

3) PLAY A GAME ABOUT POISONOUS PLANTS: “Where Sheep May Safely Graze”

The name of this game comes from a piece of music written by J. S. Bach (Canon No. 208). He probably wasn't thinking about poisonous plants when he wrote it, but the title was just too tempting to resist.

The board is designed for 1-4 players, so if you will have more than 4 players, make two copies of the game board. All players can still play as a group, but on separate boards.

You will need:

- Copies of the game board pieces and copies of the sheep tokens (one sheep per player)
- Tape (a glue stick might also be helpful for assembling the sheep tokens)
- Scissors
- Optional: colored pencils or markers so players can color their sheep in order to identify it

How to set up the game:

Tape together the two game board pages. Cut out, fold and assemble the sheep tokens. Each player should either write his name on the sheep, or color the fleece so that he will be able to keep track of his sheep.

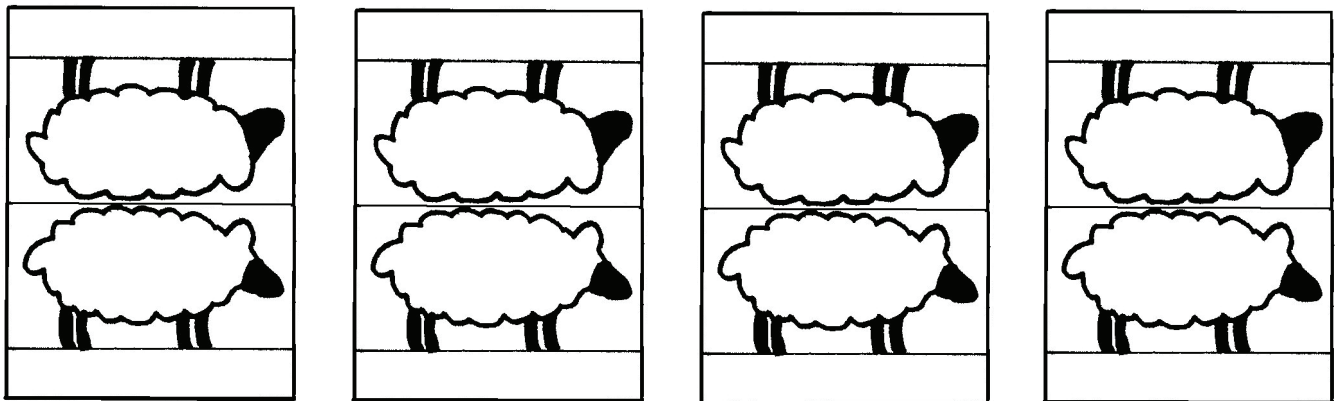
How to play the game:

The object of the game is to get your sheep across the long meadow without eating any poisonous plants. This will be difficult because three out of four plants in each row are toxic to some degree. Only one is considered by botanists to be edible. Not all the toxic plants are equally toxic. Some will just cause stomach upset or headaches, others will kill you. As with all things, “The dose makes the poison,” as Paracelsus stated back in Renaissance times. In most cases, the amount you eat has a lot to do with the outcome. Each plant has been given a numerical estimate of how toxic it is, using a scale of 1 to 3. (This is not an official number you'll find anywhere. These numbers were created for this game and should not be construed as scientifically valid toxicity estimates.) Edible plants have a toxicity score of 0, so the goal is to end up with a score as close to 0 as possible.








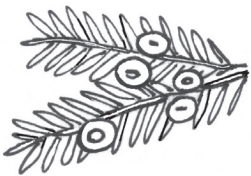










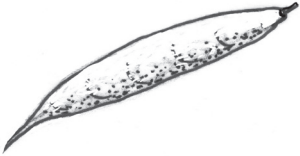





Disclaimer at this point: Even though the token is a sheep, we've erred on the side of choosing to define edibility on human standards, not grazing animal standards. In most cases, humans and animals will react in a similar manner, but if there was any discrepancy, the human factor was given more consideration since the players are humans who might find this information helpful at some point in the future.

