

TIPS

for English Language
Learners in Mathematics

Grades 7, 8, 9 Applied, 10 Applied

Grade 7

Lesson Outline

Big Picture

English language learners will:

- start their own personal vocabulary lists;
- begin to work productively in flexible student groupings.

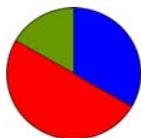
Day	Lesson Title	Language Goals*	Expectations
1	Celebrating 7	<ul style="list-style-type: none"> • Rely on the home language and culture to think, communicate, and process new experiences (Stage 1). • Begin to work with a partner on a common academic task (Stage 1). • Participate in social and academic discussions, using short phrases and short sentences (Stage 2). • Write appropriate responses (using short sentences, phrases or graphic organizers) to written questions based on familiar academic content (Stage 2). 	7m12, 7m16 CGE 3c, 4a, 4e
2	Tangram Tune-Up	<ul style="list-style-type: none"> • Follow simple directions with support from visual cues (Stage 1). • Give straightforward directions and instructions (Stage 2). 	7m39, 7m47, 7m48, 7m53 CGE 2c, 4f
3	Summer Survival	<ul style="list-style-type: none"> • Begin to apply some reading strategies (Stage 1). • Organize information around a central idea, using graphic organizers, e.g., graphs (Stage 2). 	7m47, 7m64, 7m81 CGE 2c, 5a

***English Language Learner Language Goals**

The Ontario Curriculum Grades 1–8, English As a Second Language and English Literacy Development (A Resource Guide) 2001

Stage 1 – Using English for Survival Purposes

Stage 2 – Using English in Supported and Familiar Activities and Contexts



Math Learning Goals

- Investigate patterns.

Materials

- BLM 1.1.1, 1.1.2
- coloured markers

Assessment Opportunities

Minds On ...

Whole Class → Discussion

To set the stage for the development of positive attitudes toward mathematics, briefly identify how the class learning community will operate by reviewing key succinct messages for posters.

Students suggest why the rules or procedures are necessary.

Whole Class → Brainstorm

Ask: Where do we find 7 in our world?

Accept all answers and have students explain their response.

Action!

Pairs → Investigation

Pairs of students use a calculator and BLM 1.1.1 to discover patterns involving the number 7.

Pose the question: Could there be more than six digits in the length of the period of these decimals? Explain.

Students create other 7-related patterns or statements, using a calculator.

Clarify the term *perfect square*, linking it to measurement activities from previous years.

Students complete BLM 1.1.2 and record the solutions on overheads using different colours. Overlay the overheads so they can see the overall patterns

Selecting Tools and Computational Strategies/Observation/Checklist:

Observe students, watching their calculator use and patterning skills.

Students may mention the Seven Wonders of the World.

Calculators may not display the repeating decimals as they may round the last digit or display fewer than eight digits.

To encourage quick recall of previous learning, individual students might make a list – “Number facts about 7 that I know.”

Model appropriate ways to discuss errors or consider alternate descriptions.

Word Wall

- patterns
- prime numbers
- perfect square

Consolidate Debrief

Whole Class → Student Presentations

Students report on their findings from BLM 1.1.1 and 1.1.2.

Encourage communicating using oral or written presentations that include precise language, diagrams, and charts.

Home Activity or Further Classroom Consolidation

Exploration

Summarize your activities using sentence stems, e.g., I learned..., I discovered..., I remembered..., Our class will be great if we all..., I wonder why....

Terminology

*identify
fractions
decimals
pattern
perfect square
prime numbers
product
sum*

Language Goals

- Rely on first language and culture to think, communicate, and process new experiences (Stage 1).
- Begin to work with a partner on a common academic task (Stage 1).
- Participate in group discussions using phrases and short sentences (Stage 2).
- Write appropriate responses (using short sentences, phrases, or graphic organizers) to written questions based on familiar academic content (Stage 2).

Materials

Assessment Opportunities

Minds On...

Whole Class → Discussion

Include small-group interaction before proceeding to whole-class discussion, e.g., groups of 3 in which the English language learner can listen to the conversation of two peers. English language learners record key vocabulary in their personal vocabulary lists.

Whole Class → Brainstorm

Print “Where do we find 7 in our world?” on the board and provide an example.

Make Sure They Are Ready

Using small groups before whole-class discussion allows more time for English language learners to think, have their voices heard, and clarify the task.

Action!

Pairs → Investigation

Chunk tasks into smaller components and provide assistance in helping them to understand the academic language.

Print and point to key terms each time as you are speaking.

Check for prior experiences with calculators.

If possible, pair English language learners with a peer who speaks their first language so they can discuss their understanding of the concepts as they work.

Make It Language Rich

English language learners should begin a Math word book in which they include the Math vocabulary, the words in their first language, and visual representations.

Incorporate Identity

For information about cultural links to numbers, see: http://en.wikipedia.org/wiki/Numerology#Lucky_and_Unlucky_numbers

Consolidate Debrief

Whole Class → Student Presentations

Encourage English language learners to participate in sharing their solution by modelling, by using a visual format, or by communicating with single words and phrases.

