Chick-fil-A
COLLEGE FOOTBALL
HALL OF FAME
ATLANTA
™

9th - 12th Grade

TEACHER PLAYBOOK

INTRODUCTION

A visit to the Chick-fil-A College Football Hall of Fame is an amazing experience for fans of all ages. For students, however, the entertainment factor of a trip to the Hall can be enhanced by the opportunity to connect a beloved sport with classroom learning. Founded in 1951 by the National Football Foundation, the College Football Hall of Fame immortalizes the greatest of the amateur gridiron. 5.1 million people have coached or played the game and less than 1,300 are inductees into the Hall of Fame. The College Football Hall of Fame strives to use its position as a trusted authority within college football to educate, inspire, entertain, and connect audiences while honoring the people, traditions and passion of the game.

The goal of the curriculum contained in this Teacher Playbook is to provide educators with tools to create a unique learning experience for their students – because learning happens everywhere – not just in the classroom. The Teacher Playbook lessons integrate football and STEAM-based content in hands-on projects that allow students to meaningfully apply their skills and knowledge to real-world situations. Aligned with George Standards of Excellence and national standards for science, technology, engineering, math and art, the lesson plans are flexibly designed to allow teachers to tailor the content to meet their learning objectives for their students.

BIG THOUGHT

CURRICULUM WRITERS

Lily Binford is a passionate science teacher and curriculum writer who strives to provide dynamic, experiential, place-based learning for students that focuses on solving real-world problems through investigation and innovation. Her three foundations of teaching emphasize building warm, mutually respectful relationships with students, asking rigorous questions, and making content relevant by connecting scientific concepts to everyday life. She strongly believes education should not be contained within the four walls of a traditional classroom but take place anywhere and everywhere, including informal learning experiences like field trips, outdoor explorations and meeting professionals in STEAM industries. Lily taught middle school in Dallas, Texas for six years and currently teaches 7th and 8th grade science at a public charter school in Glenwood Springs, Colorado where she takes students outdoors as much as possible. She holds a Master of STEM Education degree from Southern Methodist University and a Bachelor of Arts in English from the University of Texas at Austin. A native of Dallas, Lily lives in the Roaring Fork Valley of Colorado with her husband James and a Siberian Husky named Haze.

Sherry Dieterich is a computer science and mathematics Teacher at Braswell High School in Denton, Texas. Sherry strives to provide a safe environment in her classroom where students can grow mentally, emotionally and socially. Her goal as an educator is to create well-rounded students who are prepared for the world ahead of them, so they can achieve their highest potential and find their passions. Because Sherry believes that students learn and retain knowledge better with hands-on learning, she is an advocate for providing students with life experiences outside of the classroom. Sherry holds a Bachelor of Science degree in computer science with a minor in mathematics and a master's degree in education administration. A high school teacher for 15 years, she has written curriculum for Denton ISD and Big Thought. Sherry lives in Denton, Texas with her husband and Huey the cat.

Krissi Oden has more than 15 years of experience in art education guided by a philosophy that focuses on a Constructivist approach to teaching and learning. Krissi's goal as an educator is to empower others to celebrate their uniqueness, and to build upon their own experiences and cultures as they learn and grow. She believes it is important to identify and empower spaces such as the College Football Hall of Fame where students can apply concepts they have learned to real world examples, as well as deepen their understanding that learning happens everywhere – not just in the classroom. Krissi has taught art in middle school, high school and at the college level and holds two master's degrees, one in art history and museum education from the University of North Texas and a second in teaching in art education from Texas Woman's University. Currently, she is the Cultural Arts Manager for the City of Bedford, Texas. She lives in Denton, Texas with her husband, daughter, son and their two blue heelers.

