ROPE MAKING & KNOT TYING
EVENING ACTIVITY LESSON PLAN

WOLF RIDGE℠
ENVIRONMENTAL LEARNING CENTER

ROPES AND KNOTS

CLASS DESCRIPTION: A Traditional Skills and Crafts Class

Students will investigate how to make ropes and tie useful knots for their outdoor pursuits. The class will explore the history of rope making and materials used in rope making. Then students will create rope using hand winders in small groups. Afterwards they will use the rope they create to learn to tie basic knots.

Total time: 1.5 hours, can be taught in or outdoors
Audience: 6-20 students, 4th grade through adult
Activity level: low
Travel: none

OBJECTIVE:

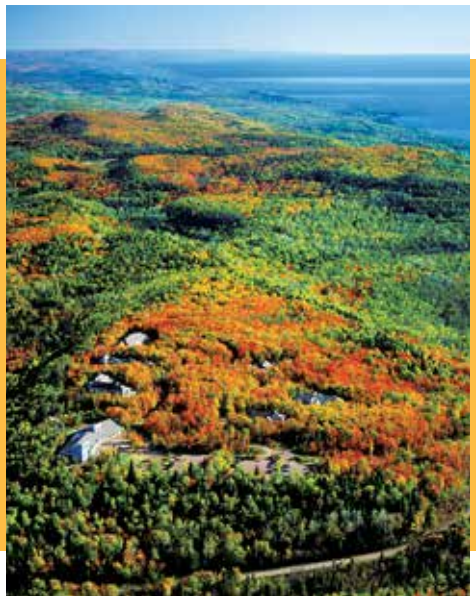
To learn the skill of making rope and tying knots for use in outdoor recreation and living.

CONCEPTS:

- Human cultures worldwide have used plant and animal material to create ropes and systems for tying things together
- A simple rope can be created by twisting twine and using a rope winder
- Knots are useful in daily life and outdoor recreation, knowing knots for different situations is an enjoyable and technical skill

OUTCOMES:

Upon completion of the Rope Making and Knot Tying class students will be able to:
1. List situations in which rope and knots are useful or essential.
2. Create rope using a twist and wrap method.
3. Complete overhand knot, slip knot, square knot, bowline, clove hitch, and taut-line hitch.



ROPES AND KNOTS

Updated January, 2025

Equipment

- full lesson plan
- 5 winding dowels
- 5 stationary dowels
- 5 rope making booklets
- 20 knot reference bookmarks
- 20 rope pieces for practicing knots
- 2 sets knot relay situation cards
- 2 scissors
- spool of twine
- spool of string
- 24' paracord for twine measuring
- 6 instructor knot reference sheets
- sample finished rope piece
- sample basswood twine

Appendices

- Glossary
- References
- Knot Reference Cards
- Knot Situation Cards

Set-up (10 min.)

- Classroom/class prep description
- Safety Management

I. Introduction (5 min.)

- Greet
- Class Overview
- Assess Learner Level

II. Making Rope (30 min.)

A. History of rope making
B. What makes strong rope?
C. Twine into rope

III. Knots (30 min.)

IV. Knot races (20 min.)

V. Conclusion & Clean Up (5 min.)

Set-up (10 min.)

Classroom/class prep description

The equipment for rope making and knot tying is stored in the kit rooms. Lay out the practice ropes and the rope making supplies. Draw a board outlining the class structure. Put out the knot cards and knot situations.

Safety Management

Adhere to and be familiar with all general safety practices designated by Wolf Ridge. Be aware of any student's special needs (medical, etc.) and adjust the activities as needed to maintain safety.

- First aid kit is located in the kit room.

I. Introduction (5 min.)

Greeting/Grabber

Greet the students as they enter and take a minute to learn their names. Discuss clearly and specifically which behaviors you expect from your students during the next 1.5 hours. Explain the need for respect; for you, for each other, for the equipment. Give them a brief class overview.

Overview of the Class and Outcomes

Briefly describe the history of rope making and the importance of knots. Each student will leave with a piece of rope that they worked together to make. Students will learn to tie several different knots and learn what situations that the knots can be used in.

Assess Learner Level

Ask students if they know how to make a rope? What is a rope? Ask students as a group to brainstorm as many knots as they can think of. What uses can they think of for knowing different knots? Have they learned to tie knots before?

II. Making Rope (30 min.)

In the next section of class we will explore how to create twisted fibers that are strong and can be used for a variety of purposes. Let's start by thinking historically- how were basic living items tied together before you could buy rope at a store?

