

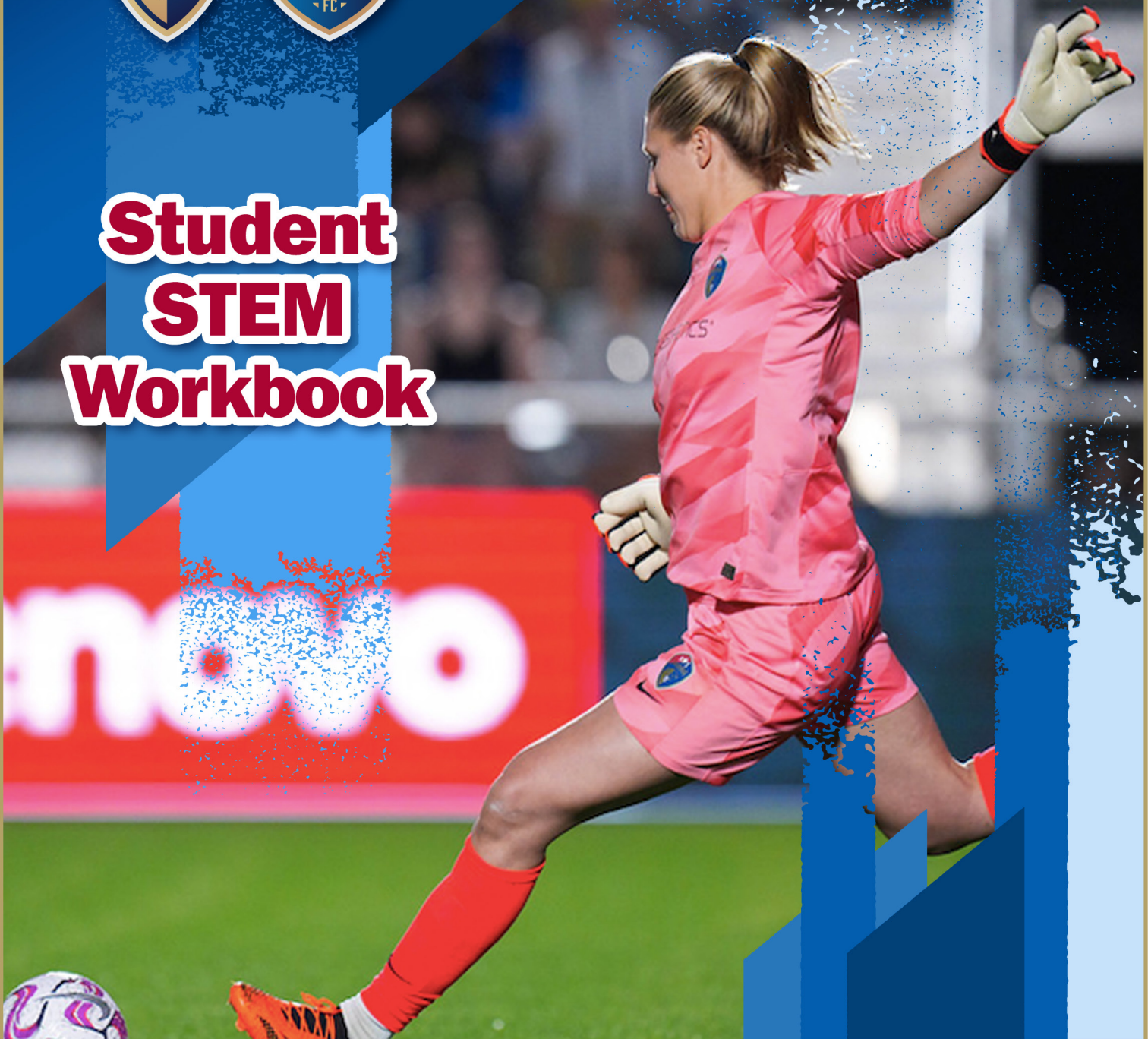
STARTING STEM

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Student STEM Workbook



Growth Mindset

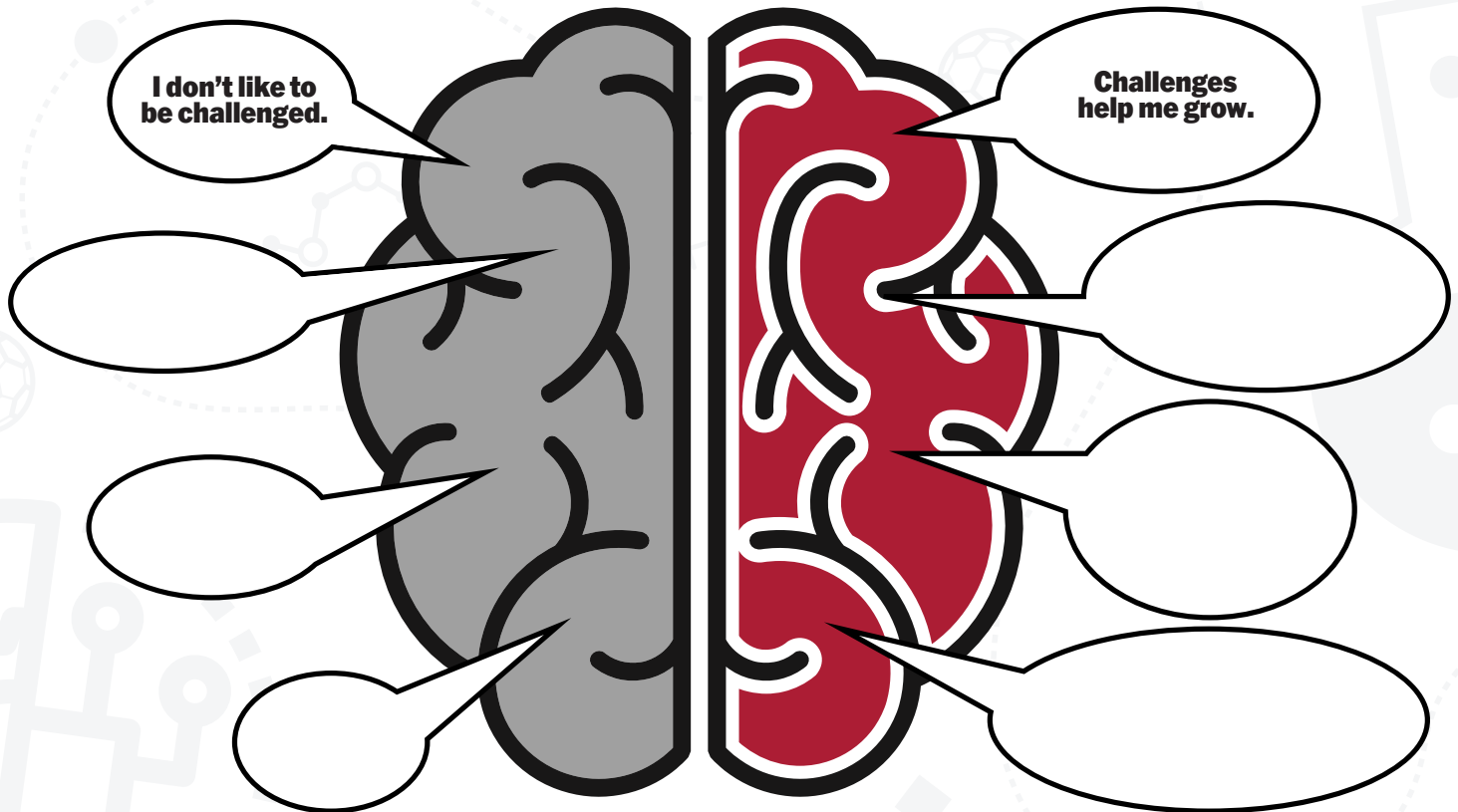
Description: A growth mindset believes in the power of yourself and your brain. A growth mindset is all about a person's attitude when facing challenges and processing failures and how they adapt and respond to setbacks. Fostering a growth mindset can help build self-awareness, self-management, relationship skills, social awareness, and goal setting.

Part 1: Think of times when you or someone else had a fixed mindset about something. Fill in the empty speech bubbles on the left with those fixed mindset thoughts. On the right, write what a growth mindset thought would look like in the speech bubbles.

Part 2: Set one goal for yourself using the table below.

FIXED MINDSET

GROWTH MINDSET



List one goal that you want to accomplish below.	What steps will you take to accomplish your goal?	How will you know when you have accomplished your goal?

SPECIFIC



What do you want to do?

MEASURABLE



How will you know when you've reached it?

ACHIEVABLE



Is it in your power to accomplish it?

REALISTIC



Can you realistically achieve it?

TIMELY



When exactly do you want to accomplish it?



