VOLUME
1

STEM sports®

STEM.ORG ACCREDITED™ EDUCATIONAL EXPERIENCE

INSIDE:
Turn the page to learn more about our NEW Digital Assets!

STEM MULTI-SPORT

Ball Edition

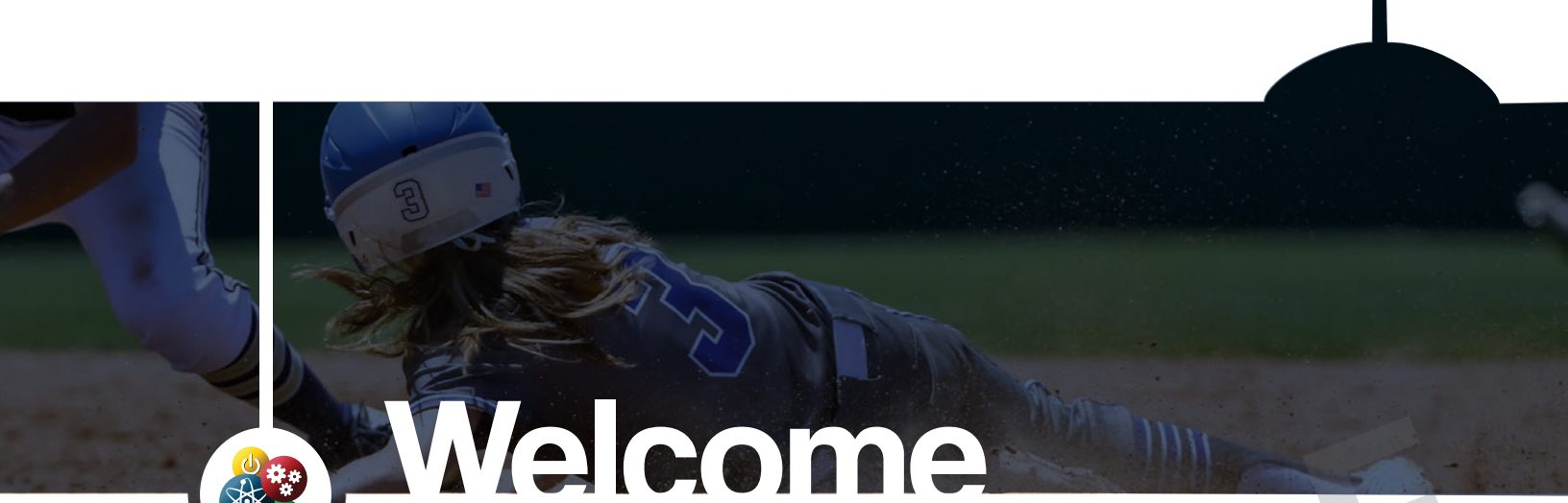
SUPPLEMENTAL CURRICULUM

GRADES 3 - 5 AND GRADES 6 - 8

Go Digital

In addition to the classroom, STEM Sports® K-8 Supplemental Curriculum is flexible and scalable to teach and implement at home and virtually on platforms such as Zoom, Google Classroom, Skype, and other digital learning tools. For each and every module, we provide solutions for successful remote learning with PowerPoint presentation decks and digital worksheets with keys.

To access these useful tools, visit www.STEMSports.com/digitaltools.



Welcome

STEM Sports® provides turnkey K-8 supplemental curricula that use sports as the real-life application to drive STEM-based, hands-on learning in classrooms, after-school programs, and camps.