This game requires a leader (most likely the teacher/adult in charge, but it could be a student, especially if you have an older student and some younger ones). The leader will give the correct answers after each move and will also be able to add some extra information at his/her discretion from the extra info sheet.



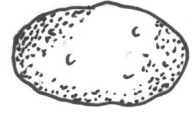




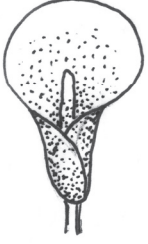
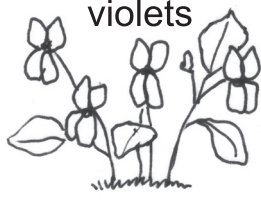

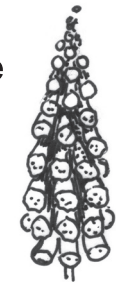

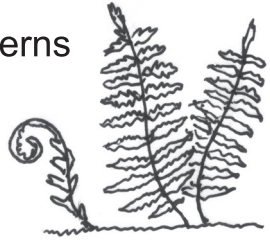

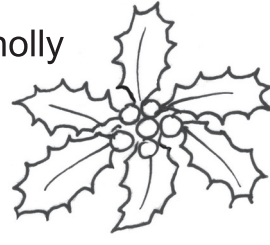









All players move at the same time. The leader calls out the number of the row the sheep will be grazing, moving from 1 to 12. The players then place their sheep on the plant in that row that they hope is edible. After all sheep have been placed, the leader reads the answers and gives the toxicity rating for each plant. The players write down their score for that row. As they progress up the rows, they keep adding up their points so that after row 12 they will have a final score. The lowest score wins.



Where Sheep May Safely Graze

12	azalea 	hibiscus 	rhododendron 	hydrangea 
11	gooseberries 	asparagus berries 	pokeweed berries 	yew berries 
10	tulip bulbs 	orchid bulbs 	daffodil bulbs 	hyacinth bulbs 
9	maple tree leaves 	dogwood tree leaves 	cherry tree leaves 	oak tree leaves 
8	raw kidney beans 	raw lima beans 	raw green beans 	raw Mung beans 
7	cherry pits 	grape seeds 	apple seeds 	pear seeds 

Trim off the top of this page then tape or glue this page to the bottom of previous page.

6	potato leaves 	potato stems 	green potatoes 	red potatoes 
5	tiger lily 	lily of the valley 	Jack-in-the-pulpit 	calla lily 
4	violets 	buttercups 	foxglove 	larkspur 
3	ferns 	ivy 	holly 	cattails 
2	white snakeroot 	jimson weed 	ragwort 	nettles 
1	wild carrots 	dandelion leaves 	rhubarb leaves 	tomato leaves 

Three of the plants (or plant parts) in each row are toxic. One is edible.

Good luck, sheep!

