Lesson Plan

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Lesson Title: Arithmetics in the Real World - Word Problems
Grade Level and Course: Grade 4, Mathematics
Time Segment of Lesson: 50 minutes

Discrete or Integrated Skills

The teacher will utilize integrated skills in instruction. The class does not have a language focus area, instead the teacher will address all four linguistic domains simultaneously. This is a math lesson that will encourage students to use various linguistic strategies to interpret and solve math word problems. Students will need to use reading, writing, speaking and listening to meet the objectives of the class.

Information on the Student Population:

There are 14 students in the class. All of the students are Chinese, share Mandarin as their native language, and are studying English as a second language at an international school in China.

All the students read and write below grade level in English. However, their English levels vary from (Mid) Intermediate to (High) Intermediate for their age group in speaking and listening, based on the ACTFL framework (American Council on the Teaching of Foreign Languages, 2024).

All of the students in the class are either in their first or second year studying mathematics in English at this school. They have all performed above average in mathematics throughout their learning. This is based on data collected from their files including assessments and teacher feedback from their previous schools, in which they studied math in their native language, as well as assessments and report cards given at this school. They have all continued to perform above average in math since entering this international school, though appropriate levels of ESL support have been required.

All students are engaged and motivated to study mathematics in English during class. They are used to pair work routines.

Big Ideas to be Addressed in the Lesson:

Arithmetic expressions can be used to solve real world problems.
Mathematics has real world applications and this is the reason to study it.

Overarching Unit Goal(s):

Students can use the four arithmetic operations with all whole numbers up to three digits, including using column methods or other approaches to solve problems with bigger numbers. This includes division problems with a remainder.

Students can round answers to an appropriate degree of accuracy - nearest, nearest whole number, nearest 10, nearest 100 and nearest 1000.

Students can interpret and solve word problems for the four operations, and whole numbers.

Students can add and subtract both positive fractions and positive mixed numbers with the same denominators, including in word problems.

Students can multiply a positive fraction, by a positive whole number, including in word problems.

Content Standard(s) Addressed in Lesson:

CCSS.Math.Content.4.OA.A.2

Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.

CCSS.Math.Content.4.OA.A.3

Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Literacy Standards Addressed in Lesson:

Reading - Comprehension of short paragraphs outlining a real world-math problem.

Writing - Writing of mathematical expressions and equations. Drawing pictorial representations of the sentences in a real world mathematical situation, with word or short sentence labels as necessary.
Listening - Comprehending direct instruction from the teacher on the solving of problems, with visual support and modelling.
Speaking - Following the teacher to read problems aloud. Free discussion with classmates as they work together to read and then solve problems.

Objective(s) of the Lesson: Students will be able to ...

(Remember SMART - Specific, Measurable, Achievable, Realistic, and Time-bound)

By the end of the class, students will be able to:

-In pairs, interpret two word problems, one with multiplication and one with division with whole numbers up to two digits. One must be read individually, and interpreted on paper with a full sentence answer. (reading, writing) The other is to be read by a partner, interpreted by listening, and solved orally using mental math. (listening, speaking) The students are expected to explain to their partner what the word problem is asking them to solve, how they would approach it, which mathematical operation they would use, and justify it using specific math-related vocabulary. (speaking, listening, reading)

-In pairs, students are to listen to two word problems read by their partner, explain how they would approach solving them, and then solve them orally using mental math. Solve one multiplication and one division word problem with numbers being no greater than what is included in the multiplication table. (reading, listening, speaking)

-Individually solve one multiplication and one division word problem with the numbers up to two digits with whole number answers, the dividend up to three digits, and the divisor, one digit. The word problems are to be read individually and solved on paper using long multiplication/division, with a written full sentence answer. (reading, writing)

-As a group, a Kahoot quiz will be given to the students with simple word problems, some of which will be written, and others given by audio recording. (reading, listening, writing)

-Exit ticket is a written multiplication problem that the students are expected to solve on paper with a full-sentence answer, then compare the answer and the solution method with their partner to make sure they match. (writing, reading, speaking, listening)

21st Century Knowledge and Skills

21st Century Knowledge and Skills	Teaching Strategies
Technology literacy	Students practice using the Kahoot quiz on the iPad. This will involve logging into the iPad and using the tool effectively.
Flexibility	Students will work with different partners throughout the class.
Communication and collaboration	Students will work with classmates to answer questions. Here they will be encouraged to practice communicating in English. For communication, the entire class is in English, to support language development.
Leadership	Students will be given the opportunity to teach each other.

Student Diversity and Differentiation of Instruction

Identify students who will need differentiated instruction for this lesson.

