Lesson Plan

Teacher Candidate: Joel Michael Pope

Lesson Title: *"Writing Mathematics Problems"*
Lesson 2 from the Unit, "From Number Sense to Operations"

Grade Level and Course: Kindergarten (aged 5 - 6)
Course name - "Arithmetic Development within Mathematics"

Time Segment of Lesson:
50 minutes
30 minute break for outdoor time
30 minutes

(1 hour, 20 minutes in total.)

Standard(s) Addressed in Lesson:

K.0A.A.1 - Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.A.4 - For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

In this class, the focus will specifically be on writing equations. Other methods for representing additions and subtractions have been covered previously.

Overarching Unit Goal(s):

- Students will be able to represent and then solve addition problems within 10 (whole numbers 0 - 10) using at least three different methods.
- Students will be able to represent and then solve subtraction problems within 10 (whole numbers 0 - 10) using at least three different methods.
- Students will be to apply their knowledge of addition and subtraction to solve word problems for both addition and subtraction to 10 with the support of the teacher reading the question and providing EAL support for meaning as necessary.
- Students will be able to both add and subtract within five automatically.

- Students will be able to create a portfolio of three different representations they have done of arithmetic problems within 10 (whole numbers 0 - 10).
- Students will be able to collaborate with classmates both in a role-play activity and playing games to practise arithmetic.
- Students will be able to create their own word problems for addition and subtraction, using at least one of speaking, drawing, dictation and writing.
- Students will be able to communicate a question they have created to classmates.
- Students will be able to write addition and subtraction problems to 10, using written digits and equations.
- Students will be able to articulate addition and subtraction equations within 10 (whole numbers 0 - 10), using English, including the words "plus", "minus" and "equals".

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

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

The following two objectives are from the overall unit objectives.

- By the end of the unit, students will be able to write two addition equations within 10 (numbers 0 - 10) using the numbers, and the symbols "+" and "=", being able to look at symbols for reference of how they look if necessary.

- By the end of the unit, students will be able to write two additional equations within 10 (numbers 0 - 10) using the numbers, and the symbols "-" and "=", being able to look at symbols for reference of how they look if necessary.

These will be communicated to students as follows:

- *"Before our last class of this unit, on (day and date), you will put two adding (+) questions that you have written on paper - for example, "2 + 1 = 3" using a pen or pencil that you choose, into your maths work folder. "*

"This will practise your writing for maths."

"You will practise reading them using either the words, "add", or "plus" and "equals".

For example, "Two plus one equals three."
Or, "Two add one equals three."

- *"Before our last class of this unit, on (day and date), you will put two take away (-) questions that you have written on paper - for example, "2 - 1 = 1" using a pen or pencil that you choose, into your maths work folder. "*

"This will practise your writing for maths."

You will practise reading them using either the words, "minus", or "take away" and "equals".

For example, "Two minus one equals one"
Or, "Two take away one equals one."

Further objective specifically for this lesson.

- By the end of the day following the class, students create a representation of one addition or one subtraction problem, including numbers and symbols, that involves reusable waste materials.

This will be communicated to students as follows.

- *"By the end of tomorrow, you will make either a plus (+) or take away (-) question, for example, "2 + 2 = 4", or "3 - 2 = 1". You can make this in any way you want, so long as you incorporate some of the reusable waste materials that we have collected after our STEAM project."*

(Students know the words, “reusable”, “waste materials” and “STEAM” from the project.)

In the communicating of this objective the reusable waste materials area in the classroom can be indicated. An example can also be shown to support meaning.

Prerequisite Skills

The following are prerequisite skills for the unit as a whole that will be relevant here.

- Students should be able to count forwards to and backwards from 10 (starting at 0), with fluency.

- Students should be aware of the correspondence between a written digit and a physical number of objects or counts - for example 7 can represent 7 objects or 7 occurrences of an event. (The relationship between counting and cardinality.)

- Students should be able to recognise the written digits for the numbers 0 - 10 and know the number it represents.

- Students should have an appreciation of the fact that if you have a known physical number of objects or occurrences of an event and add one or more new ones to count, you can count the new ones only, beginning from the number after the total number you had originally.

