Introduction

COUNTING AND THE SALULIMA

by Tauvela Fale and Paul Tauiliili

*A **SALULIMA** is hand held broom. It is commonly made by Samoans to sweep trash and dirt inside and outside the home. A salulima is made from the midrib fibers from the coconut leaf.*

*Making a **salulima** involves estimating the total number of midrib fibers needed to make a single broom. Students can learn about place value because it is important to know how many coconut leaves will be able to provide the necessary number of midrib fibres for one **salulima**.*

The process of making a coconut leaf broom will give students cultural experience, as well as opportunities to learn about and to practice counting.

Unit Overview
COUNTING AND THE SALULIMA

Enduring Understandings
Estimating and counting by ones and tens
Awareness of a place value system

Knowledge
What *salulimas* are made of and what they are used for
Samoan words used in the process of making a *salulima*
Number words up to 100 in both Samoan and English
How to count by tens (and ones)

Skills
Making a *salulima* from *tuaniu*
Counting orally
Using base ten blocks and bundles

Learning Strategies
Exploring and discovering
Modelling and observing
Participating in a group

Rationale
Many people in American Samoa use a traditional coconut broom, or *salulima*, in their homes, so the process of making this broom will connect students to their culture and, at the same time, will allow them to learn concepts and have practice related to counting.

Goals
Students will experience the traditional practice of gathering ***tuaniu*** (midribs) and making a *salulima*. They will have opportunities to estimate totals and count familiar objects, and add and compare quantities.

Essential Questions
What mathematics is involved in determining the number of *tuaniu* (midribs) needed for a single *salulima*?

Assessment
The teacher observes students' participation, process and progress as they develop and apply specific skills and knowledge. The teacher asks specific questions to confirm learning and assigns writing and initiates conversations to support learning process (e.g., reflection, knowledge).

Assistance Required
Invite parents to help students throughout the unit, especially when they need help stripping *launiu,* using knives (Lesson Three), and working on the final project (Lesson Five).

Lesson One

COUNTING MIDRIBS (TUANIU)

Focus

Learning about *salulima,* and estimating and counting

Objectives: *Students will*

- know what a *salulima* is and what it is made of.
- estimate totals and then confirm by counting by ones and tens - up to 50.

Materials Needed

Story of the *salulima* (Resource 1)

An actual *salulima*

A sample of *launiu*

Hundreds chart(s)

Teacher Activities	Student Activities
1.1. Introduce the unit by asking what student know, e.g., • What is a *salulima*? • What is it made of? • What is it used for? Tell a story of the *salulima* (see Resource 1).	*1.1. Answer questions: a broom for sweeping trash or dirt inside or outside the house - made from the coconut leaf* *Listen.*
1.2. Work with an actual *salulima*. Demonstrate how to use it by cleaning a small area in the classroom. Show the midribs that are bundled together to create the broom. Use a portion of the ***launiu*** (coconut leaflet) to show how it is made.	*1.2. Listen and watch.*
1.3. Ask students to make estimates of a complete *salulima*: • How many ***tuaniu*** (coconut midrib) are in this *salulima*? • How many *tuaniu* can be gathered from one *launiu* (coconut leaf or palm frond)? • How many *launiu* in total were needed for this *salulima*? Guide students by suggesting ways to make their estimates. Record student's responses and decide on an all-class 'best' estimate.	*1.3. Answer the teacher's questions: make estimates (careful guesses).* *Participate in the class discussion.* *Listen and watch.*
1.4. Review counting by using the *tuaniu* from the model *salulima.* Divide students into groups (e.g., 2 or 3 per group) Untie the *salulima* and give each group a bundle of 20-30 *tuaniu*.	*1.4. Watch and follow instructions.*

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Teacher Activities

Instruct student pairs or groups to work together to count the *tuaniu* (individual midribs).

Suggestions for how groups work together:

One student physically counts and says the number names aloud.

- The partner(s) listen and make corrections if needed.
- A partner listens to the number that is being said aloud and then places a marker on a hundreds chart. He or she moves the marker until the total is reached.
- A partner uses paper and a pencil to record the total number (sum).

Watch students and ensure that they can physically and orally count the midribs - the *tuaniu*.

Gather students together to compare their bundles of midribs.