Player Positions

Description: Soccer positions include goalkeeper, defender, midfielder, and forward. Each player has a specific area of the field they cover. You will analyze different player positions.



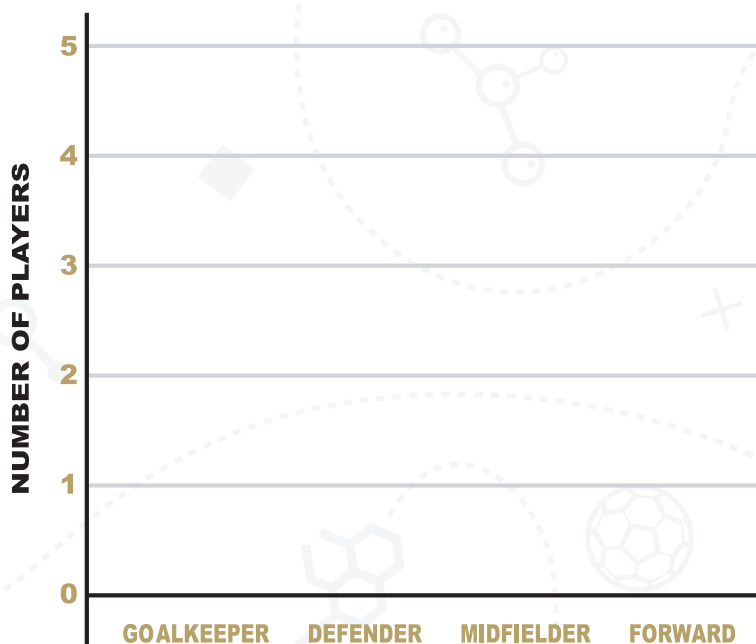
Activity: Create a bar graph showing how many players on the North Carolina FC roster play goalie, defender, midfielder, or forward, then answer the questions about the North Carolina FC roster.

North Carolina FC roster:
<https://www.northcarolinafc.com/roster/>

NAME	POSITION	NUMBER
David Garcia	Defender	24
DJ Benton	Defender	18
Daniel Navarro	Defender	5
Luke Croll	Defender	4
Gustavo Fernandes	Defender	6
Chris Lue Young	Defender	2
Nelson Flores Blanco	Defender	3
Max Flick	Defender	22
Rafa Mentzingen	Forward	14
Preston Popp	Forward	88
Shakeem Adams	Forward	17
Marvin Mariche	Forward	23

NAME	POSITION	NUMBER
Garrett McLaughlin	Forward	19
Oalex Anderson Jr.	Forward	9
Trevor Mulqueen	Goalkeeper	25
Tor Saunders	Goalkeeper	12
Nicholas Holliday	Goalkeeper	1
John McDowell	Midfielder	26
Louis Perez	Midfielder	13
Mikey Maldonado	Midfielder	15
Jaden Servania	Midfielder	10
Raheem Somersall	Midfielder	44
Luis Arriaga	Midfielder	7
Pecka	Midfielder	8

- How many total players are on the North Carolina FC roster?
- What fraction of the players on the roster are goalkeepers?
- What fraction of the players on the roster are defenders?
- What fraction of the players on the roster are midfielders?
- What fraction of the players on the roster are forwards?



Formations

Description: A formation is an arrangement of players positioned on a soccer field. You will learn about the different types of soccer formations and where each player stands on the field.

Activity: Use this worksheet to answer questions about soccer formations.

Part 1: Draw different player formations and their positions to make your own formations using 11 players. Mark players as an "X."

Part 2: Graph the location of each player on the field and identify the x- and y-coordinates of their precise location.

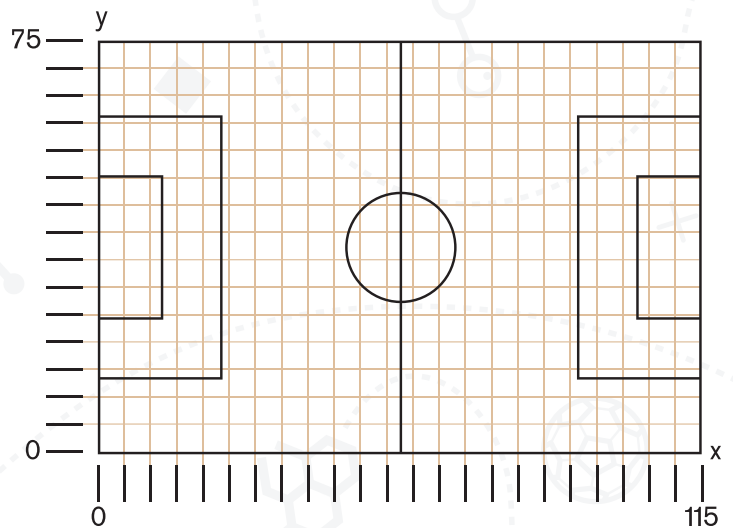
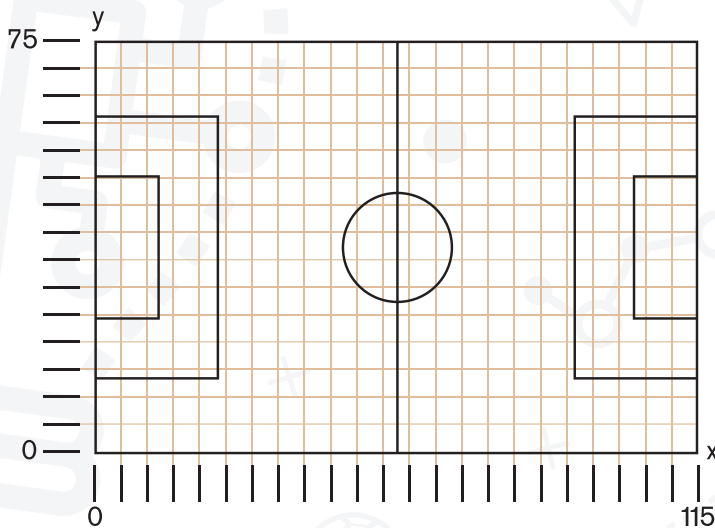
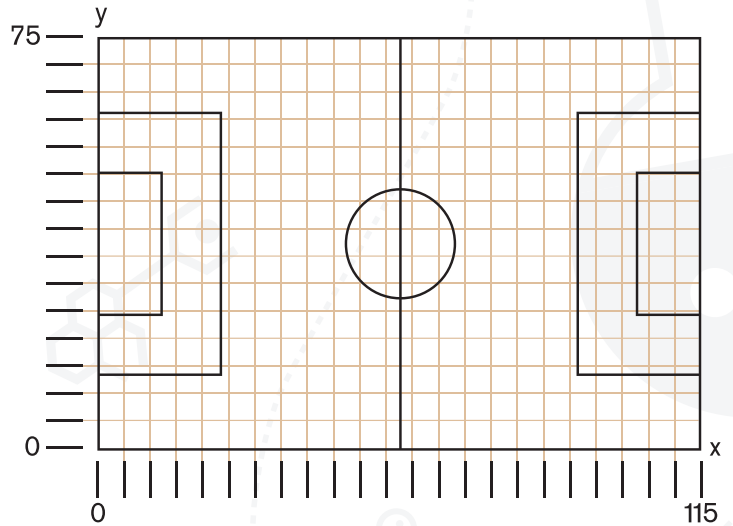
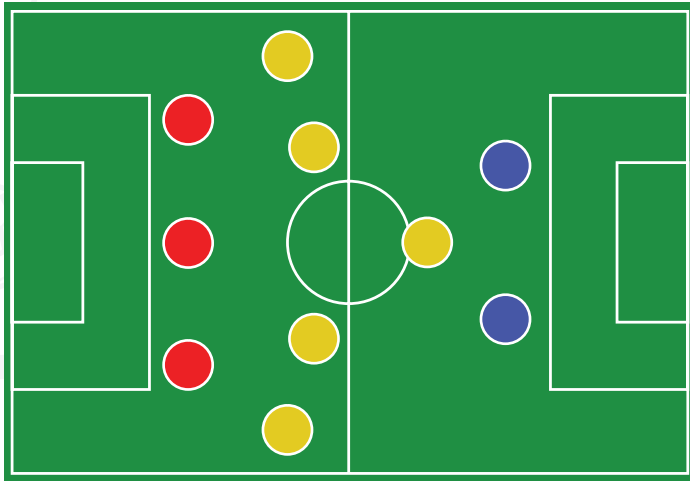
Hint: Goalkeeper is not included in formation. Remember to line your players up with a backline, middle line, and front line. Make sure your players are spread out to cover the entire area of the field.

Various Formations:

4 - 4 - 2 | 4 - 2 - 3 - 1 | 4 - 3 - 3 | 3 - 5 - 2 | 3 - 4 - 3

NOTE: Each tick mark below equals 5 yards.