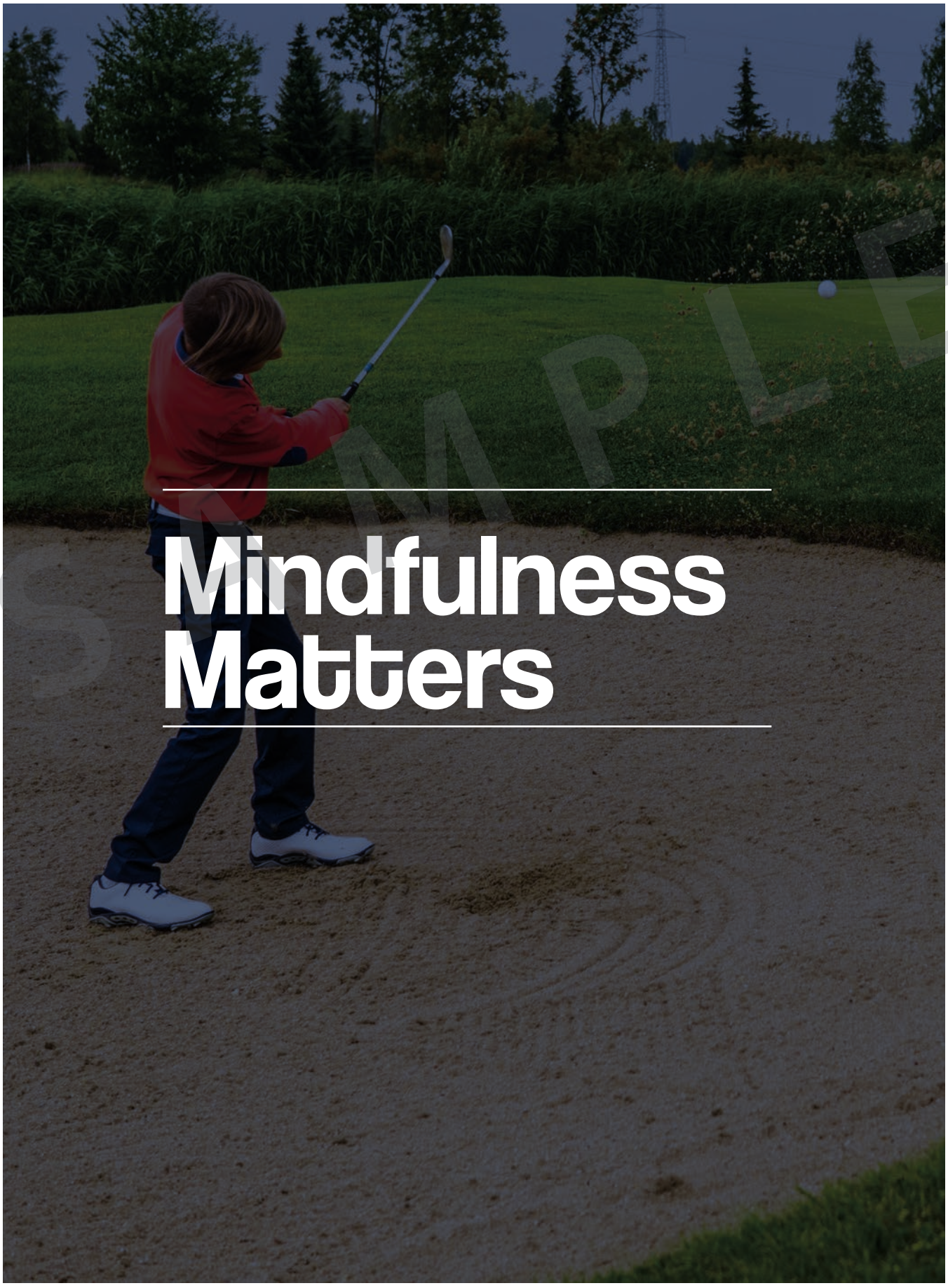
We are pleased to present Volume 1 of STEM Sports® Multi- Sport - Ball edition, highlighted by the following:

- Content for a minimum of 16 hours of instruction that includes some healthy, physical activity.
- Turnkey kits equipped with all of the relevant sports equipment along with the necessary science supplies.
- Eight lessons aligned with Next Generation Science Standards (NGSS) and/or Common Core State Standards (CCSS) and/or National Standards for K-12 Physical Education.
- STEM.org Accredited™ Educational Experience approved
- 5E lesson plans so that students will develop 21st-century skills such as critical thinking, collaboration, creative problem-solving, and leadership.
- Differentiation: lessons for Kindergarten to 2nd graders, 3rd to 5th graders, and lessons for 6th to 8th graders.
- "Capstone" Project (Grades 6th to 8th) to commensurate student's knowledge of each curriculum.
- Assessments in each lesson to evaluate students effectively.
- Ready-to-use worksheets that align with each lesson and standards.
- A list of STEM-based, sports-related jobs pertinent to the lesson concept in each module.
- Engineering Design Process (EDP) woven into each curriculum.
- STEM Sports® glossary to support instructors and students as they come across key vocabulary in each module.
- Mindfulness Matters: important messaging to assist with the uniqueness of blending STEM with sports.
- Well-designed and scalable lessons for teachers, administrators, or volunteers.
- Professional development or training are not required.

Please visit www.STEMSports.com for additional information and to learn about all of the curricula that we offer.

We sincerely hope you and your students enjoy this STEM Sports® supplemental curriculum.

Please complete our Teacher Survey at www.stemsports.com/teacher-survey.
We appreciate your feedback.



Mindfulness Matters

Mindfulness may not be the first thing one thinks about STEM Sports®. However, mindfulness is essential to fully understanding the design and benefits of the STEM Sports® curricula by way of the following:

- Approximately 85% of STEM jobs anticipated for the year 2030 have yet to be invented.
- Moreover, within the next 10 years or so, 80% of all jobs will be STEM related.

The STEM Sports® curricula distinctly blends STEM content areas through hands-on/active play and sports. Active play provides a mechanism to teach STEM concepts; therefore, learning is integrated, engaging and meaningful as participants are exposed to STEM applications through real world experiences.