Where Sheep May Safely Graze

<p>potato leaves (1)</p> <p>Potatoes belong to the Solanaceae family, the nightshades. All nightshades produce solanine chemicals, at least to some degree. This chemical is most abundant in the green parts of the plant.</p>	<p>potato stems (1)</p> <p>Since potato stems are green, they contain some solanine, a chemical that can affect both the digestive system and the nervous system. Cooking does not destroy this chemical.</p>	<p>green potatoes (1)</p> <p>Eating a few bites of green potato won't make you terribly sick, but eating a lot of them isn't good for you. The green color indicates the presence of solanine, a toxic chemical.</p>	<p>red potatoes (0)</p> <p>The tubers of potato plants do not contain much solanine as long as they are white or red in color.</p>
<p>tiger lily (0)</p> <p>Tiger lilies are edible and are sometimes used to garnish salads and desserts. They belong to the family of daylilies, which are chemically different from other plants we call lilies.</p>	<p>lily of the valley (2)</p> <p>Though it looks great in your flower garden, all parts of this plant can cause abdominal pain, vomiting, and reduced heart rate. Eating a large amount can be deadly.</p>	<p>Jack-in-the-pulpit (1.5)</p> <p>This plant contains saponins, which cause severe irritation to the mouth, throat and stomach. In severe cases, swelling causes problems with breathing. When cooked properly, the root can be edible.</p>	<p>calla lily (3)</p> <p>This type of lily contains oxalic acid (also found in rhubarb leaves) and causes digestive distress. The acid can affect other organs, also, and a dose of as little as 5 grams can be fatal to small children.</p>
<p>violets (0)</p> <p>Violets are often used to add color to a green salad. They are high in vitamin C.</p>	<p>buttercups (1)</p> <p>These lovely flowers can be a danger to grazing animals. They can cause cholic in hoofed animals and digestive distress in all animals. They can also irritate the skin.</p>	<p>foxglove (2)</p> <p>This plant contains digitoxin, a chemical that will make you nauseated, then cause serious heart problems. However, in small doses this chemical is used as a heart medication.</p>	<p>larkspur (2)</p> <p>The toxins in this plant cause problems to muscles and nerves, and can be fatal. This plant causes problems in grazing animals. In late summer, the plant becomes less toxic.</p>
<p>ferns (.5)</p> <p>People in Asia eat fern fiddleheads with no apparent ill effects. However, all ferns have been shown to be carcinogenic and they are probably contributing to Japan's high rates of digestive cancers.</p>	<p>ivy (1)</p> <p>Ivy leaves and berries are mildly poisonous, causing digestive discomfort and labored breathing. Their bitter taste helps to keep humans from eating them.</p>	<p>holly (1)</p> <p>Holly looks nice as a holiday decoration, but don't eat it. It will give you nausea, vomiting and diarrhea.</p>	<p>cattails (0)</p> <p>All parts of the cattail are edible. Some people grind the roots into a flour. The stems are tender and taste like cucumber. The brown spikes can be eaten like corn on the cob.</p>
<p>white snakeroot (2)</p> <p>All parts of this plant are toxic due to a chemical called tremetol, which causes severe trembling and vomiting and can be fatal. The toxin can pass through a cow's udder and into its milk causing "milk sickness."</p>	<p>jimson weed (3)</p> <p>Like deadly nightshade, jimson weed contains a chemical called atropine, which interferes with the normal functioning of the nervous system. In very small amounts, this chemical can be used as a medicine.</p>	<p>ragwort (2)</p> <p>This plant is most dangerous to grazing animals. It is bitter and therefore unlikely to be consumed by humans. It causes liver damage because of its many alkaloid chemicals.</p>	<p>nettles (0)</p> <p>Though they have a reputation for being nasty stingers (because of the hairs on their stems), cooking them removes the sting and makes them completely edible.</p>
<p>wild carrots (1)</p> <p>The carrots we grow in our gardens are far removed from their wild cousins. It is advisable not to eat things you find in the wild that look like carrots. They can be poisonous.</p>	<p>dandelion leaves (0)</p> <p>Dandelion leaves are a great source of vitamins, minerals, and fiber. All parts of the plant are edible, either cooked or raw. Many people use the leaves as salad greens.</p>	<p>rhubarb leaves (1)</p> <p>Rhubarb leaves contain oxalic acid, which can cause kidney damage, convulsions and coma. However, you'd have to eat quite a few of them to achieve these extreme effects.</p>	<p>tomato leaves (1)</p> <p>These contain solanine, which can cause stomach upset and nervous system distress. Tomatoes are in the nightshade family of plants, Solanaceae, along with Atropa belladonna, jimson weed, and potatoes.</p>