3 - 5 - 2 Formation ● DEFENDER ● MIDFIELDER ● FORWARD



Soccer Team Roster

Description: Soccer rosters can include up to 30 players, even though only 11 can play on the field at one time. In this lesson, you will learn how to build your own soccer team. You will pick 11 soccer players and pick which position they play.



North Carolina Courage roster:
<https://www.nccourage.com/roster/>

Activity: Use the North Carolina Courage roster to pick out your starting 11 players.

NAME	POSITION	NUMBER
Sarah Clark	Defender	2
Kaleigh Kurtz	Defender	3
Malia Berkley	Defender	7
Emily Fox	Defender	12
Ryan Williams	Defender	13
Sydney Collins	Defender	18
Nikia Smith	Defender	21
Kiki Pickett	Defender	23
Estelle Johnson	Defender	24
Haley Hopkins	Forward	5
Kerolin Nicoli	Forward	9
Brittany Ratcliffe	Forward	11
Tyler Lussi	Forward	14
Rikki Madsen	Forward	17
Olivia Wingate	Forward	20

NAME	POSITION	NUMBER
Mille Gejl	Forward	22
Tess Boade	Forward	28
Katelyn Rowland	Goalkeeper	0
Casey Murphy	Goalkeeper	1
Marisa Bova	Goalkeeper	44
Hensley Hancuff	Goalkeeper	51
Emily Gray	Midfielder	4
Narumi Miura	Midfielder	6
Brianna Pinto	Midfielder	8
Denise O'Sullivan	Midfielder	10
Haleigh Stackpole	Midfielder	15
Frankie Tagliaferri	Midfielder	19
Meredith Speck	Midfielder	25
Clara Robbins	Midfielder	26
Victoria Pickett	Midfielder	99

Roster for 3-5-2 formation:

Roster for 4-3-3 formation:

Player	Position
	Defender
	Defender
	Defender
	Midfielder
	Midfielder
	Midfielder
	Midfielder
	Midfielder
	Forward
	Forward

Player	Position
	Defender
	Defender
	Defender
	Defender
	Midfielder
	Midfielder
	Midfielder
	Midfielder
	Forward
	Forward
	Forward



Scoring Percentages

Description: A soccer player's scoring percentage is the ratio of the number of shots that are goals to the number of total shots taken.

Key concept: (# of goals/total # of shots) x 100

Activity: Find 10 players to form a team. Form two teams of 10. Stand in front of the soccer goal and place a cone 12 yards from the goal. Each team will practice shooting a penalty kick from the cone and try to score a goal on the other team. Calculate your scoring percentage as a team in the table below.



Team 1

Kick #	Goal	Miss
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Scoring % =

Team 2

Kick #	Goal	Miss
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Scoring % =



Height & Wingspan

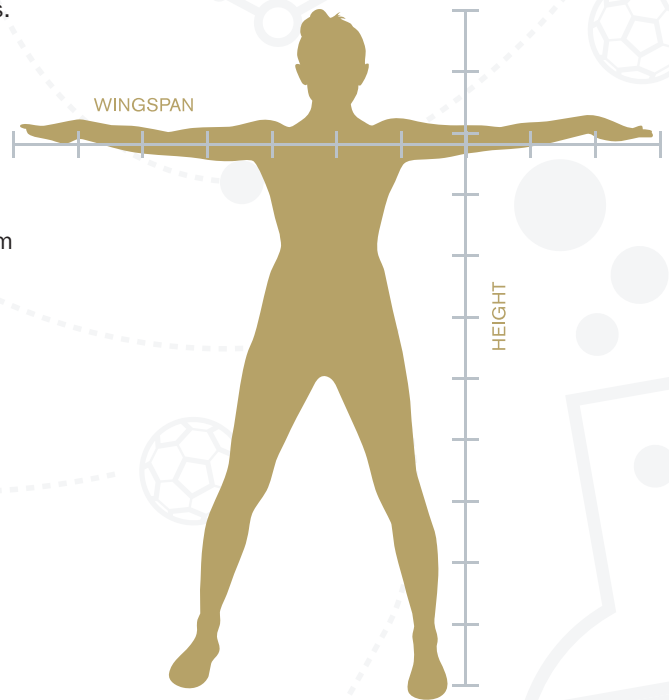
Description: The average height of professional soccer players is 71 inches. Their wingspan, however, can be different from their height. Wingspan is the distance between a player's outstretched fingertips. Below, you will explore whether your height and wingspan are the same or different.

Compare your height to your classmates and record your results on the graph below.

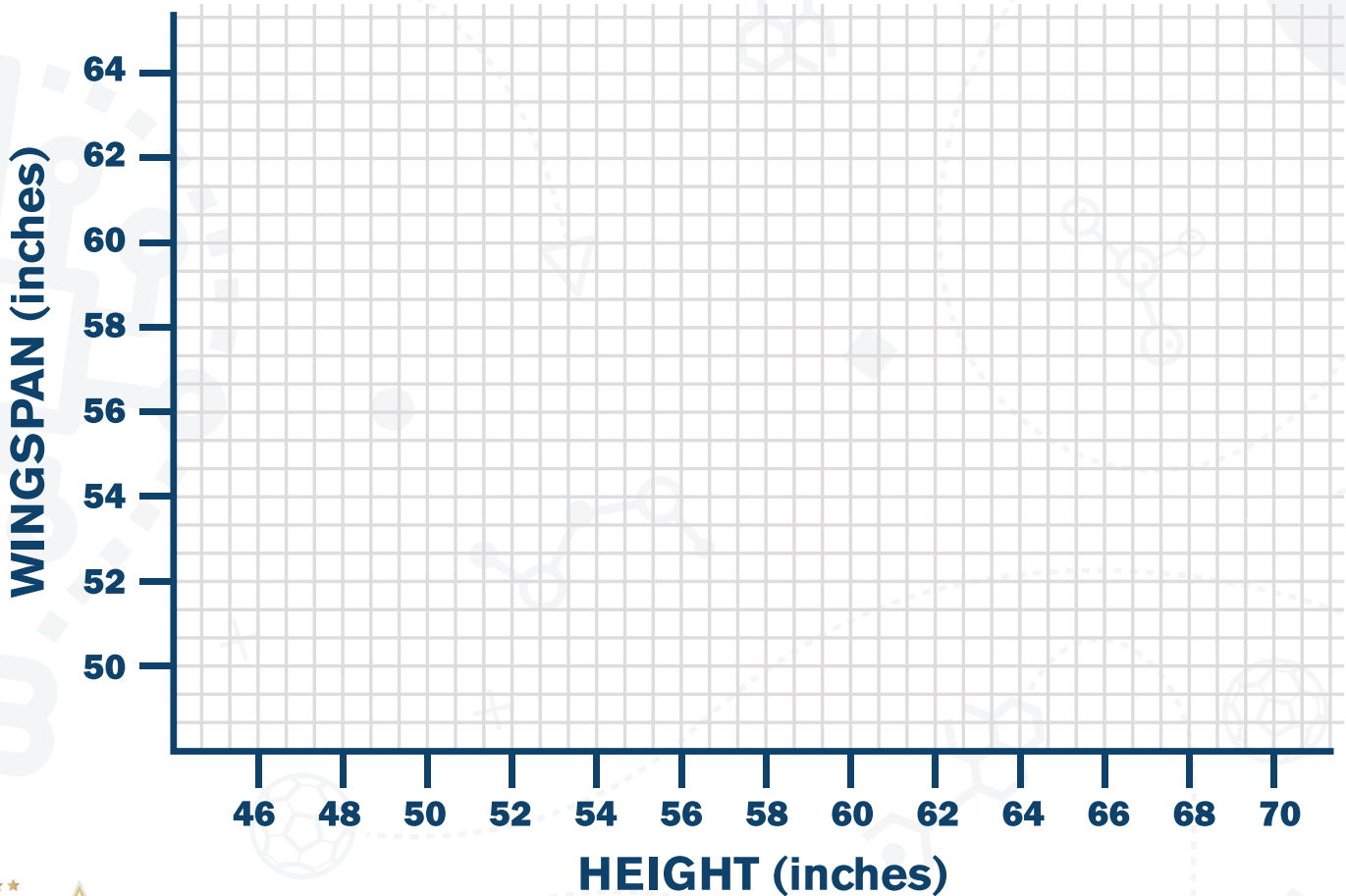
Activity: Stretch out your arms to the side and measure your wingspan (from fingertip to fingertip). Stand up straight and measure your height from the bottom of your foot to the top of your head.

My wingspan measures _____ inches.

My height measures _____ inches.