A. History of Rope Making

For as long as people have had objects that needed to be attached to each other, we have been twisting fibers together to make ropes. Twisting fibers by hand is an ancient rope making method. Evidence of using rocks as weights for spinning fibers around each other has been found in Egyptian cultural records as well as among American Indians dating back to 1000 years ago. Over time, rope making in Europe, America, and other parts of the world became a mechanized industry.

B. What makes rope strong?

The Ojibwe used the inner bark of basswood trees to twist together into strong twine for tying things together. Pass around an example of basswood twine. Ask the students if they have made basswood twine in Ojibwe Life class. Explain the process of getting basswood fibers to make into twine: first the tree must be cut down and then the bark must be removed and soaked in water for weeks to separate the inner bark from the outer bark. The inner bark is then dried and twisted together into twine.

Can you think of any other plants in nature that could make strong twine or cordage?

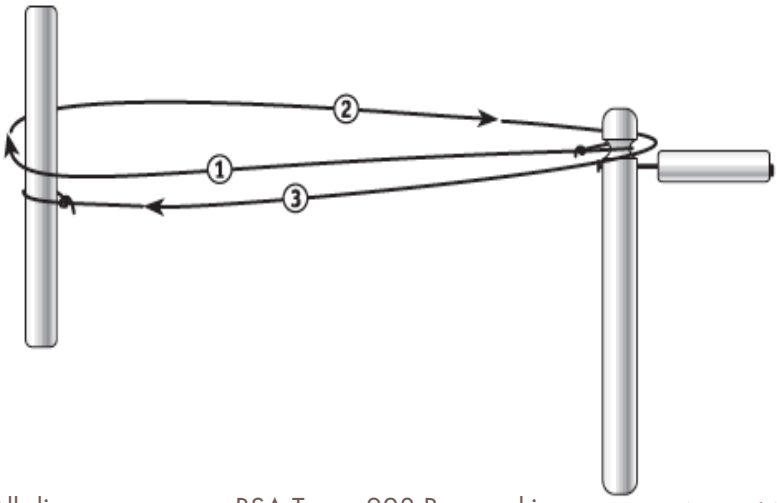
Show students a diagram of rope showing the twisting of the fibers. Explain that rope is stronger the more fibers are twisted together.

C. Twine into Rope

Now the exciting part- twisting twine into strong rope! Explain that we will work in groups of 4 to twist twine into rope using a simple winding tool. Show students the winding dowel (the one with the handle) and the stationary dowel (the one with no handle). Hand out the rope making instruction sheet. Each group will get a 24' length of twine (use the paracord as a measuring tool) that will make about 4' of rope, enough for each student to leave with around a 1' section.

Do a demonstration with some student volunteers, following the rope making instruction sheet, before letting all the groups work separately.

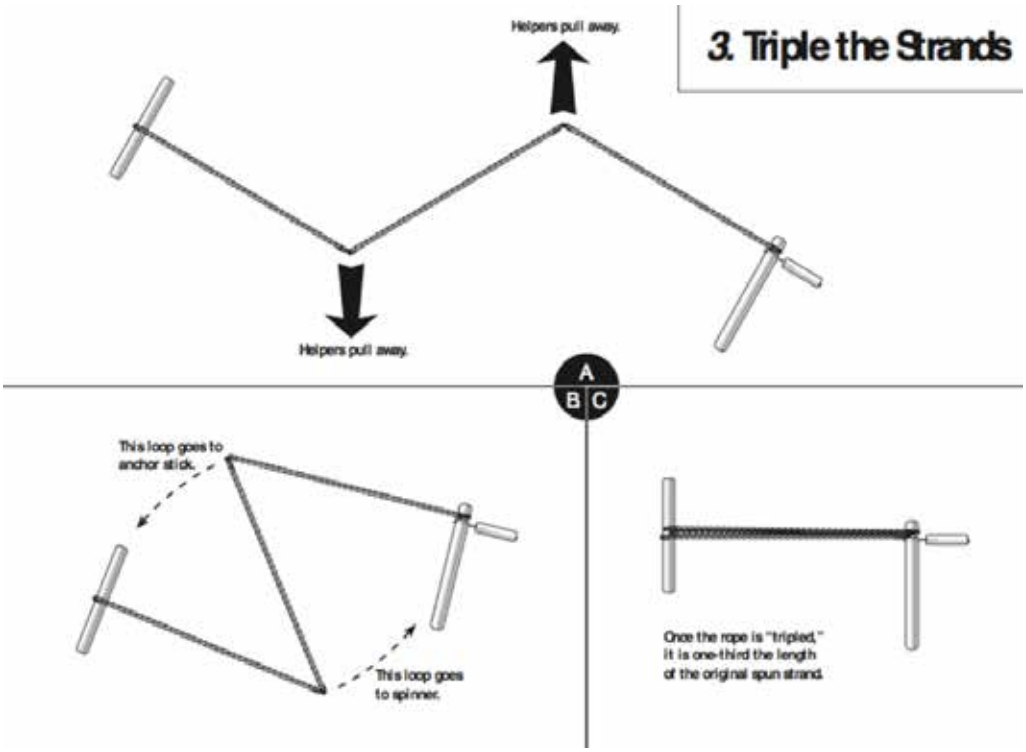
To wind rope using the simple rope winders, first measure out a 24 foot length of twine. Tie a bowline knot on one end of the rope and slip it over the grooved dowel. Then wrap the twine from the winding dowel to the stationary dowel three times, ending by tying it off to the stationary dowel. Have one person hold each dowel. See diagram below:



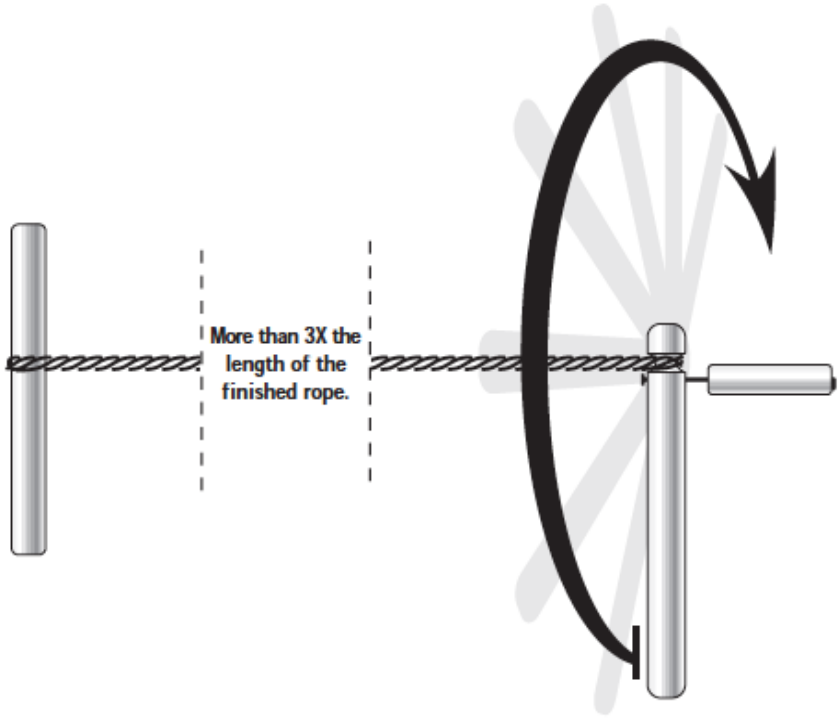
All diagrams source: BSA Troop 228 Ropemaking (usscouts.org/scoutcraft/BoyScoutRopemaking.pdf)

Next, pull back on the winding dowel to create equal tension on all the strands of the twine. Working with the twine at this tight level of tension, wrap the winding dowel around and around until the strands of twine are tightly twisted around each other.

To make the rope keep its twist, the next step is to bend it in thirds. This step requires two more helpers. The helpers pull the rope away in thirds, making sure as the sections are pulled away from each other they are pulled at equal tension that the rope doesn't twist and kink. Then the helpers loop their new ends over the dowel ends to triple the rope.



Next the newly tripled rope must be wrapped or twisted as before, BUT now it will be wound the opposite direction to make the rope fibers grab onto each other so that they won't unwind once tension is released. Once the tripled rope is wound tightly the opposite direction of the original twist it should be pulled back and forth in a quick motion to set the rope fibers.



Lastly the rope can be relaxed and removed from the dowels it is attached to. The ends can be taped, whipped, or back spliced to prevent them from fraying.

After demonstrating with the large group, split into smaller groups and encourage the students to try making a length of rope on their own.