Student Diversity	Differentiation of Instruction
All students as ESL learners.	- In formulating questions to be used in the class, the active voice will be used instead of the passive voice, sentences will be kept to present simple tense and everyday language will be focused on from the school and other aspects of everyday life, as opposed to more specialised vocabulary that students might not be familiar with. These will

	support students in comprehending the questions (Cooper, 2023). - There is a mathematical word wall up in the class (Krick-Morales, 2013). Key words from the wall that will be relevant to this class are “times”, “multiplied by”, and “divided by”, “expression”, “calculation”, “multiplication” and “reasonable”. - Pre-teach the vocabulary words in the problems used in the class that students may not be familiar with (Robertson, n.d.). This has been done in the previous class, with a review set that was given for homework - For the process of solving the questions, a clear process will be provided with visual supports to help students follow along, written on a large A1 sheet and visible to students throughout the class. (Robertson n.d.)
Slightly lower level English students.	- Paired up with higher level students during pair activity, who can support them with English and provide first language reference and translation as necessary. - Sit closer to the teacher during individual practice activities, including final exit tickets, so any prompting or support can be provided as necessary.
Higher level English students.	- Paired up with lower level students. This will stretch their own skills both of reading and speaking as they vocally discuss with their partner. They will use primarily English, but first language support can be used as necessary.

	- They can replace the teacher to lead the class through some of the whole class examples.

Formative and Summative Assessments- include open ended questions that will lead students to think deeply about the content and will also build on prior knowledge.
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Formative Assessment	Summative Assessment
Entry questions in book - multiplication and division. Students show these up to the teacher when finished.	There is no summative assessment in this lesson. Six lessons later, students will take an end of unit test. Later, they will take an end of semester test.
Questions to be worked on in pairs. Students interpret the word problems and then solve (in the later activities).	
Kahoot! quiz, with word problems given either in written or audio form.	
Final exit ticket.	

Teaching Strategies and Related Student Activities (Include Web 2.0 activities and innovative strategies,as appropriate):

Steps in Mini-Lesson	Details	I do/we do/you do
Class warm up	- Two multiplication problems (two digits by two digits) and two division problems (three digits by one digit) are on the board.	You do.

	- Students write the answers to these in their books. Briefly go through these as a class after. This is a review of a previously covered skill - start a lesson with a review of previous learning (Roshenshine, 2012). It also activates thinking and skills required for this lesson.	We do.
Introduction of the lesson. Review of math word problem-related vocabulary from the previous lesson.	Note: Throughout the class, the ideas of models and guided practice are provided (Rosenshine, 2012). Also applied is the idea of alternating between problems with solutions provided and problems students must solve. (National Council on Teacher Quality, 2016) Tell students today's objective. Briefly remind the students of the multiplication and division-related math vocabulary and explain that we will apply the vocabulary to interpreting and solving simple word problems. Have a student hand out a word problem set to each pair of students, with each student in the pair getting either "Paper A" or "Paper B". Have the students watch and follow along as the teacher demonstrates how to interpret a written word problem on the board. Highlight/underline key words, and link them to mathematical language, such as numbers, operations and equal sign.	I do

	Ask student A to read the first oral word problem to student B. Ask student B to explain what mathematical operation they would use to solve the problem, and how they know using math-related vocabulary. Repeat this step with student B reading their word problem to student A, with student A explaining how to approach it. After both rounds, the teacher is to orally explain the two word problems, focusing on the used mathematical vocabulary and answering any student questions about the method.	We do.
Teacher modelling; students following along and writing.	The teacher is to repeat the previous activity with a new word problem, however this time the teacher is to demonstrate how to use mental math to solve the problem after interpreting it. After the demo, the students are to take turns reading the word problems on their worksheet to the partner, with the partner interpreting them and using mental math to solve them. Each student is to read two problems (one with multiplication and one with division), and to interpret and solve two problems (one multiplication and one division). At the end of the activity the teacher is to show the answer to all four problems on the board, and address any student questions.	I do. We do.

Students practice word problems individually.	On their worksheets, students are to individually solve two word problems: one with multiplication and one with division. They are to write the mathematical expression they got from the wording, use long multiplication or division to manually find the answer, and are to write the solution in full-sentence form as an answer to the original problem. At the end of the activity the teacher is to show the solutions to both word problems on the board, with the students checking their answers and correcting any mistakes.	You do.
Kahoot quiz.	The teacher is to run a Kahoot Quiz, with students giving responses on their tablets. Each question is a word problem with a simple mental math solution, however some word problems will be shown on the screen, and some will be read out as an audio. Students are to answer 6 questions, which will be a mix of multiplication and division..	You do.
Class conclusion and exit ticket.	Put away tablets and then do some breathing exercises for calming. Remind students of what we have covered today and give overall feedback. Tell them that we will do a final exit ticket before we leave the class. Students complete the exit ticket, which is one final multiplication word problem.	We do. You do.

Materials and Resources for Lesson

Materials, Technology, and Websites	Required Preparation
Poster showing the steps of our process.	Create a poster on the computer, print in A1 to have on the separate whiteboard.
Kahoot! quiz with four questions.	Prepare quiz.
Two question sheets "A and B", each with 6 different word problems to be interpreted/solved orally/mentally (Including the teacher demonstrated ones), and three written word problems (including the exit ticket).	Write questions and prepare sheet.
One tablet for each student for Kahoot Quiz.	Students have these stored in their desks.

References

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