

O Organize the Facts

Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

L Line up a Plan

Choose an operation or operations.

Write in words what your plan of action will be.

V Verify Your Plan with Action

Estimate your answer.

Carry out your plan.

E Examine Your Results

Does your answer make sense? (Compare your answer to the question.)

Is your answer reasonable? (Compare your answer to the estimate.)

Is your answer accurate? (Check your work.)

Write your answer in a complete sentence.

Cooperative Pairs

Working in cooperative pairs is a vital part of *The Key Elements to Mathematics Success*. Cooperative learning allows students at various performance levels to work together, using a variety of learning activities, to improve their understanding. Communication about the learning process is an essential element of working in cooperative pairs. This dialogue enhances student learning and creates a sense of responsibility on the part of the students. Cooperative learning can be a catalyst in creating an atmosphere of achievement and a sense of accomplishment on the part of the students when the task is successfully completed.

Levels of Teacher Support

The lessons are carefully designed with opportunities for modeling, guided practice, and independent practice.

Modeling:

Each lesson contains “modeling boxes” which list step by step instructions on how to model each concept. Modeling steps are provided for concrete, pictorial, and procedural steps of the lesson.

Guided Practice:

Detailed instructions about how to structure guided practice are given in each lesson. Guided practice is led and closely monitored by the teacher. Students may work individually or in pairs during the guided practice.

Independent Practice:

Independent practice is provided through practice problems and homework in each lesson. Independent practice is structured to take place in the lesson following modeling and guided practice sections. Teachers can use the independent practice as a tool for informal formative assessment.

Word Problem Closure

At the end of the lesson, the SOLVE problem introduced at the beginning of the lesson is revisited. The student completes the additional steps of SOLVE, applying the lesson concept in a problem-solving situation.

Closure

Closure is a crucial part of every lesson and provides the teacher an opportunity to evaluate if the lesson objectives have been met. Teachers use the essential questions to reinforce the concept from the lesson, help organize the learning, and bring the lesson to its conclusion. A quick discussion of the essential questions will allow the teacher to informally assess student understanding of the material.

Homework

Homework is provided at the end of each lesson to give students ample opportunity to practice the lesson concept.

Quizzes

The lesson quizzes consist of 10 multiple-choice questions. These 10 questions cover the material taught in the lesson. The quizzes can also be used as homework, class work, review for a test, or as warm-ups.

Review Activities

Review activities are provided for many lessons. There are a variety of engaging activities including scavenger hunts, chain reactions, “I Have, Who Has”, and Mystery Squares. The activities are designed to provide multiple practice opportunities for the students in puzzle and game formats. The review activities incorporate the essential elements of cooperative learning and communication about the concepts.

The Key Elements to Algebra Success and the English Language Learner (ELL)

- SOLVE** – A step-by-step procedure to attack word problems, dissecting the English language by identifying key words needed to solve the problem, and mapping out a plan with pictures and phrases to ultimately arrive at a well thought out answer. Steps can be written in students’ native language while they are still becoming familiar with the process of SOLVE and gradually transitioning into English only. The steps of SOLVE have been modified slightly for use with ELL students. The modified steps provide additional support and involve verbal communication about the process, which is a vital link for the ELL student:

S - Underline the question. TPIAMTF (this problem is asking me to find) – THE _____ . The students cannot just restate the question if they are made to start a sentence with *the*.

O - Circle the necessary facts. When writing out the necessary facts, be as brief as possible and teach the students abbreviations right away (\$, #, lb, cm, pkg. etc.).

L - Choose an operation and discuss a plan out loud. – +, •, /

$$\frac{\text{number of nuts}}{\text{total}} + \frac{\text{number of bolts}}{\text{total}} = \frac{\text{total}}{\text{total}} \cdot \frac{\text{number of boxes}}{\text{total}} = \frac{\text{answer}}{\text{total}}$$

V - Estimate the answer out loud. Then use the set-up created in the L step to carry out the plan.