Record the total or sum for each group's bundle of midribs.

Decide the total or sum and compare the actual number to the estimates students made in 1.3.

Discover how close the class estimate was, and talk about the usefulness of estimating.

1.5. Bring the lesson to a close.

Ask individual students to come up to the front and count out a specific number of *tuaniu* from the bundle: e.g., 12 midribs; 7 midribs; 15 midribs; and so on.

Encourage students to reflect on their learning:

- What did you learn about a *salulima (*e.g., what it is used for and made of)?
- What did you learn about estimating?
- What did we practice and/or learn when we were counting?

Student Activities

1.4. (continued)
Work with a partner (or two partners) and count the items as the teacher directs.

Participate in the class discussion.

1.5. Respond to the teacher's prompts.

Think about learning and give ideas.

Lesson Two

HOW MANY GOOD TUANIU?

Focus

Stripping a *launiu* and working with bundles of ten

Objectives: *Students will*

- understand how to judge a good *launiu*, choose appropriate *tuaniu* for a *salulima*, and estimate numbers.
- be able to count by tens (over 50 but less than 100).

Materials Needed

One *launiu*

A knife (for removing midribs)

String or rubber bands to hold together bundles of *tuaniui* (midribs)

Paper and pencils and/or chart paper (or board) and markers

Hundreds chart(s)

Teacher Activities	Student Activities
2.1. Introduce the lesson by giving the cultural background to the activity in the lesson: *Once a Samoan lady prepares to strip one launiu she will begin by estimating how many tuaniu she will get from one launiu. This will depend on how many leaflets, or tuaniu, on the launiu are good ones, how many are too short, and how many are broken. To make good salulima, only the good leaflets should be used.*	*2.1. Listen.*
2.2. Explain the process of preparing to make a *salulima:* 1. Tell where you got the *launiu* from 2. Identify the tools you used to cut down a coconut leaf 3. Ask students what they notice about leaflets leaflets or midribs. 4. Point out that we will not use any midribs or *tuaniu* that are too short, or are very small or broken. [Suggestion: remind students how Toma measured the lengths of a good *tuaniu* in the story.] 5. Show the technique needed to remove each *tuaniu,* helping them to notice that the each one must be removed in a certain direction.	*2.2. Listen and watch carefully.* *Participate when prompted by the teacher.*
2.3. Demonstrate the process and begin the counting. Gather the students around, as a mother would do when asking her children to watch and help with a task. Lay the coconut leaf (whole palm frond) on the floor. Have students observe as you separate the leaflets carefully. Invite students to put the midribs in bundles of tens and to put string or rubber bands to tie the bundles.	*2.3. Follow the teacher's instructions.* *Observe and listen.* *Count midribs and put them into bundles of ten.*

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Teacher Activities

Student Activities

Instruct students how you want them to work together to make bundles and count.

Options for Students to Count and Record Bundles

One student could volunteer to record numbers as the other students count - individually or in a class chorus.

Some students could assist you in collecting the *tuaniu* and creating groups of ten and tying them into bundles.

Each student or student pair could take a turn at making one bundle and counting out loud for the others to hear (and check).

When all the bundles were made and on a table at the front of the room, students could take turns coming forward to count, or one student could hold up each bundle for the class to count out loud. One or all student could record the total number of bundles.

2.3. (continued)
Follow instructions to create bundles of ten and count by ones (1 bundle, 2 bundles, 3 bundles…) and then by tens (10, 20, 30…)

Record numbers as given.

2.4. Guide students to count by tens in a variety of ways:

- Help students to recognize each bundle as ten midribs or a 'ten' and to count by tens: e,g, 1 bundle, 2 bundles, 3 bundles becomes 10, 20, 30, and so on.
- Ask how many bundles come from one side of the coconut leaf, and have them count bundles and then count tens of midribs.
- Ask them to determine how many bundles come from the whole leaf. Again, have them count by tens. (NOTE: try to ensure that there are 10 bundles so that they can count up to 100.)
- Invite students to come up and choose 30 midribs (or 40 or 60, and so on) and count them out in tens: *for 40? 10, 20, 30, 40.*

2.4. Count the tuaniu bundles as directed by the teacher.

Practice counting and listen as others count.