Make It Language Rich

Provide resource materials in the classroom for students to complete this activity.

Exploration with increased language focus

Home Activity or Further Classroom Consolidation



Math Learning Goals

- Sort and classify triangles and quadrilaterals.
- Identify perpendicular bisectors.
- Create 2-D composite shapes.
- Compare similar shapes and congruent shapes.

Materials

- square paper
- BLM 1.2.1, 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7
- tangram set

Assessment Opportunities

Minds On ...

Whole Class → Reflection

Ask several students to share their math journal entries from Day 1.

Action!

Whole Class → Model Making

Using a transparency of BLM 1.2.1, model how to make tangram pieces.

1. After making the first cut, ask: What shapes have been made?
2. After the second cut, ask: How are these triangles the same as the larger triangle?
3. Point out the fold between the midpoints of the shorter sides of the remaining large triangle. Ask: What kind of shapes, lines, and angles do you see?
4. Show the perpendicular bisector (lines of symmetry) of the trapezoid. Ask: How are these smaller trapezoids different from the larger one?
5. Indicate steps 5 and 6 on BLM 1.2.1, asking about the shapes as they are cut out and labelled.

Students make their own tangram pieces, using plain square paper.

Scaffold: Provide a tangram ready to be cut out and ask students to describe the pieces as they are cut out (BLM 1.2.2).

Small Groups → Discussion

Students complete selected activities from BLM 1.2.3 and 1.2.4 and describe the shapes, using precise vocabulary.

Show solutions on an overhead (BLM 1.2.5).

Pairs → Game

Partner A creates a figure using the tangram pieces, and then provides instructions so that Partner B can recreate the figure with another tangram set. Partner B may not ask questions for clarification, but may only respond to Partner A's directions.

Students compare the two figures and assess the quality of Partner A's instructions. The partners exchange roles and work together on BLM 1.2.6.

Communicating/Observation/Mental Note: Focus on communicating fluent, accurate, and effective use of mathematics vocabulary.

To activate prior knowledge, use geometry, fraction, and measurement vocabulary.

Note: BLM 1.2.7, Tangram Puzzles.

Word Wall
 • midpoint
 • perpendicular bisector

Consolidate Debrief

Whole Class → Note Making

List the mathematics terminology and represent the meaning of each term, using words and diagrams.

Home Activity or Further Classroom Consolidation

Challenge someone at home or in class with tangram puzzles (BLM 1.2.7). Ask if he/she knows any paper-folding techniques. Practise the activities to show the class the next day.

Exploration

Terminology

isosceles triangle
parallelogram
right-angled triangle
square
tangram

Language Goals

- Follow simple directions with support from visual cues (Stage 1)
- Give straightforward directions and instructions (Stage 2)

Materials

Assessment Opportunities



Minds On...

Whole Class → Reflection

Post the sentence stems. As English-speaking students share their journal entries, have them point to the appropriate sentence stems.



Action!

Whole Class → Model Making

Provide oral prompts as students describe pieces they cut out, e.g., Is this a triangle or a parallelogram?

Point to the words and shapes as you ask the question.

Model giving simple directions. Peers model following simple directions.

Small Group → Discussion

When students work on BLM 1.2.3 and 1.2.4, pair English language learners with a peer who speaks their first language, if possible, so they can discuss their understanding of the concepts as they work.

Pairs → Game

Pair English language learners with peers who speak the same first language, if possible. Alternatively, English language learners assume the role of Partner B only.



Consolidate Debrief

Whole Class → Note Making

Students add to their personal Math word lists.

Exploration

Home Activity or Further Classroom Consolidation

Make It Language Rich

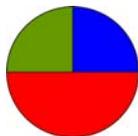
Post a chart that includes the geometric shape and its name. Point to the shape as you provide instructions for the activity.

Assess with Sensitivity

Use students' worksheets to assess their use of Mathematics vocabulary.

Make Sure They Are Ready

Provide practice with academic language.



Math Learning Goals

- Collect data by conducting a survey.
- Select an appropriate type of graph to represent a set of data.
- Identify bias.

Materials

- graph paper
- graphing software

Assessment Opportunities



Minds On ...

Whole Class → Review

Ask several students to report on their tangram activities.

Recall kinds of graphs and their different purposes, e.g., circle graph shows parts of a whole, line graph shows change, bar graph shows relationship between separate items. Review important parts of a graph such as titles, labels, and scales.

Discuss how one event might prompt several questions for which different graphs might be appropriate, e.g., going to the beach.

- What type of graph would we use to show the number of students likely to be at the beach at different times during a day? (pictograph or line graph)
- What type of graph would we use to show the portion of time spent at the beach swimming, playing volleyball, and/or sunbathing? (circle graph)
- What type of graph would we use to show attendance at favourite local beaches? (bar graph)



Action!

