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People who lived a long time ago developed various methods to record information. Writing on paper is a method of recording information. You might find it fun to learn about another method of recording information, used by the Inca people, who lived between about 1100 and 1500 AD (500 to 900 years ago). The Inca lived in the Andes Mountains of South America. They used a **quipu** (also spelled khipu) to record information. In this lesson you will learn how to make your own quipu.



Figure 1: Quipu in the Museo Machu Picchu, Casa Concha, Cusco, Peru
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<https://creativecommons.org/licenses/by-sa/4.0/deed.en>

<https://en.wikipedia.org/wiki/Quipu>

Figure 1 above is a photograph of a quipu. The quipu is composed of cords of natural fibers. Cotton and wool are examples of natural fibers. The cords can have different colors, and have different kinds of knots tied in the cords. The colors and knots are used to record information.

There are two main parts to the quipu:

1. primary cord
2. pendant cords

The primary cord is seen at the top of the picture in Figure 1 above. All of the pendant cords are tied to the primary cord. To make a quipu, first you make the primary cord. Then you can

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make several pendant cords and attach them to the primary cord. To finish the quipu, you can tie different kinds of knots on the pendant cords.

The information recorded on old quipus is mysterious. People who study old quipus are attempting to decipher the information. It is clear that much of the information is in the form of numbers. That is what we will concentrate on in this lesson. You will learn how to code numbers on the pendant cords by tying various kinds of knots.

The colors used for the cords were also selected to record information, but that information is more difficult to understand. For your quipu, you can decide on your own what the colors mean, along with some help you will find in this lesson.

The Inca used a base ten number system, just like we use today. This makes it easier for you to learn how to record numerical information on the cords. But first, let us learn how to make the cords.

Cords can be made of **cotton craft thread** (string) or **wool yarn** of various colors.

Making the primary cord

The primary cord is a heavier cord than the pendant cords. You will make a primary cord by using 3 strands (3 strings). You will make pendant cords using only 2 strands. Therefore, the finished primary cord will be heavier (larger in diameter) than the pendant cords.

Cords are made by twisting strands together. It is helpful to have a tool to assist with the twisting.



Figure 2: Spindle tool used to twist together strands

Figure 2 above is a photograph of a spindle tool I made for twisting strands together. The long part of the tool is made from a small branch of a willow tree, about 11 inches long and one half inch in diameter. A hole was drilled into one end of the branch for a screw. A small hook was made from coat hanger wire and attached to the wood handle with the screw. I will make a spindle for each family of Plantmasters members to use in making quipus.

The primary cord can be made with strands that are all the same color or of two or more colors. It is believed that the colors of the primary cord were important in identifying the kind of information recorded on the quipu. You can decide for yourself what color or colors to use

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for your primary cord. For my example, I will use strands of green, yellow and white for the primary cord.

Step 1 – if you want a primary cord of three colors, then decide on the colors you want to use. Then cut the strands of each color to a length of about 36 inches (one yard). If you want just one color, then cut a strand about 108 inches long (three yards) and fold it to make 3 strands of 36 inches length.

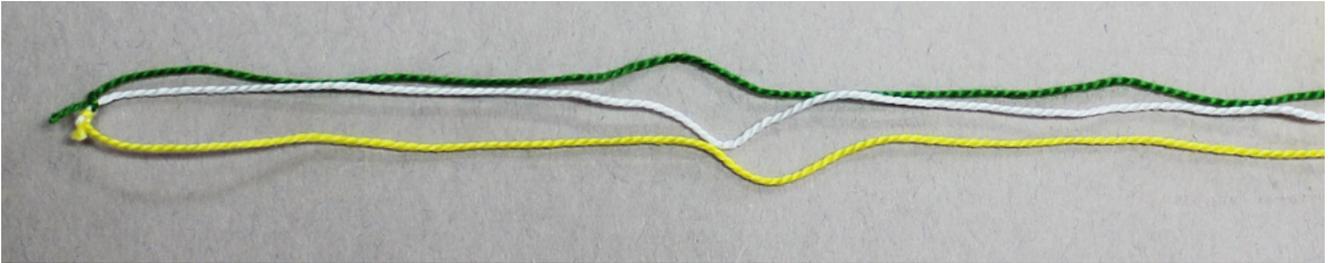


Figure 3: Three strands I used for making a primary cord

If you are using different colors for your strands, you will need to tie them together at one end as in the photograph in Figure 3 above.

Step 2 – loop the strands over the hook of the spindle tool as seen in Figure 4 below.



Figure 4: strands looped over the hook of spindle tool

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Step 3 – place a heavy object on the free ends of the strands. This will keep the strands from untwisting as you twist them together with the spindle tool.



Figure 5: coffee cup weight placed on free ends of strands

Step 4 – with the spindle laying flat on a table, on your left side, place your left hand on top of the spindle tool and push it away from you with a rolling action. As the spindle rotates, it will twist the strands together. Or, you can pull the spindle tool toward you to twist the strands in the opposite direction. The direction of the twisting also is used as a way to record some information. A cord twisted by pushing the spindle away from you is known as the **S** direction and the opposite direction is known as the **Z** direction. You decide which way you want to twist your primary cord.