Class - Height vs. Wingspan



Hydration

Description: Hydration is the process of replacing water in the body. You will learn the importance of staying hydrated (drinking water) during physical activities.

Activity: Complete the worksheet discussing the importance of staying hydrated. Calculate how many ounces of water you should drink each day. (For example: if you weigh 90 pounds, $90/2 = 45$ ounces of water). Use the hydration log to mark off how many ounces of water you drink and answer the questions below.

Key concept: 8 ounces = 1 cup; 64 ounces = 8 cups = 1/2 gallon

Hydration log (each drop = 1 cup)



Young Athlete

Weight 80 pounds
Recommended water
Intake: 8-10 cups of water per day



Average Pro Soccer Player

Weight 160 pounds
Recommended water
Intake: 16-20 cups of water per day



1. Why is water important?
2. How do you know you're getting enough water?
3. Signs of dehydration:
4. Tips for staying hydrated:
5. Why is it important to drink water before, during, and after playing soccer?
6. What units of measurement can be used to measure the amount (volume) of water?
7. If a soccer player has a 24-ounce bottled water, how many ounces should she drink if she wants to drink $\frac{1}{2}$ of it?



Anatomy

Description: Anatomy is the study of the human body and its parts. You will learn about the different parts of the body that are important when playing soccer.

Activity: Use the word bank to label the different parts of the body.

Part 1: Blow up one of the balloons and see how long you can keep the balloon in the air using your head, thigh, chest, shoulder, and feet. You can then blow up the soccer beach ball and try the same thing.

Part 2: Use a soccer ball and see how long you can keep the ball in the air using your head, thigh, chest, shoulder, and feet.

Hint: This activity is also known as “juggling.” Pick up the ball with your hands and drop it on the top of your foot to start.

Additions: See how many “juggles” you can get with the soccer ball in a row. Challenge yourself to try and get more.

**Arm, Chest, Foot, Head, Knee,
Shin, Shoulder, Thigh**



Soccer Field Geometry

Description: A typical soccer field is 100-130 yards long and 50-100 yards wide. You will learn about the different aspects and dimensions of a soccer field.

Activity: Below is an image of the North Carolina FC soccer field at WakeMed Soccer Park. Use this image to answer the following questions.

Part 1: Label the different parts of the soccer field.

Hint: Areas include: 18-yard box, penalty box, corner kick, center circle, arc, etc.

Part 2: What is the perimeter of the soccer field? What is the area of the soccer field?

Hint: perimeter = (length + width) x 2; area = length x width

Additions: Create your own soccer field outside using chalk.

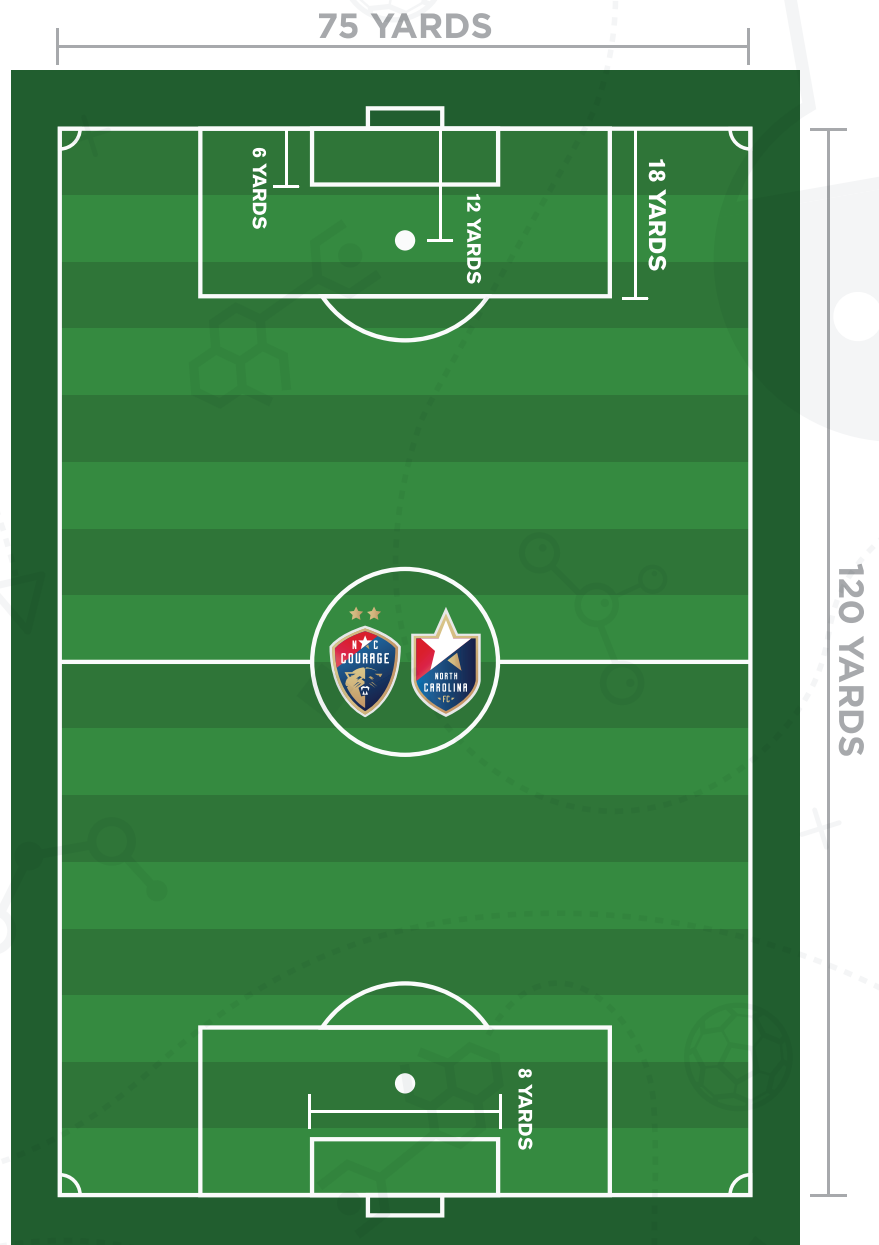
NOTE: 1 yard = 3 feet or 0.91 meters

1. How many feet long is WakeMed Soccer field?

2. How many feet wide is WakeMed Soccer field?

3. How many meters long is WakeMed soccer field?

4. How many meters wide is WakeMed soccer field?



Heart Rate

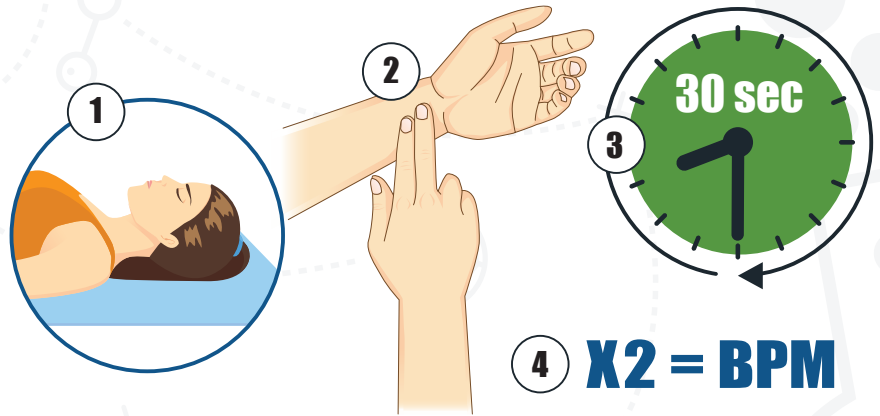
Description: Your heart rate is unique to you. By listening to your body, you can learn what is optimal for your individual performance.

Activity: You will measure your heart rate at rest, after juggling, after dribbling, and after jogging/sprinting. Find some space outside to complete this activity. Make sure to bring a soccer ball and a classmate or friend to time you.

Part 1: Measure your heart rate for the activities listed below in the graph on the x-axis.