Small Groups → Brainstorm

Brainstorm seven topics that relate to summer activities. Discuss the importance of avoiding bias, asking clear questions, and having a fair sample in a survey.

Each group prepares survey questions for one of the topics, and shares its questions. The class critiques them for suitability as part of a survey.

Pairs → Data Gathering → Graphing

Each pair selects and writes one survey question on a piece of paper with their names at the top. In a chain from student to student, allowing seven seconds, circulate the questions for the class to respond to. A student at the end of the chain walks the paper to the other end of the chain. Stop the rotation of questions once enough data has been collected. Return papers to the pairs who posed the questions. Each pair chooses an appropriate graph type to display the data.

Learning Skills (Teamwork)/Observation/Rating Scale: Assess cooperation and class participation.



Consolidate Debrief

Whole Class → Sharing

Pairs show their graph and explain why they chose that type of graph.

Ask:

- Were the results as predicted?
- How would rewording the question change the graph?
- Was there any bias in the questioning or in the display? Explain.

Home Activity or Further Classroom Consolidation

Concept Practice

Present the data from your survey question in an alternative form, e.g., different scale, using technology.

Look for several types of graphs in print media and make a display.

- Word Wall
- circle graph
 - pictograph
 - bar graph
 - line graph

Terminology

bar graph
line graph
circle graph/pie chart
scatter plot
pictograph
data
survey
graph title
graph labels
graph scale

Language Goals

- Begin to apply some reading strategies (Stage 1).
- Organize information around a central idea using graphic organizers, e.g., graphs (Stage 2).

Materials

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Assessment Opportunities

Minds On... Whole Class → Review

Encourage English language learners to share with the help of first language buddies, or with pictures or diagrams.

As an alternative grouping, have English language learners share orally in a small group or with a partner.

Action! Individual → Guided Instruction

Work with English language learners to create their survey questions.

Create a chart as you demonstrate the parts of the question. Under each column, include relevant words and phrases, saying them out loud and pointing to them.

1	2	3	4
When		travel	
How many times		swim	
With whom	did you	visit friends	this summer?
Where			

Illustrate how to form a question by selecting a word or phrase from each column:

1	2	3	4
When	did you	visit friends	this summer?

English language learners form three questions of their own using the chart. They use these questions for the survey.

Consolidate Debrief Whole Class → Sharing

English language learners share their graph, using simple sentences and pointing to the relevant information.

*Concept Practice
With more time to
process language*

Home Activity or Further Classroom Consolidation

English language learners label their graphs using their first language and English. English language learners could look in print media from their cultures to find examples of graphs.

Make Sure They Are Ready

Circulate to identify whether English language learners have prior experience with data collection and graphing.

Lesson Outline

Big Picture

English language learners will:

- continue with their own personal vocabulary lists;
- work productively in flexible student groupings;
- communicate in day-to-day classroom interactions;
- use graphic organizers.

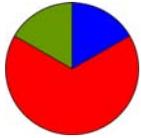
Day	Lesson Title	Language Goals*	Expectations
1	What's the Story?	<ul style="list-style-type: none"> • Use short patterned questions to seek information (Stage 1). • Respond to oral questions and information in standard Canadian English in school settings (Stage 1). • Organize information around a central idea, using graphic organizers (Stage 2). • Participate in social and academic discussion, using short phrases and short sentences (Stage 2). 	<p>7m27, 7m74, 7m76, 7m77</p> <p>CGE 2b, 2c, 3c, 5a, 5b, 5e</p>
2	Designing and Conducting a Valid Survey	<ul style="list-style-type: none"> • Begin to use acceptable notebook formats appropriate to subject areas, using titles, dates, charts, and graphs (Stage 1). • Begin to adapt to a variety of teaching approaches and strategies used in a Canadian classroom (Stage 1). • Identify main ideas and key information in text (Stage 2). • Organize information around a central idea, using graphic organizers (Stage 2). • Participate in controlled, directed group work (Stage 2). 	<p>7m73, 7m74, 7m77</p> <p>CGE 2b, 2c, 3c, 5b, 5e</p>
3	Organizing, Displaying, and Presenting Data	<ul style="list-style-type: none"> • Respond to short, simple questions (Stage 1). • Share personal information and experiences (Stage 1). • Respond to vocabulary, questions, and instructions in a familiar context (Stage 2). • Participate in social and academic discussions, using short phrases and short sentences (Stage 2). 	<p>7m74, 7m75, 7m77, 7m78</p> <p>CGE 2c, 4b, 5a, 5b, 5e</p>

***English Language Learner Language Goals**

The Ontario Curriculum Grades 1–8, English As a Second Language and English Literacy Development (A Resource Guide) 2001

Stage 1 – Using English for Survival Purposes

Stage 2 – Using English in Supported and Familiar Activities and Contexts

**Math Learning Goals**

- Make inferences and arguments based on the analysis of data.
- Distinguish between primary and secondary data.
- Distinguish between a census and a sample.
- Identify bias in data collection methods.

