



GRASS

This module will help students understand the importance of grass to a golf course and the natural environment. The different lengths of grass challenge golfers each day. The length of the rough, the speed of the greens, and the width of the fairways all add to the appeal and challenge of individual courses. There are many obstacles that face golf course superintendents, including rain, droughts, sun, aeration, thatch, course damage and divots among other things. These challenges will be discussed throughout this module.

Grass types vary from the Northeast to the Southwest. This module will help students understand the characteristics of different grass types and where they thrive. Some grasses can survive in different climates; the Grass Reference Guide will help determine which grasses are found in your geographic region. After learning about the different grasses, students will be able to identify grasses, where they are located, and their purpose on the golf course.

Golf courses help preserve millions of acres of our natural environment. These courses produce an enormous amount of oxygen. This module will explore the effect grass has on the amount of oxygen produced on a daily basis and how many people are affected by this production.

There are many rules that govern the golf course and each one plays an important part in the enjoyment of the game. Students will learn why it is important to follow these rules, and how ignoring them will directly affect not only their game, but everyone else's on the course.





TYPES OF GRASS

There are hundreds of different grasses all over the world. Even the smallest golf courses have a variety of grasses. Grass differs from region to region depending on environmental factors such as temperature and type of soil. For example, a popular fairway grass for golf courses in the Northern United States is Kentucky Bluegrass. However, in the Gulf States, one might find Zoysia grass, which can tolerate extreme droughts. This section utilizes the Grass Reference Guide to help children/students learn popular golf course grasses, specific uses on the course, types of soil they grow in, how much water is needed, and level of maintenance.

- Activities:
- Vocabulary words (on instructor's page)
 - Coloring diagram for 6-8 year olds
 - "Identify and define" diagram for 9-12 year olds
 - Word Jumble and What's She Saying? for 6-8 year olds
 - Crossword for 9-12 year olds
 - Art Project for all ages
 - Oxygen Formula Math Problem for 9-12 year olds
 - Grass Reference Guide (provided in back of Grass Module)

Key words
for this section:

Parts of Grass

Blade

Cotyledon

Endosperm

Monocot

Root

Areas of Golf Hole

Fairway

Fringe

Green

Seed

Seed Coat


Sod

Stem

Rough

Tee Box



Presented by 



Objective/Lesson: To identify the different types of grass and understand how they are used on a golf course (use narrative and diagram).

Narrative: Explain types of grass and help children understand the design of a golf hole.

Definitions: **Part I: Types of Grass (use Grass Reference Guide)**

Bermuda Grass - The main turf choice for golf courses and athletic fields throughout the warmer regions and across the equator.

Bent Grass - A popular low-growing grass that is planted on the greens of the golf course and occasionally on the fairway and tee box areas.

Kentucky Bluegrass - A blue-green grass that can be found in your family's lawn and on most golf course fairways.

Rye Grass - The seeds of this grass germinate quickly and can be used as a temporary ground cover while slower-growing grasses take hold.

St. Augustine Grass - A warm weather grass found primarily along the Southern U.S. coast that can survive in many types of soil.

Zoysia Grass - Warm weather grass from Southeast Asia that grows in many types of soil and can survive droughts.

Part II: Areas of a golf hole

Fairway - The optimal playing area between the tee box and green.

Fringe - A closely mowed area of grass that borders the green and separates the green from the rough and fairway.

Green - The area of short grass surrounding the hole where the ball should be only hit with a putter.

Rough - The high grass area next to the fairway and fringe.

Tee Box - A rectangular flat surface where you take your first shot for the hole you are playing.

Materials: Grass Reference Guide (provided in back of module)
Color pencils

Directions: As a group, discuss the definitions of the vocabulary words.

1. Distribute golf hole diagram and colored pencils or crayons.
2. Ask each child to label and color the different types of grass and indicate where they are used on the golf course.

Activity Time: 30 minutes



TYPES OF GRASS

ALL AGES



GOLF HOLE NARRATIVE

Unlike most sports, golf is played on many acres of land in a natural environment. Golf courses can include lakes, trees, sand and other natural features, but the majority of the playing area is covered by grass. Every hole on the course has different lengths of grass to make it challenging for the golfer.

The Golf Hole Diagram will allow students to review the areas of a golf hole. Discuss the types of grass that can be used for these areas. (Use Grass Reference Guide as supplement to this exercise)

A typical golf hole found on a course includes the following five areas:

The **Tee Box** is a flat rectangular grass surface where golfers take the first shot of each hole. The **Fairway** is the optimal playing area between the tee box and green. The **Rough** is the area next to the fairway and fringe that features thicker higher grass or naturally growing vegetation. The **Fringe** is a closely mowed area of grass that borders the green and separates the green from the rough and fairway. The **Green** is an area of short grass surrounding the hole where the flagstick and cup are located.



TYPES OF

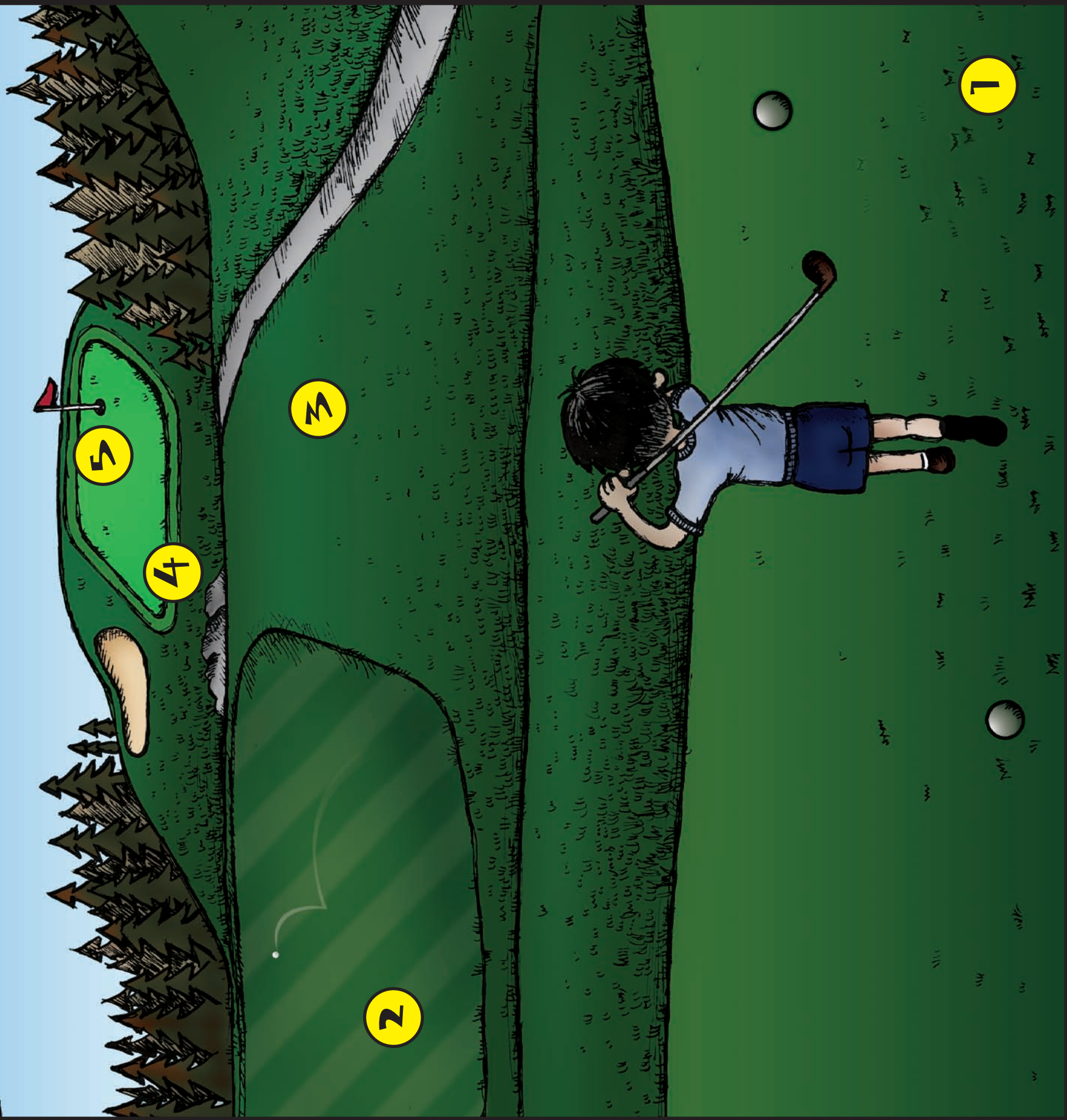
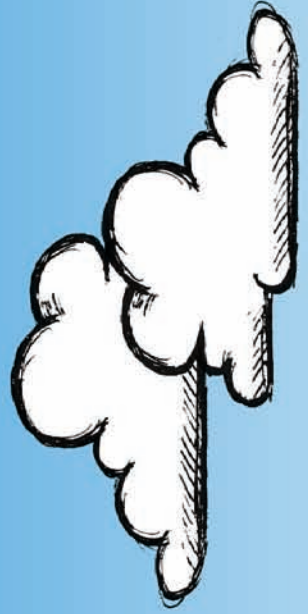
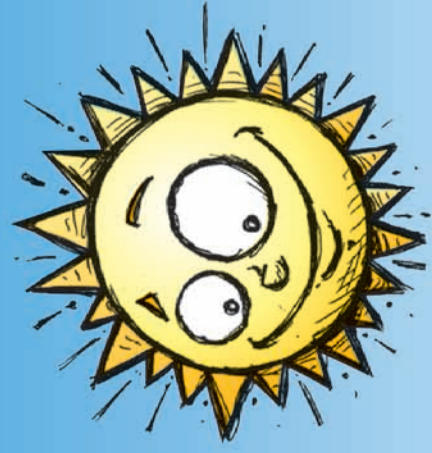
GRASS

ALL AGES





TYPES OF GRASS



What types of grass make up your golf course? Generally, it depends on the geographic region and levels of maintenance on what grass will be used for the various parts of the course. Identify the following areas of a golf hole and determine which grasses are used.



Tee Box - A flat rectangular grass surface where golfers take the first shot of each hole.

Fringe - A closely mowed area of grass that borders the green and separates the green from the rough and fairway.

Fairway - The optimal playing area between the tee box and green.

Green - A area of short grass surrounding the hole where the flagstick and cup are located.

Rough - The area next to the fairway and fringe that features thicker higher grass or naturally growing vegetation.

1

GOLF HOLE COLORING

It's time to color! Can you remember the definitions for the different parts of the course you learned?