2.5. Have students record the sum of the *tuaniu* for one coconut leaf, working in pairs or individually on chart paper or on their own paper:

1. Have them draw the correct number of bundles.
2. Have them identify each bundle with a number until they reach the total: 10, 20, 30, 40, 50…

Encourage them to count aloud (quietly) as they work.

Have students compare their drawings with each other and with the actual bundles on the table at the front of the room.

OPTION: have students use a hundred's chart to record counting by tens.

Create a class chart, with the help of the students, to show the written numbers and record the total number (sum) of *tuaniu* from the one *launiu,* and post it on the wall.

2.5. Record the sum of the tuaniu in one coconut leaf by drawing and writing numbers.

Count aloud (quietly) to practice saying the numbers.

Compare with others.

Lesson Three

COUNTING MORE TENS AND ONES

Focus

Counting higher numbers by tens and ones

Objectives: *Students will*

- count to 100 by tens.
- distinguish counting by ones and by tens.
- be able to recognize good *tuaniu* for a *salulima*.

Materials Needed

Chart of *tuaniu* from Lesson Two
Four or five more whole coconut leaves
Knives for removing *tuaniu*
String or rubber bands for tying bundles
Board and markers

Preparation: invite parent helpers.

Teacher Activities	Student Activities
3.1. Review the number of *tuaniu* the class counted from *one launiu*. (Refer to the chart from Lesson Two.)	*3.1. Listen and make comments.*
3.2. Review the process to prepare more coconut leaves (5-6). Divide the students into groups and give each group a *launiu.* Ask groups to cut good *tuaniu* and put them into bundles of ten. Encourage them to talk about why they do or do not choose the midribs.	*3.2. Work in groups to help process the launiu and make bundles.* *Discuss.*
3.3. Ask groups to count the midribs (ones) and count the bundles (tens). Ask each group to record their results for their *launiu* on the board.	*3.3. Count by ones and tens, recording results.*
3.4. Gather students together to collect and record the information about totals or sums: e.g., how many *tuaniu* bundles are in each *launiu*? Suggestion: identify each *launiu* (L1,L2, L3) so the data is clear. Ask students to use ones and tens to compare the sum totals, e.g., • Which *launiu* had the most (or least) good *tuaniu*? • Which *launiu* had more than 80 (or 50 or 90) *tuaniu*? • Which *launiu* had more than 6 (or 5 or 7) bundles of ten?	*3.4. Share information.* *Answer questions.* *Practice counting.*
3.5 Write the data in sentence form (in English and Samoan), e.g., • The sum of *tuaniu* on the first *launiu* is 89. • The sum of *tuaniu* on the second *launiu* is 71 (and so on).	*3.5. Listen and watch.*
3.6. Complete the lesson by discussing how they prepared to make the best salulima (choosing good midribs - not too short, weak or broken).	*3.6. Share ideas.*

Lesson Four

COMPARING TOTALS

Focus

Using Base Ten Blocks and making comparisons

Objectives: *Students will*

- understand and count tens and ones (base ten blocks).
- compare totals and determine smaller and larger (smallest and largest).

Materials Needed

Base Ten Blocks

Charts of totals prepared in Lessons Two and Three

Hundreds chart(s)

Teacher Activities

4.1. Introduce the lesson.

Review the process of choosing good midribs to make a strong *salulima*. Point out the cultural background:

When a Samoan person chooses a launiu to make a salulima, he or she estimates which launiu will give the most tuaniu. Therefore it is good to estimate by observing a launiu and to see which one gives many tuaniu versus one that gives less. In this lesson students will be doing this estimation by counting in a systematic way and comparing the launius to see which has more tuaniu and which has less.

Explain that they will be representing the sum or total of each *launiu* with a different manipulative: Base Ten Blocks.

NOTE: student must have some prior experience with Base Ten Blocks.

Point out that one *launiu* will give less than100 good *tuaniu*.