Materials

- BLM 3.1.1

Minds On...**Whole Class → Brainstorm**

Create a mind map with “data management” in the middle, and “sports” and “music” in two corners. Elicit answers that lead to creating some connections among these three ideas, e.g., What data could we collect from the Internet about music? (secondary data) or by surveying our class? (primary data)

Connecting/Oral Questioning/Observation/Mental Note: Assess students' ability to connect the use of data to situations in their world.

Assessment Opportunities**Action!****Groups of 4 → Investigation**

Students examine and analyse the data and answer the questions (BLM 3.1.1).

Ask specific questions from the chart to relate the data to the headings.

Groups answer the questions on BLM 3.1.1.

Note: Use this activity as a beginning for a discussion that graphs, data, and statistics are a math tool for organizing and analysing large amounts of information, i.e., data helps to tell a story.

Whole Class → Discussion

Discuss the discrepancy between the number of men vs. women who lost their lives.

To demonstrate a census vs. a sample, survey the class, by a show of hands, posing the question: Is the “women and children first” rule fair? Generalize from the data obtained that x % of the class thinks it is fair, and then survey the girls only.

Introduce the term *bias* in data collection.

Think Literacy: Mathematics, Grades 7–9, p. 2–4.

Point out the difference in the two surveys (one is a census of the class, the other is a survey).

Consolidate Debrief**Whole Class → Discussion**

Revisit the terms introduced during **Minds On...** and **Action!** Students give evidence of when they were used during the lesson.

Word Wall

- census
- sample
- primary/secondary data
- bias

*Application***Home Activity or Further Classroom Consolidation**

Find current statistics in a newspaper, a magazine, on television, or on the Internet to answer the following question about the data: What story might the data tell?

Terminology

survey
primary/secondary
data
census
sample
bias
inference
tally chart

Language Goals

- Use short patterned questions to seek information (Stage 1).
- Respond to oral questions and information in standard Canadian English in school settings (Stage 1).
- Organize information around a central idea using graphic organizers (Stage 2).
- Participate in social and academic discussions using short phrases and short sentences (Stage 2).

Materials

Assessment Opportunities

Minds On...

Whole Class → Brainstorm

Teach and review terminology, as needed. Say the word as you add it to the mind map.

Encourage English language learners to contribute to the mind map, using examples from their culture.

Post the mind map as reference during the investigation.

Additional vocabulary may be necessary (e.g., economic status, gender, statistics).

Make Sure They're Ready

Circulate to assist English language learners with both the language and the math concepts.

Make It Language Rich

Post the key words on the Word Wall for reference. Encourage use of bilingual dictionaries.

Make It Comprehensible

Check often for comprehension, review instructions, and ask questions.

Assess with Sensitivity

Observe growth of English language learners in their ability to share during brainstorming and discussions.

Action!

Groups of 4 → Investigation

Group students so that English language learners are with an English-speaking peer who also speaks their language.

Using pictures if possible, share the story and history of the Titanic to set the context for BLM 3.1.1.

Explore vocabulary specific to the story, e.g., maiden voyage, luxury liner, steerage

Discuss the columns in the table, using an overhead version. Highlight key words during the discussion.

Consolidate Debrief

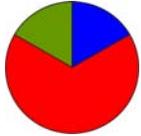
Whole Class → Discussion

Students point to the posted mind map during the discussion.

Home Activity or Further Classroom Consolidation

Application

Encourage English language learners to find articles with statistics in their own language or highlighting their own culture so that they can be shared with the class the next day.

**Math Learning Goals**

- Identify bias in data collection.
- Collect primary data by conducting a survey.
- Organize primary data into a tally chart.

Materials

- BLM 3.2.1, 3.2.2
- overhead projector

Assessment Opportunities**Minds On...****Small Groups → Discussion**

Students share stories from the Home Activity, Day 1.

Whole Class → Survey

Survey the class by a show of hands the number of minutes that should be required for homework time: Should homework in Grade 7 be limited to 15 minutes per day? Record the responses on a yes-no tally chart.

Ask: Is this a “fair” or biased sample?

Action!**Whole Class → Discussion**

Lead a discussion of the criteria required to conduct a valid survey by asking student volunteers to read the five scenarios on an overhead of BLM 3.2.1. Pause after each scenario to consider bias, sample size, phrasing of the question, and method of data collection.

Student volunteers read aloud the descriptions of the four rides on an overhead of BLM 3.2.2. By a show of hands, students select their favourite ride. Record results on a tally chart.

Discussion Questions

- How reliable are these results for the decision being made?
- What are some other ways data could be collected?

Small Groups → Investigation

Students investigate reasons why they might want to collect data, e.g., music at a dance, fundraising, school uniforms. They share some of their suggestions with the class.

Small groups decide on a topic for which they would like to collect data and design a survey.