- Students should have a developing appreciation of the fact that if you have a known count of objects and lose one or more, you can count backwards from the original number the appropriate number of times.

- (English language) Students should be familiar with the numbers 0 - 10 in English.

- (English language) Ability to comprehend instructions, questions, or other information, of up to three sentences delivered in English, with only contextual, visual and gesture or action based support, with slower and exaggerated language if necessary.

More developed prerequisite skills for this class specifically:

- Ability to write the digits 0 - 10.
- Developing ability to approach and solve arithmetic problems within 10, even if some support is still needed.
- Exposure to the written symbol equations for addition and subtraction.

Student Diversity and Differentiation of Instruction

The class has 14 students.

Two specific case studies are outlined in the table below.

In addition, one girl and one boy - Carey and Vivian - have more advanced English reading skills. Using the Reading A-Z program, as outlined here , as a guide, Carey is able to read books up to Level F independently, and Vivian up to Level G. This puts them well into the Grade 1 Level of reading. Their English writing level is more advanced also. They are able to use broad knowledge of phonics to spell words and can write simple sentences. The same students also have developed arithmetic skills, being able to cope with addition and subtraction to 20 and above. They also have intermediate fluency in English, being able to receive everyday information and that on academic content, as well as communicate, with few barriers.

For the rest of the students, four had little familiarity with arithmetic to 10 before the unit and hence may still need extra support. The other six have developed confidence with addition and subtraction to 10, and are beginning to take their skills further to bigger numbers. English levels in both groups are varied, from an ability to understand everyday language, and communicate basic interests and needs, but needing some support to follow more academic content, to intermediate fluency as defined above. The class have only had little formal phonics instruction and so all are in the earlier stages of learning to read, with being able to read three letter CVC words from blending, to books of Level B in the Reading A-Z program as defined above.

All students in the class have developed fine motor skills for writing.

Based on this diversity, groupings for this lesson will be done as follows.

- For the stations activity - students in groups, practising writing of equations in different ways - they will be in three homogeneous groups.

Vivian, Carey and Zhong (Zhong's situation is described below) will be one group. They will be able to stretch themselves, working with and writing additions and subtractions within 50. They will also be provided with word equations to read for the writing of the equation, to stretch their reading. They will be encouraged to use English for discussion.

There will be a second group of the six students developing confidence with addition and subtraction within 10. They can be split into two smaller groups, each of three students, heterogeneous based on groups they would normally work in, so that they gain experience working with different peers. They can initially start working together on problems within 10, and move up to within 20 by the end of the stations session.

The third group will consist of the final five students, including Holly (Holly's situation described below). One of the class teacher's can directly work with them to support them in solving the problems before they write.

Students can discuss in a language of their choice, but the teacher will also interact with them and ask concept questions using graded English.

- Working on the artistic creation with the reusable waste materials, students will be seated homogeneously based on interest. This will allow them to discuss and support each other in taking their thinking further if they begin to think creatively based on their interests.

Students can discuss in a language of their choice, but the teacher will also interact with them and ask concept questions using graded English, as before.

Two specific students who may need further support during the class are as follows.

Student Diversity	Differentiation of Instruction
Zhong will need support for special needs. Previous case study from March 2023 is here. Updated case study, including reading level, from August 2023, is here.	- The structure of the class and key activities will be described to Zhong previously. It will then be noted again with him in the time leading up for it. This will support him in preparing himself mentally for it. - Zhong provided with the opportunity to lead the class in a game counting to 20 as described below. He enjoys opportunities to have attention with the class and this allows him to do so constructively. If he doesn't want to, he will not need to. - During the whole group time, if he needs a break from the mat, he can be allowed the opportunity to go for a walk to the back of the classroom and back. An iPad can also be available for him to work on an App, for example,

	the Khan Academy Kids App, if he needs a break. - During the station's activity, he is in the small, homogeneous group with Vivian, and Carey. This will allow him to be pushed with more complicated problems. Vivian and Carey have experience working with him in this small group setting, and are understanding, supportive and accommodating in situations where be set on using a particular piece of equipment for example. - It may be the case that he has less interest in the arts activity creating an equation using reusable waste materials. If this is the case, he can be guided to complete the activity in a way that is accommodating to his interests. He is regularly working on his own projects, High Speed Train station and network constructions, and more recently, airports. He can be guided to create a representation of an addition or subtraction using materials of his choice as part of one of these situations. Examples could be for calculating total ticket prices.