Teachers should be mindful of the fact STEM Sports® curricula are:

- Collaborative in nature, ensuring peer-to-peer learning opportunities
- Inquiry-based, allowing learners to discover information for themselves
- Designed for problem-solving: an essential lifelong skill
- Hands-on, engaging all types of learners
- Student-led, encouraging ownership of learning
- Active, promoting physical activity and wellbeing

Participants should be mindful of the fact STEM Sports® curricula are:

- Introduction to STEM concepts, facilitating comfort with STEM content areas
- Blending play and sport in an environment that is engaging, fun, and applicable to life outside the classroom
- Designed for all ensuring success for all participants – students do not have to be athletic or excel at science to accomplish curricula tasks
- Applicable to the real world where learning is meaningful for all participants

In sum, stakeholders should be mindful of all the STEM Sports® curricula have to offer. The unique design of the STEM Sports® curricula is essential to maximize learning and understanding of STEM concepts in sports and life applications.

Contents
Grades 3-5

Module 5.0
What is a Golf Ball?

PAGE 30

Objective
Students will make observations and measurements on different types of materials. Students will explain how properties impact the function of a golf ball.

Concept
Science: Physical Properties

Time
(2) 60-minute sessions

Module 6.0
Scoring in Golf

PAGE 34

Objective
Students will explain the mathematical steps for calculating golf scores. Students will compare golf scores using greater than and less than symbols.

Concept
Math: Comparing Values and Expressions

Time
(1) 60-minute session

Module 7.0
Force of a Golf Swing

PAGE 38

Objective
Students will diagram the forces involved in a golf swing. Students will predict how a change in energy will influence the behavior of the ball. Students will design and test an experiment that answers the question, how you can increase the distance a golf ball travels.

Concept
Science: Forces and Motion

Time
(3) 60-minute sessions

Module 8.0
Climate and Weather in Golf

PAGE 46

Objective
Students will use climate maps to predict where there would be more golf courses in the world. Students will provide examples of desirable climates to play golf.

Concept
Science: Weather and Climate

Time
(2) 60-minute sessions

Contents
Grades 6-8

Module 5.0
What is a Golf Ball?

PAGE **70**

Objective
Students will analyze different uses of technology to determine how it meets the criteria and constraints of the problem. Students will answer text-dependent questions about engineering and technology. Students will compare and contrast different solutions to a problem.

Concept
Engineering
Use of Technology

Time
(3) 50-minute blocks

Module 6.0
Scoring in Golf

PAGE **78**

Objective
Students will use a number line to solve addition and subtraction of integers. Students will construct a mathematical expression to calculate the final score in a golf game.

Concept
Math: Positive and Negative Numbers

Time
(2 - 4) 50-minute blocks

Module 7.0
Force of a Golf Swing

PAGE **82**

Objective
Students will design a controlled experiment that tests how the acceleration/distance of the golf ball changes based on the force applied to the ball. Students will explain the relationship between force, acceleration, and mass by using experimental data.

Concept
Science: Forces

Time
(3) 50-minute blocks for *Student Designed Experiment* OR (2) 50-minute blocks with *Scaffolded Experiment*

Module 8.0
Climate and Weather in Golf

PAGE **88**

Objective
Students will draw a diagram that demonstrates how a golf area of the world can have varying weather patterns, different from the area's climate. Students will make a claim about the best air mass interactions for the game of golf and support it with evidence and reasoning about the differences between weather and climate.

Concept
Science: Weather and Climate

Time
(2) 50-minute blocks

STEM Multi-Sport Ball Edition

Supplies Checklist

Tee Up Golf

- [ ] **Two (2)** PGA Tour Tee-Up Medium-Size Putters
- [ ] **Three (3)** PGA Tour Tee-Up Medium-Size Irons
- [ ] **Two (2)** PGA Tour Tee-Up Large-Size Putters
- [ ] **Two (2)** PGA Tour Tee-up Large-Size Irons
- [ ] **One (1)** PGA Tour Tee-Up Left-Handed Medium-Size Iron
- [ ] **One (1)** PGA Tour Tee-Up Left-Handed Large-Size Iron
- [ ] **Six (6)** Digital Stopwatches
- [ ] **Six (6)** 25-Foot Tape Measures
- [ ] **One (1)** Digital Weight Scale
- [ ] **One (1)** Radar Gun
- [ ] **Six (6)** Baseballs
- [ ] **One (1)** Cut (Halved) Baseball
- [ ] **Four (4)** Targets
- [ ] **Eight (8)** Balls
- [ ] **Six (6)** Callaway Golf Balls
- [ ] **Three (3)** Callaway Golf Halved Golf Balls
- [ ] **Six (6)** Softballs
- [ ] **One (1)** Cut (Halved) Softball
- [ ] **One (1)** STEM Multi-Sport - Ball Edition - Supplemental Curriculum Manual

STEM sports

Modules

Module 8.0

GRADES 3-5

Climate and Weather in Golf

Concept
Science: Weather and Climate

Objective
Students will use climate maps to predict where there would be more golf courses in the world. Students will provide examples of desirable climates to play golf.

Time
(2) 60-minute sessions

Standards

Next Generation Science Standards Connections

3-ESS2-1.
Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2.
Obtain and combine information to describe climates in different regions of the world.

5-ESS2-1.
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Supplies Provided
Worksheets and Colored Climate Maps

Please email Info@STEMSports.com to access Worksheet Keys.