Figure 6: strands of primary cord twisted together in the S direction

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Step 5 – continue to twist the strands together until the cord is tightly twisted. If you slide the spindle tool toward the weight on the other side of the cord, you will release the tension on the cord. When that happens, if the cord is twisted tightly, the strands will twist together in a compound way as seen in Figure 7 below. A compound twist is a twisted cord that is twisted together a second time, like the examples in Figure 7.



Figure 7: a tightly twisted primary cord with no tension on the cord – parts of the cord have a compound twist

Step 6 – finishing the primary cord. I am almost finished now making the primary cord. Slide the spindle tool away from the weight on the other end of the strands to remove the compound twists. You might ask someone to help you with this step. You need to prevent the strands from untwisting. Grab the cord at its center point and fold it in half, while also holding both ends so they do not untwist. While holding the looped end in one hand and the two free ends in the other, remove the free end from the hook of the spindle tool. While holding both ends of the doubled-up cord, repeatedly pull the cord tight and then move your hands toward each other to loosen the tension on the cord. Keep doing this until you obtain a nicely twisted cord as seen in Figure 8 on the next page (a cord with a compound twist its full length).



Figure 8: finished primary cord with a compound twist – showing the looped end

Step 7 – tie an overhand knot near the end of the cord that has the free strands, as seen in Figure 9 below. Pull the knot tight to finish the primary cord!

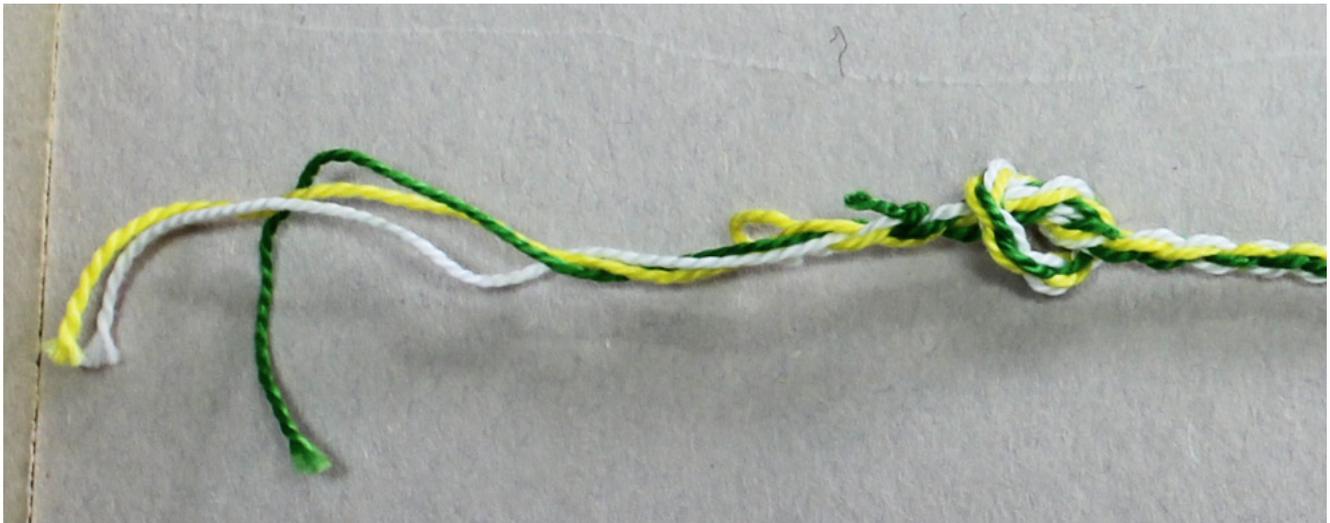


Figure 9: overhand knot in free end of primary cord

Making the Pendant Cords

Now that your primary cord is finished, you are ready to make some pendant cords. You may make as many of these as you like. I will show you the three pendant cords I made and use them as examples for recording numerical information.

There could be many reasons why people who lived long ago would want to record numerical information. Perhaps it would be useful to know how many people lived in a particular town or village. It might also be useful to know how much food of various kinds a town had stored for their people.

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Step 1 – remember that the pendant cords are not as heavy as the primary cord. I will make pendant cords using only two strands. The two strands should each be 36 inches long (one yard = 36 inches) if you plan to make a cord of two colors. If the cord will be just one color, then use a strand 72 inches long (2 yards) and double it over. Let us start by making a pendant cord of just one color. I used a red strand of 72 inches as seen in Figure 10 below.