TYPES OF GRASS

AGES 6-8

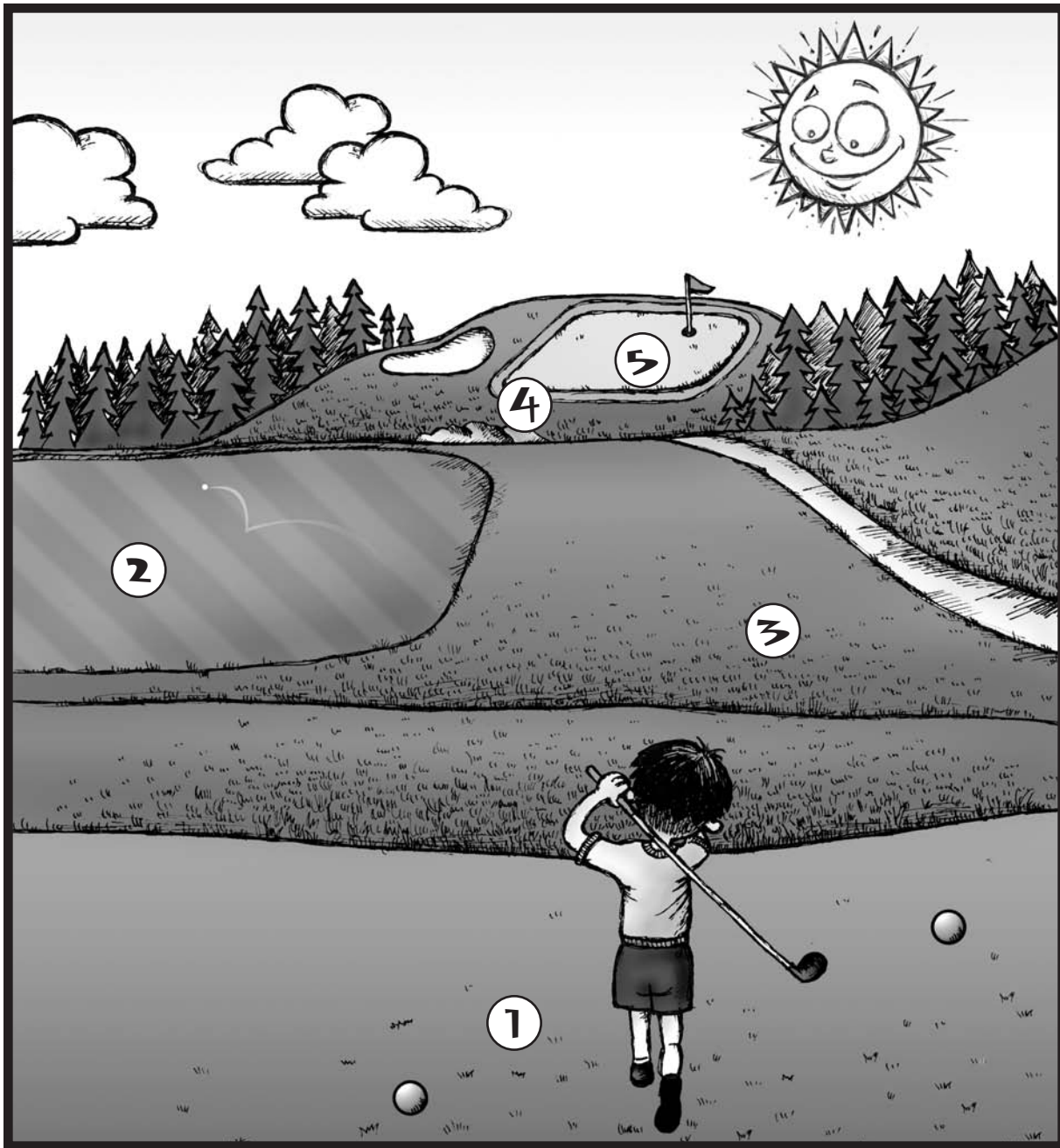


1

GOLF HOLE IDENTIFICATION

Identify the different areas of grass and list possible types of grass for each area by using the definitions you learned.

INSTRUCTOR



TYPES OF GRASS

AGES 9-12

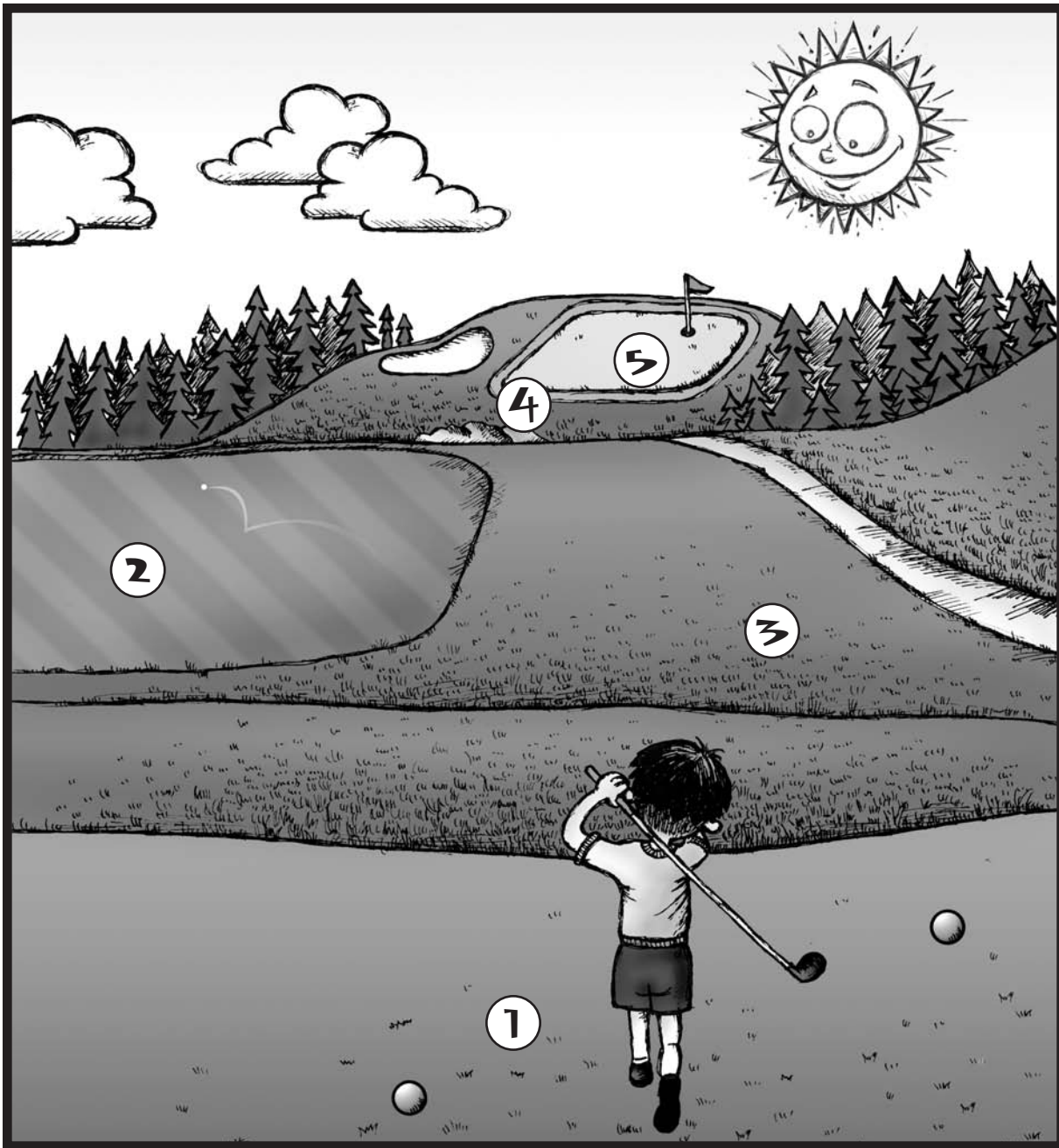
- | | |
|--|---|
| 1. Area: <u>Tee Box</u>
Type of grass: <u>Bent, Bermuda, Zoysia</u> | 4. Area: <u>Fringe</u>
Type of grass: <u>Bent, Bermuda</u> |
| 2. Area: <u>Fairway</u>
Type of grass: <u>Bent, Bermuda, Rye, KY Bluegrass</u> | 5. Area: <u>Green</u>
Type of grass: <u>Bent, Bermuda, Rye, KY Bluegrass</u> |
| 3. Area: <u>Rough</u>
Type of grass: <u>Bent, Bermuda, Fescue, Rye, St. Augustine</u> | |



1

GOLF HOLE IDENTIFICATION

Identify the different areas of grass and list possible types of grass for each area by using the definitions you learned.



TYPES OF GRASS

AGES 9-12

- | | |
|---|---|
| 1. Course area: _____
Type of grass: _____ | 4. Course area: _____
Type of grass: _____ |
| 2. Course area: _____
Type of grass: _____ | 5. Course area: _____
Type of grass: _____ |
| 3. Course area: _____
Type of grass: _____ | |



Objective/Lesson: To learn the parts of a seed of grass. To identify types and areas of grass as well as learn their function on the golf course.

Definitions: *Blade* - The flat leaf of grass that sticks out from the ground.

Cotyledon - The special seed leaves containing the endosperm that are the first parts visible when the seed germinates.

Epicotyl - A stem of a seedling or embryo located between the cotyledon and the first true leaves.

Endosperm - A seed's temporary food supply packed around the embryo in the form of special leaves.

Monocot - A type of plant with one cotyledon, like grasses.

Radicle - The root of the plant that emerges through the seed coat when the seed germinates.

Root - The part of grass that grows underground from the radicle which supplies necessary nutrients to keep the plant alive, and anchors it to the soil.

Seed - The part of a mature plant containing the basic materials to grow a new plant.

Seed Coat - The outer covering of the seed that protects the embryo from injury and from drying out.

Sod - The surface of the ground, usually covered with grass.

Stem - The main stalk of a plant that helps provide support.

Materials: Word Jumble & Crossword Handouts
Pencils

Directions: As a group, discuss the definitions of the vocabulary words, referring to first page of Grass Reference Guide (PG 4.4.9)

1. Distribute the word search and crossword puzzle handouts and pencils.
2. Ask the children to complete the activity and then turn it in.
3. Discussion of the handout is optional upon completion.

Activity Time: 20 minutes



TYPES OF GRASS

ALL AGES



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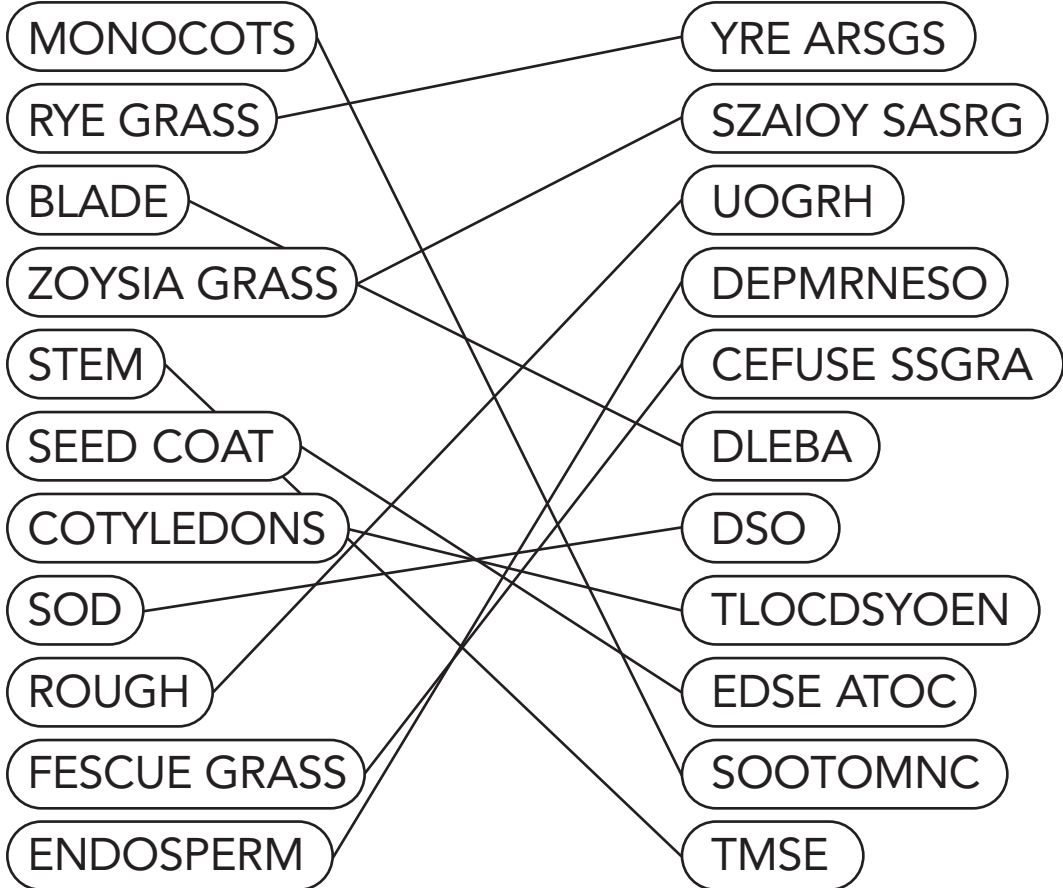


3

WORD JUMBLE

After discussing the words below, distribute to students

See if you can match the words with the scrambled ones in the other column!



INSTRUCTOR



TYPES OF GRASS

4

WHAT'S SHE SAYING?

Use the secret code translator below to find out!



GSVIV ZIV NZMB WRUUVIVMG
THERE ARE MANY DIFFERENT
GBKVH LU TIZHH TILDRMT LM
TYPES OF GRASS GROWING ON
GSV TLOU XLFIV
THE GOLF COURSE

AGES 6-8

A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
M	L	K	J	I	H	G	F	E	D	C	B	A



3

WORD JUMBLE

After discussing the words below, distribute to students

See if you can match the words with the scrambled ones in the other column!

MONOCOTS

RYE GRASS

BLADE

ZOYSIA GRASS

STEM

SEED COAT

COTYLEDONS

SOD

ROUGH

FESCUE GRASS

ENDOSPERM

YRE ARSGS

SZAI OY SASRG

UOGRH

DEPMR NESO

CEFUSE SSGRA

DLEBA

DSO

TLOCDSYOEN

EDSE ATOC

SOOTOMNC

TMSE



TYPES OF GRASS

4

WHAT'S SHE SAYING?

Use the secret code translator below to find out!