Holly will need support for EAL, as well as general academic support. See here further information that focuses specifically on literacy skills.	- As a school arrival time activity, Holly can play a short arithmetic board game with the teacher support, in which she practises some arithmetic question and is exposed to the language related to the problems - “add”, “plus”, “minus”, “take away” and “equals” to prepare her. This can be done in a (slightly) heterogeneous group with some close friends. (She is inspired and has confidence when working with her friends.) - Similarly, she can sit with her friends during the whole group part of the class. She can sit near the front, so that she can easily follow the EAL support the teacher is providing through use of gestures, visuals and exaggerated expression. - Homogeneous groupings during the stations activity will provide support based on her level and also enable her to build up confidence not working directly with friends. - Again, she can work with friends during the art activity making a creation for an arithmetic equation using reusable waste materials of her choice, so they can support each other in taking their creativity further.

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.

Key assessments for the unit as a whole are found on the unit plan.

Below are assessments specific to this lesson.

Formative Assessment	Summative Assessment
Writing numbers 0 - 10 on mini whiteboards. **Differentiation:** Carey and Vivian who are known to be competent at the writing of these numbers, practise 21st-century skills of leadership and communication, as they each lead one group, saying the numbers for the others to write.	Throughout the unit, students will complete a written page of two addition and two subtraction problems they have written out at times of their choice. Differentiation: Carey, Vivian and Zhong to write equations with two numbers, at least one above 25. Carey and Vivian also to practise writing real world questions that model these. Other students write equations with numbers above 10, based on formative assessment of their current level of confidence. The third group from the stations activity in the lesson, to complete the assessment under teacher scaffolding to solve the problems as necessary.
Writing addition and subtraction equations in sand, on blackboards and using different paper/marking tools of their choice. As students are completing the stations activity, there will be sets of cards available for them to take equations from	

to solve and write. One set with problems within 10, one set with problems with 20 and one set with problems within 50. As students become ready however, they will be encouraged to create their own problems. There will also be a set of word problems for Vivian, Carey and Zhong's group. **<u>Differentiation:</u>** Three groups as described above. First group - Carey, Vivian and Zhong - will write equations within 50, and also practise reading as they read word problems given by the teacher. Second group - Independently practice questions within 10 and then within 20 when they are ready. Third group within 10, supported by the teacher.	

Calculating answers to addition and subtraction problems, during an activity at stations during the lesson. **<u>Differentiation:</u>** Different types of equations solved, as described above.	
Students do a piece of artwork in the art room, showing the written equation form of either one addition or one subtraction. The only requirement is that it shows this equation and it involves use of reusable waste materials. This will assess artistic (cross-curricular) and motor skills as well as mathematical skills, and students will be practising creativity. They may cut out the numbers and symbols from reusable waste materials. They may write an equation as part of a scene they are drawing or creating, involving reusable waste materials. They will be shown examples and then there are no limitations.	

Differentiation: - Students tailor what they produce based on their own ideas and imagination.	

● If there is no summative assessment in this lesson, what/when will the summative assessment be/take place

Questions for formative assessment during and/or after the lesson:

1. "What is _____ + _____?" (Multiple examples)

For example, "What is 7 + 2?"

2. "What is _____ - _____?" (Multiple examples)

For example, "What is 7 - 2?"

3. "What does this say?"
(Showing each of the +, - and = symbols.)

4. "What does this say?"
(Showing an arithmetic equation, for example 3 + 4)

5. “What is the answer to this?”
(Showing an arithmetic equation, for example, 8 - 5)

6. “How do you write plus?”

7. “How do you write add?”

8. “How do you write minus?”

9. “How do you write take away?”

10. Real world addition and subtraction problems.

For example,

“We started with nine balloons. We have used two. How many do we have now?”

Big Ideas to be Addressed in the Lesson:

1. Maths problems that we encounter everyday can be represented in multiple ways.

2. A symbol equation can be used to represent a real world problem.

Literacy:

3. There are different forms of writing.

Cross-curricular (science/social skills).