Figure 10: red strand for a pendant cord

Step 2 – loop doubled-up strand over spindle tool hook

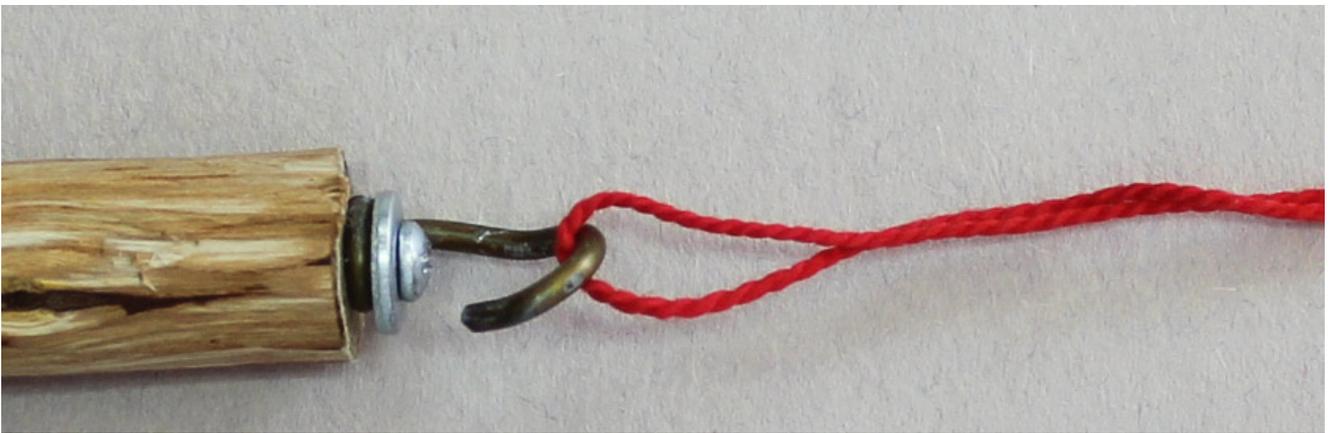


Figure 11: strand looped over spindle hook

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Step 3 – twist the doubled-up strand until it is tightly twisted (you decide which direction to twist it). The cord is tight enough when it forms a compound twist when not tensioned (see Figure 12 below).

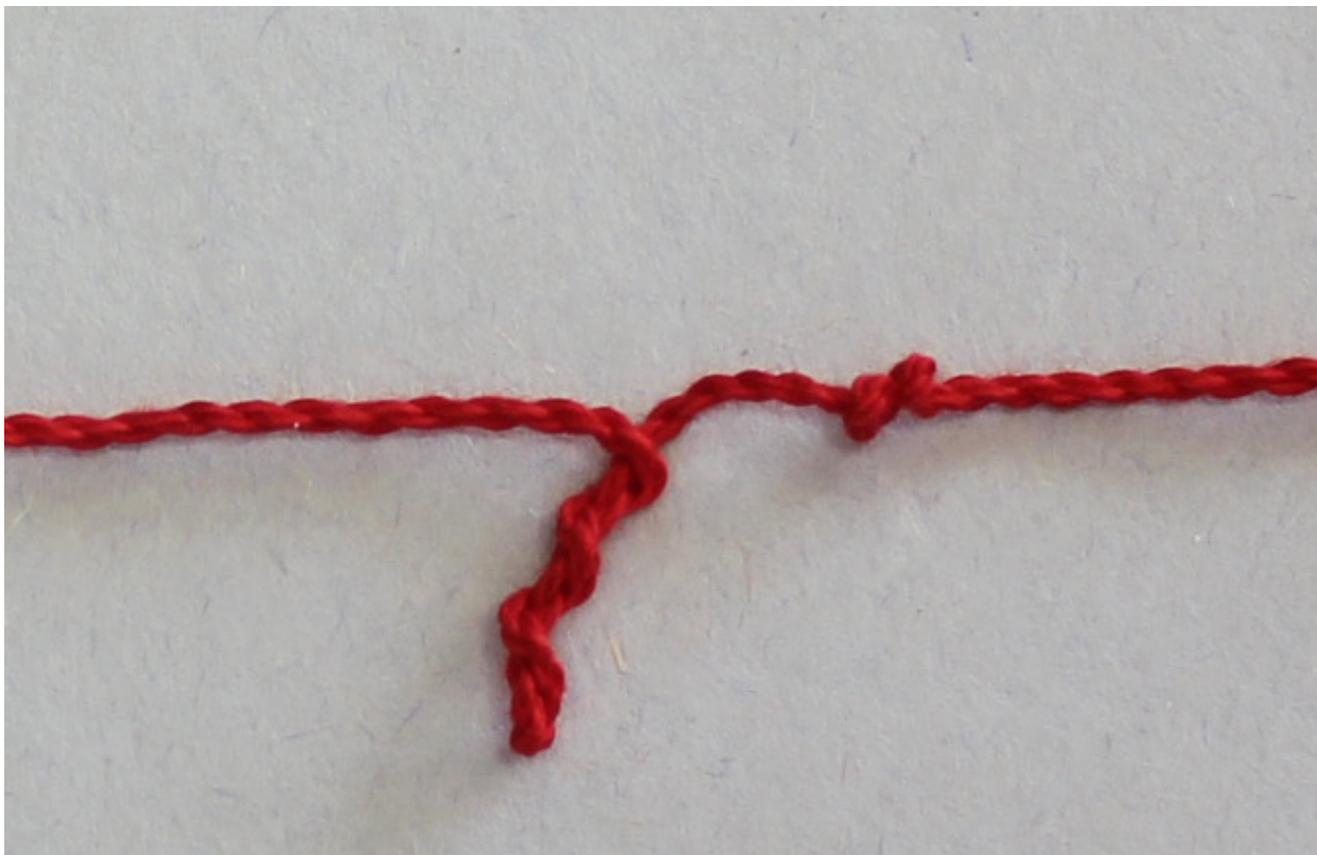


Figure 12: pendant cord twisted sufficiently to form compound twists

Step 4 – fold the tensioned pendant cord in half and manipulate it the same as you did when making the primary cord to make a nice compound twisted cord.