4.2. Pass out base ten blocks for each pair or small group of students.

Ensure each has at least 10 *tens* rods and 10 *ones* cubes (unit blocks) to be able to represent the maximum sum of a *launiu:* 100 + 10 = 110

4.3. Guide students to make base ten block representations

Sample Representation

If the first launiu has 89 tuaniu then place or display 8 tens and 9 ones or unit cubes. It is important to show ONE to ONE correspondence with bundles of launiu and the base ten blocks

Demonstrate, using data from the first *launiu* (Lesson Two),

continued…

Student Activities

4.1. Listen and ask questions if needed.

Respond to any prompts or questions.

4.2. Notice the difference between tens (rods) and ones (unit blocks or cubes).

4.3. Watch and listen.

Teacher Activities	Student Activities
Ask students to work in their pairs/groups. Assign to each group one of the *launiu* that they counted in Lesson Three (*Launiu*1 or L1, L2, L3 and so on). Direct them to make a model, using the base ten blocks, to represent the total number of *tuaniu* in their *launiu*, e.g. if the sum or total was 73, they would choose 7 tens rods and 3 unit blocks or cubes. Have them present their models and confirm their results. When all the groups have presented, encourage them to circulate to look at each other's models and count/say the sum or total out loud.	*4.3. (continued)* *Make a model of their assigned launiu.* *Share their models, and check that the results are accurate.* *Fix any errors.* *Count using the models.*
4.4. Ask the groups/pairs to decide the order of the models, from largest to smallest: e.g. "L1 is largest; next is L3; next is L6; next is L2; next is L5; and L4 is the smallest." Invite them to discuss their findings and resolve any conflicts. Ask how they know. Direct them to take notice of the tens and the ones, and to explain what they see.	*4.4. Make comparisons by responding to questions and prompts.* *Discuss and share ideas.*
4.5. Write down in text, showing how many tens there are in each *launiu* and how many ones there are, e.g.,	*4.5. Watch and listen.*

Sample Representations Written in Numbers

Each *launiu* has a different number of good *tuaniu*:

L1	L2	L 3	L 4	L 5	L 6
89	76	96	79	85	68

Compare sizes, guiding students to choose *smaller* or *larger*. Check students' understanding by choosing any two samples (e.g., L2 and L4) and asking them to say which is larger (or smaller). For visual support refer to the base ten block models they made earlier. OPTION: Have students discuss the sums using the hundreds charts. Talk about different ways to explain comparisons: show several groups of three samples and put them in order of largest to smallest:, e.g., • L4, L2, L6 (79 is larger than 76; 76 is larger than 68) • L1, L4, L6: L1 is the largest; L6 is the smallest; L4 is in between.	*Respond to the teacher's questions and discuss.*
Ask students to put all of the sums in order: e.g., L3, L1, L5, L4, L2, L6	*Put items in order.*
4.6. Close the lesson by preparing for the final lesson: • How many bundles can you hold in your hand? • How many bundles of ten would make a good broom?	*4.6. Listen and make suggestions.*

Lesson Five

MAKING A SALULIMA

Focus

Student projects: making a *salulima*

Objectives: *Students will*

- follow a traditional process to make the *salulima.*
- count the number of *tuaniu* in their own brooms using tens and ones.
- be aware that math is embedded in Samoan cultural practices.

Materials Needed

Coconut leaves (enough for each child to make a broom)

String or twine for tying bundles

Cards or paper squares and markers

Camera

Preparation: invite parents to help the children.

Teacher Activities	Student Activities
5.1. Introduce the activity for this lesson. Point out key ideas from the cultural background: *A Samoan child who has an opportunity to create his or her own salulima gains a skill that is useful for later in life. Students have learned how a salulima is made, what it is made of, and how it is used. Through this experience, they can learn to appreciate the cultural practice and also learn that math is embedded in this cultural activity.*	*5.1. Listen, asking questions if needed.*
5.2. Guide the students through the process of making their brooms. Explain that the size of the *salulima* should suit the child, so they will each be making smaller brooms than they worked with during the lessons. Help them to choose good *tuaniu*, and put choose an amount that is comfortable in their hands. Ask them to count the number of midribs they use and to record the sum. Help them to write the total on a card (for showing others - see 5.3. below). Help them to tie the midribs together carefully.	*5.2. Listen and follow directions.* *Ask questions and/or help as needed.*
5.3. Invite students to share their work in two ways: 1. Ask students to compare their brooms with a few others, e.g., one student estimates the number of midribs; the owner gives the 'answer'. 2. Each student presents their *salulima* and tells the number of midribs by showing the total number and saying it in terms of tens and ones, e.g., 56 *tuaniu* is the same as 5 tens and 6 ones. Suggestion write the number on the board as each student speaks.	*5.3. Compare with other students, making estimates and giving answers to partners.* *Present their data.* *Listen and watch.*