4. Waste materials can be used in multiple ways.

This links to a STEAM project the class will be working on, as described here , with possible remediation and extension described here .

Discussion Questions

Write out questions that you would like students to discuss in class, before class or after class because they are interesting, support higher order thinking, and make for a lively and engaging discussion. If discussions must happen outside class, what tool will you use to facilitate the discussion (e.g. Twitter)?

1. How can we show this addition or subtraction problem?

2. How else can we tell people things?

3. What are some things we write?

4. What are some differences between the writing in these mathematics problems and the writing in the books we look at during reading time?

21st Century Knowledge and Skills

21st Century Knowledge and Skills	Teaching Strategies
Creativity	Students create their own representations of addition or subtraction symbol equations (at least partly using recycling materials.)
Collaboration	Students work together in teams to solve problems during the station's activity.
Communication	Students will communicate with their peers during station group work. Students will later have the opportunity to share and present their work with the reusable waste materials with students from other classes in the kindergarten, during our end of week work sharing. They explore different methods of written communication, including with markers and in sand.
Media Literacy	After the class, students can practise uploading the photos and documentation we have taken, onto Class Dojo.
Technology Literacy	Students will use iPads to take photos of each other during the activities at stations to document the work. Opportunity for students to do self-practice on the Khan Academy Kids App.
Flexibility	At the different stations during the station's activity, different methods or tools for writing

	are available. Students practise flexibility in having to adjust to the materials available.
Leadership	Opportunity for students to show leadership in different ways through group work. As they later present their project work to younger students, they are practising leadership and innovation.
Productivity	During stations activity and arts activity at the end, where students are making math equations out of reusable waste materials, they need to manage themselves with less input from teacher, and hence need to practise productivity.
Social Skills	Students will interact socially with classmates as they explore the different reusable waste materials together and discuss how they might do their representation of an arithmetic equation using these.

Creation of Innovative Spaces for Use of Technology:

- Area of the iPad for quiet iPad use for practice of skills on an App, such as the Khan Academy Kids App, or Starfall. These can be used by students who finish work early, or who may need a break from the whole class due to differentiated needs.
  (As described above, Zhong will use this if he needs to.)

- iPads available for students to use to take photo and video documentation of each other during project and free activities.

- Large TV available by the mat and separate from tables where many activities will take place. This will be used for songs and videos as necessary during whole group time.

Literacy Skills

Describe the literacy skills (if any) covered in this lesson and how it will help improve the students' reading skills such as comprehension, oral language, phonetic or phonological awareness, fluency and vocabulary as applicable.

Please see the unit plan for literacy skills development across the whole unit.

Specific to this lesson.

- Writing mathematical numbers and equations.
- Reading mathematical numbers and equations.
- Reading and writing word problems, or sections of word problems as students become able, with differentiated support.

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

Teaching Strategies and Activities: What are the teaching strategies and activities that you plan to use to help students meet the lesson's objectives? What are the steps that you will take to deliver this lesson (e.g., introduce the author, read the poem, ask students to…)? Make this section as detailed as possible. It should allow you to hand it off to a substitute teacher.

(1) Students sit on the mat by the board. Student whose turn it is on previously created rota, to us the trumpet blowing sound, as previously discussed with the class, to signal the start of class. (1 minute) (You do)

(2) Counting warm up activity. First the class counts up to 20 together. Then a game where one student at a time says a number up to 20. Zhong can be provided the opportunity to lead this game if he would like. If not a student can be selected by taking a popsicle stick out of the jar containing a popsicle stick with their name on for each student. (3 minutes) (We do)

(3) Students asked if they can remember what we have been studying recently. Discussion allowed with attention slowly drawn towards addition and subtraction problems. (2 minutes) (We do)

(4) Students asked what ways we can represent addition and subtraction problems. Again, a discussion allowed with a recall of the project work from the last class. (3 minutes) (We do)

(5) It is noted that today we will specifically be learning about how to write equations using symbols. Objectives on the board and now gone through with students. It is communicated with students when they will complete the objectives. The writing can be done at any time, with time allocated in the following lesson. The creation using waste materials will happen in the second half of this class. (3 minutes) (I do)