Hint:

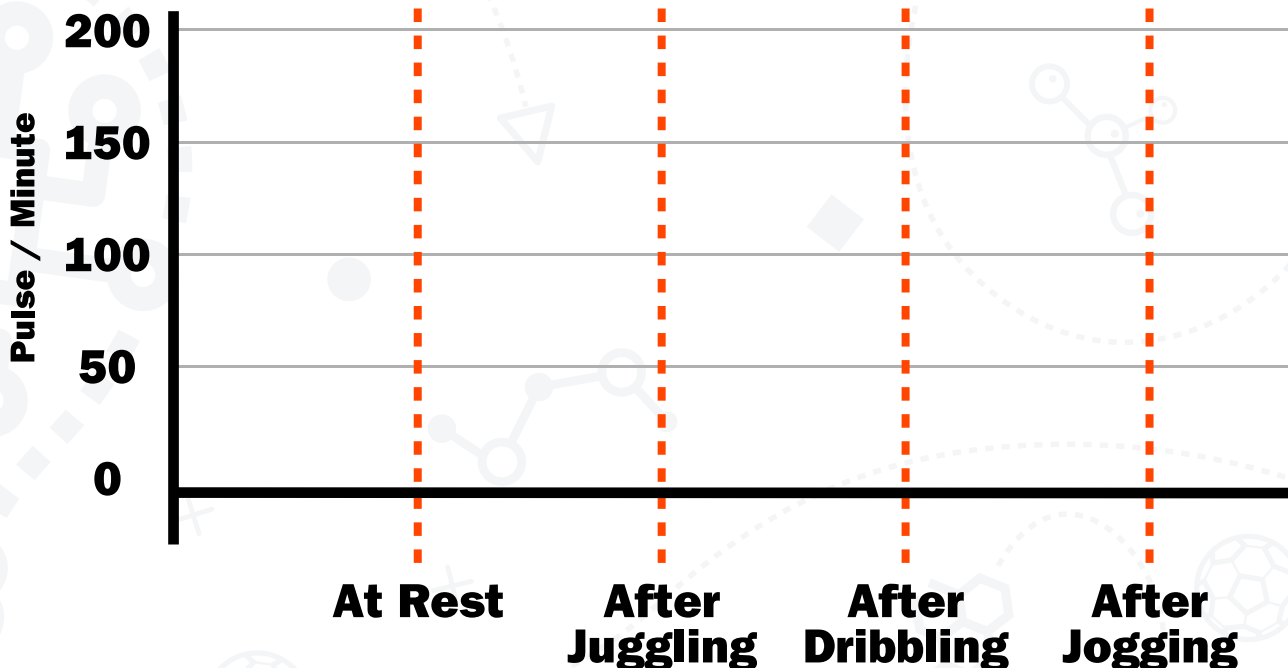
1. Rest quietly
2. Gently place 2 fingers on the inside of your wrist
3. Count the beats for 30 seconds
4. Double this number to get the number of beats per minute (BPM)



Part 2: Plot your heart rates for each activity on the graph below.

Additions: Try measuring your heart rate during different activities.

HEART RATE CALCULATION



Plot your heart rate at different intensity levels.



STEM Jobs in Soccer

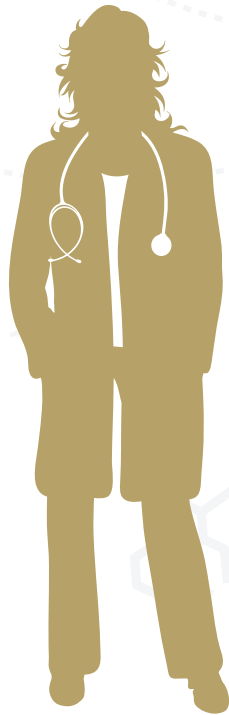
Description: Science, Technology, Engineering, and Mathematics (STEM) are important skills in many different jobs, especially in sports. There are many jobs in professional soccer where STEM skills are used during and after the season.

Activity: Match the job title on the left with the job description on the right.

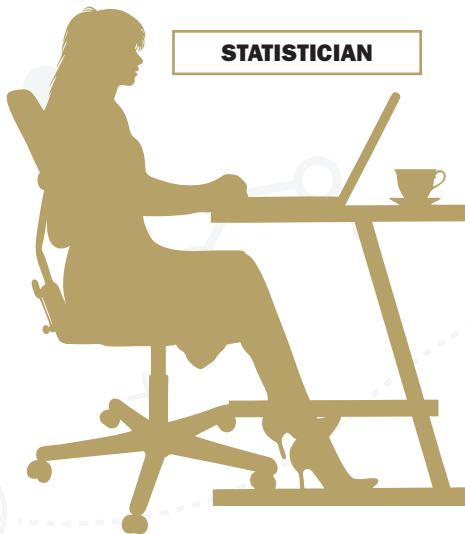


GROUNDSKEEPER

DOCTOR



ENGINEER



STATISTICIAN

This person uses his/her knowledge about physics, buildings, and structures to oversee the construction of soccer facilities.

This person uses his/her knowledge of math and computers to calculate player and team performance and make recommendations for the coaches.

This person uses his/her knowledge about science, medicine, and the human body to ensure soccer players remain healthy throughout the season.

This person uses his/her knowledge about science, grass, water, and light to ensure the soccer field is in excellent condition before and during the game.



Design Your Own Soccer Uniform

Description: In soccer, an entire uniform (jersey, shorts, socks, etc.) is known as a kit. Members of the same team wear the same kit. Each soccer team has a city and state associated with their team. Each team also has their own logo and mascot that is unique to their team.

Here is a profile of the North Carolina FC & NC Courage:

City & State: Cary, NC

Team Name: North Carolina FC & North Carolina Courage

Stadium: WakeMed Soccer Park

Mascot: (NC Courage): Lioness

Colors: Atlantic Blue, Cardinal Red & Southern Gold



North Carolina Courage roster:
nccourage.com



North Carolina Courage roster:
northcarolinafc.com

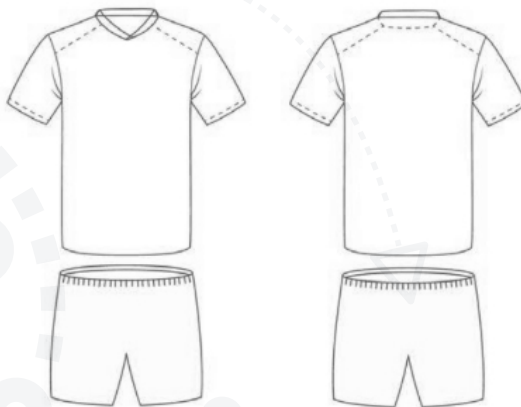
Activity: Use the space below to create your own soccer jerseys, team name, logo, and mascot for your own fictional team.

Part 1: Create jerseys, shorts, socks, and shoes for your team. Pick what colors you would like to use.

Part 2: Come up with a city and state for your team. Once that is created, use the profile of the North Carolina FC to come up with a logo and a mascot.

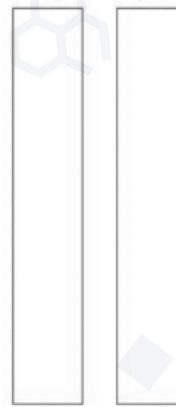
Hint: Example - City & State: Chicago, IL, Team Name: Chicago Pandas, Mascot: Penny the Panda, Colors: Sky Blue & Slate Green

HOME JERSEY



SLEEVES

L R



TEAM COLORS

<input type="text"/>	color
<input type="text"/>	color
<input type="text"/>	color
<input type="text"/>	color
<input type="text"/>	color