Assessment (Outcome 2): *Create rope using a twist and wrap method.*

To assess this outcome: Ask students to pair up, have person A explain to person B how to make rope using the twist and wrap method as if person B was their younger sibling. Then have person B explain the process to person A as if they were someone much older than them.

III. Knots (30 min.)

Hand out the knot tying sheets to each student along with a length of rock climbing rope. Students will need to use their stationary dowel or a table/chair leg for some of the knots. Explain that knots have many uses and can have many names depending on the situations they are used in. The knots we will learn and use today are useful in daily life and in outdoor/camping situations. We will learn and practice the knots then have relay races to tie knots for different camping situations.

Overhand Knot

A simple knot many students will already know. This knot can be used as a confidence booster for students who may be intimidated by knot tying. The overhand knot can be used to make a stopper at the end of a rope, to bundle together shorter lengths of rope, and sometimes to mark a length on a rope. What other uses can students think of? Perhaps the start of tying a shoe?

INSTRUCTOR NOTE:
Gauge the rope made by your group to decide if teaching knots will be more successful with the rope they have made or with the practice ropes you have in the kit. Either is possible.

Pay attention to student abilities and frustrations as you teach knots, you may choose to teach fewer or more knots depending on their interest and abilities.

Square Knot
A classic knot, show how to tie this knot and teach the mnemonic "Right over left and under, left over right and under". Have the students stand in a circle and tie all their practice ropes together in a big circle. Stand in a circle inside the rope circle and lean out with the ropes behind your backs- if everyone tied their square knot correctly the circle should hold up. Brainstorm situations in which you might use a square knot.

Slip Knot
This knot forms a loop in the rope, something we haven't tried yet. It can change sizes easily and be untied easily. It is used in knitting and crocheting, as well as to tie a rope to a tree or a pole. It isn't very secure on its own, but can be combined with other knots to make it stronger. Have students practice using a friends arm or a tree.

Bowline
A useful knot because it forms a loop that won't slip. Can be used to tie off a canoe to a tree or to tie sometime to a pole or tree securely. Teach students the mnemonic "Up the rabbit hole, around the tree, back down the rabbit hole." The knot can be made stronger by adding an overhand knot to the loop after the bowline is tied. If students master this knot, challenge them to try tying it with only one hand.

Clove Hitch
Another knot useful for tying a rope to a tree or pole. Practice this knot around an inverted chair leg. Can be made by forming two loops or "a pair of glasses" then putting one loop behind the other or one "lens" behind the other.

Taut-line Hitch
This knot makes a loop that can change in size until it is pulled tight or put under tension and then the loop holds its size. Useful for setting up a tarp or tying off a tent guy line. Could also be used to hang a clothesline.

Assessment (Outcome 1): *List situations in which ropes and knots are useful or essential*

To assess this outcome, write the names of all the knots students just learned on the board and have students come up to list situations in which they could use each knot. Or in small groups, have students sketch a diagram of a campsite and label all the places knots are in use, labelling which knots are where. Challenge them to incorporate all 6 knots into their diagram.

IV. Knot Races (20 min.)
Organize the students into two teams to have a knot tying relay race. This can be done in or outdoors with the practice lengths of rope. The two teams will line up facing the instructor. The instructor will place two chairs in the competition space with a practice rope on each chair. Each team will send up their first knot competitor to their team chair and the first competitors will be given a situation card to read. Then they compete to tie the knot appropriate for the situation. Once they tie the correct knot and have their knot checked by the instructor they must untie the knot and then their second competitor from their team can approach the chair. The relay continues until both teams complete all the knots. At the instructor's discretion competitors may or may not be allowed to seek advice and help from their teammates. Additionally the instructor may decide whether or not students can use their knot reference cards in the competition. Celebrate the student's new knot knowledge.

Assessment (Outcome 3): *Complete overhand knot, slip knot, square knot, bowline, clove hitch, and taut-line hitch.*

Assess this outcome via the knot races and the knot practices beforehand. Be sure to celebrate even small knot tying successes and encourage students to keep trying- knots can be confusing. Continue to provide help throughout and emphasize cooperative learning.

V. Conclusion and Clean Up (5 min.)

Briefly discuss with students what they learned about during the lesson. Remind them that they can continue practicing knot tying with any kind of string or rope they have around. While they don't need to remember every knot they learned, it can be useful to know a couple knots for when you need to tie things together. Tell students they can bring their length of rope home with them.

Have students throw any extra scraps in the trash bins. Replace all items neatly in the bin and return it to the kit room along with posters and TV. Wash hands and table tops with soap and water after class. Stack tables and chairs and close windows.