Materials Needed
Pencils

Sequence of Lesson

Have your students take this lesson's assessment prior to engaging by visiting:
www.stemsports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Engage: Ask students to look at the map of the United States golf courses on page 47. Have them record their observations, questions, and inferences on the worksheet. Guiding question: Why do you think some areas have more golf courses than others?

Explore: Have students review the climate map of the United States on page 47. Have students continue to add to their observations, questions, and inferences to the worksheet. Guiding question: Regarding climate, what does a golf course need?

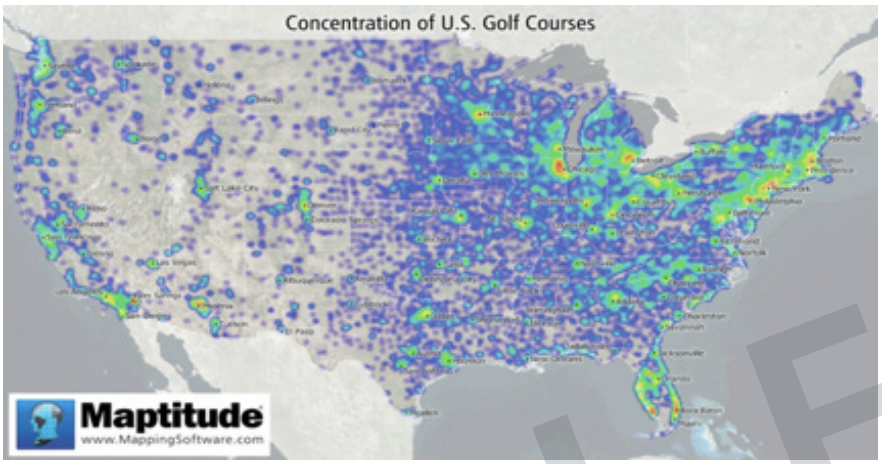
**Teaching method suggestion: Use an around the world method. Post the maps in different places around the learning space: students move through the space in 30 second intervals, recording their observations, questions, and inferences as they go. Additional maps can be found at www.stemsports.com/resources/resources-golf/ or by visiting www.STEMSports.com under "Resources", then "STEM Golf."*

Explain: Define key vocabulary as needed: Precipitation, Climate, Trends and Average Climate Zones. Present to students the different types of climate maps: precipitation, temperature, and plant hardiness maps. Model how to read the maps. If necessary, support the lesson by defining climate and precipitation.

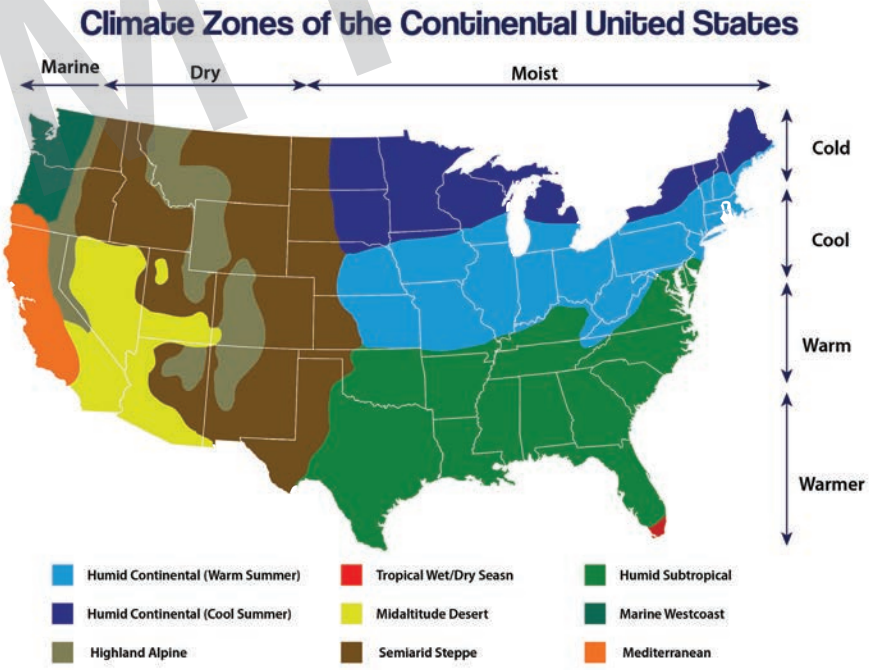
Elaborate: Have students select an area of the United States: Northeast, Northwest, Southwest, South, Midwest, and Mountain. Using the worksheet, students should analyze the map(s) in further detail to make a claim about whether or not the climate in the area supports golf courses. Students should support their claim with evidence from the maps.

Evaluate: Provide students with the climate maps of multiple areas of the world. Ask students to use the climate data to predict where there would be more golf courses.

Have your students retake this lesson's assessment to effectively evaluate their comprehension by visiting:
www.stemsports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.



Map: Created with Maptitude Mapping Software by Caliper, July 2018
Source: HERE October 2017



Extend: Students could brainstorm and/or research why some areas of the world, regardless of poor conditions/climate, have golf courses. Use additional areas of the world to analyze good golf conditions/climate: Asia, Africa, and South America.