AWAY JERSEY



SLEEVES

L R

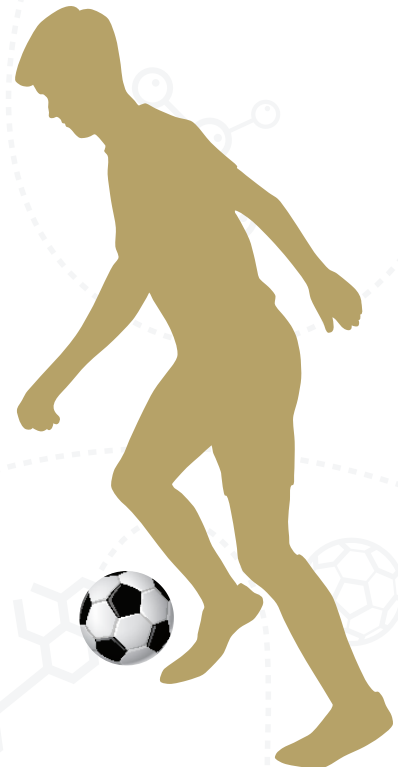
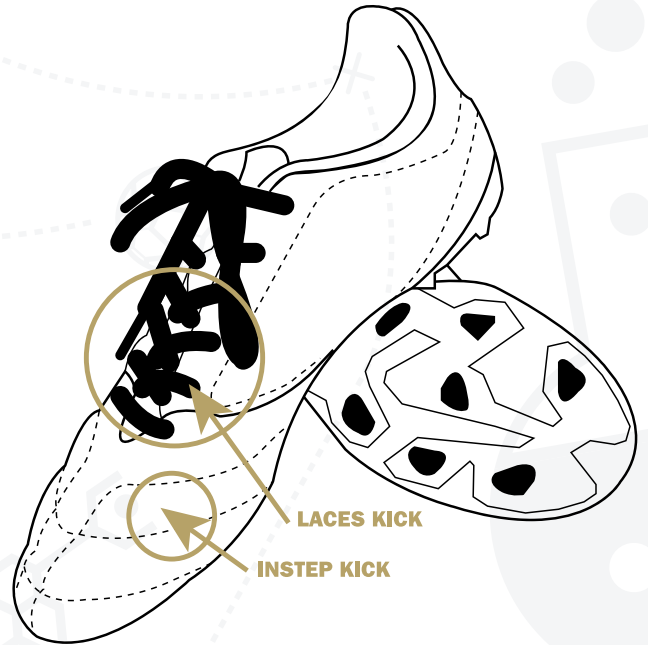
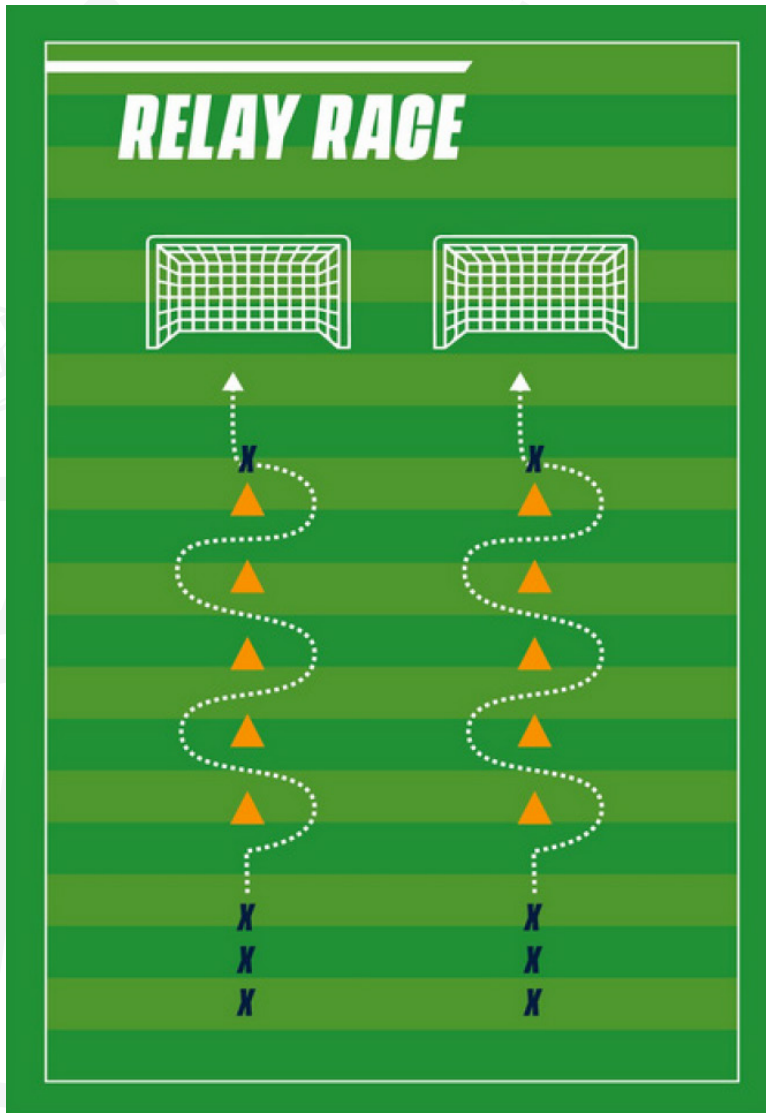


Dribbling

Description: Soccer players wear soccer cleats and can use the inside, outside or laces (top of the shoe) when they dribble in soccer.

Activity: Set up two soccer goals. Place a few cones, a few yards apart, in front of the soccer goals (see image below). Create two teams of players that will stand at the end of the cones, with one soccer ball for each team. Each player will take turns dribbling the soccer ball around the cones and try to score a soccer goal after they make it through them. The player will then dribble the soccer ball back and give it to the next player on their team.

Additions: Race against the other team! Add a time limit. Players can also try this activity using one foot or both feet.



Reaction Time

Description: All soccer positions must react quickly to what is happening in the game. It is especially important for goalkeepers to have a fast reaction time. They usually only have about 0.3 seconds to react to shots and penalty kicks. In this lesson, you will work on your reaction time and calculate your save percentage.

Save Percentage = (# shots stopped/# of total shots) x 100

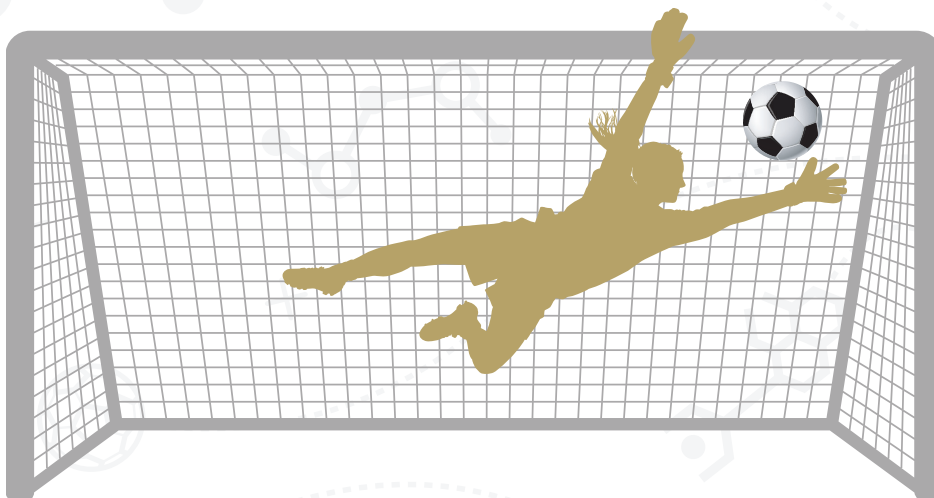
Activity: Find a space somewhere inside or outside and make a goal with two cones. You will need a classmate or partner. One of you will act as the “goalkeeper,” and one will act as the “shooter.” The “goalkeeper” will stand inside the goal. The “shooter” will place a soccer ball and line it up 12 yards from the goal. The “shooter” will shoot at the “goalkeeper,” and the “goalkeeper” will see how many shots he/she can save out of 10 shots.

Part 1: Calculate how many successful saves are made from 10 shots. Record your results in the table below and calculate your save percentage.

Part 2: Use the soccer ball to calculate how any successful saves are made out of 10. Record your results on the table below and calculate your save percentage.

Additions: Switch positions with your partner, with the new “shooter” taking 10 shots against the new “goalkeeper.”

Name	Number of Saves										Save Percentage
	1	2	3	4	5	6	7	8	9	10	



NWSL Teams

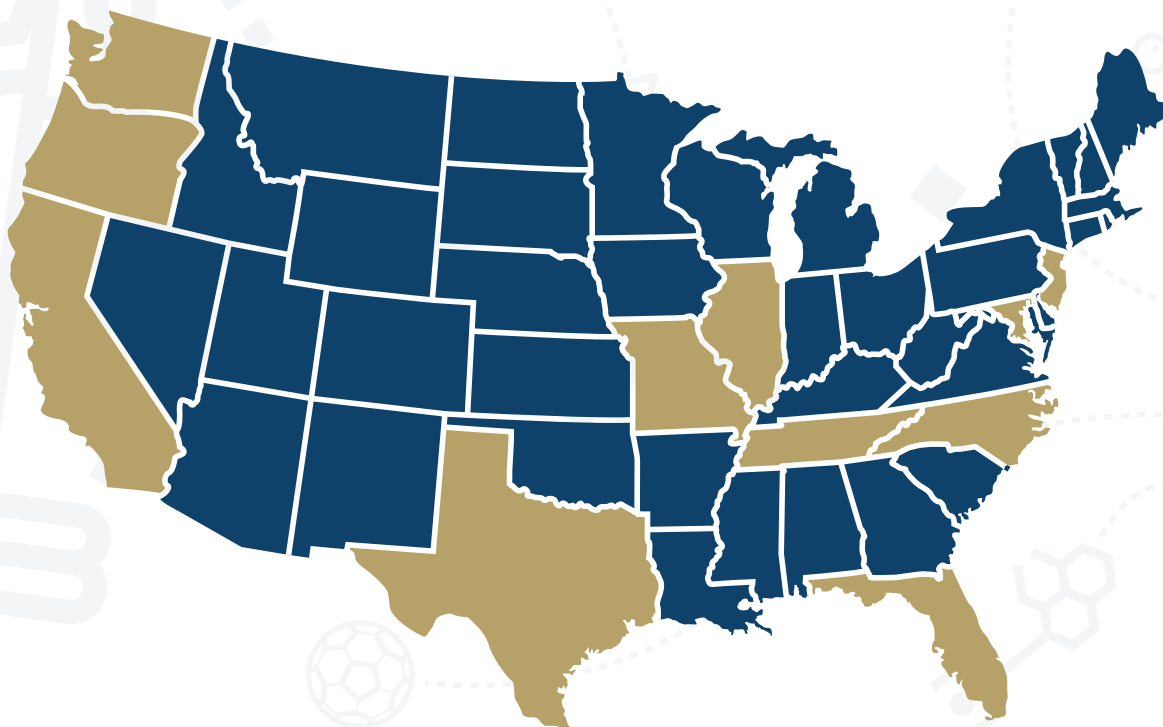
Description: National Women's Soccer League is a women's professional soccer league run by the United States Soccer Federation. The league consists of 12 teams.