GSVIV ZIV NZMB WRUUVIVMG

 GBKVH LU TIZHH TILDRMT LM

 GSV TLOU XLFIHV

AGES 6-8

A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
M	L	K	J	I	H	G	F	E	D	C	B	A



Use your vocabulary words to solve the puzzle.



TYPES OF GRASS

AGES 9-12

INSTRUCTOR

							¹ B				² T		
			³ S				L				H		
	⁴ S		E				⁵ F	A	I	R	W	A	Y
	E		E				D					T	
	⁶ E	N	D	O	S	P	E	R	⁷ M		C		
	D								O		H		
	⁸ C	O	⁹ T	Y	L	E	D	O	N	S			
	O		E						O				
	A		E				¹⁰ G		C				
	T		B				¹¹ R	O	O	T			
			O				A		T				
			X				S		¹² S	O	D		
							S						

DOWN

1. A single piece of grass is often referred to as a _____ of grass.
2. Plant materials (such as grass clippings) that have accumulated in a grassy area.
3. This small object is planted in the soil and soon after a plant grows from it.
4. The outer covering of the seed.
7. A type of plant that has one cotyledon.
9. At the beginning of the hole, you have to hit your ball from a designated area known as the _____.
10. There are many different types of _____ located on a typical golf course.

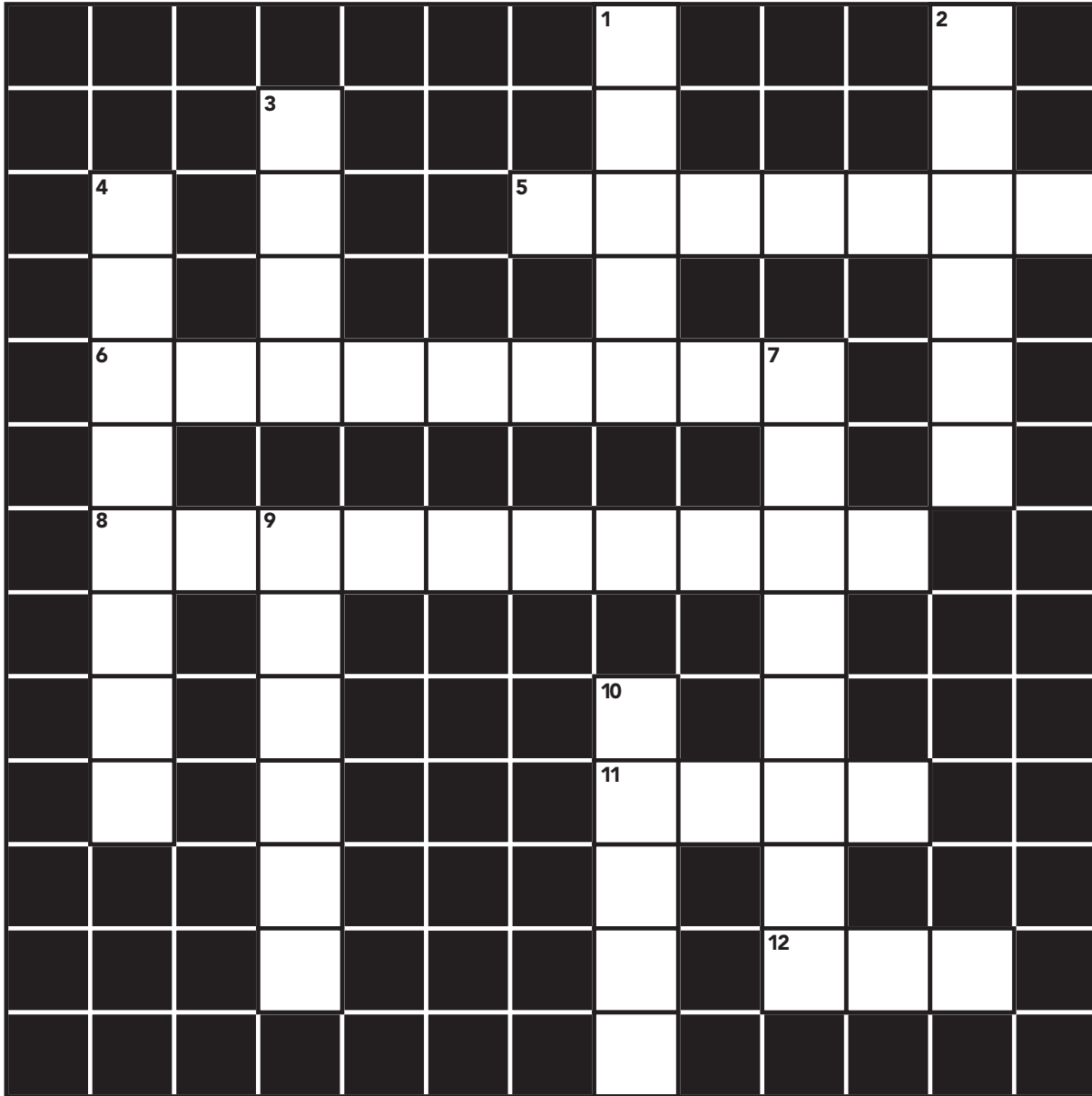
ACROSS

5. The optimal playing surface between the tee box and the green on a typical golf hole.
6. A temporary food supply for the seed.
8. The seed's outer protective covering.
11. The part of grass that brings in nutrients from the soil.
12. The grass-covered surface of ground that is used to start the growth of a lawn is called _____.



5 CROSSWORD

Use your vocabulary words to solve the puzzle.



TYPES OF GRASS

AGES 9-12

DOWN

1. A single piece of grass is often referred to as a _____ of grass.
2. Plant materials (such as grass clippings) that have accumulated in a grassy area.
3. This small object is planted in the soil and soon after a plant grows from it.
4. The outer covering of the seed.
7. A type of plant that has one cotyledon.
9. At the beginning of the hole, you have to hit your ball from a designated area known as the _____.
10. There are many different types of _____ located on a typical golf course.

ACROSS

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8. The seed's outer protective covering.
11. The part of grass that brings in nutrients from the soil.
12. The grass-covered surface of ground that is used to start the growth of a lawn is called _____.





TYPES OF GRASS ALL AGES

Objective/Lesson: To learn what is common between all types of grass seeds and recognize differences.

- Materials:**
- 1 small bag of seed for each of three different types of grass grown on your golf course or in your area (can be obtained from Greenskeeper or lawncare center. Save leftover grass for another experiment)
 - Enough large styrofoam cups for groups of 3 to have 3 cups each
 - 1 box of food coloring per group (you will need green, orange and blue)
 - Popsicle sticks (or something to stir with)
 - Enough handouts for each student to have one
 - 1 magnifying glass per group
 - 1 bottle of Elmer’s glue per group
 - 1 piece of newspaper per group

- Directions:** As a group, review the definitions of the vocabulary words and review seed diagram (located in Grass Reference Guide).
1. Divide students into groups of 3.
 2. Give each group three cups.
 3. Distribute one The First Tee logo sheet to each student.
 4. Pour one type of seed into each of the three cups. Ask students to look at each type of seed closely with the magnifying glass noting any differences and discuss vocabulary words.
 5. Have children add appropriate colored dye or dyes (see box for ratios to make different colors) to their cups and stir to color seeds blue orange and green.
 6. Pour damp seeds onto newspaper and allow to dry.
 7. Spread glue on the areas of The First Tee logo marked #1.
 8. For green areas marked #1, add green seeds and allow to dry.
 9. Spread glue on the areas of The First Tee logo marked #2
 10. For blue areas marked #2, add blue seeds and allow to dry.
 11. Spread glue on areas marked #3.
 12. For orange areas marked #3, add orange seeds and allow to dry.

Activity Time: 30-45 minutes

Background: Students might want to create their own drawings to fill in with colored seeds. Have extra paper on-hand if they are feeling extra artistic!



Your instructor will discuss the different types of seed structures before you start your project!



While doing this project, you will learn about the differences between types of grass seed and learn the importance of each of the structures that make up each seed.

Here's what to do!

1. Add appropriate colored dye or dyes (see box for ratios to make different colors) to your cups and stir to color seeds blue, orange and green.
2. Pour damp seeds onto newspaper and allow to air dry
3. Spread glue on the areas of The First Tee logo marked #1.
4. For blue areas marked #1, add blue seeds and allow to dry.
5. Spread glue on the areas of The First Tee logo marked #2
6. For orange areas marked #2, add orange seeds and allow to dry.
7. Spread glue on areas marked #3.
8. For green areas marked #3, add green seeds and allow to dry.
9. Allow artwork to dry flat.

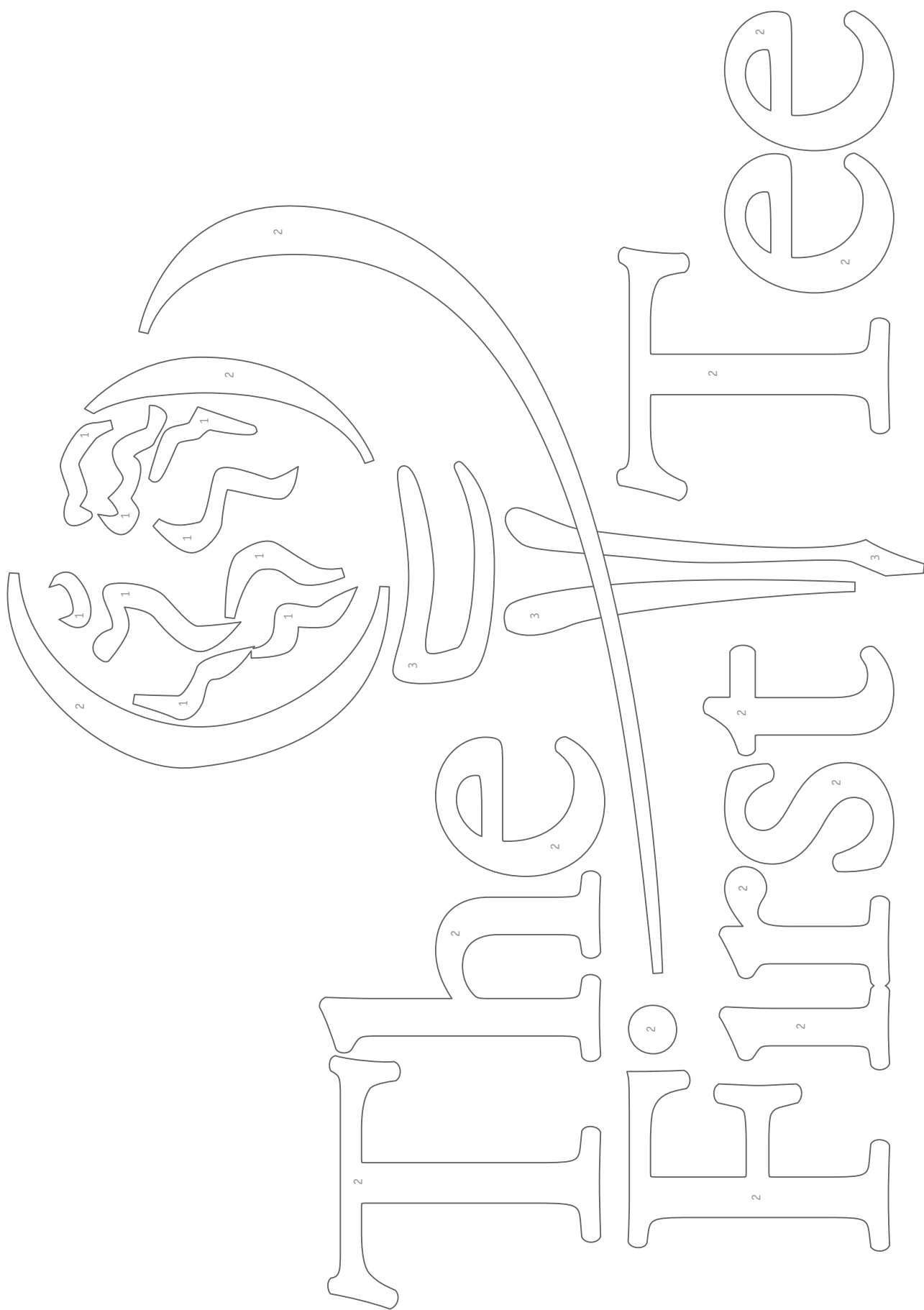


TYPES OF GRASS ALL AGES



Presented by





Objective/Lesson: To understand the importance of grass and its oxygen producing capabilities to a golf course and the environment.