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Step 4a – to prevent the pendant cord from untwisting, tie an overhand knot at the end with free strands. Then trim untwisted parts below the knot with scissors, just as was done for primary cord. I did not do this for my pendant cords, as you will notice in the photographs. But afterwards I found that the pendant cords started to unwind as you can see in Figure 32.

Step 5 – now you need to tie the pendant cord to the primary cord. Untwist the looped end of the pendant cord so that it forms an open loop. Wrap the looped end around the primary cord as seen in Figure 13 below. Insert the free end of the pendant cord through the loop of the pendant cord.



Figure 13: pendant cord tied to primary cord

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Step 6 – Tighten the pendant cord around the primary cord. The pendant cord should now look like Figure 14 below.



Figure 14: pendant cord tightened to primary cord

Making a Barber Pendant Cord

Now I will make a pendant cord with two colors in a pattern named **barber**.

Step 1 – cut two strands, each 36 inches long, of different colors. Loop them together as seen in Figure 15.

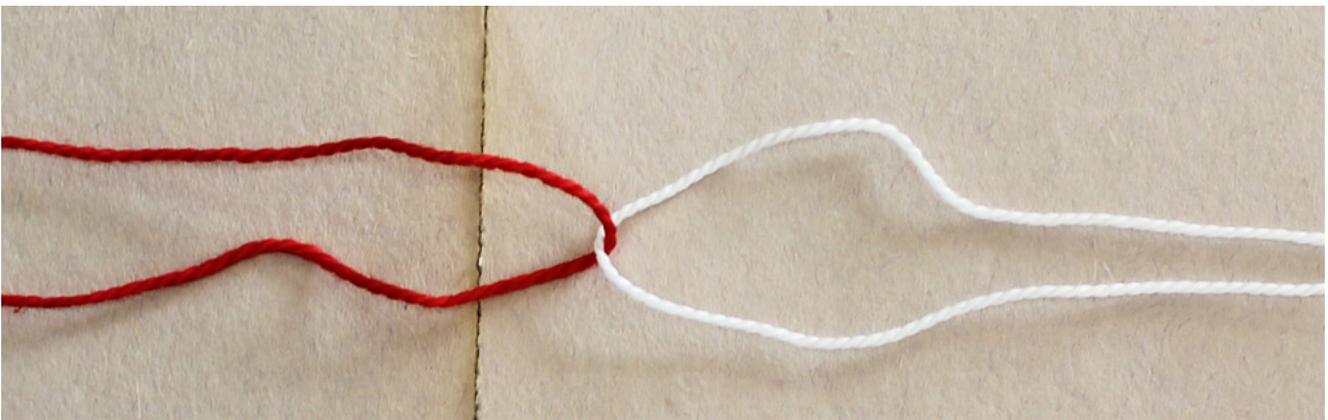


Figure 15: strands for a barber pendant cord

Step 2 – tie together the free ends of one of the colored strands and loop it over the spindle tool hook where you tied the strands.

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Step 3 – twist the strands with the tool until tight. Half of the length of the twisted strands will be one color the other half the other color. Grab the cord in the middle, where the two colors meet and manipulate the cord into a compound twist. It should now look like Figure 16 below. Connect the barber pendant cord to the primary cord.



Figure 16: a pendant cord with barber pattern

Make a Mottled Pendant Cord

Now I will demonstrate how to make a pendant cord of two colors, but with a pattern named **mottled**. I will again use two strands, one white and one red. When I have finished, you will see that the mottled pattern is different than the barber pattern.

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Step 1 – cut two strands, each 36 inches long, of different colors. Tie the two stands together as seen in Figure 17 below.

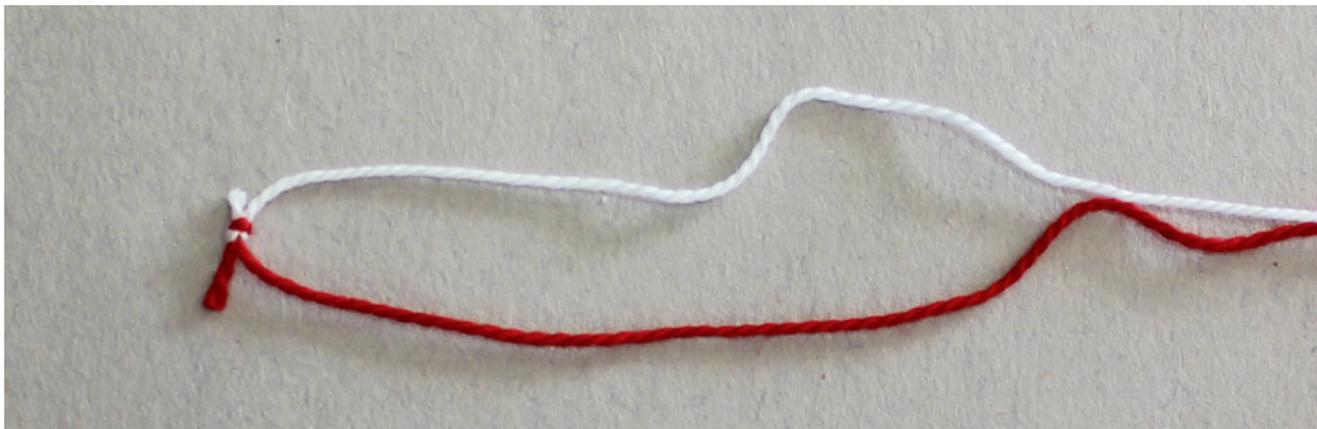


Figure 17: strands prepared for a mottled pendant cord

Step 2 – loop the strands over the spindle hook where they are tied together.