STEM Jobs in Sports

- Golf Course Architect
- Sports Photographer
- Club General Manager
- Groundskeeper
- Sportswriter

Fun Facts

The first 18-hole golf course was played on a sheep farm.

Module 8.0

Name: _____

Climate and Weather in Golf

GRADES 3-5

Look at the maps. What do you notice, wonder, and think about what you see?

Notice (Observe)	Wonder (Question)	Think (Infer)
Guiding Question: Why do you think some areas have more golf courses than others?		

Notice (Observe)	Wonder (Question)	Think (Infer)
Guiding Question: What connection do you see between climate and golf course concentration?		

Name: _____

Climate and Weather in Golf

GRADES 3-5

Circle your US region choice:

Northeast **Northwest** **Southwest**

South **Midwest** **Mountain**

Does the climate, precipitation, and temperature of your regional area support golf courses?

_____

_____

_____

What evidence from the climate maps supports your claim from above?

_____

_____

_____

Why does the climate of your region either support or not support golf courses? List at least three reasons.

_____

_____

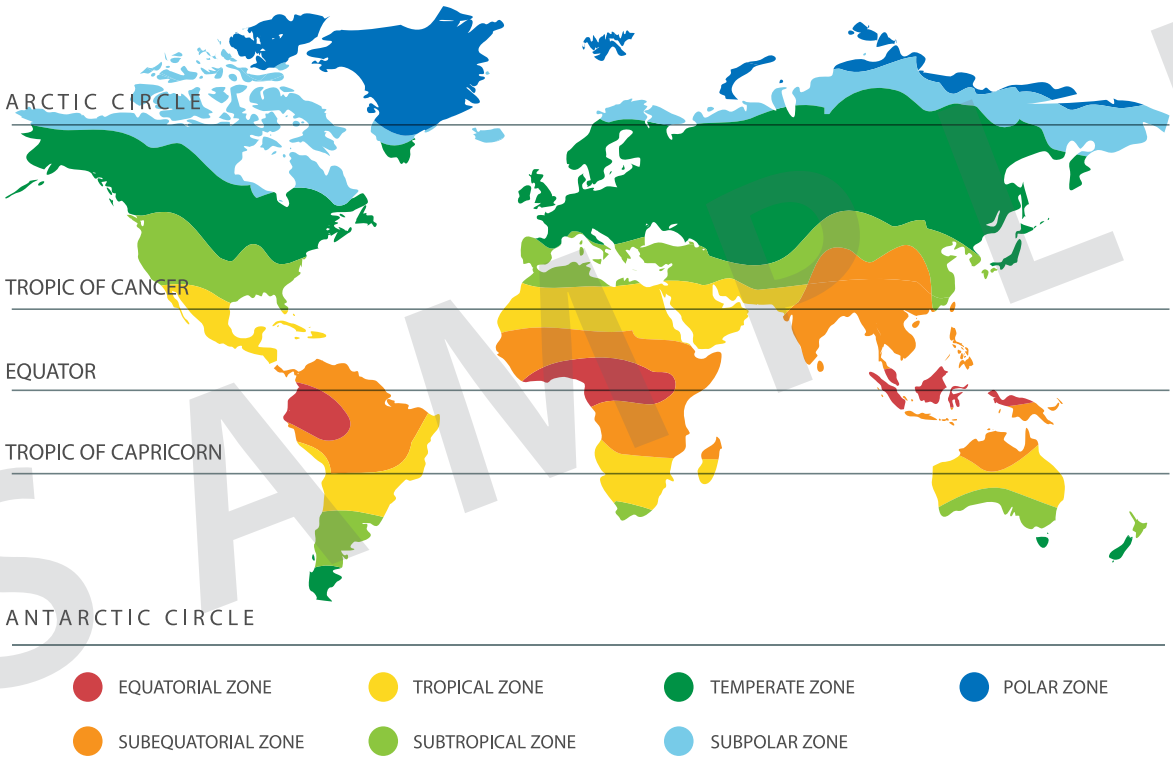
_____

Module 8.0

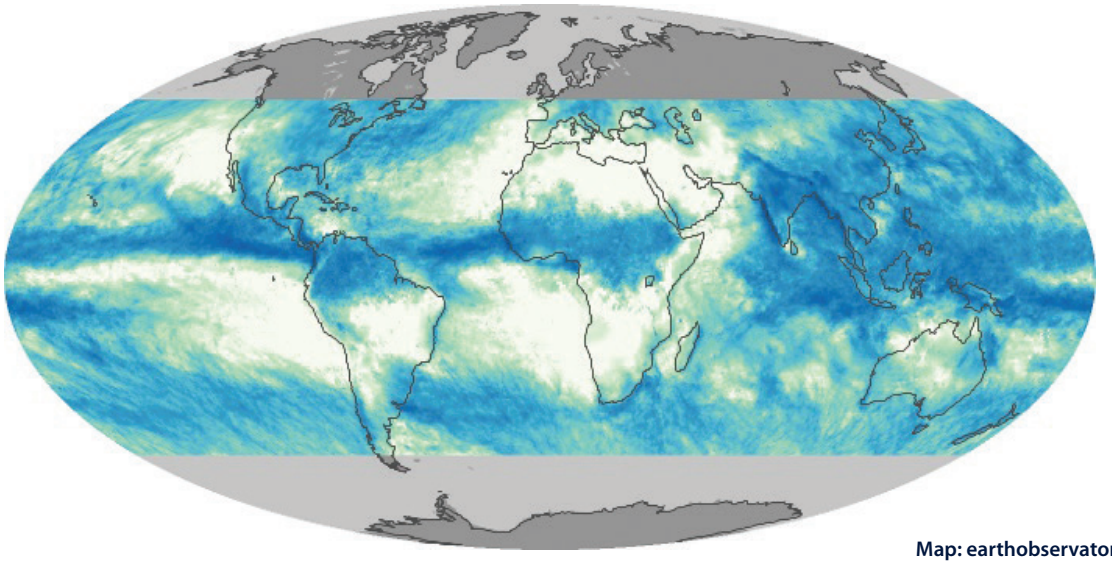
Name: _____

Climate and Weather in Golf

GRADES 3-5



Total Rainfall - July 2016



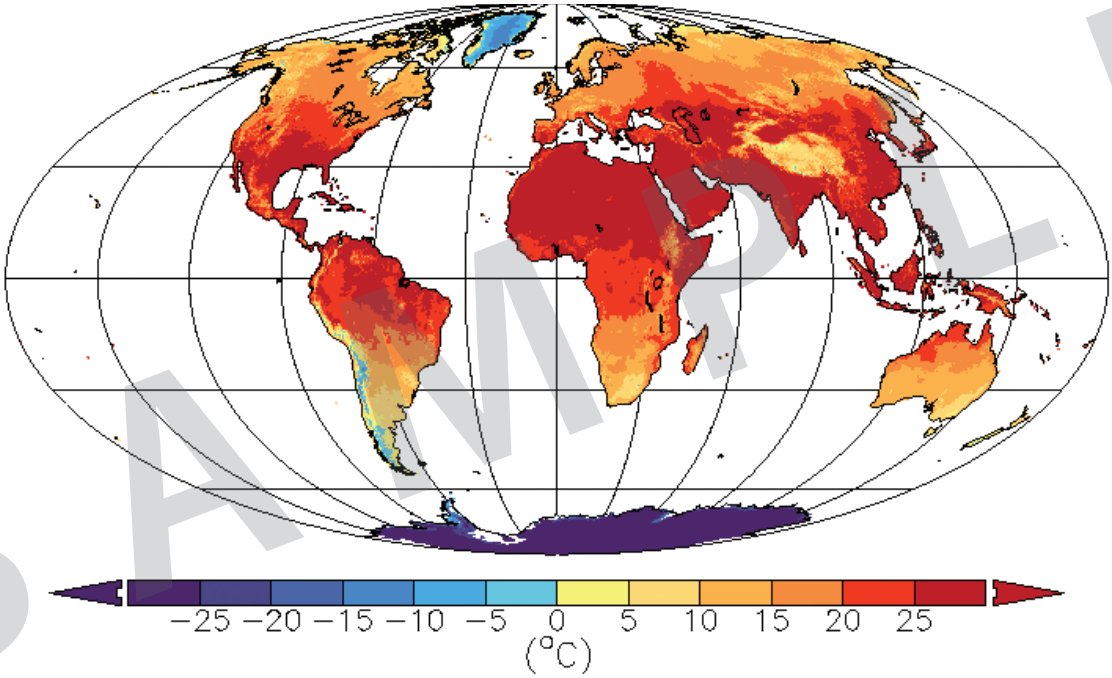
Map: earthobservatory.nasa.gov/

Name: _____

Climate and Weather in Golf

GRADES 3-5

Monthly Mean Air Temperature (July, 2000)



Map: Matsuura, Kenji & National Center for Atmospheric Research Staff (Eds). Last modified 08 May 2020. "The Climate Data Guide: Global (land) precipitation and temperature: Willmott & Matsuura, University of Delaware." Retrieved from https://climatedataguide.ucar.edu/climate-data/global-land-precipitation-and-temperature-willmott-matsuura-university-delaware.

Make a prediction based on the weather/climate where there would be more golf courses, and support your answer with evidence from the graph and scientific reasoning.

_____

_____

_____

_____

_____

_____

_____

Module 8.0

GRADES 6-8

Climate and Weather in Golf

Concept
Science: Weather and Climate

Objective
Students will draw a diagram that demonstrates how a golf area of the world can have varying weather patterns, different from the area's climate. Students will make a claim about the best air mass interactions for the game of golf and support it with evidence and reasoning about the differences between weather and climate.

Time
(2) 50-minute blocks

Standards

Next Generation Science Standards Connections

MS-ESS2-6.
Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates assessed.

MS-ESS2-5.
Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

National Standards for K - 12 Physical Education Connections

Standard 4: The physically literate individual exhibits responsible personal and social behavior that respects self and others.