Materials: Calculator Pencils
Measuring tape String
Paper

- Directions:** As a group, review the definitions of the vocabulary words.
- Have the children take out a pencil and paper.
 - Have them write their answers to three questions:
 - How large an area of grass do you think it takes to produce a full day's supply of oxygen for you?
 - How large an area do you think a golf course covers? (43,560 square feet in one acre)
 - How many people do you think will have their daily oxygen supply fulfilled by a golf course?
 - After the students make their predictions, tell them that it takes **25 square feet** to fulfill each of their daily oxygen needs. Was that more or less than they thought?
 - Take them outside and rope off 25 square feet so they can see how large or small an area it takes to supply their oxygen. (NOTE: 5ft x 5ft)
 - Discuss the fact that an average golf course ranges from 6,200-6,600 yards from tee to green but the course, on average covers **150 acres**.
 - In order to determine the number of people's oxygen needs that will be met by the golf course, first convert square feet into acres.

25 square feet is the number of feet to fulfill one person's daily oxygen needs.

There are 43,560 square feet in one acre.

$43,560 \text{ sq. ft} \div 25 \text{ sq. ft} = 1,742$ (the number of people whose daily oxygen needs are met in one acre)

One acre will fulfill the daily oxygen needs of 1,742 people.
 - Students can determine the total number of people whose daily oxygen needs are met by the golf course with the following formula:

Average golf course= 150 acres

Multiply 1,742 by 150 = 261,300 (total number of people)
 - The average golf course will fulfill the daily oxygen needs of 261,300 people.

Activity Time: 20-30 minutes

Post Discussion Questions: How accurate were your predictions?

Did you think there would be less or more people who would benefit the oxygen produced by the golf course?

Are there many golf courses in your area? Did you think grass was a contributing factor in your daily health?

How many golf courses are in your town? Do they supply oxygen for everyone who lives there?



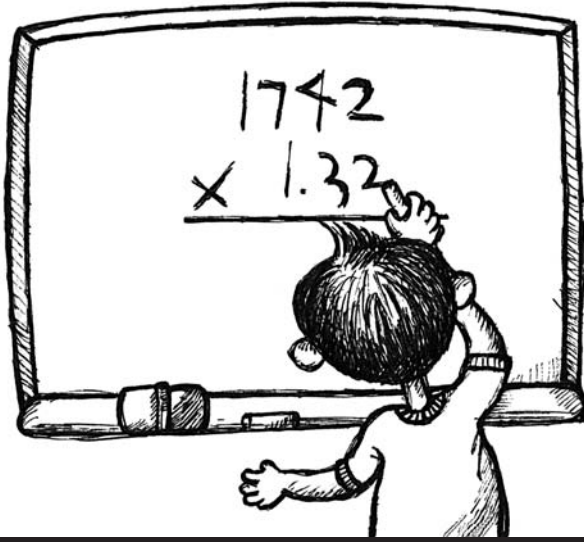
TYPES OF GRASS

AGES 9-12



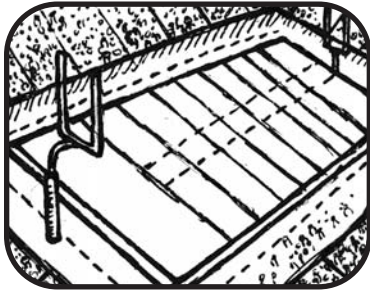
The activity shows how grass helps us with our everyday oxygen needs.

Use the formula below to determine how many people each place supplies with oxygen.



Formula: 1,742 (# of people whose daily oxygen needs are met in one acre) X _____
 (# of acres) = Total # of people whose daily oxygen needs are met. _____

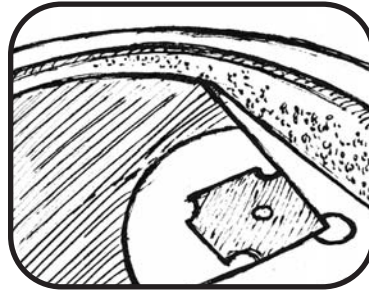
A Football Field (1.32 acres)



$$\begin{array}{r} 1,742 \\ \times 1.32 \\ \hline 2,299.44 \\ \hline \end{array}$$

(2,299 People)

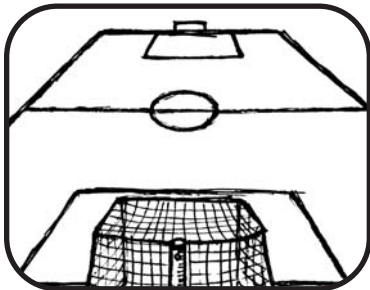
A Baseball Field (1.92 acres)



$$\begin{array}{r} 1,742 \\ \times 1.92 \\ \hline 3,344.64 \\ \hline \end{array}$$

(3,345 People)

A Soccer Field (1.03 acres)



$$\begin{array}{r} 1,742 \\ \times 1.02 \\ \hline 1,794.26 \\ \hline \end{array}$$

(1,794 People)

A City Park (11.09 acres)



$$\begin{array}{r} 1,742 \\ \times 11.09 \\ \hline 19,318.78 \\ \hline \end{array}$$

(19,319 People)

Now find out how many acres your local golf course is and work the problem with the provided formula and as shown with the examples to find out how much oxygen your local golf course provides.

Your Local Golf Course (_____ acres)



$$\begin{array}{r} 1,742 \\ \times \text{_____} \\ \hline \text{_____} \\ \hline \end{array}$$

(_____ People)

Bonus Question:

There are _____ golf courses in our town X **150** acres which totals _____ acres of grass.

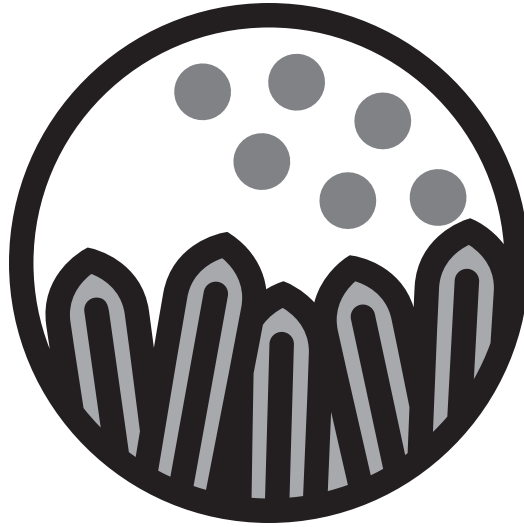
1,742 people X _____ acres = _____ people in our town supplied with oxygen from golf courses.



TYPES OF GRASS

AGES 9-12





GOLF COURSE MAINTENANCE

Golf courses are unique environments. They are there to challenge you, excite you, and awe you each time you visit. Keeping them in good shape is not an easy task for the grounds crew. They are working before you get up in the morning and they finish late in the evening. This section is designed for students to understand what goes into making a golf course look the way it does and how it is kept that way. Different grasses are used on different parts of the course to protect it, different methods are used to maintain its quality, and many processes go into challenging you. This section is filled with activities, games, and definitions to help students learn the extensive and never-ending process to golf course maintenance so that when each person steps on the course, they are respecting the course, their partners, the rules, and the game.

- Activities
- Vocabulary words (on instructor's page)
 - Aeration/Overseeding Process for all ages
 - Identifying various turf grasses with the Greenskeeper for all ages
 - Grass growing exercises for all ages
 - Maze for all ages
 - Word Find for all ages

Key words
for this section:

Aeration

Drought*

Erosion*

Fertilizer

Germination

Irrigation

Overseeding

Pesticide

Plug

Plumule

Radicle*

Sprig

Thatch

****review from previous module or section***



Objective/Lesson: To understand the process it takes to maintain a golf course.

Definitions: ***Aeration*** - The process of punching holes in the golf course and removing the dirt to loosen soil that has been compacted by golfers walking on it. Usually done by a machine.

Drought - A period of dryness.

Erosion - Removal of rock and soil material by natural processes, principally running water, glaciers, waves and wind.

Fertilizer - A substance put down on the soil to produce more plant growth.

Germination - The point at which a seed has the proper water, oxygen, light and temperature and other factors to grow.

Irrigation - The replacement or supplementing of rainfall with water from another source.

Overseeding - The act of laying grass seed on top of existing grass in order to promote new growth or replace it with a new kind for that particular season.

Pesticide - An agent used to destroy pests, such as insects, that can harm or stunt the healthy growth of the grass.

Plug - A section of grass used to fill in a hole.

Plumule - The shoot which contains the leaves and stem.

Radicle - The root of the plant that emerges through the seed coat when the seed germinates.

Sprig - A small division of grass used to encourage its spread it to new places.

Thatch - A mat of plant material (such as grass clippings) that has not decomposed yet and has accumulated next to the soil in a grassy area.

Materials: Course Aeration and Overseeding Process Diagram
Puzzle/Word Find Handouts
Pencils

Directions: As a group, discuss the definitions of the vocabulary words.

1. Discuss the aeration and overseeding process.
2. Ask the children to complete the activity and then turn it in.
3. Discussion of the handout is optional upon completion.

Activity Time: 20 minutes

On Course Adventure: Have the students visit the Greenskeeper and discuss the importance of course maintenance and its impact.

Discuss what happens to courses when golf repair rules are not followed.

Discuss why it is important to repair divots and how long it takes for the grass to grow back compared to an unrepaired divot.

Examine the difference between aeration and overseeding and the importance of both to the golf course.

Discuss how many times aeration and overseeding are done during the year.



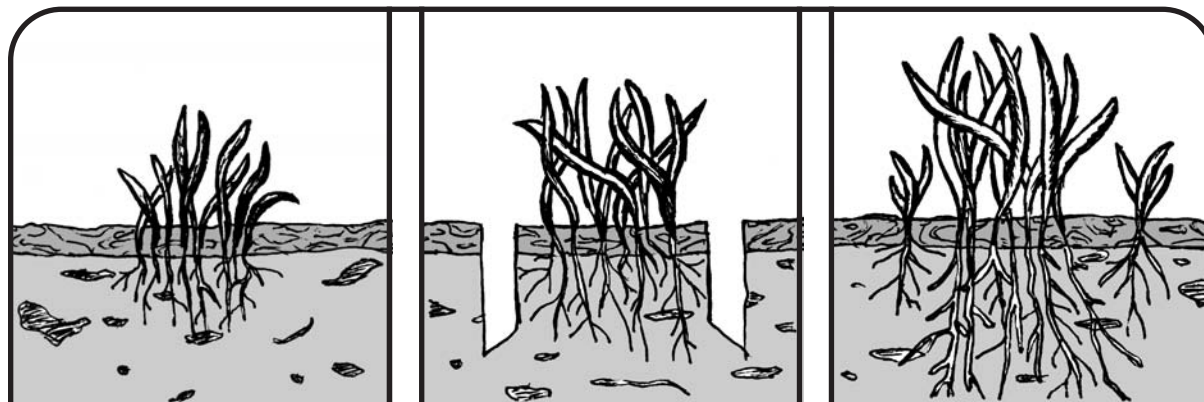
COURSE MAINTENANCE ALL AGES





COURSE AERATION AND OVERSEEDING PROCESS

Aeration is the process of loosening the soil to make room for growing roots and to increase oxygen flow.

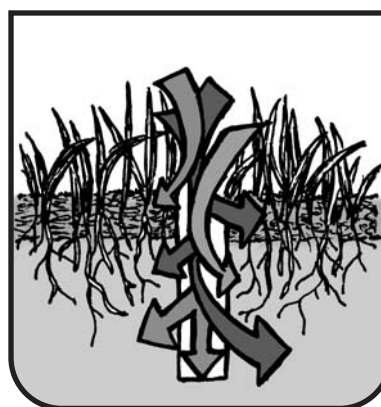


Before Aeration

Immediately After

After

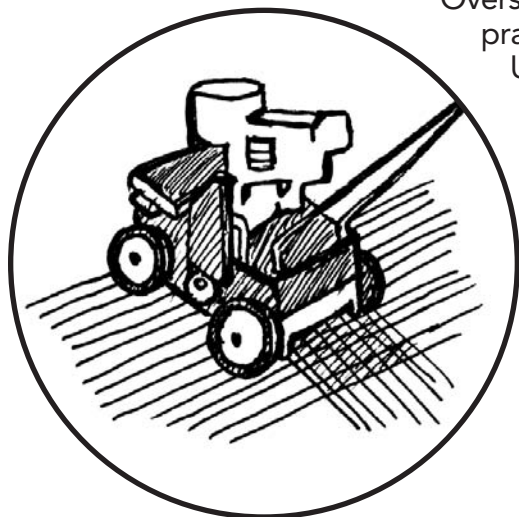
Most golf courses aerate their greens (and sometimes fairways) once or twice a year. A special machine built for the task cores the ground (by punching holes and removing the dirt) in a certain pattern. This is done to loosen the soil that has been compacted by golfers walking over it. This opens up room for the roots to grow and increases oxygen to the roots. Without these little holes, the greens would die. Aeration relieves soil compaction, improves the soil mixture around the highest part of the grass' roots and reduces or prevents the accumulation of excess thatch.