Step 3 – twist the strands together to form a compound twisted pendant cord.

Step 4 – tie the mottled pendant cord to the primary cord. Figure 18 shows the mottled pattern of the pendant cord.



Figure 18: mottled pendant cord tied to primary cord

If you have been carefully looking at the photographs so far, you may have noticed that I tied the three pendant cords to the primary cord in two different ways. Now let us take a closer look at how to tie the pendants using the two methods.

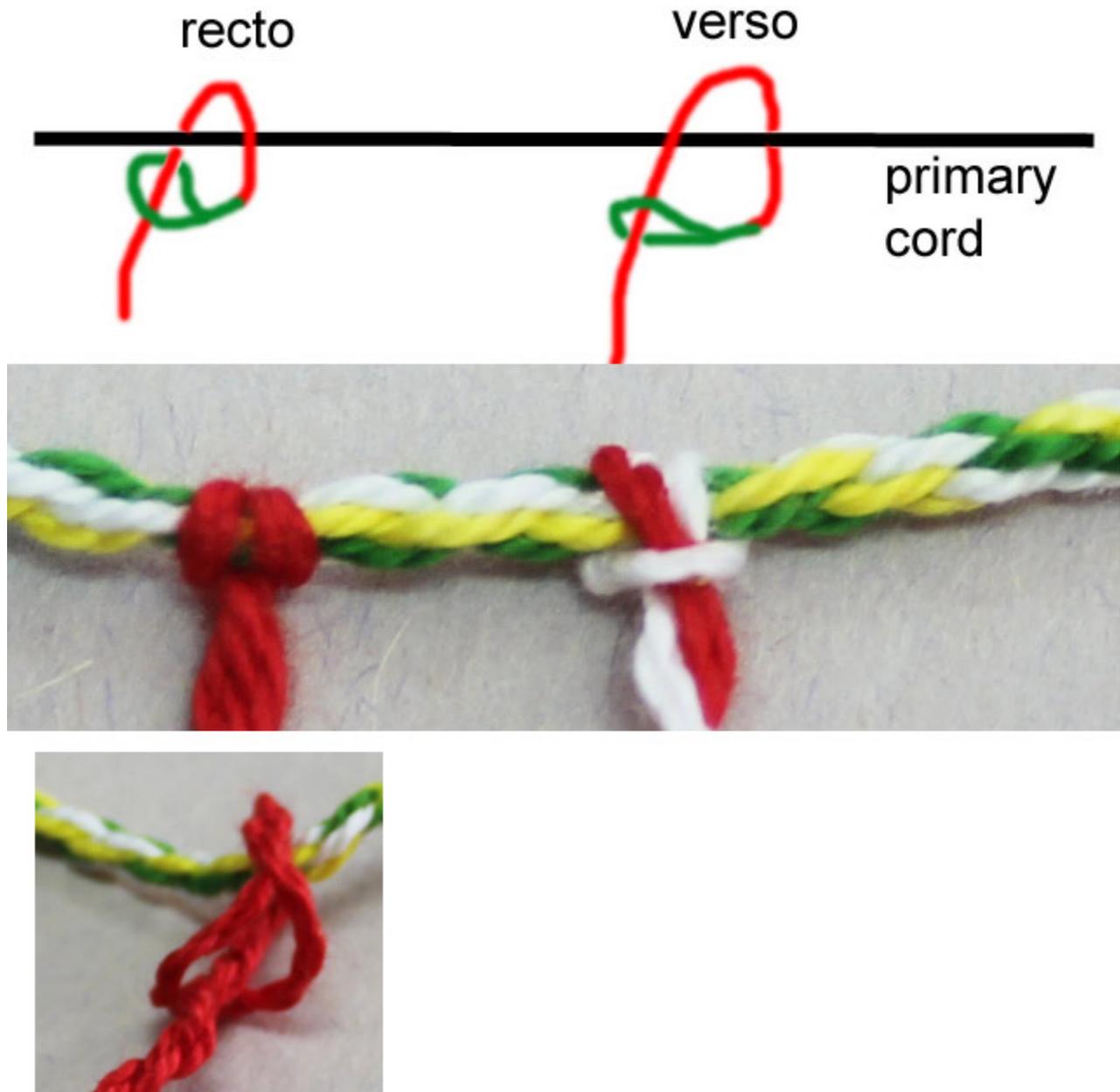


Figure 19: two methods of tying pendant cords to the primary cord

The two methods of tying pendant cords are named **recto** and **verso**. These methods require that you lay the primary cord down, always with the knotted end to your left.