Supplies Provided
Worksheets and Weather Cards

Please email Info@STEMSports.com to access Worksheet Keys.

Materials Needed
Pencils and Internet Access

Sequence of Lesson

Have your students take this lesson's assessment prior to engaging by visiting:
www.stemsports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Engage: Ask students to discuss with a partner the best weather for playing golf.

Teacher note: If this is a general STEM classroom, ask students to describe the best weather for playing outdoors. Ask students to share out.

Explore: Show students the weather pattern cards on page 90 and ask them to sort based on the areas with the best climate for outdoor activities and golf.

Explain: Present students with information about the climate zones in different parts of the country and the world. Explain how air masses influence the general climate but that the interaction (fronts) and movement create changes in weather.

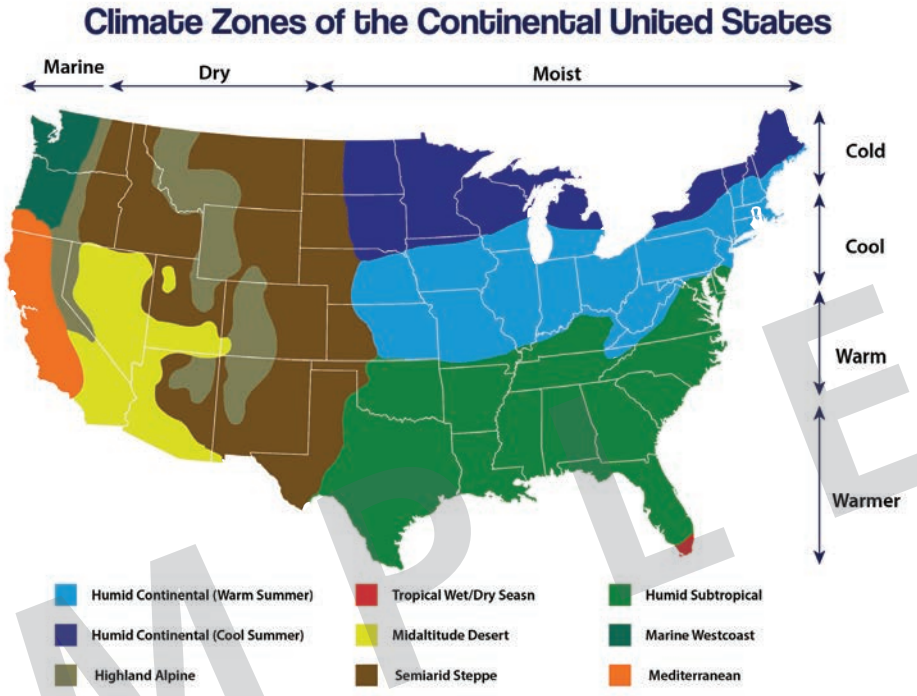
Elaborate: Have students select popular golf locations in two different parts of the country or world. Examples of Los Angeles, California and Scotland can be found on page 91. Students should also research weather data for golf season. Students should work with a partner to create a diagram/drawing that explains how these locations can have weather different from the normal regional climates (fronts). Example: cold weather in California and sunny days in Scotland.

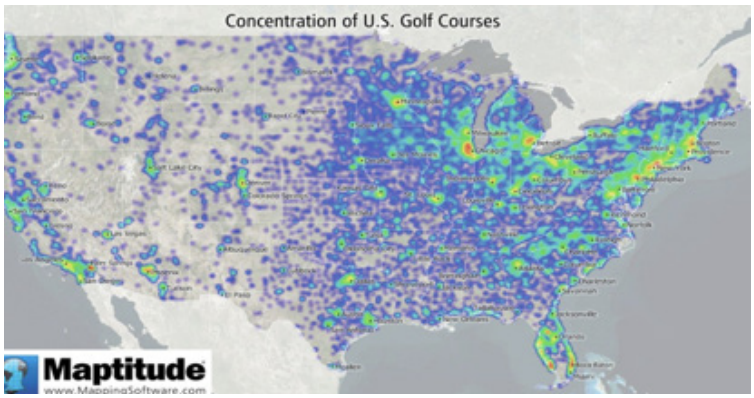
Teacher note: If technology is not available, or research is not feasible due to time constraint, use the provided data on a scaffolded worksheet.

Evaluate: Students will describe what air mass and air mass interactions (fronts) create the best golf weather and use evidence to support his/her claim.

Have your students retake this lesson's assessment to effectively evaluate their comprehension by visiting:
www.stemsports.com/assessments
If you have limited digital capability, please email Info@STEMSports.com to access the Assessment & Key.

Extend: Students could use their knowledge of air mass interactions to create a system that would provide the best playing conditions for golf.





Map: Created with Maptitude Mapping Software by Caliper, July 2018
Source: HERE October 2017

STEM Jobs in Sports

- Golf Course Architect
- Sports Photographer
- Athletic Quality Control Coordinator
- Sportswriter
- Baseball Groundskeeper

Fun Facts

The highest golf course in the world is in Peru (Tactu Golf Club) at 14,335 above sea level.