Aeration Process

Overseeding is the process of laying grass seed on top of existing grasses to promote new growth or to replace the existing grass with a new strain for an upcoming season.

Overseeding bermuda grass fairways is a common practice on golf courses in the southern half of the United States. Not only does overseeding beautify a golf course during the winter, it also helps the grass tolerate cart traffic, divoting and weed invasion. In spring, bermuda grass is seeded over the rye grass.



Aeration Machine

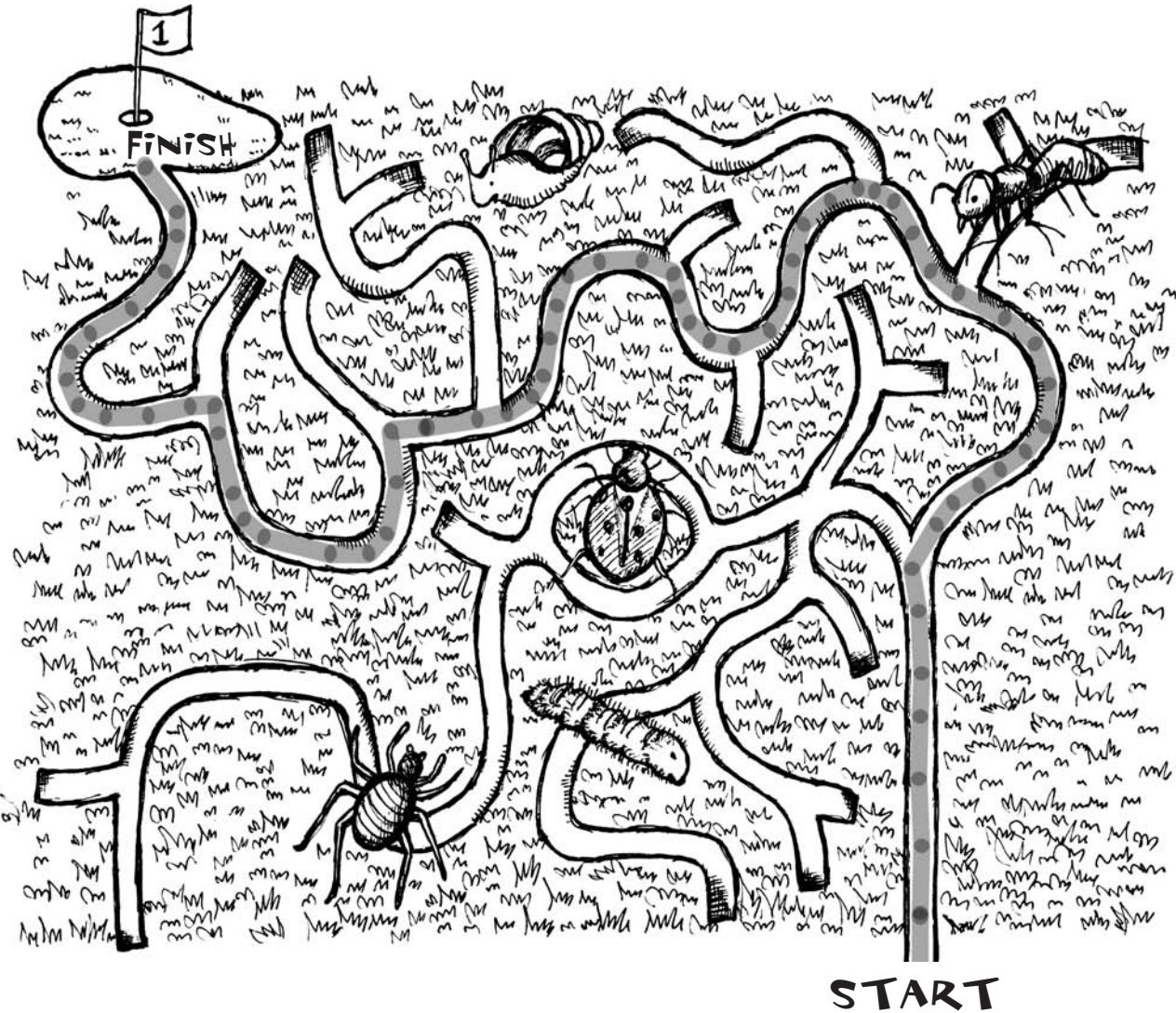


GET TO THE GREEN

See if you can avoid the critters in the grass to get all the way to the green.



INSTRUCTOR



COURSE MAINTENANCE ALL AGES

BOON COURSE ADVENTURE

A VISIT TO YOUR GREENSKEEPER

- 1 Have the Greenskeeper show students equipment used for maintenance.
- 2 Discuss how students can become Greenskeepers.
- 3 When will the next aeration be done?
- 4 How long does it take for the course to recover?
- 5 What kinds of grasses have been tried that don't work?

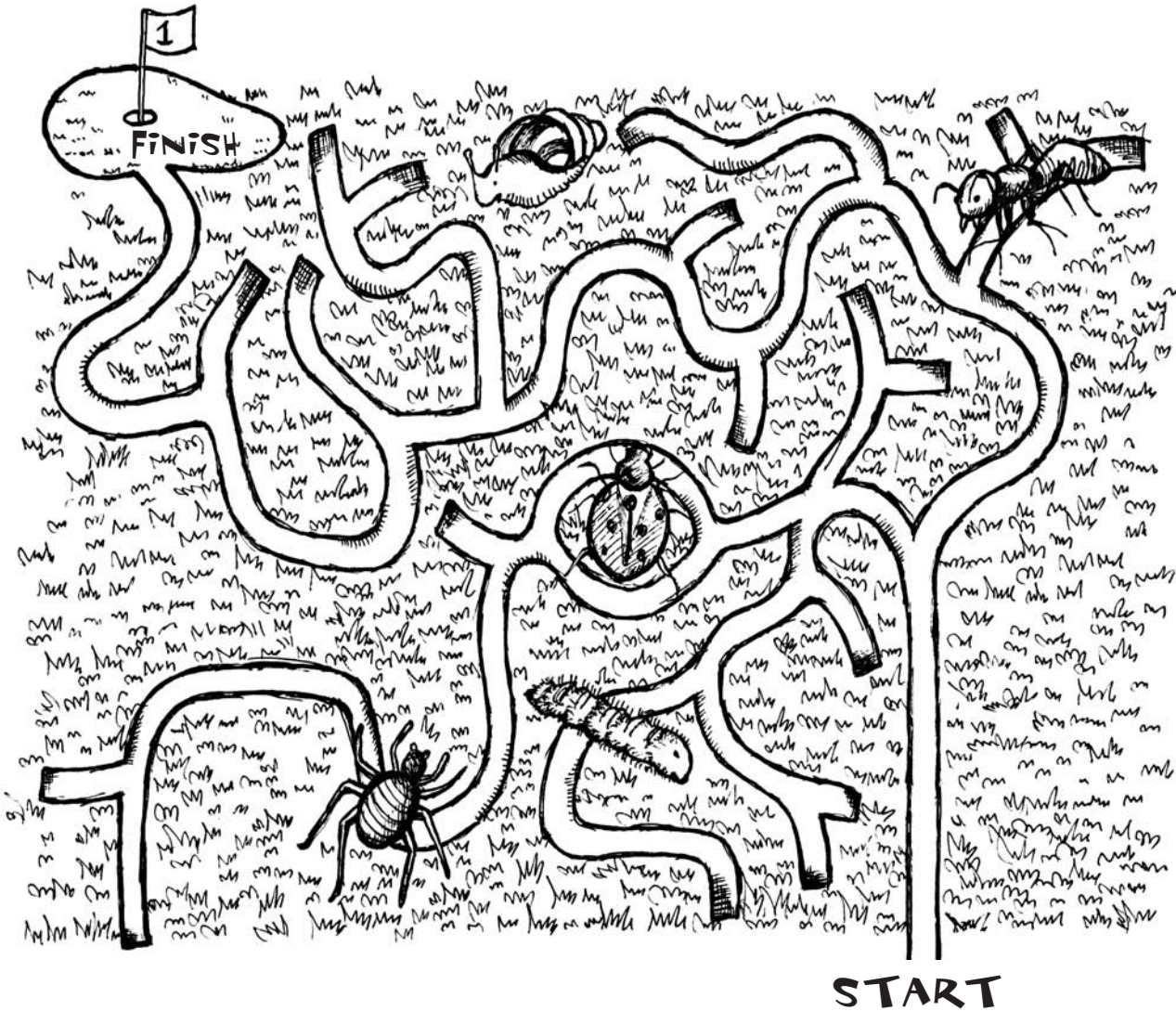


GET TO THE GREEN

See if you can avoid the critters in the grass to get all the way to the green.



COURSE MAINTENANCE ALL AGES



BOON COURSE

ADVENTURE

A VISIT TO YOUR GREENSKEEPER

- 1 Have the Greenskeeper show you equipment used for maintenance.
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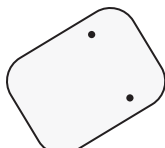
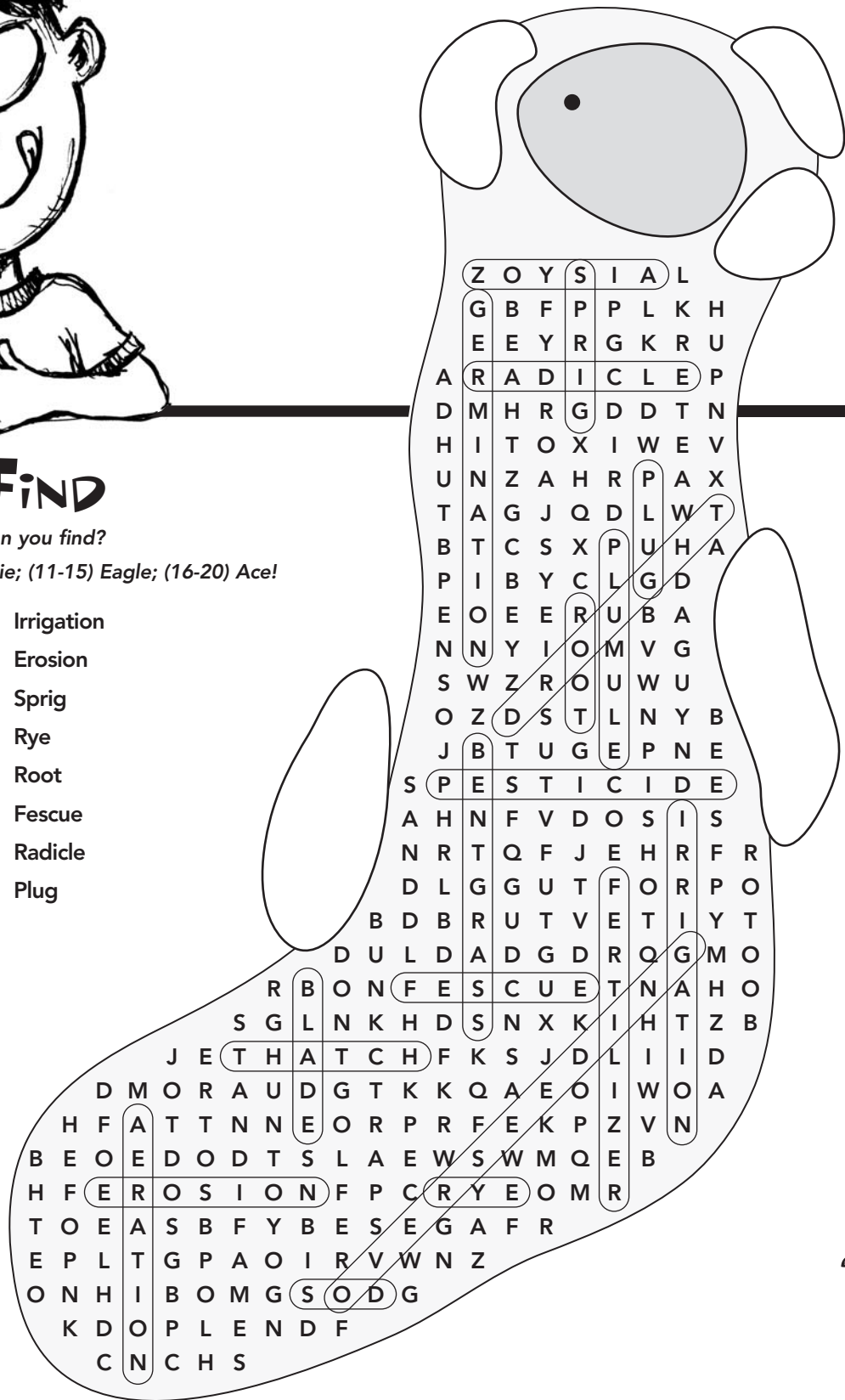


WORD FIND

How many words can you find?