To tie by the recto method, pass the looped end of the pendant cord **underneath** the primary cord then wrap the pendant cord **over** the primary cord. Pass the free end of the

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pendant cord through the loop, pulling the cord through the loop until the knot is tight around the primary cord (see images on left side of Figure 19).

To tie by the verso method, lay the loop end of the pendant cord **over** the primary cord. Then wrap the looped end of pendant cord **underneath** the primary cord. Pass the free end of the pendant cord through the loop, pulling the cord through the loop until the knot is tight around the primary cord. (see images on right side of Figure 19).

The method of tying, recto or verso, also provides some information. Decide which way you would like to tie your pendant cords. They can all be either recto or verso, or you can use a combination. You decide what it means for a cord to be tied recto or verso!

Now that you know how to make different kinds of pendant cords, you need to learn how to tie knots.

Tying Knots on the Pendant Cords

These knots can be used to record numbers. You can decide what the numbers mean.

The **overhand knot** is the most elementary of knots. Try to tie an overhand knot in a rope.



Figure 20: overhand knot

The **figure eight knot** is also used on pendant cords. Try to tie a figure eight knot.



Figure 21: figure eight knot

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The third kind of knot you will need to learn is the **long knot**. The long knot and figure eight knot are used only at the bottom of a pendant cord when recording numbers. The figure eight knot represents the digit 1. The long knot can be tied with a variable number of wraps to represent the digits 2 through 9. The next series of images show how to tie a long knot of three wraps, representing the digit 3. Try to tie a long knot representing the digit 3.



Figure 22: long knot - step one



Figure 23: long knot - step two

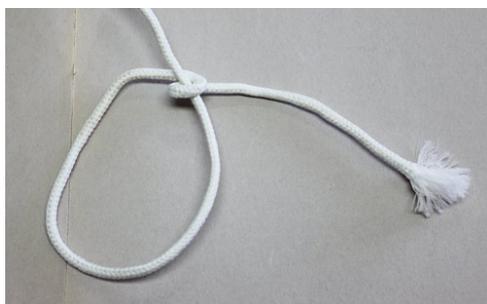


Figure 24: long knot - step three



Figure 25: long knot - step four

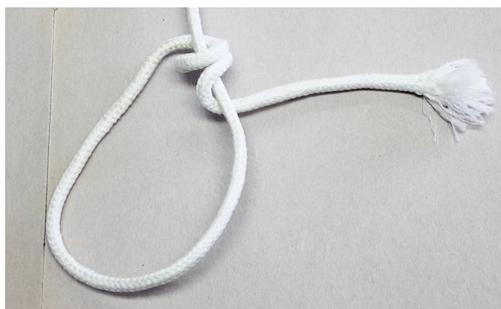


Figure 26: long knot - step five



Figure 27: long knot - step six, now tighten the knot to finish



Figure 28: long knot with three wraps representing the digit 3 - front view



Figure 29: long knot with three wraps – back view

(continued on next page)