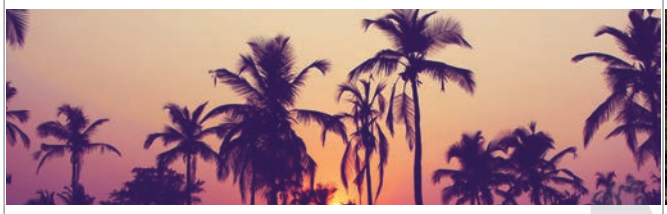
Name: _____ Class: _____

Climate and Weather in Golf

GRADES 6-8

Weather Cards

Tropical Maritime



Warm

Humid

Example location: Southeast (Florida and Georgia)

Polar Maritime

Cool

Humid

Example location: Northeast and Northwest

Polar Continental

Cool

Dry

Example location: Central Canada

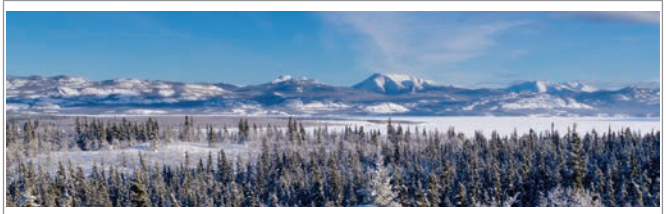
Tropical Continental

Warm

Dry

Example location: Southwest (Arizona and New Mexico)

Arctic Continental



Cool

Dry

Example location: Northern Canada

Name: _____ Class: _____

Climate and Weather in Golf

GRADES 6-8

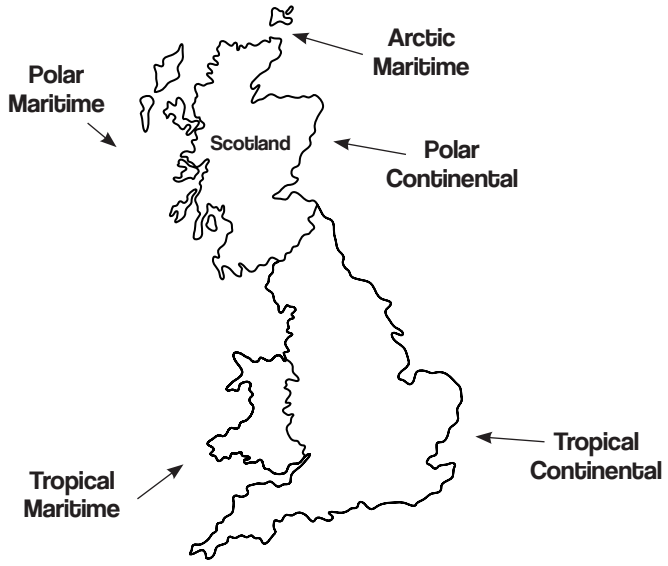
Scotland Annual Average Climate

Averages	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	93	67	67	53	54	58	71	80	82	96	93	95
Temp (°C)	3.4	3.5	4.8	6.8	9.5	12	13.9	13.7	11.6	8.7	5.7	3.6
Min Temp (°C)	0.9	0.8	1.9	3.3	5.7	8.4	10.4	10.2	8.3	5.8	3.1	1
Max Temp (°C)	6.1	6.3	8	10.4	13.4	15. 7	17.6	17.3	15	11.7	8.5	6.3

Los Angeles Annual Average Climate

Averages	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	82	87	61	26	6	2	1	7	12	32	62	66
Temp (°C)	14.1	14.7	15.6	16.8	18.2	20.2	22.6	23	22.3	20.1	17.2	14.6
Min Temp (°C)	9.1	9.8	10.6	11.9	13.6	15.4	17.3	17.7	17	14	11.8	9.5
Max Temp (°C)	19.1	19.6	20.4	21.7	22.7	25	27.9	28.4	27.7	25.3	22.7	19.7

United Kingdom



California

Capstones

Want to continue the education? Choose one of three Capstone Projects

Email Info@STEMSports.com with your Capstone selection to access an additional project for either Baseball, Softball, or Golf for Grades 6-8.

STEM Baseball

The Best Team, Statistically

Students will compare baseball players using qualitative descriptions and qualitative statistics. Students will evaluate the best team by using statistics to play a simulated baseball game.

STEM Softball

Women in STEM Sports

Students will identify groundbreaking women in STEM and Sports. Students will research and summarize essential information from online sources.

STEM Golf

Designing a Sustainable Golf Course

Students will design a sustainable golf course by considering the good of the planet, people and profitability. Students will construct written responses using prior knowledge and research for their sustainability plan.

Notes

Notes

Learn more at STEMSports.com

Follow @STEMSportsUSA on your favorite social platforms for updates

STEMSportsUSA @STEMSportsUSA STEMSportsUSA STEMSportsUSA/pins @STEMSportsUSA STEM Sports @STEMSportsUSA

CONTACT US

602.845.0316

www.STEMSports.com

Info@STEMSports.com