<p>azalea (2)</p> <p>The azalea is a small rhododendron. The nectar of the azalea flowers is also toxic, so if bees make honey from azaleas, the honey will be toxic.</p>	<p>hibiscus (0)</p> <p>Hibiscus plants are famous for their huge flowers. Since the flowers are edible, they can be used as disposable plates!</p>	<p>rhododendron (2)</p> <p>Rhododendrons are the larger group of plants to which azaleas belong. Rhododendrons are large bushes with huge ball-shaped flowers. As long as you look and don't taste, you're OK!</p>	<p>hydrangea (1.5)</p> <p>Hydrangea are distantly related to rhododendrons, but contain the same toxic chemicals found in the <i>Prunus</i> family (fruits with pits). These chemicals mainly affect the digestive system.</p>
<p>gooseberries (0)</p> <p>Gooseberries are one of the few simple, round berries that are edible. They are related to currants and are native to Europe and Africa. They are used in salads, desserts and jams.</p>	<p>asparagus berries (.5)</p> <p>Asparagus berries are somewhat controversial, but the general consensus is to refrain from eating them, as they have been reported to cause toxic effects.</p>	<p>pokeweed berries (1.5)</p> <p>The pokeweed plant is a common weed. The ripe berries are dark purple and can be used as a natural dye. Eating more than a few berries can cause nausea and headache.</p>	<p>yew berries (2)</p> <p>These bright red berries are found on bushes that have soft, flat needles, like an evergreen. Eating more than a few berries can cause vomiting, diarrhea and dizziness. Eating a lot of them can be fatal.</p>
<p>tulip bulbs (1)</p> <p>Most of the tulip bulb is moderately toxic. During WW II people in Holland ate the outer parts of tulip bulbs when faced with starvation. The knew the central part of the bulb was toxic and did not eat it.</p>	<p>orchid bulbs (0)</p> <p>Orchids are not closely related to these other bulbs, so their chemistry is different. All parts of the orchid plant are edible and the flowers are often used in salads and desserts.</p>	<p>daffodil bulbs (2)</p> <p>Daffodils are related to tulips but their bulbs seem to be more toxic than tulip bulbs. Eating daffodil bulbs causes intense vomiting and diarrhea.</p>	<p>hyacinth bulbs (2)</p> <p>Related to tulips and daffodils, hyacinths are also to be avoided. The alkaloid chemicals cause intense digestive misery, and can also affect other systems of the body.</p>
<p>maple leaves (2)</p> <p>These are more of a danger to grazing animals than people, as horses find them tasty and people do not. The leaves get more toxic as they wilt and turn colors. Only a few pounds of them will poison a horse.</p>	<p>dogwood leaves (0)</p> <p>The leaves and berries of the dogwood tree are non-toxic.</p>	<p>cherry leaves (2)</p> <p>The leaves of the cherry tree contain the same toxic chemicals found in the seeds. Horse owners are very careful to keep cherry tree leaves out of their animals' pastures.</p>	<p>oak leaves (1)</p> <p>Oak leaves contain high levels of tannic acid, which causes digestive upset and possibly other symptoms at high doses. It can cause grazing animals to cholic. Pigs are not affected.</p>
<p>raw kidney beans (2)</p> <p>Raw kidney beans contain a substance called lectin, which is beneficial to the plant, but not to you. Even 4-6 raw beans can cause great distress to your digestive system. Boiling beans for 10 min. destroys the lectins.</p>	<p>raw lima beans (1)</p> <p>Raw lima beans contain a substance called linamarin, which is fairly toxic. When boiled for just 10 minutes, this chemical is broken down and becomes harmless.</p>	<p>raw green beans (.5)</p> <p>We've all eaten a few raw green beans once in a while. Don't panic! A few won't harm you. Just don't eat a bushel of raw beans or you'll get some distressing digestive disturbances.</p>	<p>raw Mung beans (0)</p> <p>Mung beans belong to the genus <i>Vigna</i> and come from India. The other beans in this row are genus <i>Phaseolus</i> and are native to the Americas. Mung beans can be eaten raw or cooked.</p>
<p>cherry pits (1)</p> <p>All members of the <i>Prunus</i> family have cyanogenic glycoside chemicals that attack the cells in your digestive system. A large dose of these chemicals can affect other organs, as well.</p>	<p>grape seeds (0)</p> <p>Grape seeds are not only non-toxic but they are beneficial. Grape seed extract is a powerful anti-oxidant, protecting your cells from dangerous molecules called "free radicals."</p>	<p>apple seeds (.5)</p> <p>Apple seeds contain small amounts of a toxic cyanide chemical, but you'd have to eat hundreds of seeds to produce any noticeable symptoms.</p>	<p>pear seeds (.5)</p> <p>Pear seeds have the same issue as apple seeds, since they are somewhat related. Again, eating an occasional apple or pear seed is not a problem.</p>