Activity: Use the logos, word bank, and map to complete the worksheet.

Part 1: Fill in the team name and the city/location associated with each of the 12 NWSL team logos using the word bank provided.

Part 2: Use the word bank to label the 12 NWSL team names on the correct location on the map below.

Hint: If you need help locating the teams on the map, do some research online or ask a classmate for help.



NWSL Teams
Portland Thorns FC
Houston Dash
Washington Spirit
Racing Louisville FC
North Carolina Courage
Chicago Red Stars
OL Reign
Orlando Pride
NJ/NY Gotham FC
Kansas City Current
Angel City FC
San Diego Wave FC



USL Teams

Description: United Soccer League One is a men's professional soccer league that consists of 12 teams around the United States.

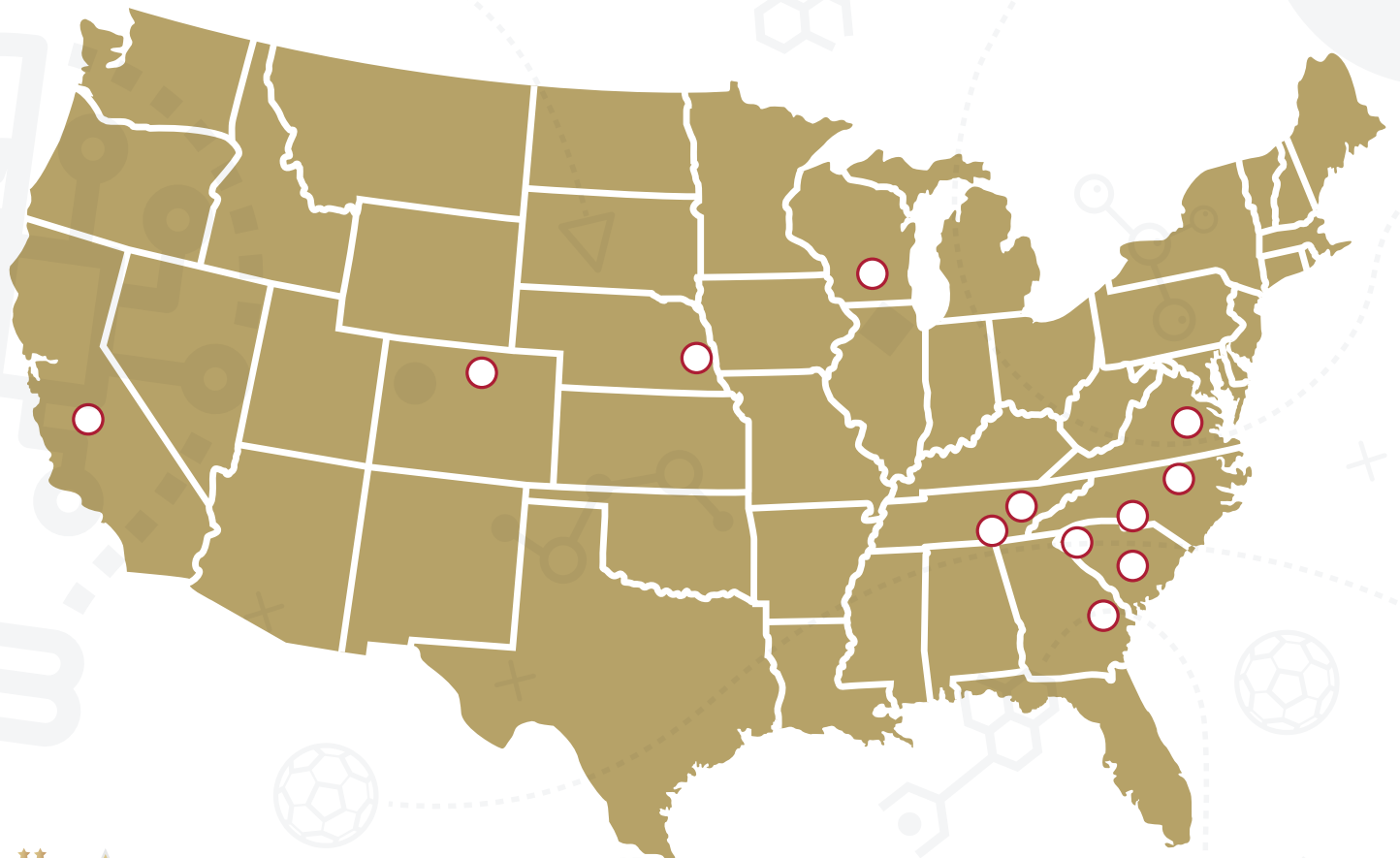
Activity: Use the logos, word bank, and map to complete the worksheet.

Part 1: Match the team name with each of the 12 USL League One team logos provided.

Part 2: Use the word bank to label the 12 USL League One teams on the correct location on the map below.

Hint: If you need help locating the teams on the map, do some research online or ask a classmate for help.

USL League One
Central Valley Fuego FC
Charlotte Independence
Chattanooga Red Wolves FC
Forward Madison FC
Greenville Triumph SC
North Carolina FC
Northern Colorado Hailstorm FC
Union Omaha
Richmond Kickers
South Georgia Tormenta FC
Lexington SC
One Knoxville SC



Throw-In

Description: In soccer, when the ball goes over the sidelines by one of the teams, the other team is awarded a throw-in. Players must stay behind the line, throw the ball over their heads, and keep both feet on the ground for play to resume.

Activity: Try throwing the soccer ball behind the line at a 5' x 5' target 10' away. Write down how many throws bounce inside the target.

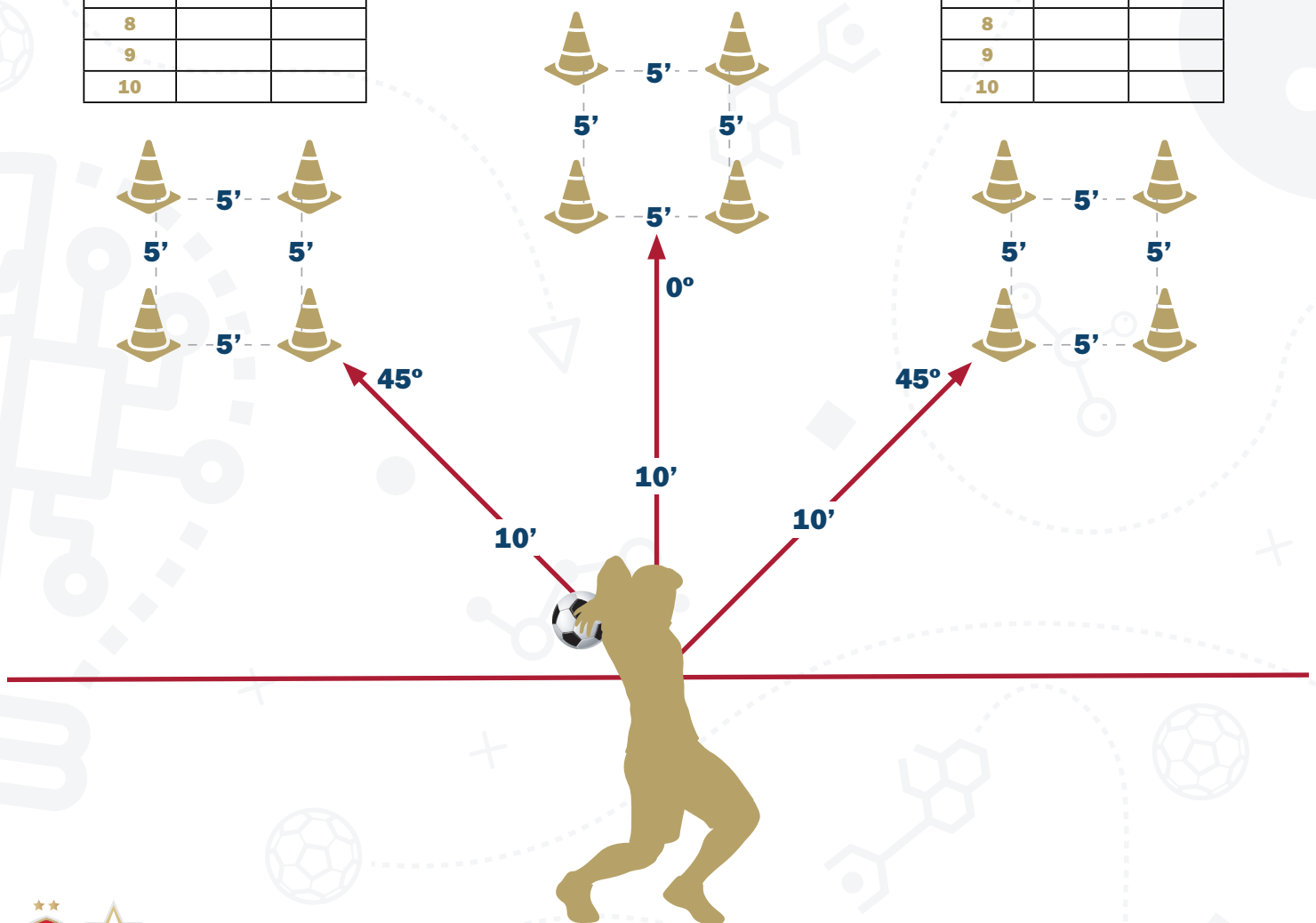
Part 1: Attempt throw-ins straight onto the field (0 degrees), slightly to the left (45 degrees left), and slightly to the right (45 degrees right).