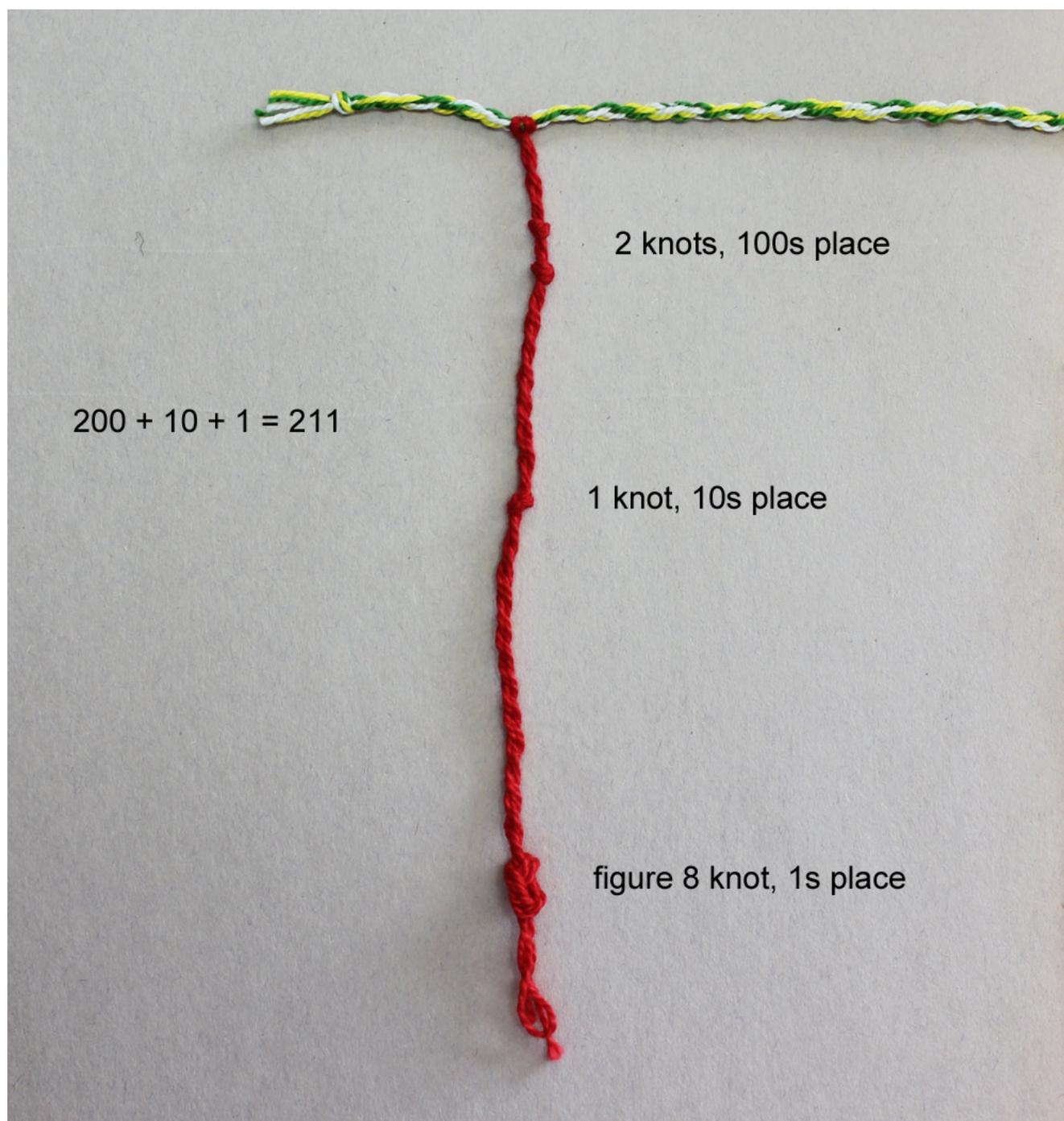


Figure 30: pendant cord tied to represent the number 211

The cord above represents the number 211. At bottom of the pendant is the digit in the ones place. The figure eight knot represents the digit 1. For tens place, 100s place, etc., we just tie overhand knots to match the digit needed.