Students consider:

- How will the information collected be used?
- How and why is this important?
- What collection methods will be used?
- What is an appropriate sample size?
- Are questions appropriately phrased?

Students conduct their survey by passing the survey questions between groups.

Consolidate Debrief**Whole Class → Discussion**

Lead a discussion to identify possible uses of the data collected in their surveys, making the point that surveys should inform a decision of some type.

Reflecting/Application/Rating Scale: Individually student write a reflection about the kinds of decisions that could be made based on their survey data.

Home Activity or Further Classroom Consolidation

Write a journal response:

We live in the Information Age. An informed citizen needs to be able to collect, organize, display, interpret information, and identify bias. How can our study of data management help you become an informed decision maker?

Application Reflection

Teachers should choose an example that is geographically or culturally appropriate for their group.

Terminology

survey
bias
sampling
technique
sample size
primary data
tally chart

Language Goals

- Begin to use acceptable notebook formats appropriate to subject areas, using titles, dates, charts, and graphs (Stage 1).
- Begin to adapt to a variety of teaching approaches and strategies used in a Canadian classroom (Stage 1).
- Identify main ideas and key information in text (Stage 2).
- Organize information around a central idea using graphic organizers (Stage 2).
- Participate in controlled, directed group work (Stage 2).

Materials

Assessment Opportunities

Minds On...

Small Groups → Discussion

English language learners can post their statistics articles from first language sources, so that classmates can see stories with data and graphs in a language other than English.

Whole Class → Survey

Express the survey question in simple language and post it on the overhead or board as a visual reference during the discussion.

Action!

Whole Class → Discussion

Provide a print copy of the description of the four rides along with a visual so that English language learners can use their bilingual dictionaries and personal math vocabulary lists to record notes in their first language. Ask English-speaking students to restate responses in their own words so that each idea is shared more than once.

Small Groups → Investigation

If possible, pair English language learners with other students whose first language is the same.

Consolidate Debrief

Whole Class → Discussion

Reflecting/Application/Rating Scale: Provide sentence stems to help English language learners to complete the written reflection. Some examples are:

- I found out that...
- I now know that...
- I would use this data to...

Application Reflection

Home Activity or Further Classroom Consolidation

Alternate journal responses for English language learners:
List three places you see data in everyday life. How does this data help you make decisions?

Additional vocabulary may be necessary (e.g., fair, collect, determine, justify)

Incorporate Identity

Build a positive classroom atmosphere by valuing resources from the English language learner's first language.

Make Sure They're Ready

Review the terminology using Word Wall.

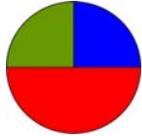
Make It Comprehensible

Use simple language structures for discussion questions.

Engage the Senses

Make frequent use of visual support.

Teachers could provide some examples of data from everyday life, or refer to the examples shared in the **Minds On...** discussion.



Math Learning Goals

- Interpret, display, graph and draw conclusions from primary data.

Materials

- BLM 3.3.1
- chart paper
- markers

Assessment Opportunities



Minds On... Pair/Share → Discussion

Students share and discuss their journal entries from the previous day.

Whole Class → Brainstorm

Brainstorm on how students' primary data collected on tally charts from their group surveys could be displayed (Day 2). On chart paper record possible types of displays, e.g., relative frequency table, stem-and-leaf, bar graph, line graph.

Briefly review key features of each.

Accept all responses about types of displays.



Action! Whole Class → Demonstration

Lead a discussion on the most appropriate type of graph for the tally chart of Canada's Wonderland data from Day 2. Demonstrate how to produce a relative frequency table and an appropriate type of graph (stem-and-leaf and/or bar graph).

Small Groups → Practice Graphing

Each group creates a presentation to communicate the results of their survey conducted on Day 2 (see BLM 3.3.1). Emphasize the importance of group cooperation, time management, and delegation of tasks among all group members.

Communicating/Presentation/Checkbric: Assess students' ability to display data graphically, to explain the purpose and results of their survey.

Dynamic statistical software such as TinkerPlots® may be used to display and analyse data.



Consolidate Debrief Small Groups → Presentation

Each small group presents its results to the class. Students use the criteria on BLM 3.3.1 as a checklist for observing the presentations of others.

After each presentation, peers comment on criteria met and provide suggestions for improvement.

Model positive review comments, e.g., Your survey may have been more accurate if you had worded your survey question in the following way....

Word Wall
• frequency table

Reflection

Home Activity or Further Classroom Consolidation

Complete worksheet 3.3.2 to reflect on your participation within your group.

Learning Skills (Teamwork)/Reflection/Anecdotal Notes: Assess students' self-reflection.

Terminology

relative frequency table
stem-and-leaf plot

Language Goals

- Respond to short, simple questions (Stage 1).
- Share personal information and experiences (Stage 1).
- Respond to vocabulary, questions, and instructions in a familiar context (Stage 2).
- Participate in social and academic discussions using short phrases and short sentences (Stage 2).

Materials

Assessment Opportunities

Minds On...

