

Quipu

Subject: Mathematics
Strand: Number

Creators: Ashley Pennington and Harley Weston
Grade: 6

Content (topic)	
Exploring integers	
Outcomes	Indicators
<p>N6.6 Demonstrate understanding of integers concretely, pictorially, and symbolically.</p> <p>N6.9 Research and present how First Nations and Métis peoples, past and present, envision, represent and use quantity in their lifestyles and worldviews.</p>	<p>N 6.6d: Represent integers concretely, pictorially, or physically.</p> <p>N 6.6h: Explain the role of zero within integers and how it is different from other integers.</p> <p>N 6.9a: Gather and document information regarding the significance and use of quantity for at least one First Nation or Métis peoples from a variety of sources such as Elders and traditional knowledge keepers.</p> <p>N 6.9c: Communicate to others concretely, pictorially, orally, visually, physically, and/or in writing, what has been learned about the envisioning, representing, and use of quantity by First Nations and Métis people and how these understandings parallel, differ from, and enhance one's own mathematical understandings about numbers.</p>
Lesson Preparation	
Equipment/materials:	
<ul style="list-style-type: none">• Six lengths of cord for each student, each approximately 50 cm in length.	
Presentation	
Development	
<ul style="list-style-type: none">• Background Information:<ul style="list-style-type: none">○ The Inca are an indigenous people who controlled a region in South America prior to European contact. The Inca built a sophisticated road system to connect the various regions of their empire to move goods and information. The roads were paved with flat stones and messengers travelling on foot carried goods and information along the roads. Information was carried either	

by word of mouth or using knots on cords called quipu.

- The basic structure of a quipu is a main cord, from a few centimeters to over a meter in length, with hanging cords attached usually each about 500 centimeters in length. Knots are tied on the hanging cords, often in groups arranged in rows across the quipu. These knots (number and type) apply numeric data. (See Appendix A)
- Numbers are stored on the hanging cords with the unit digit furthest from the main cord. The digits are recorded in evenly spaced clusters along the cord.
 - For digits other than the unit's digit, the clusters contain between zero and nine single knots to indicate the digit.
 - A long knot represents the unit's digit with the number of loops indicating the value of the digit.
 - If the value of the unit's digit is one, a figure eight knot represents it.
- On the quipu that contains numeric data there are three types of knots, single knots (S), long knots (L) and figure eight knots (E) as illustrated in Appendix B.
- Uniform spacing of the clusters of knots along the cord allows for the representation of a number containing a zero digit by leaving a space at the appropriate place on the cord. For example the quipu in the figure below contains the number 124, 31, 140 and 104. (S means small knot and the number beside it is the number of small knots, L means long knot and the number beside it is the number of loops, and E means figure eight knot.) See Appendix C.
- Divide the students into pairs. Have each student lay one cord on his or her desk as the main cord and then tie two cords to the main cord as hanging cords.
- Have each student tie a number on each of the two hanging cords. Each pair of students should then exchange their quipu to see if the partner can read the numbers from the quipu. Suggested numbers are the student's age, their height in centimeters, hour or building numbers of their address, age of their oldest bother, sister or the sum of the digits of their phone number or the number of minutes it takes to travel to school.
- Use this activity as an opportunity to point out the importance of zero as a place keeper in a place value system.
- Have the students untie the knots and then tie the remaining three cords onto the main cord.
- Each day for the next five days have each student record a number of their choice on one of the five cords. Have each student exchange his or her quipu with another student to see if the number can be read correctly.

Reference: <http://aboriginalperspectives.uregina.ca/other/quipu1.shtml>

Appendix A



Appendix B
Pictures of Knot Tying



Single knot- loose



Single knot- tight



Long knot- 5 loops- loose



long know- 5 loops - tight



Figure eight knot- loose



figure eight knot- tight

Appendix C