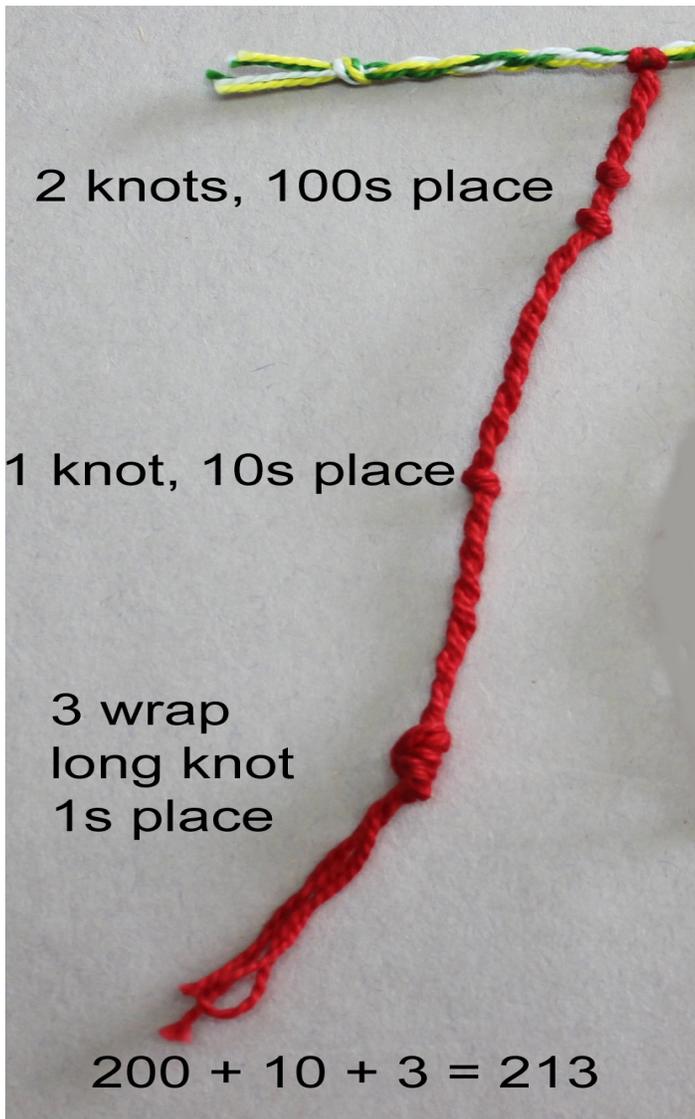


Figure 31: pendant cord tied to represent the number 213

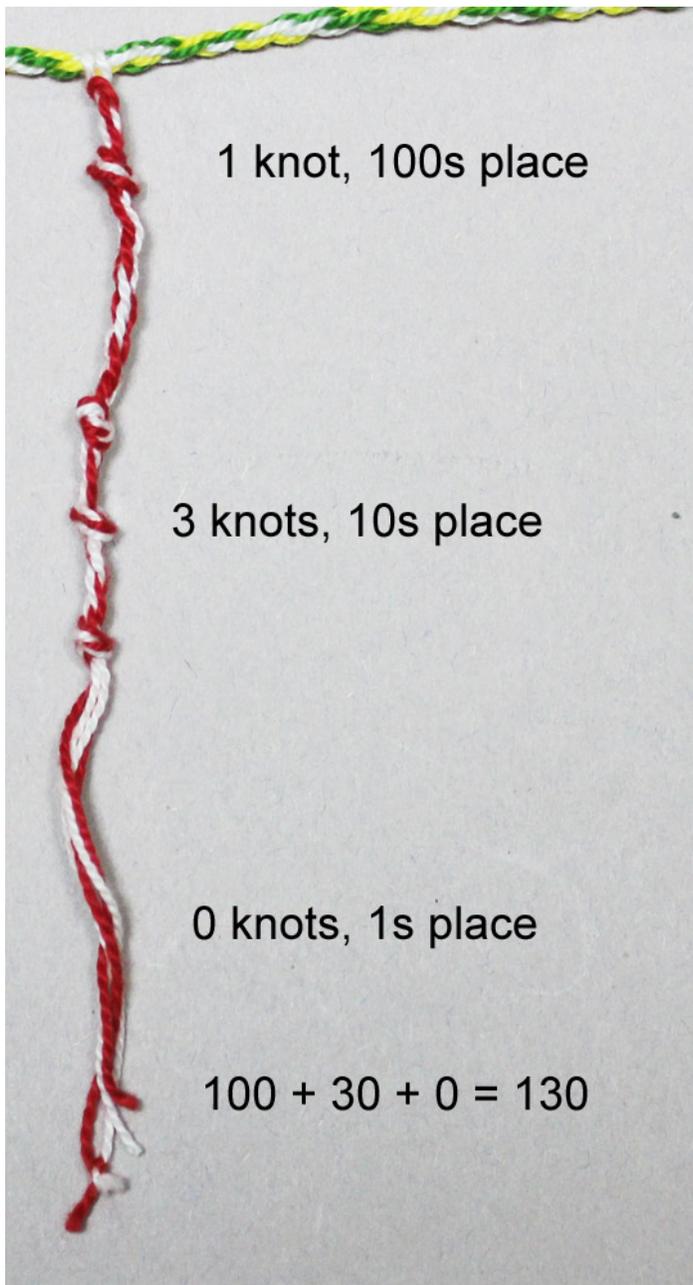


Figure 32: pendant cord tied to represent the number 130

In Figure 32 above you should notice that there is no knot at the bottom of the pendant cord. The absence of a knot at the bottom represents the digit 0. The absence of knots at other positions on the pendant cord also represent digit 0. If the pendant in Figure 32 did not have any knots in its center part, the number represented would be 100.

Now complete your own quipu!

Now it is time for you to make pendant cords. You should decide about the colors to use first and what the colors mean. I will give you some examples, but you should come up with your own ideas on how you will record information on your quipu.

An example quipu (please make your own scheme, don't use mine)

1. a **white, yellow and green primary cord** indicates that the quipu records information about **people** living in the **state of Ohio, United States of America**.
2. a **green pendant cord** is used to record the **year of the census information**. It should be positioned to the far left on the primary cord, the first pendant cord on left side of the quipu. The pendant cord is to be twisted in the **S direction** and tied to the primary cord by the **recto method**. Suppose the number recorded on this pendant cord is 1810. That would indicate that this census is for the year 1810.
3. a **blue pendant cord** is used to indicate the **county in the state**. Imagine that record keepers for Ohio have agreed that each county will be represented by a number. They have agreed that the county of Geauga will be represented by the number 1806, the year the county was established. The pendant cord is to be twisted in the **S direction** and tied to the primary cord by the **recto method**. Then, if a blue pendant cord, twisted in the S direction and tied by recto method contains knots representing the number 1806, then it is understood that this quipu contains information about people living in the county of Geauga, state of Ohio.
4. a **white pendant cord** is used to record the **assigned family number**. The pendant cord is to be twisted in the **S direction** and tied to the primary cord by the **recto method**. In 1810 there were few families living in Geauga County. Let us imagine that record keepers assigned a number to each family. As we read the quipu, we always start reading the information on the left side first. As we move to the right, we look for the first white pendant cord. This tells us that the next pendant cords to the right of the white cord (those of colors other than white) are the numbers related to a specific family.
5. a **red pendant cord** is to be used to record the **number of people in a family**. The cord should be twisted in the **S direction** and tied to the primary cord by the **recto method**.
6. a **red pendant cord** is to be used to record the **number of children in a family**. The cord should be twisted in the **S direction** and tied to the primary cord by the **verso method**. In this scheme, we can understand that the pendant color of red is used to record the numbers of people in a family. If the red pendant cord is tied by the recto method, then we understand that the number recorded on the cord represents the total number of people in the family. If the red pendant cord is tied by the verso method, then we understand that the number recorded on the cord represents only the children in the family.

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Now I would like you to create your own rules for making a quipu. Use the rules to make your own quipu. Decide what information you would like to record on your quipu.

Learning More About Quipus

I have not provided a complete description for making an authentic quipu, but I hope you have found this lesson interesting. You can learn more about quipus at the links provided below.

Videos on how to make your own quipu

<https://www.youtube.com/watch?v=neScvi4XDRw>

Wikipedia article

<https://en.wikipedia.org/wiki/Quipu>

Another article

<https://www.newscientist.com/article/mg23931972-600-we-thought-the-incas-couldnt-write-these-knots-change-everything/>