Pair/Share → Discussion

English language learners can share their journal entries orally, visually, and using gestures.

Whole Class → Brainstorm

Add visual examples of types of displays to the charts. Post the charts as a reference. Leave them posted during the **Action!**

Action!

Whole Class → Demonstration

Review the Canada’s Wonderland survey from Day 2. Refer to the visuals to reinforce the categories of the survey.

Consolidate Debrief

Small Groups → Presentation

English language learners highlight key words on the criteria list.

Assist the group in assigning tasks so that English language learners can participate in the task.

Make It Language Rich

Provide lots of visual aids to assist with the language required in this lesson.

Make It Comprehensible

Leave the Canada’s Wonderland display posted during the practice graphing work for visual reference.

Make It Explicit

Have students repeat instructions and refer to the criteria list so that students are clear on the task.

Engage the Senses

English language learners could participate in the presentation using mime.

Home Activity or Further Classroom Consolidation

Reflection

Lesson Outline

Big Picture

English language learners will:

- use manipulatives to develop and demonstrate concept understanding;
- continue with their own personal vocabulary lists;
- follow instructions;
- participate in classroom activities.

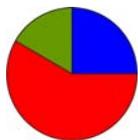
Day	Lesson Title	Language Goals*	Expectations
1	Fraction Puzzles	<ul style="list-style-type: none"> • Follow simple directions with support from visual cues (Stage 1). • Follow brief written instructions (Stage 1). • Begin to work with a partner on a common academic task (Stage 1). • Understand key vocabulary and concepts related to specific subjects and themes (Stage 2). • Identify main ideas and key information in text (Stage 2). 	7m11, 7m15 CGE 3c, 5a, 5e
2	Adding Fractions	<ul style="list-style-type: none"> • Recognize frequently used classroom vocabulary (Stage 1). • Follow simple directions with support from visual cues (Stage 1). • Work with a partner on a shared academic task (Stage 1). • Ask for assistance and communicate needs (Stage 2). • Understand key vocabulary and concepts related to specific subjects or themes (Stage 2). • Participate with increasing comfort and confidence in classroom activities (Stage 2). 	7m11 CGE 3b, 3c, 5a
3	Adding Fractions with Different Denominators	<ul style="list-style-type: none"> • Follow brief written instructions (Stage 1). • Begin to understand teacher expectations and follow classroom routines (Stage 1). • Copy board notes and text accurately (Stage 1). • Identify main ideas and key information in text (Stage 2). • Begin to accept responsibility for own learning by recognizing consequences and managing own time (Stage 2). • Begin to make notes, with assistance (Stage 2). 	7m11, 7m12 CGE 4b, 5e

***English Language Learner Language Goals**

The Ontario Curriculum Grades 1–8, English As a Second Language and English Literacy Development (A Resource Guide) 2001

Stage 1 – Using English for Survival Purposes

Stage 2 – Using English in Supported and Familiar Activities and Contexts



Math Learning Goals

- Explore/review fractional parts of geometric shapes.
- Order fractions.

Materials

- pattern blocks
- overhead pattern blocks
- BLM 7.1.1, 7.1.2, 7.1.3, 7.1.4
- 2 or 3 large imperial socket wrench sets in cases

Assessment Opportunities

Minds On...

Whole Class → Solving a Problem

Students solve an area fraction puzzle:

- With your pattern blocks build two different triangles each with an area that is one-half green and one-half blue.

Students share their solutions, using the overhead pattern blocks.

Discuss whether rearranging the blocks makes the solution “different.”

See Continuum and Connections Fractions in LMS library.

Virtual pattern blocks are available at:
http://arcytech.org/java/patterns/patterns_j.shtml

Action!

Pairs → Problem Solving

Students complete questions 1 to 5 on BLM 7.1.1, using pattern blocks. They show the graphic solution, labelling each colour with the appropriate fraction of the whole triangle (BLM 7.1.2).

Students complete questions 1 to 5 (BLM 7.1.3) individually. Pairs of students take turns, completing question 6, using an imperial set of socket wrenches.

Curriculum Expectations/Demonstration/Marking Scheme: Assess students’ understanding of equivalent fractions and ordering fractions.

Briefly review the meaning of *parallelogram* (blue or beige block) and *trapezoid* (red block). Some methods students may use include physical size of each socket, ordering of the sockets could also be accomplished using equivalent fractions, converting to decimals, or measuring in millimetres.

Consolidate Debrief

Whole Class → Sharing/Discussion

Pairs of students share their solutions to an area puzzle using the overhead pattern blocks and explain how they know their solution is correct.

Discuss possible answers to question 5 on the student worksheet (BLM 7.1.1).

Several different pairs of students share their solutions, even if the solution is merely another arrangement of the same pattern blocks. This allows more students to be recognized and reinforces multiple solutions and explanations.

Discuss the various methods students used to solve the socket set problem.

Students explain why they placed a certain socket between two others.