E - Choose your answer.
- Cooperative Pairs** – Working, questioning, and communicating with others regarding mathematics at all stages of learning. Activities are done in an interactive setting, encouraging language development along with mathematical development. This includes the pairing of ELL students who speak the same language(s) with others who may be at varying stages of their English language development.
- Modeling with Manipulatives** – Students participate in activities leading to the discovery of on-grade-level mathematical concepts. Through this process, they develop mathematical understanding while exploring ways of expressing their discoveries in English. Manipulative use is consistent throughout the program. The appearance of each manipulative, their meaning, as well as the language used to describe the actions of these manipulatives remain the same throughout.
- Word Walls** – Updated through the use of KEMS lessons, new math vocabulary words (and their meaning/pictorial representation) are added for every new concept as they are discovered. The Word Wall is an interactive tool for all learners and provides an additional language resource for ELL students. Additionally an Operation Word Wall is created by each class and used for solving word problems throughout the year. As an added resource, words can be written in both English and the native language of the learner. Pictures/descriptions are also encouraged next to words wherever appropriate.
- Video Clips of Each Lesson** – Available for use in class at www.NTNmath.com, the video clips can help overcome the significant classroom language barriers ELL students face. These video clips, though in English, show key vocabulary words as a way of familiarizing students with appropriate vocabulary used to build a concept.

Planning for your Key Elements to Mathematics Success Class

Materials Needed: include materials needed for both the teacher and the students including items from the manipulative kit, activities to prepare for pairs on cardstock, and/or pages to copy for class.

Objective: (from teacher lesson notes)

Essential Question: (from teacher lesson notes)

Word Wall Words: (from teacher lesson notes)

Agenda: Consider the following when planning each component of the lesson.

Activity	Time Frame	Notes/Details
Environment	N/A	<ul style="list-style-type: none"> Groupings used today - seating arrangements needed? Word Wall updates for this lesson? Agenda, Objective & Essential Questions posted? Needed technology set up?
Warm-up	_____ minutes	<ul style="list-style-type: none"> What are some great questions to ask during the warm-up? How does this warm up relate to the lesson? How can this be modified to fit within the 5 minute time frame?
Fact Masters	_____ minutes	<ul style="list-style-type: none"> How will math facts be practiced today? (Group led, DVD, CD, quiz) What time in the lesson will it be done? Choral Drill or Quiz today?
Lesson	_____ minutes	<ul style="list-style-type: none"> What is the goal for today's lesson? What materials are needed? <ul style="list-style-type: none"> Is there an activity from the activities section of my TE that I will use to support this lesson? How does the flow of this lesson encourage student discovery of the concept being covered? What questions need to be asked to guide the discovery of today's concept? How does this lesson fit in with my district pacing guide? How will this concept be enhanced with the traditional textbook? How will I instruct partners to work? Pages being covered today... Complete SOLVE Problem <ul style="list-style-type: none"> ASK: What is the question asking me to find? (beginning of class) <ul style="list-style-type: none"> What are my facts? What is my plan? What operation is needed? Estimate an answer. Work out the answer. Check over work, choose answer. What graphic organizer/foldable will be made/referenced? <u>If time permits...</u> <ul style="list-style-type: none"> Will this section be used today? If so, how? How will I use the quiz for this lesson?
Closure	_____ minutes	<ul style="list-style-type: none"> Essential Questions Homework assigned

Notes:

Planning for your Key Elements to Mathematics Success Class

Materials Needed:

Objective:

Essential Question:

Word Wall Words:

Agenda:

Activity	Time Frame	Notes/Details
Environment	N/A	
Warm-up	_____ minutes	
Fact Masters	_____ minutes	
Lesson	_____ minutes	
Closure	_____ minutes	

Notes:

Planning for your Key Elements to Mathematics Success Class

Materials Needed:

Objective:

Essential Question:

Word Wall Words:

Agenda:

Activity	Time Frame	Notes/Details
Environment	N/A	
Warm-up	_____ minutes	
Fact Masters	_____ minutes	
Lesson	_____ minutes	
Closure	_____ minutes	

Notes:

Planning for your Key Elements to Mathematics Success Class

Materials Needed:

Objective:

Essential Question:

Word Wall Words:

Agenda:

Activity	Time Frame	Notes/Details
Environment	N/A	
Warm-up	_____ minutes	
Fact Masters	_____ minutes	
Lesson	_____ minutes	
Closure	_____ minutes	

Notes:

Materials List**Lesson 1**

Paper for foldable
Stapler
“S” and “0” posters from packet
Index cards

Lesson 2

Foldable from Lesson 1
“L” poster from packet
Index cards for operation words

Lesson 3

Foldable from Lesson 1
“V” and “E” posters from packet

Lesson 4

Beans (2 per student pair)

Lesson 5

Centimeter cubes (35 per student pair)

Lesson 6

Beans (81 per student pair)
Colored pencils

Lesson 7

Colored pencils
Centimeter cubes (72 per student pair)
Calculator - optional

Lesson 8

Beans (72 per student pair)

Lesson 9

Centimeter cubes (12 per student pair)
Colored pencils

Lesson 10

Two-colored counters (21 per student pair)
Colored pencils

Lesson 11

Two-colored counters (21 per student pair)
Colored pencils

Lesson 12

Centimeter cubes (20 per student pair)
Colored pencils
Paper for foldable (1 sheet per student)
Scissors

Lesson 13

Centimeter cubes (50 per student pair)
Colored pencils
Foldable from Lesson 12

Lesson 14

Index cards (6 blank cards for each group of students)
Student cards (6 sets)
Paper for foldable
Teacher cards (Decks 1, 2, and 3)

Lesson 15

Fraction strips for all three kits
Scissors
Overhead fraction strips
Plastic bag (one per student)
Colored pencils
Paper for foldable (1 sheet per student)

Lesson 16

Fraction Kits 1-3
Overhead fraction strips
Colored pencils
Foldable from Lesson 15

Lesson 17

Fraction Kits 1-3
Overhead fraction strips
Colored pencils
Foldable from Lesson 15

Materials List**Lesson 18**

Fraction Kits 1-3
2 sets of overhead fraction strips
Colored pencils
Foldable from Lesson 15

Lesson 19

Fraction Kits 1-3
2 sets of overhead fraction strips
Colored pencils
Foldable from Lesson 15

Lesson 20

Overhead fraction strips
Colored pencils
Fraction Kits 1-3
Foldable from Lesson 15

Lesson 21

Centimeter cubes (50 per student pair)
Colored pencils

Lesson 22

Copy Master T660
Colored pencils

Lesson 23

Sticky notes (1 per student pair)
Envelope (1 per student pair)
Toothpicks (2 per student pair)
Two-colored counters (2 per student pair)
Blue fraction strip (1 per student pair)
Ruler (1 per student)
1 meter stick – optional

Lesson 24

Centimeter cubes (48 per student pair)
Colored pencils

Lesson 25

Copy Master T735 (1 per student pair)
Scissors
Colored pencils
Centimeter cubes (24 per student pair)

Lesson 26

Copy Master T762
Painter's tape
Sticky notes
Ruler (1 per student)

Lesson 27

Copy Master T796 (1 per student pair)
Fraction strips (2 per student pair)
Protractor (1 per student pair)

Lesson 28

String (1 six-inch piece per student)
Protractor (1 per student pair)

Lesson 29

Two-colored counters (4 per student pair)
String (2 six-inch pieces per student pair)
Colored pencils