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Teacher Activities	Student Activities
Once everyone has presented, review the totals on the board, e.g., point to a sum on the board, and ask a student to say that number aloud, as a total and as a set of tens and ones ("63 *tuaniu* is 6 tens and 3 ones").	*5.3. (continued) Say the numbers when asked.*

Plenary for Unit: Counting and the *Salulima*

Review the learning in the unit.

Discuss the cultural practice of making and using the *salulima.*

Listen and respond to questions and prompts.

Sample Questions

What makes a *salulima* useful?

Why are *salulimas* different sizes?

What determines the size of the *salulima*?

What do we consider when choosing a good *launiu*?

What makes some *tuaniu* a poor choice?

Ask students to get into groups of 10 and count the number of brooms that they have all made, pointing out that they are a 'bundle of 10'.

Follow instructions. Compare and count when asked.

Ask students to show their cards with their sum total (prepared in 5.2.) and tell each other (again) how many midribs are in their brooms.

Optional: write the numbers on the board (with each name beside).

Help students compare their *salulimas* as a group:

- Encourage them to line up in order of size so that the smallest *salulima* is at one end and the largest is at the other end.
  Note: they can refer to their cards or the list on the board.

Get into a line up to show the size of each broom: from smallest (fewest tuaniu) to largest (most tuaniu).

- Encourage them to tell each other their number over and over, as needed, to find their place.
  Notes: they will have to check with the person on either side to be sure their number is 'in the middle'. If two people have the same number, they stand together.
- Ask students to say their sums again to check the order.
  Note: make adjustments if there are any misplaced numbers.

Say numbers when prompted - individually and as a group.

- Ask students to talk aloud as a group, telling each number, and write these numbers on the board, this time in order (no names).
- Have the class say each number out loud one more time.
- Point out that the numbers are from smallest to largest.

Take a photo of the children lined up.

Invite the students to celebrate with each other and the parents.

Celebrate and thank helpers

Thank the parents for their assistance.

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❖ Resource 1: Cultural Background and a Story

The cultural background and the story both help introduce values related to the ***salulima***, which is a hand-held broom, and show the importance of mathematics in daily life. Note that it is important for teachers to use both the Samoan and English language to name and identify cultural objects and actions.

It is important for young Samoans to estimate how many fibers or midribs, called ***tuaniu***, that they will need to produce a *salulima*. Then Samoans will not waste coconut leaves by cutting too much or waste energy by cutting too few and have to go back into the plantation or to the coconut tree to cut more.

Here is a story:

One day, a mother called her children Toma and Sina to come to help her make a ***salulima,*** *or hand-held broom. She asked them to come and sit down, and in front of them she placed a* ***launiu*** *(coconut leaf) that she had cut. She told them that they were going to help her clean the house, but first they needed a new salulima****.*** *The mother then asked Toma and Sina to begin by removing the leaflets or* ***tuaniu*** *from the first coconut leaf.*

Mother: O mai si ou fanau tatou salusalu ese le lau o le tuaniu ona fau ai lea o le tatou salulima.

Toma and Sina began to help their mom with the task first by removing the leaflets. First Toma and Sina used the thumbnail but then they ran into the house to get a small knife like their mother was using. Toma had a question.

Toma: “Ae a tuaniu puupuu ia e latalata i le siusiu o le launiu?”

And then the mother showed Toma how to measure them. She asked Toma to stand beside her and showed Toma a perfectly-sized tuaniu. The tuaniu started from his waist and reached the bottom of his feet. That is how he remembered which ones were long enough and which ones were too short.

When they had finished the mother showed them how to “salusalu” the leaflet and remove leaf part and keep the midrib or tuaniu.

When the mother felt they had enough Toma and Sina threw away the leaf particles and the mother showed them how to bundle and tie them together and make a salulima.

Then the mother and Toma and Sina began to sweep their house and it was clean.