Home Activity or Further Classroom Consolidation

Complete worksheet 7.1.4.

Provide a tangram pattern.

Concept Practice

Terminology

*fractions
solution
whole
parallelogram
trapezoid
area
equivalent
between
calculate*

Language Goals

- Follow simple directions with support from visual cues (Stage 1).
- Follow brief written instructions (Stage 1).
- Begin to work with a partner on a common academic task (Stage 1).
- Understand key vocabulary and concepts related to specific subjects and themes (Stage 2).
- Identify main ideas and key information in text (Stage 2).

Materials

- coloured paper
- models of pattern block fractions
- plastic and paper tangrams

Assessment Opportunities

Minds On... Whole Class → Solving a Problem

Establish lesson vocabulary using visuals, e.g., flash cards.
 English language learners record the terms in their personal vocabulary list notebook and translate in their own language.
 Model solving a fraction puzzle using pattern blocks, e.g., two trapezoids are the same as one hexagon.
 Pair an English language learner with an English-speaking peer who can repeat instructions, if necessary.

Additional vocabulary may be necessary, e.g., pattern blocks, socket wrench.

Make Sure They're Ready

Circulate to make sure that English language learners understand the terminology.

Action! Pairs → Problem Solving

Post labelled diagrams of geometric shapes (e.g., parallelogram, trapezoid, triangle, etc.) for reference.
 Read the instructions on BLM 7.1.1 aloud. English language learners state them in their own words.
 Check for understanding, e.g., read question number 1 – a student volunteer models the solution.
 English language learners use diagrams and pictures to complete the explanation for question 5.
 Discuss what socket wrenches are used for.

Make It Language Rich

Post vocabulary on the Word Wall. English language learners can access bilingual dictionaries.

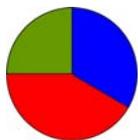
Consolidate Debrief Whole Class → Sharing/Discussion

Have another student explain the same solution in his/her own words so that English language learners can hear it phrased in different ways, using the manipulative to add clarity.

Concept Practice

Home Activity or Further Classroom Consolidation

Explain the terms used in the columns of the chart and do one example together.



Math Learning Goals

- Investigate combinations of fractions using manipulatives.

Materials

- pattern blocks
- overhead pattern blocks
- BLM 7.2.1

Assessment Opportunities

Minds On...

Whole Class → Introducing Problems

Using pattern blocks, students show that $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$. Several students share their methods.

Students show that $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ and share which pattern block they chose to represent one whole.

Demonstrate the use of different pattern blocks to represent one whole.

One way: Using the hexagon as one whole, the triangle can be one-sixth, three triangles (or the trapezoid) can be one-half, and together they form four-sixths (two-thirds).

Action!

Pairs → Exploration

Students answer several questions involving combining fractions that can be modelled with pattern blocks. For example, $\frac{1}{2} + \frac{5}{6}$; $\frac{1}{3} + \frac{1}{6}$; $\frac{1}{3} + \frac{5}{6} + \frac{4}{3}$.

Students explain each solution, and identify which pattern block they used to represent the whole.

Fractions, both proper and improper, that have denominators of 2, 3, or 6 work well with pattern blocks.

Consolidate Debrief

Whole Class → Sharing/Discussion

Students demonstrate their strategies to add fractions using overhead pattern blocks.

Discuss the idea of equivalent fractions with common denominators as it relates to the pattern blocks, e.g., using smaller blocks helps to combine fractions with different denominators.

For example, to add $\frac{1}{2} + \frac{5}{6}$, students may choose to use the hexagon as the one whole. They would use the trapezoid to represent $\frac{1}{2}$ and five triangles to represent $\frac{5}{6}$. To combine the fractions, students need to express the answer in triangles (one whole and two triangles, or one- and two-sixths, which can be simplified to one and one-third using the blue rhombi).

Students should use a variety of methods to determine the common denominator.

Curriculum Expectations/Demonstration/Checklist: Assess students' ability to add fractions using manipulatives.

As students explore and discuss they gain a deeper understanding of equivalent fractions and of the algorithm for determining a common denominator.

Home Activity or Further Classroom Consolidation

Complete the worksheet, Combining Fractions (7.2.1).

For virtual pattern blocks and related activities see: <http://math.rice.edu/~lanius/Patterns/>

Concept Practice

Terminology

common denominator
equal
equivalent
represent
amount
sum

Language Goals

- Recognize frequently used classroom vocabulary (Stage 1).
- Follow simple directions with support from visual cues (Stage 1).
- Work with a partner on a shared academic task (Stage 1).
- Ask for assistance and communicate needs (Stage 2).
- Understand key vocabulary and concepts related to specific subjects or themes (Stage 2).
- Participate with increasing comfort and confidence in classroom activities (Stage 2).

Materials

- variety of manipulatives useful for demonstrating fraction combinations

Assessment Opportunities

Minds On... Whole Group → Introducing Problems

Alternatively, students work in groups of four. Group English language learners with a peer who is fluent in the first language, if possible.