(6) It is noted that first we will need to practise writing numbers. (I do)

(7) Mini whiteboards formative assessment. Students move to and sit at two different areas of the mat. Carey and Vivian each to lead one group, saying a number for everyone to write. Teacher to monitor to obtain formative assessment data and to support as necessary, and intervene as necessary to support Vivian and Carey to ensure all numbers 0 - 10 are covered. (7 minutes) (You do)

(8) Addition and subtraction song for transition and movement. (whole class) (6 minutes) (We do)

(9) Students asked what they remember seeing in the songs. Short discussion. Leading to addition and subtraction symbols. (4 minutes) (We do)

(10) Addition, subtraction and equals symbols shown. Class practice writing these together in air and with different body parts for variety. (whole class). (4 minutes) (We do)

(11) Now, students rotate in stations to practise writing equations in different ways. Groupings as described above. During the process, students in each group take it in turns to take videos and photos of the others at work using iPads for our class documentation.
Station 1: Writing in sand.
Station 2: Working with chalk on large blackboards.
Station 3: Working with different markers and coloured writing tools of their choice.

For answering questions, students can use number and symbol cards in their groups, which they draw to choose the numbers to add or subtract. They can work together to solve them, practising communication and collaboration and advancing their skills together. Then they can write.
Alternatively, they can create their problems

Teachers to monitor and observe as necessary to support and for formative assessment data.

(18 minutes - 6 minutes per station) (You do0

(BREAK - 30 minutes)

(12) Short group reflection. Students asked how they found the activity before the break. How they are finding writing equations. (4 minutes) (We do)
(13) Students asked if they can remember the third learning objective from the class - the use of reusable waste materials to create a piece of artwork showing the written equation form of an arithmetic problem. It is discussed how we could do it and an example shown. (2 minutes) (We do)
(14) Students work on the project in the art classroom. (20 minutes) (You do)
(15) If students finish, they can take their learning further on the Khan Academy Kids App. (You do)

(16) Students called together again. Reminded that they will have time, during the two following project times to continue to work on their project as necessary. Asked what we had covered in the class for conclusion. (4 minutes) (We do)

Review: Write down ideas on how you will review the topic, including notes on types of formative assessments that you will use during the lesson.

Students will do a further review of writing arithmetic equations as the arrival activity to school the following day.

For student choice, there will be different options.

1. Writing on the large whiteboard at the front of the class.
2. Writing on a mini whiteboard or blackboard.
3. On a type of paper and with a writing medium of their choice.

Materials and Resources for Lesson

Materials, Technology, and Websites	Required Preparation
"Math Whiz!" Addition Song	Video prepared on YouTube.
"Math Whiz!" Subtraction Song	Video prepared on YouTube.
iPads available in "Quiet Area"	Quiet area with iPads set up as a permanent area of the classroom.
Khan Academy Kids and Starfall Apps	Already downloaded onto iPads
4 iPads for video and photo documentation.	Set up on the table next to the stations area.
6 shoe boxes with sand and 6 popsicle sticks	Sand shoeboxes are part of class materials.

	Boxes with popsicle sticks set up on one table in the stations area.
6 mini blackboards with chalk	Set up on a second table in the stations area.
A range of different writing mediums and types of material to write on.	Available in the classroom arts area. A range of resources brought over to the third table in the stations area. (Students are able to take further materials from the arts area if they wish.)
Sets of cards with arithmetic problems within 10, 20 and 50 respectively written on. Set of cards with word problems written on.	Available as part of school shared resources. Set up in the stations area.
Recycling and other reusable waste material.	Previously collected and available in the recycling area. Some were taken to the arts room previously before the lesson. Students can help take the rest.

References

Danny Go! (2022, October 10). *"Math Whiz!" Addition Song /// Danny Go! Kids Learning Songs for Kindergarten.* [Video]. YouTube. https://www.youtube.com/watch?v=iLXNBiGJAGs

Danny Go! (2023, January 17). *Math Whiz! (Subtraction Song) | Kids Learning | Danny Go! Songs For Kids.* [Video]. YouTube. https://www.youtube.com/watch?v=c8_t_E5cG38