Lesson 30

Copy Master T866 (1 per student pair)
Rulers (1 per student pair)
Scissors

Materials List

Appendix A

Copies of T926 or T927 on quiz days
Copies of T924 (each student needs 1 set of numbers)
Copies of T925 for every 2 students (each pair/group needs 9 squares)
Scissors
Fact Masters Curtain
Colored pencils
Gridded index cards
Beans (81 per student pair)
2 cups for each pair
Paper clips
Hole punch
Masking tape
Phase 2- T922, T923, T928, T929, T930–T936, T937

Appendix B

Copies of T968 or T969 on quiz days
Copies of "TI/I" on T963-T966
Copies of T287 for every 2 students
Scissors
Fact Master Curtain
Colored pencils
Beans (81 per student pair)
Masking tape
Gridded index cards
Hole punch
Paper clips
Phase 2 - T961, T962, T968, T969, T970, T971, T972–T978, T979

Word Wall List**Lesson 1**

S – Study the Problem

O – Organize the Facts

Lesson 2

L – Line up a Plan

addition

subtraction

multiplication

division

equals

together

add

plus

increase

sum

and

total

rises

grow

above

all together

altogether

“How many?”

take away

difference

left over

minus

below

decrease

subtract

“How much more?”

times

product

each

per

double

triple

of

groups

triple

multiplied

items

quotient

Lesson 2 (cont.)

per equal groups

cut into

split

divide

is

same

equivalent

is equal to

Lesson 3

V – Verify Your Plan with Action

E – Examine Your Results

Lesson 4

round

place value

scale

ones

tens

hundreds

thousands

digits

Lesson 5

place value

ones

tens

hundreds

compare

expanded form

Lesson 6

add

subtract

algorithm

addend

sum

minuend

subtrahend

difference

regroup

groups

items

inverse

Word Wall List**Lesson 7**

groups
items
arrays
multiply
product
factor
distribute
area models

Lesson 8

quotient
dividend
divisor
total items
items
groups

Lesson 9

unknown value
arrays
multiply
divide
equation
multiplication
division
fact family

Lesson 10

equation
unknown value
division
multiplication
groups
items
total items

Lesson 11

equation
unknown value
equal symbol
remainder

Lesson 12

multiple
common multiple
least common multiple

Lesson 13

factor
common factor
greatest common factor
prime
composite
divisible
factor tree
prime factorization

Lesson 14

numeric pattern
sequence
term
rule
extending the pattern
missing term

Lesson 15

numerator
denominator
fractions
halves
fourths
eighths
thirds
sixths
twelfths
fifths
tenths
equivalent
legal trade
whole unit

Lesson 16

addend
sum
denominator

Word Wall List**Lesson 16 (cont.)**

numerator
equivalent
simplify
simplest form
legal trade

Lesson 17

subtrahend
minuend
difference
denominator
numerator
equivalent
simplify
simplest form
legal trade

Lesson 18

improper fractions
mixed fractions
numerator
denominator
addends
sum
legal trade

Lesson 19

improper fractions
mixed fractions
numerator
denominator
minuend
subtrahend
difference
simplest form

Lesson 20

fraction
numerator
denominator
groups
items
product

Lesson 21

equivalent fractions
numerator
denominator
decimal
tenths
hundredths

Lesson 22

decimal
tenths
hundredths
place value chart
less than
greater than

Lesson 23

kilometer
meter
centimeter
kilogram
grams
liter
milliliter
equivalence

Lesson 24

equation
unknown
items
groups

Lesson 25

area
perimeter
dimensions

Lesson 26

line plot
x-axis
y-axis

Word Wall List**Lesson 27**

degree
protractor
ray
angle
vertex
acute angle
obtuse angle
right angle (90°)
straight angle (180°)

Lesson 28

non-overlapping
ray
angle
decompose
degrees

Lesson 29

point
line
line segment
ray
right angle
acute angle
obtuse angle
perpendicular lines
parallel lines
right triangle
acute triangle
obtuse triangle

Lesson 30

symmetrical
line of symmetry
plane figures
two-dimensional

Appendix A

groups
items
array

Appendix B

groups
items
dividend
divisor
quotient
total items