Using various manipulatives, students show that $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$. Students use words, diagrams, and/or pictures to show how they used the manipulative.

Students demonstrate their understanding of $\frac{1}{2}$ and $\frac{1}{6}$, using the same manipulative, and show the sum $\frac{1}{2} + \frac{1}{6} = \frac{2}{3}$. Students share their solutions (with peers fluent in first language, if possible).

Additional vocabulary may be necessary, e.g., triangle, hexagon, trapezoid, recipe.

Explain the homophones *some* and *sum*.

Make It Comprehensible

Ask students to explain the fraction combinations that their models show.

Make It Explicit

Share exemplars of fraction combinations early in the lesson for students to reference as models.

Make It Language Rich

Encourage English language learners to describe their models orally.

Action! Pairs → Exploration

Provide a variety of manipulatives for the pairs to use during their exploration. English language learners and their English-speaking partners use key vocabulary words, diagrams, and pictures to explain their solutions.

Consolidate Debrief Whole Class → Sharing/Discussion

Students write and draw their solutions on the board, or use the overhead, and provide a model using the manipulative, so that the English language learners can visualize the various strategies used.

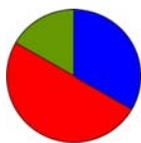
English language learners share their solutions using manipulatives and pictures with their partner. English language learners add *common denominator* and *equivalent fractions* to their personal math vocabulary lists.

Home Activity or Further Classroom Consolidation

Concept Practice

Unit 7: Day 3: Adding Fractions with Different Denominators (TIPS4RM)

Grade 7



Math Learning Goals

- Add fractions by connecting concrete to symbolic.
- Recognize the need for and find equivalent fractions with common denominators.

Materials

- BLM 7.3.1, 7.3.2
- pattern blocks

Minds On...

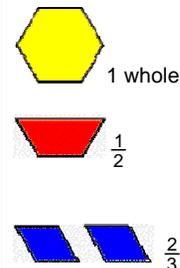
Whole Class → Teacher Directed Instruction

Some students share their solutions to question 3 from the previous day's Home Activity ($\frac{1}{2} + \frac{2}{3}$) using overhead pattern blocks.

Record the symbolic form of each solution, i.e., the fractions. Discuss how to get the solution without using pattern blocks.

Through questioning, students consider the use of equivalent fractions with a common denominator, in this case, 6. They may determine the common denominator in different ways.

Assessment Opportunities



Action!

Pairs → Think/Pair/Share

Students think individually about solving each of the questions from the Home Activity, Day 2, using equivalent fractions with a common denominator. Then with a partner, they discuss their strategies for finding equivalent fractions with a common denominator. Pairs share their strategies with a small group and/or the whole class.

Curriculum Expectations/Observation/Checklist: Assess students' understanding of addition of fractions with common denominators.

Consolidate Debrief

Whole Class → Note Making

Create a note together that outlines the process for adding fractions using equivalent fractions with a common denominator. Include the multiples method of finding common denominators.

Students determine the steps to follow in the process.

Students work independently on differentiated practice, based on the teacher's observations in Action (see BLM 7.3.1, 7.3.2).

BLM 7.3.2 shows scaffolding.

*Differentiated
Concept Practice*

Home Activity or Further Classroom Consolidation

Complete the worksheet, Adding Fractions with Different Denominators, and the practice questions.

Provide student with appropriate practice questions.

Terminology

*common
denominator
equivalent
fractions*

Follow brief written instructions (Stage 1)

- Follow brief written instructions (Stage 1).
- Begin to understand teacher expectations and follow classroom routines (Stage 1).
- Copy board notes and text accurately (Stage 1).
- Identify main ideas and key information in text (Stage 2).
- Begin to accept responsibility for own learning by recognizing consequences and managing own time (Stage 2).
- Begin to make notes, with assistance (Stage 2).

Materials

Assessment Opportunities

Minds On...

Whole Class → Teacher-Directed Instruction

Support the instruction with visual cues and printed labels, pointing to the symbols and words to make the connection, e.g., common denominator.

Show the symbolic form on the board and leave posted during Action!

Use the pattern blocks, as needed, to demonstrate equivalent fractions.

Make Sure They're Ready

Circulate to ensure that they understand both the instructions and the math concept.

Make It Language Rich

Post new terminology on the Word Wall. English language learners highlight the terms on their worksheets.

Make It Comprehensible

Circulate to check for comprehension.

Make It Explicit

Repeat the instructions individually if students have difficulty.

Engage the Senses

Provide manipulatives for students to use.

Action!

Pairs → Share

Students share their strategies in groups and restate other group members' comments in their own words, asking questions and sharing their own strategies.

**Consolidate
Debrief**

Whole Class → Note Making

English language learners can write additional information in their own language to support the notes.

English language learners add common denominator and equivalent fractions to their personal math vocabulary list.

Home Activity or Further Classroom Consolidation

*Differentiated
Concept Practice*