Appendices

Glossary

backsplice - A method of securing the ends of a rope so the rope doesn't fray. It can be seen step by step here: www.animatedknots.com/backsplice.

fiber - A thread or filament structure or object from which a vegetable tissue, mineral substance or textile is formed.

rope - A length of strong cord made by twisting plant or synthetic fibers together.

whip - A method of securing the ends of a rope so the rope doesn't fray. Involves wrapping a tread around the ends. It can be seen step by step here: www.animatedknots.com/commonwhipping.

References

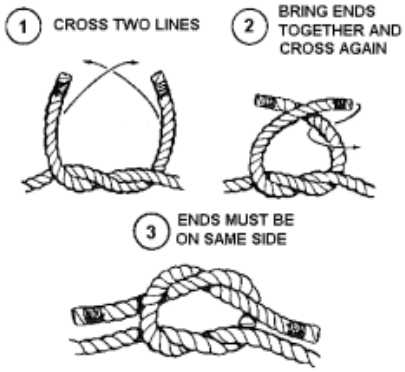
- *Rope making lesson plan from BSA:* usscouts.org/scoutcraft/BoyScoutRopemaking.pdf
- *The Six Boy Scout Knots*: https://meritbadge.org/wiki/images/5/5d/Six-Boy-Scout-Knots.pdf
- *History of Rope:* http://www.neropes.com/resources/history_of_rope.pdf
- *California State Parks Rope Making Lesson Plan:* http://www.parks.ca.gov/pages/485/files/rope%20making%20station%20revised%203-11-12.pdf

Worksheets attached

- Knot Reference Cards
- Knot Situation Cards

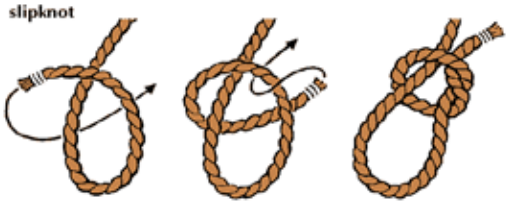
KNOT REFERENCE CARDS

Square Knot



Uses: Joining two ropes together
"Right over left and under, left over right and under"

Slip Knot



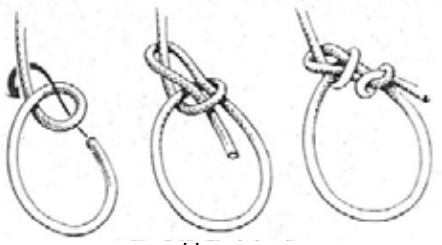
Uses: Making a loop that can change size
Can use to tie rope to a tree or pole
Not very secure on its own

Overhand Knot

A basic knot

Uses:
Mark a length
Secure other knots
Bundle a rope together

Bowline



Uses:
Tying a loop that won't change size
Can be used to tie objects together
"Up the rabbit hole, around the tree, back through the rabbit hole"
Can be secured with an additional overhand knot

Clove Hitch

Uses:
Ties a rope to a tree or pole

Tying trick:
Make a pair of "glasses" then pass one "lens" under the other

Taut-line Hitch

Uses: Make a loop that can change in size
Holds its size under tension
Great for tying tarps and tent lines

Knot Relays Situation

You are hanging your food up in a tree on a camping trip and brought two ropes- each of which is too short to use on it's own. You need to tie the two ropes together with a knot that won't fall out even when the ropes are holding your 50 lb food bag.

Solution

Square Knot

Knot Relays Situation

You are hanging a clothesline between two trees. Which knot do you use to tie off each side to the trees?

Solution

Bowline on one end, taut-line hitch on the other end (or taut-line hitch on both ends)

Knot Relays Situation

You are staking your tent's rainfly to the ground (the part of the tent that keeps rain from getting in during the night). You want the rainfly to be as tight as possible, so you need a knot that you can cinch tighter after you tie it.

Solution

Taut-line hitch

Knot Relays Situation

Quick! You are trying to get your boat into shore and out of a thunder storm. You find a small stump you can tie off to but you need to tie off as quickly as possible. It's not very windy, and the boat is in a protected cove.

Solution

Slip knot or Clove hitch

Knot Relays Situation

You are tying up your canoe to the shore while you eat lunch. It's a windy day and you want to make sure the knot you tie to a tree won't come undone while you enjoy your sandwiches.

Solution

Bowline