(1-5) Par; (6-10) Birdie; (11-15) Eagle; (16-20) Ace!

- | | |
|-------------|------------|
| Pesticide | Irrigation |
| Blade | Erosion |
| Germination | Sprig |
| Zoysia | Rye |
| Plumule | Root |
| Overseeding | Fescue |
| Aeration | Radicle |
| Bent Grass | Plug |
| Fertilizer | |
| Drought | |
| Thatch | |
| Sod | |



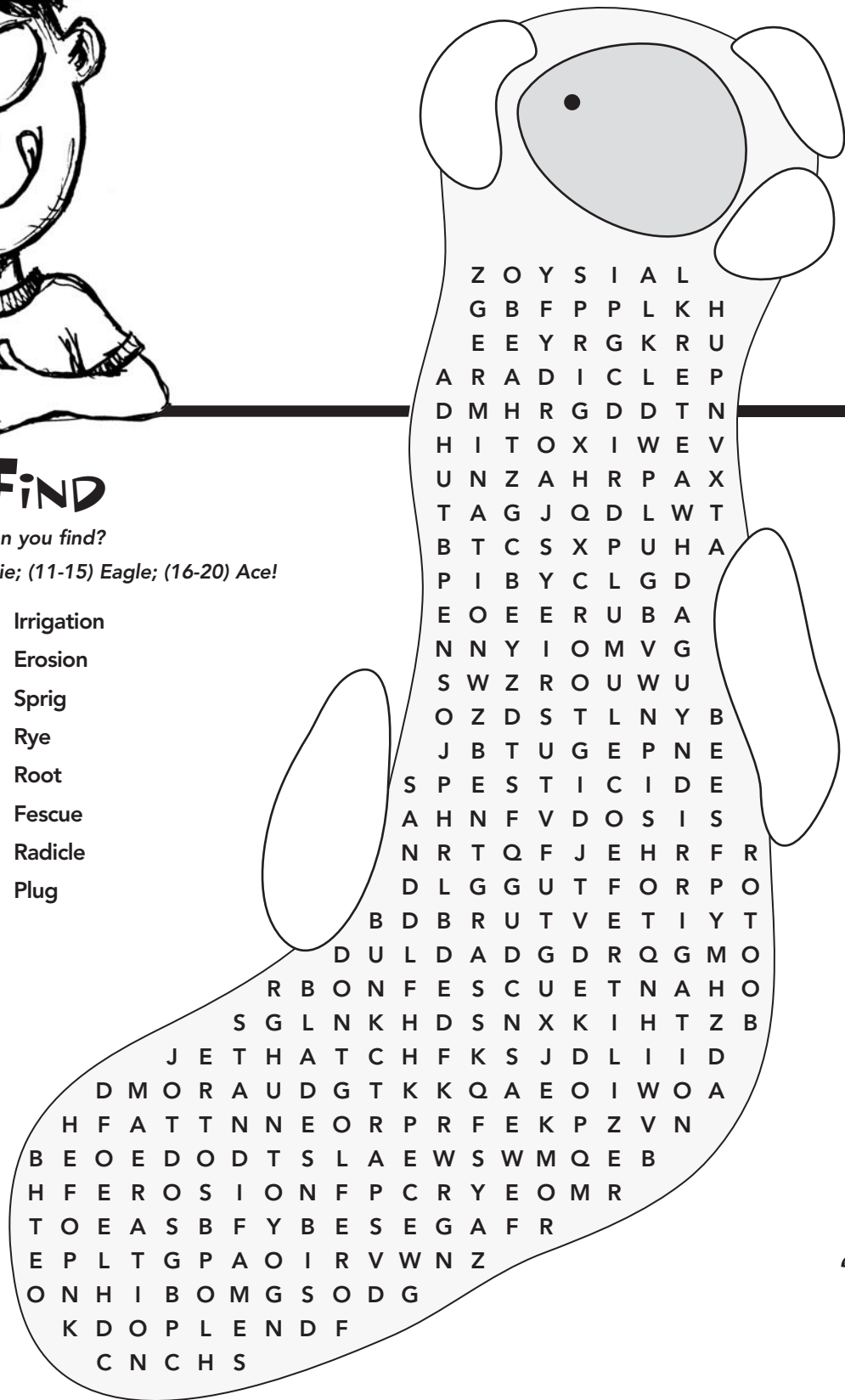


WORD FIND

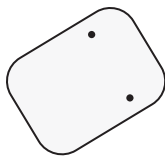
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| Fertilizer | |
| Drought | |
| Thatch | |
| Sod | |



Z O Y S I A L
 G B F P P L K H
 E E Y R G K R U
 A R A D I C L E P
 D M H R G D D T N
 H I T O X I W E V
 U N Z A H R P A X
 T A G J Q D L W T
 B T C S X P U H A
 P I B Y C L G D
 E O E E R U B A
 N N Y I O M V G
 S W Z R O U W U
 O Z D S T L N Y B
 J B T U G E P N E
 S P E S T I C I D E
 A H N F V D O S I S
 N R T Q F J E H R F R
 D L G G U T F O R P O
 B D B R U T V E T I Y T
 D U L D A D G D R Q G M O
 R B O N F E S C U E T N A H O
 S G L N K H D S N X K I H T Z B
 J E T H A T C H F K S J D L I I D
 D M O R A U D G T K K Q A E O I W O A
 H F A T T N N E O R P R F E K P Z V N
 B E O E D O D T S L A E W S W M Q E B
 H F E R O S I O N F P C R Y E O M R
 T O E A S B F Y B E S E G A F R
 E P L T G P A O I R V W N Z
 O N H I B O M G S O D G
 K D O P L E N D F
 C N C H S



Objective/Lesson: To learn what happens in the process of growing grass and how the environment can affect the rate and success of its growth.

Materials: Three clear plastic cups per group
Masking tape and markers
Paper towels
3 different types of grass seed – enough for each group to have several per type
Dark construction paper
Water

Directions: As a group, review the definitions of the vocabulary words.

1. Divide students into small groups along with materials.
2. Instruct them to label the three seed cups/viewers with the name of their group, date of the planting, and the type of seed to be placed in it.
3. Line the inside of each plastic cup with dark construction paper making sure that the top of the paper is even with the top of the cup.
4. Fill the inside of the cups with tightly crumpled paper towels to within an inch of the top.
5. Fill the cups with enough water so that the paper towels and the construction paper are wet.
6. Place several seeds of one type between the plastic cup and the construction paper about an inch and a half below the top of the cup. Repeat with cups #2 and #3.
7. Set the cups on a sunny window sill.
8. Check at the same time each day to see what is happening. Continue to add water to cups in order to keep the paper towels damp to ensure that the seeds sprout.
9. Have students chart the growth and development of each type of seed.

Activity Time: 20 minutes to prepare cups to place in sunny area. Over the next week, take time to record observations.

Post Discussion Seeds remain dormant or inactive until conditions are right for them to germinate or sprout. Seeds need water, oxygen, and proper temperature to germinate. Depending on the type of seed, germination may require full light or no light at all. When the seed is exposed to the proper conditions, water and oxygen are taken in through the seed coat. The embryo's cells start to enlarge, causing the seed coat to burst and a root, also called a radicle to emerge, followed by a plumule (shoot) that has both the stem and the leaves.

Factors that cause poor germination: Overwatering, which causes a lack of oxygen
Deeply planting the seed which causes it to expend the energy stored in its seed coat before it reaches the soil surface.
Underwatering, which prevents the germination process or can hamper it if it has started.
Seeds that require a particular temperature to germinate might fail to sprout if they don't receive exposure to the correct level of cold or heat (ex. Apple seeds will not germinate unless they are exposed to cold for a period of time).



COURSE MAINTENANCE ALL AGES




What are we learning today?

In this experiment, you won't actually let grass grow under your feet - but you will watch it grow! You and your group will learn what happens in the process of growing grass and how the environment can affect the rate and success of its growth. It's all up to you!

Materials: Three clear plastic cups per group, masking tape and markers, paper towels, 3 different types of seeds including grass seed, dark construction paper and water

Directions: Here's what you need to do to create your own Seed Growing Viewer!

1. Place a piece of tape on each of the plastic cups and write the name of your group, date of the planting, and the type of seed to be placed in it.
2. Line the inside of each plastic cup with dark construction paper making sure that the top of the paper is even with the top of the cup.
3. Fill the inside of the cups with tightly crumpled paper towels to within an inch of the top.
4. Fill the cups with enough water so that the paper towels and the construction paper are wet.
5. Place several seeds of one type between the plastic cup and the construction paper about an inch and a half below the top of the cup. Repeat with cups #2 and #3.
6. Set the cups on a sunny window sill.
7. Over the next few days, check at the same time each day to see what is happening. (Continue to add water to cups in order to keep the paper towels damp to ensure that the seeds sprout!)
8. Chart the growth and development of each type of seed. Notice what changes you see in the chart below!

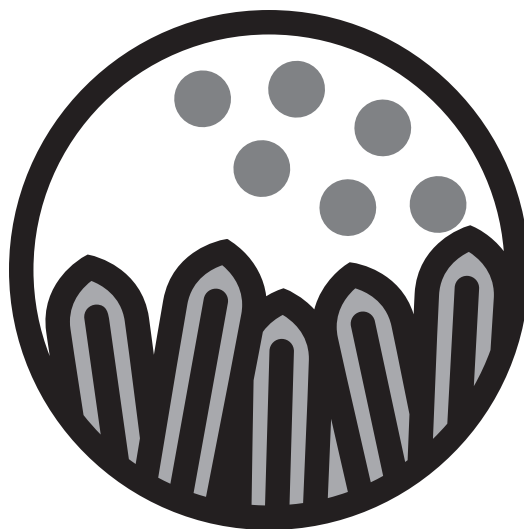
Discussion Questions: What happens if you fail to keep the paper towel in the cup wet?

Did all of the seeds sprout on the same day? If not, why not?

Can you identify the different parts of the new plant?

Viewer #	Seed Type	Day 2	Day 3	Day 4	Day 5
1					
2					
3					





GOLF COURSE ETIQUETTE

Golf is a game of integrity and honesty, and it is up to every player to uphold the reputation of the game. When making use of a golf course facility, players have a responsibility to leave it in the best condition possible so that future golfers can enjoy their game in the same conditions. This module will help students understand the rules of golf, how to replace a divot, and how to repair a ball mark. Students can apply what they learn about golf course etiquette each time they play and in addition, develop personal responsibility.

Activities

- Rules of Golf (on instructor's page)
- Divot replacement exercise for all ages
- Ball Mark Repair exercise for all ages
- Matching exercise with types of clubs for 6-8 year olds
- "What club to hit?" activity for 9-12 year olds

Rules of Golf for this section:

- **Ball Mark/Divot Repair**
- **Ground under Repair**
- **Nature Preservation**
- **Standing (Casual) Water**



Objective/Lesson: To identify certain rules of golf and how they affect our play on the golf course in relation to conservation and etiquette.

Definitions: *Ball Mark/Divot Repair* - Players should carefully repair any divot holes they make and any damage to the putting green made by the impact of a ball (whether or not made by the player himself). Upon completion of the hole by all players in the group, damage to the putting green caused by golf shoes should be repaired.

Ground Under Repair - Any part of the course marked by order of the Committee or declared by its authorized representative. It includes material piled for removal and holes made by a greenskeeper, even if they are not marked.

Nature Preservation - When damage to young trees is unavoidable, the following Local Rule is recommended: "Protection of young trees identified by _____" (i.e. signs, roped off area, etc.) - If such a tree interferes with a player's stance or the area of his intended swing, the ball must be lifted, without penalty, and dropped. Assisting preservation of the course by defining areas, including turf nurseries, young plantations and other parts of the course under cultivation, as "ground under repair" from which play is prohibited. When the Committee is required to prohibit play from environmentally-sensitive areas that are on or adjoin the course, it should make a Local Rule clarifying the relief procedure.

Standing (casual) Water - Any temporary accumulation of water on the course, that is visible before or after the player takes his stance, and is not in a water hazard. Snow and natural ice, other than frost, are either casual water or loose impediments. Dew and frost are not casual water. A ball is in casual water when it lies in or any part of it touches the casual water.

Directions: As a group, discuss the explanations of the rules of golf above.