Part 2: Place 5' x 5' targets 10' away and mark "hit" or "miss" in the tables provided.

Throw-In	Hit	Miss
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Throw-In	Hit	Miss
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Throw-In	Hit	Miss
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		



Biomechanics (Newton's Law)

Description: Newton's First Law states that an object will not change its motion unless a force acts on it.

Activity: Build your own catapult to observe Newton's First Law using these materials:

7 craft sticks | 3 rubber bands | a milk cap | cotton balls {or other objects to launch}

Step 1: Stack 5 craft sticks together, and rubber band the ends.

Step 2: Stack 2 craft sticks together, and wrap a rubber band around the very end.

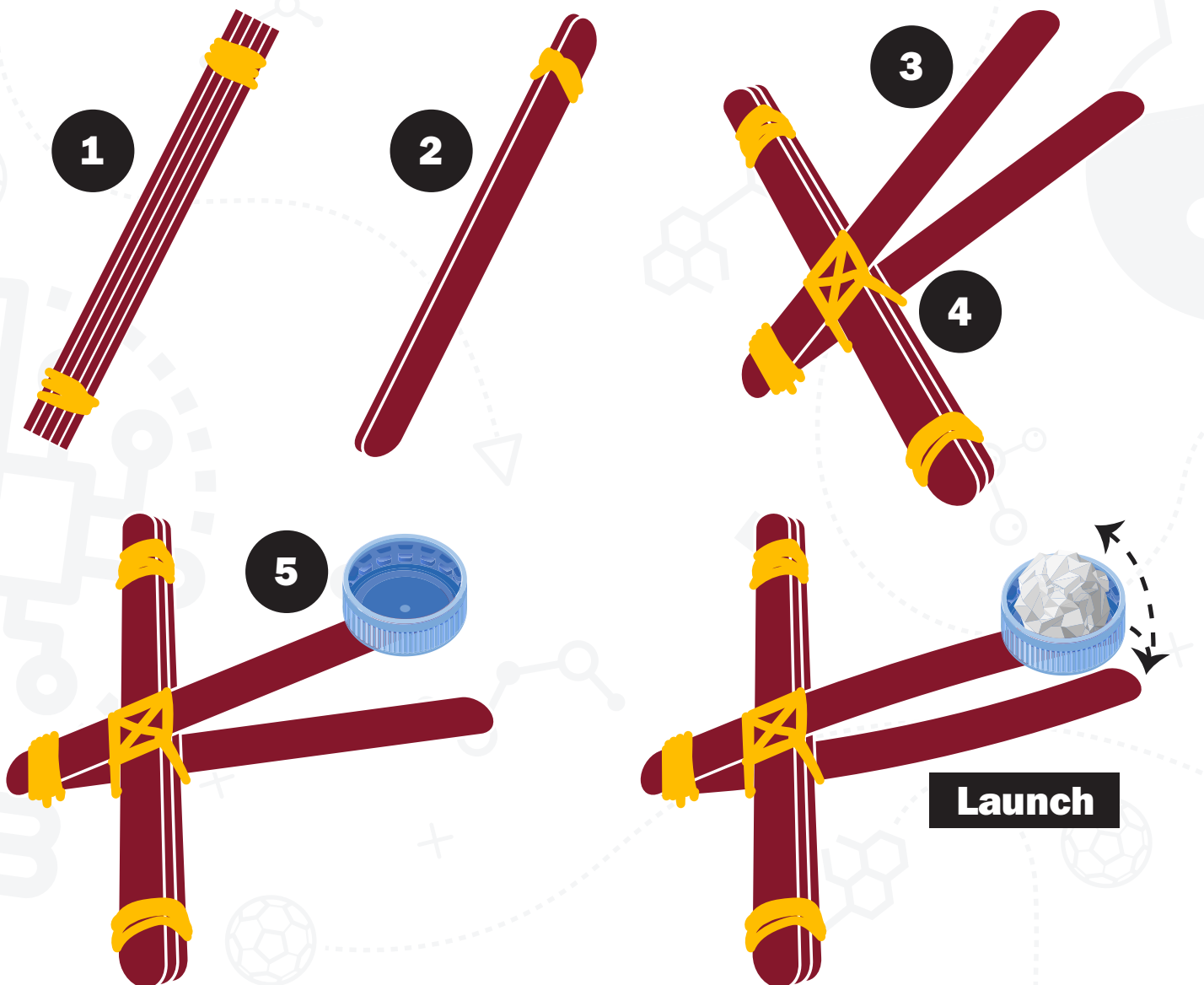
Step 3: Separate the 2 craft sticks. Place the stack of 5 craft sticks between the 2 craft sticks.

Step 4: Wrap a rubber band around all of the craft sticks to hold the catapult together.

Step 5: Glue a milk cap {or something similar} on to serve as a launching platform

LAUNCH AN OBJECT WITH THE POPSICLE STICK CATAPULT

Push down on the top craft stick and release to launch an object from the milk cap.



Soccer Equipment & Rules

Description: The game of soccer has a variety of rules and equipment that are used during practices and games by the players, coaches, and referees. In this lesson, you will learn about some of those rules and equipment.

Activity: Use the word banks below to complete the worksheet on soccer rules and soccer equipment.

Soccer Equipment

Use the following soccer equipment word bank to fill in the blanks below.

Shin Guards Cones Whistle Soccer Cleats
Yellow Card Red Card Flag Soccer Pump
Soccer Ball Soccer Goal Jersey Gloves
Captain Armband

1. A ref uses a _____ to start and stop the soccer game.
2. Players must be wearing _____ underneath their socks that are checked by the ref before the game in order to play in the soccer game.
3. The leader on the team usually wears a _____.
4. A _____ is used to fill the soccer ball with air.
5. A goalie uses _____ in order to catch the soccer ball.
6. A _____ is where you score goals.
7. A ref uses a _____ to warn players of dangerous play.
8. Each player must wear a _____ that matches their other teammates.
9. _____ are used in practice to help prepare for games.
10. Each player is required to wear _____ on their feet that are checked by the ref before the game in order to play in the soccer game.
11. A _____ is placed in the middle of the field before each half starts and after a goal is scored.
12. A _____ is used by the linesman to help the ref in determining which team has a throw-in.
13. A ref uses a _____ to dismiss a player from the game.

Soccer Rules

Use the following numbers to fill in the blanks below.

1 2 3 8 10 11 16 18
22 45 50 90 180

1. A maximum of _____ players on each team can be on the field.
2. A soccer half is _____ minutes long.
3. A maximum of _____ players can be on the field at once.
4. A soccer goal is _____ yards wide.
5. The penalty box is _____ yards long.
6. A soccer game is _____ minutes long.
7. A maximum of _____ goalies can be on the field.
8. If a team is in a 4-3-3 formation, there are _____ number of midfielders.
9. If a team is in a 4-2-2 formation, there is _____ goalie.
10. If a member of a team is awarded a red card, there are now _____ players left on their team.
11. There are _____ feet in 60 yards.
12. If a soccer team has a 10-10 record, their winning percentage is _____%.
13. If a soccer team scored 34 goals but gave up 18 goals, their goal differential is _____.