Discussion of the handout is optional upon completion.

Activity Time: 20 minutes



GOLF COURSE ETIQUETTE
ALL AGES



Objective/Lesson: To help students learn how to repair a divot on the golf course and why it is important to the healing of the turf.

Materials: Sand or Sand/Seed Mix
A shovel
Any displaced turf on the course
A notebook to record observations over a period of time
A pen or pencil

Directions: **Note:** First contact your local golf course superintendent/greenskeeper to coordinate activity. Make sure to get permission from the golf course.

1. Take a walk on a golf course and try to identify divots that have not been repaired.
2. Fill in the hole with sand or sand/seed mix. (If you have no sand, try to find the grass that was displaced and put it back into the hole)
3. Smooth over sand to level out divot.
4. Record the hole number and location of the divot.
5. Each week, return to the same spot and see how your divot is healing.

Activity Time: 30-45 minutes one day a week for 4 weeks

Post Discussion

Questions: Did you find many unrepaired divots? Were there signs other golfers had repaired them before you arrived?
Do you notice the divots you have fixed from the week before healing?
Are you more conscious now of repairing any damage you make when you are playing?



GOLF COURSE ETIQUETTE ALL AGES





The experiment shows the effects of properly repairing displaced turf known as divots.



If you create divots, you should also repair them — that’s part of the etiquette of the game. Repairing your divots ensures that other golfers have the same level playing surface. Different methods are used to repair divots. Be sure to ask about the local procedure when you are playing at a new course.

Directions: Here’s what you need to do to track the progress of your repaired divot!

1. Get permission from Greenskeeper to walk course.
2. Take a walk on a golf course and try to identify divots that have not been repaired.
3. Fill in the hole with sand or sand/seed mix.(If you have no sand, try to find the grass that was displaced and put it back into the hole)
4. Smooth over sand to level out divot.
5. Record the hole number and location of the divot.
6. Each week, return to the same spot and see how your divot is healing.

Record your findings each week to track the progress of the divot.

Divot Location	Condition Week One	Condition Week Two	Condition Week Three	Condition Week Four
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Discussion Questions:

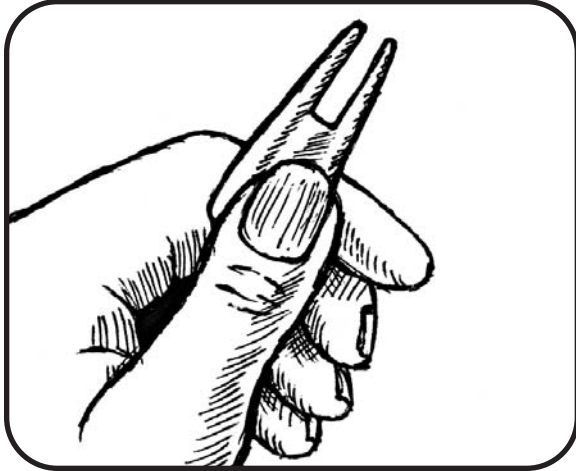
Did you find many unrepaired divots? Were there signs other golfers had repaired them before you arrived?
 Do you notice the divots you have fixed from the week before healing?
 Are you more conscious now of repairing any damage you make when you are playing?



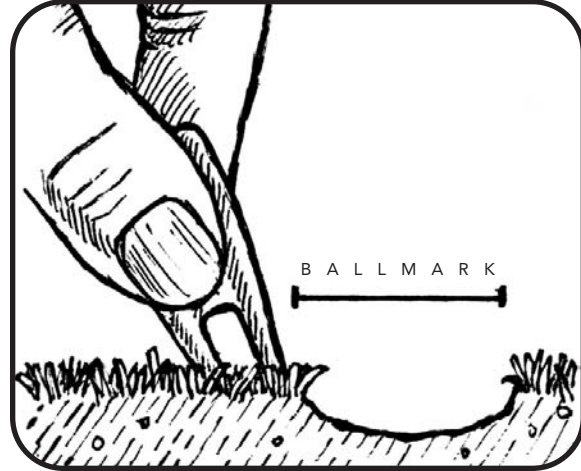
HOW TO REPAIR A BALLMARK ON THE PUTTING GREEN!

Follow the four steps when repairing a ball mark on the green.

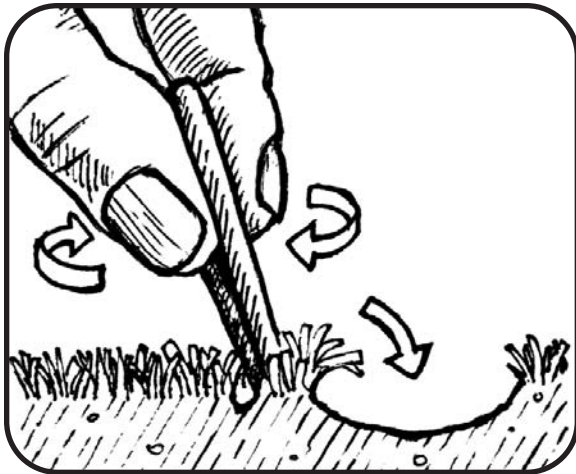
INSTRUCTOR



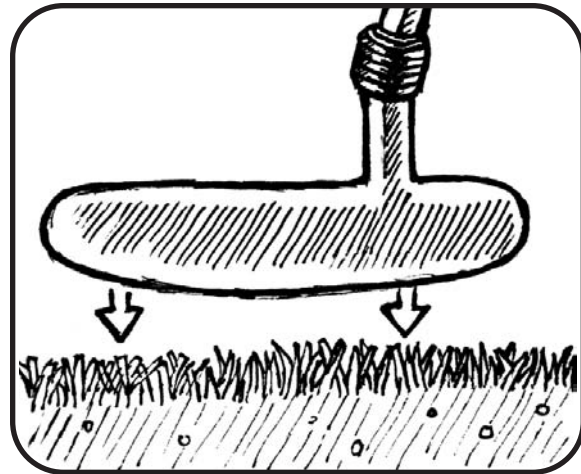
1 Use a ballmark repair tool whenever possible.



2 Insert the repair tool at the edge of the ball mark. Do **NOT** insert the tool within the depression itself.



3 Push the tool forward from the edge of the ball mark toward the center. Do this around the edges of the indentation. Do **NOT** insert the tool under the indented area and push up - a common mistake. Think of it as pushing turf in from the edges toward the center.



4 Tamp down the repaired area with your putter so that the surface is even.



GOLF COURSE ETIQUETTE ALL AGES



Presented by

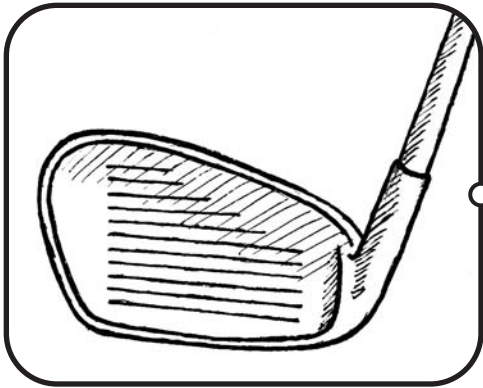


MATCH THE CLUB

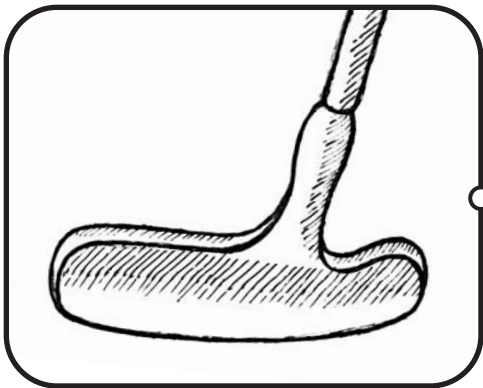
After discussing the definitions below, distribute to students

See if you can match the club to the correct definition in the other column!

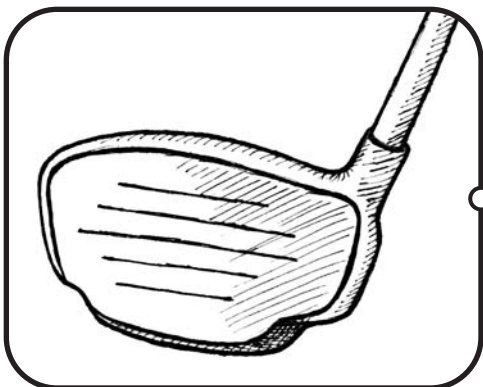
INSTRUCTOR



IRON



PUTTER



DRIVER

The only club that should be used on the green.

Club used for longer carry. Typically used on the tee box. The longest club(s) in the golf bag and often called a metal wood or wood.

Club used for shorter carry or on narrow fairways. In a golf bag, there are typically a set of these clubs with varying degrees of loft for different distances.



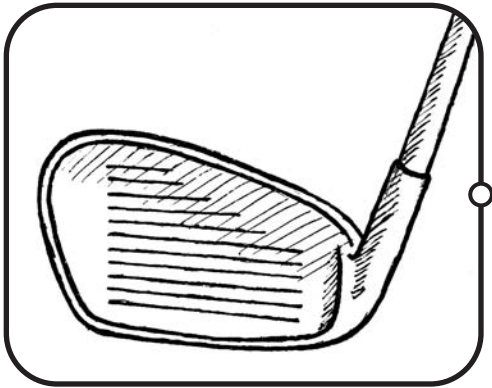
GOLF COURSE ETIQUETTE

AGES 6-8



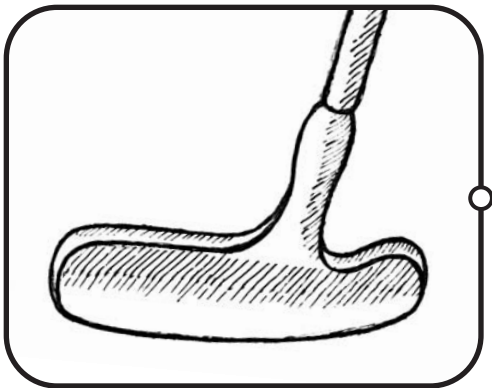
MATCH THE CLUB

See if you can match the club to the correct definition in the other column!



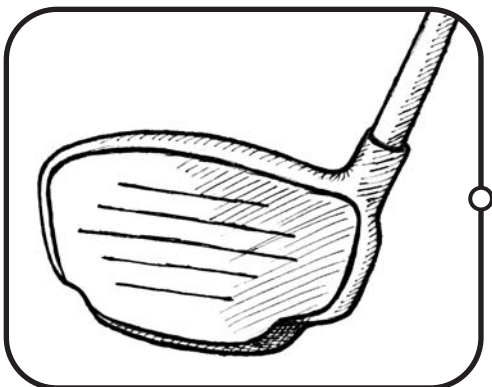
IRON

- The only club that should be used on the green.



PUTTER

- Club used for longer carry. Typically used on the tee box. The longest club(s) in the golf bag and often called a metal wood or wood.



DRIVER

- Club used for shorter carry or on narrow fairways. In a golf bag, there are typically a set of these clubs with varying degrees of loft for different distances.



WHAT CLUB TO HIT?

See if you can correctly determine where it is appropriate to hit these clubs on the listed parts of the golf course! Then note why you would use that particular club or why you would not.



DRIVER

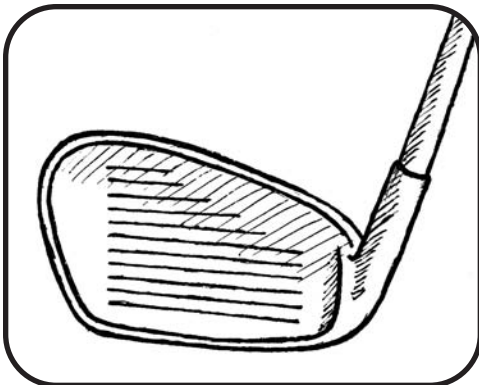
Tee Box: Yes, mostly on par 4 or par 5 holes that require a longer carry.

Fairway: Maybe, it is very hard to hit a driver off of the fairway, but other woods are used for longer shots.

Rough: No, it is extremely difficult to hit a driver out of the rough.

Fringe: Maybe, it is not common, but a driver or other type of metal wood can be used on the fringe.

Green: No, the putter is the only club that should be used on the green.



IRON

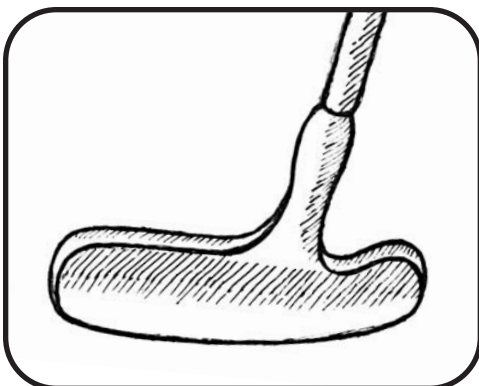
Tee Box: Yes, mostly on par 3's, holes that require a shorter carry or have narrow fairways.

Fairway: Yes, this is the primary use for these clubs on the course.

Rough: Yes, because it is the most reliable club to hit out of the rough.

Fringe: Yes, most often used to chip from the fringe in order to carry a longer distance on the green.

Green: No, the putter is the only club that should be used on the green.



PUTTER

Tee Box: No, there would not be any benefit to hitting a putter off the tee box.

Fairway: No, there would not be any benefit to hitting a putter off the fairway.

Rough: No, it would be extremely difficult to hit a putter out of the rough.

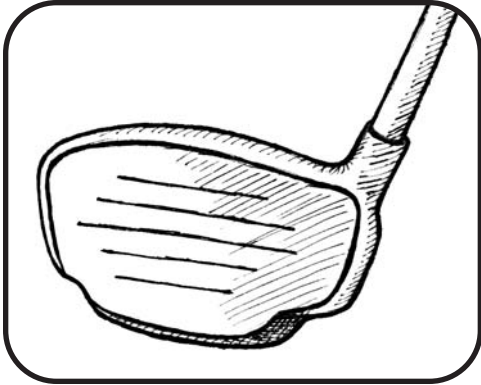
Fringe: Yes, it can be used for shots that require a shorter carry to the hole.

Green: Yes, the putter is the only club that should be used on the green.



WHAT CLUB TO HIT?

See if you can correctly determine where it is appropriate to hit these clubs on the listed parts of the golf course! Then note why you would use that particular club or why you would not.



DRIVER

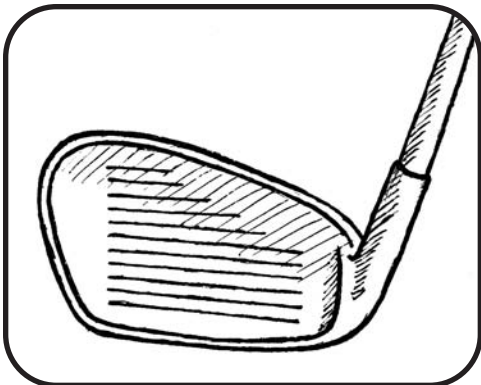
Tee Box: YES NO MAYBE
 WHY? _____

Fairway: YES NO MAYBE
 WHY? _____

Rough: YES NO MAYBE
 WHY? _____

Fringe: YES NO MAYBE
 WHY? _____

Green: YES NO MAYBE
 WHY? _____



IRON

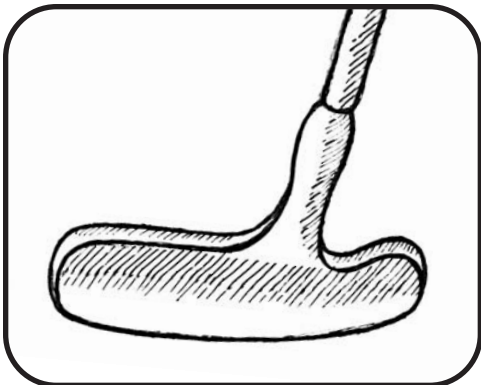
Tee Box: YES NO MAYBE
 WHY? _____

Fairway: YES NO MAYBE
 WHY? _____

Rough: YES NO MAYBE
 WHY? _____

Fringe: YES NO MAYBE
 WHY? _____

Green: YES NO MAYBE
 WHY? _____



PUTTER

Tee Box: YES NO MAYBE
 WHY? _____

Fairway: YES NO MAYBE
 WHY? _____

Rough: YES NO MAYBE
 WHY? _____

Fringe: YES NO MAYBE
 WHY? _____

Green: YES NO MAYBE
 WHY? _____



Presented by



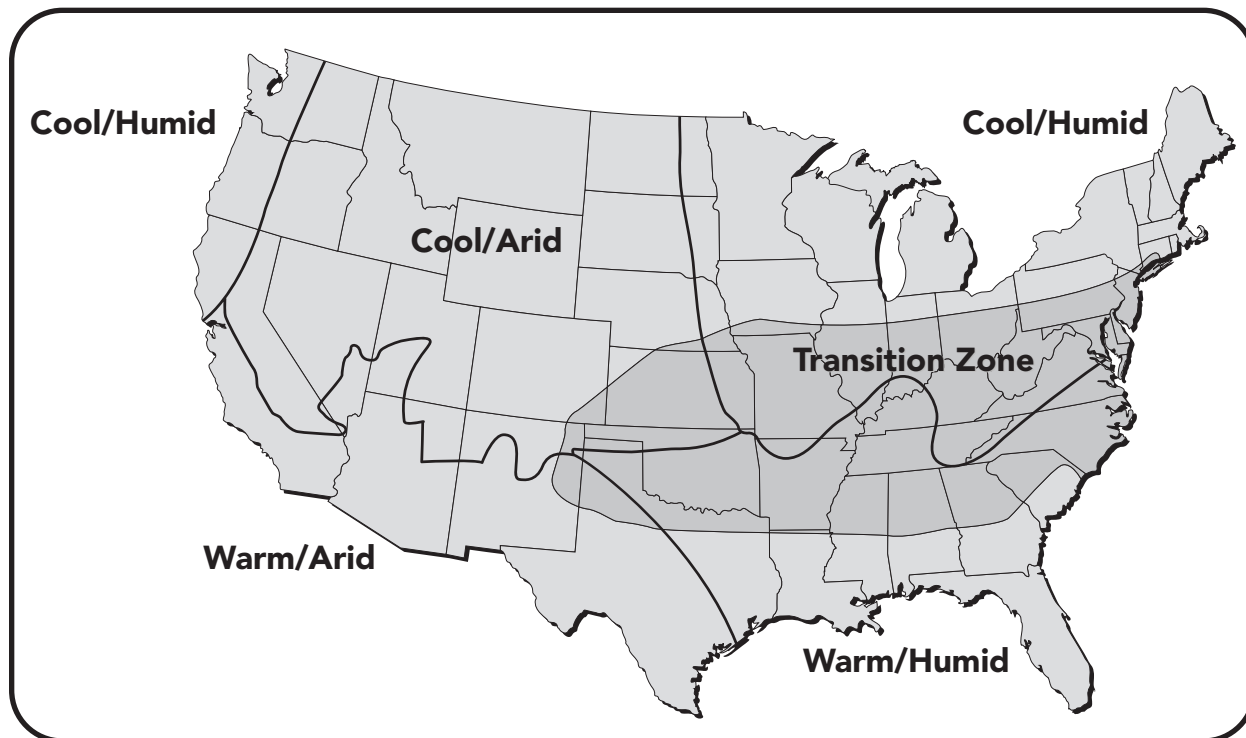


GRASS REFERENCE GUIDE

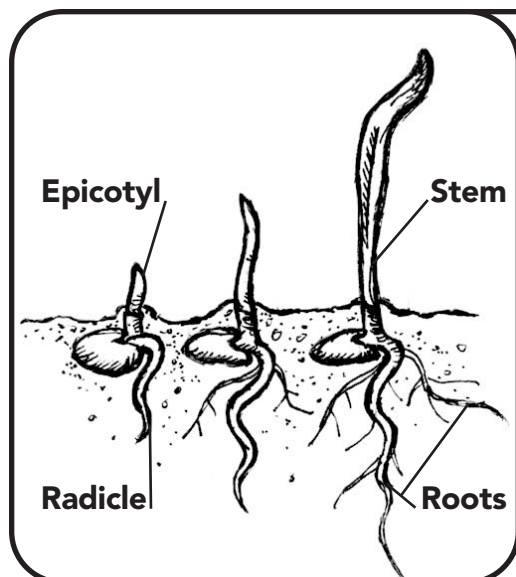
This reference guide should be used to assist students in Grass Module exercises. The guide includes a Seed Region Map of the continental United States. The map shows the temperature ranges and geographic regions. The seed germination process and seed diagram should be used as a resource to the grass definitions. The seven types of grass are clearly described and will help students learn more about the grasses found in their regions.

INSTRUCTOR

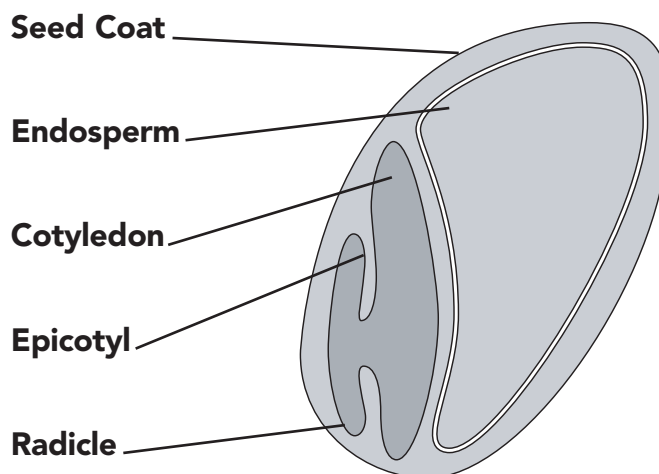
SEED REGION MAP



SEED GERMINATION PROCESS



SEED DIAGRAM



BENT GRASS

A popular low-growing grass that is planted on the green of the golf course and sometimes on the fairway and tee box areas too.

Use on course:

Tee Box, Fairway, Rough & Greens

Water:

Temperate climate; Needs plenty of water

Soil:

80-90% Sand mixed with some sort of peat;
Shallow roots

Temperature:

Cool Transition

Region:

Northeast United States

Maintenance:

Needs to be cut often & short, before it gets out of hand; Does not mix well with other grasses



BERMUDA GRASS

The main turf choice for golf courses and athletic fields throughout the warmer regions and across the equator.

Use on course:

Tee Box, Fairway, Rough & Greens

Water:

Water weekly

Soil:

Sandy, Acidic, Infertile soil;
Extensive root system

Temperature:

Warm

Region:

Southern United States

Maintenance:

Needs full sunshine and has rapid growth rate



FESCUE GRASS

Found in the Northern regions, requires very little maintenance and has long and slender blades that blend in well with other grasses.

Use on course:

Rough

Water:

Does not need excessive amounts of water

Soil:

Clay soil that is high in organic matter;
Deep root system

Temperature:

Cool Transition

Region:

Northeast United States

Maintenance:

Grows in shade and can go for long periods without being mowed



KENTUCKY BLUEGRASS

A blue-green grass that can be found in your family's lawn and on most golf course fairways.

Use on course:

Fairway & Greens

Water:

Needs regular watering

Soil:

Very shallow root system

Temperature:

Cool Transition

Region:

Northern United States

Maintenance:

Needs plenty of sunshine and regular fertilization;
Very low maintenance



RYE GRASS

The seeds of this grass germinate quickly and can be used as a temporary ground cover while slower growing grasses take hold.

Use on course:

Fairway, Rough & Greens

Water:

Needs consistent watering

Soil:

Favors moist, well drained fertile soil

Temperature:

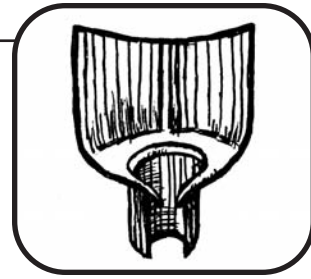
Cool, used in warm areas for overseeding

Region:

All

Maintenance:

Rapid growth rate, more than any other grass



ST. AUGUSTINE GRASS

A warm season grass found primarily along the U.S. Gulf Coast that can survive in many types of soil.

Use on course:

Rough

Water:

Needs water on a regular basis

Soil:

Tolerates wide range of soil types

Temperature:

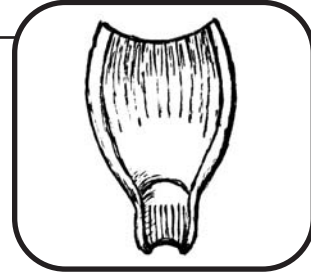
Warm

Region:

Southern Regions

Maintenance:

Moderate level of maintenance; Supplemental watering may be required



ZOYSIA GRASS

Warm season grass mainly from Southeast Asia that grows in many types of soil and can survive droughts.

Use on course:

Tee Box

Water:

Extremely drought tolerate

Soil:

Does not tolerate poorly drained soil;
Deep root system

Temperature:

Warm Transition

Region:

Gulf & Atlantic Coast (from Florida to Maryland)

Maintenance:

Very invasive