Each lesson contains the following components:

- **Lesson Title**
- **Players** - Grade Levels.
- **Equipment** – Supplies required for the lesson as written.
- **Kickoff Question** – An overarching question which kickstarts learning and serves as connective tissue for the entirety of the lesson.
- **Pregame** – Establishing a foundation for learning. Intended to be completed prior to visiting the Hall, the Pregame provides background information and topics for classroom discussions to ignite student curiosity and prepare them for their explorations at the Hall and in the classroom.
- **First Half** – Assignments for students to complete as they explore the Hall, most frequently data collection or sketching. In order for students to absorb as much as possible during their Hall experience, most lesson activities take place before and after the field trip.
- **Second Half** – Where learning is solidified by connecting classroom content with real-world experiences at the Hall. Lesson projects challenge students to apply the knowledge and concepts from "Pregame" and "First Half", utilizing data gathered on the field trip.
- **Extra Point** - Optional art activity or project based on concepts from the lesson.
- **Game Stats** – Fun fact related to the lesson theme.
- **Going Pro** – Information about a career connected to lesson content, including required education and/or training.
- **Standards** – Applicable Georgia Standards of Excellence (GSE) and national learning standards aligned with each lesson's primary subject content.

TABLE OF CONTENTS

A BLIMP'S EYE VIEW

STANDARDS

Art:

GSE VAHSDR.CR.1a
GSE VAHSDR.CR.1b
GSE VAHSDR.CR.4b
GSE VAHSDR.PR.1a

EQUIPMENT

- Journal and writing utensil
- Student Playbook for every student
- Large paper
- Colored pencils or markers

KICKOFF QUESTION

- Does seeing a familiar object from a new perspective change how we experience or think about it?

PREGAME

(Before the Hall of Fame)

Ask who knows what a "blimp" is. More specifically, has anyone ever seen the Goodyear Blimp?

A blimp, also known as an airbus or airship, flies on gas--usually helium. The Goodyear Blimp is perhaps the most well known. For nearly 100 years, the Goodyear Tire & Rubber Company has flown blimps over sporting events, giving viewers a bird's-eye view of the game. Most blimps also display messages/images important to the viewers.

Blimps were not always marketing tools:

- The first balloon, or blimp, was created in 1912.
- In the 1920s, Goodyear blimps appeared across the US not just for people to see but also as military vehicles for the Navy.
- From 1930-'40, Goodyear blimps carried lighted signs with messages and loudspeakers to "blimp-cast" live greetings to the public below.
- During World War II, Navy convoys relied on blimps' ability to stay airborne for long periods to monitor the seas.
- Postwar, the blimps went back to lighting the skies with flying signage.
- From 1955 to now, Goodyear blimp signage has evolved from large bulbs of one color to sophisticated screens with moving images, colors and logos.
- Today blimps are familiar sights at football games especially, known to advertise nonprofits and help raise money for charities.
- One way blimps raise funds is to ask viewers to text a phrase to a number to donate to a specific cause. Many philanthropies benefit from such promotions.
- Blimp signage also may send helpful messages to people in dangerous weather conditions. Across the years, Goodyear Blimps have supported many needs in many ways.

FIRST HALF

(At the Hall of Fame)

Note: Students will use the Student Playbook for grades 6-8.

Ask students to use their Student Playbooks to take notes at the "Goodyear Blimp Experience" on the Hall of Fame's second floor. Once at the exhibit, take a moment to look around the airship and ask your students:

- What do you notice?
- What's different from the inside of this exhibit and your car?
- And a plane?
- And a train?

Tell students to find a seat, choose a favorite team, and watch a video of a Goodyear Blimp flyover of that stadium. As they do, have them consider:

- How is this perspective different from inside the stadium?
- Can a person see more or less?
- How does this change one's experience or understanding of the field or the stadium?

SECOND HALF

(Back in the Classroom)

Every student's assignment is to draw a blimp designed to help others in the way Goodyear blimps aid the Navy, nonprofits, and people in dangerous conditions. Sketch ideas first, then draw a finished version on large paper.

The Goodyear Blimp's iconic silver color and Goodyear logo are recognizable all over the US and in other parts of the world. As they design their blimps, students should consider color, shape, and marketing abilities. Tell them to brainstorm with these questions in mind:

- What distinctive characteristics will my blimp have and why?
- What will go inside?
- Does the appearance from the inside matter? If so, why?

Once students have their design, ask them.

- Which organizations would you use the blimp to raise money for and why?
- Besides raising money, how can it help an organization?

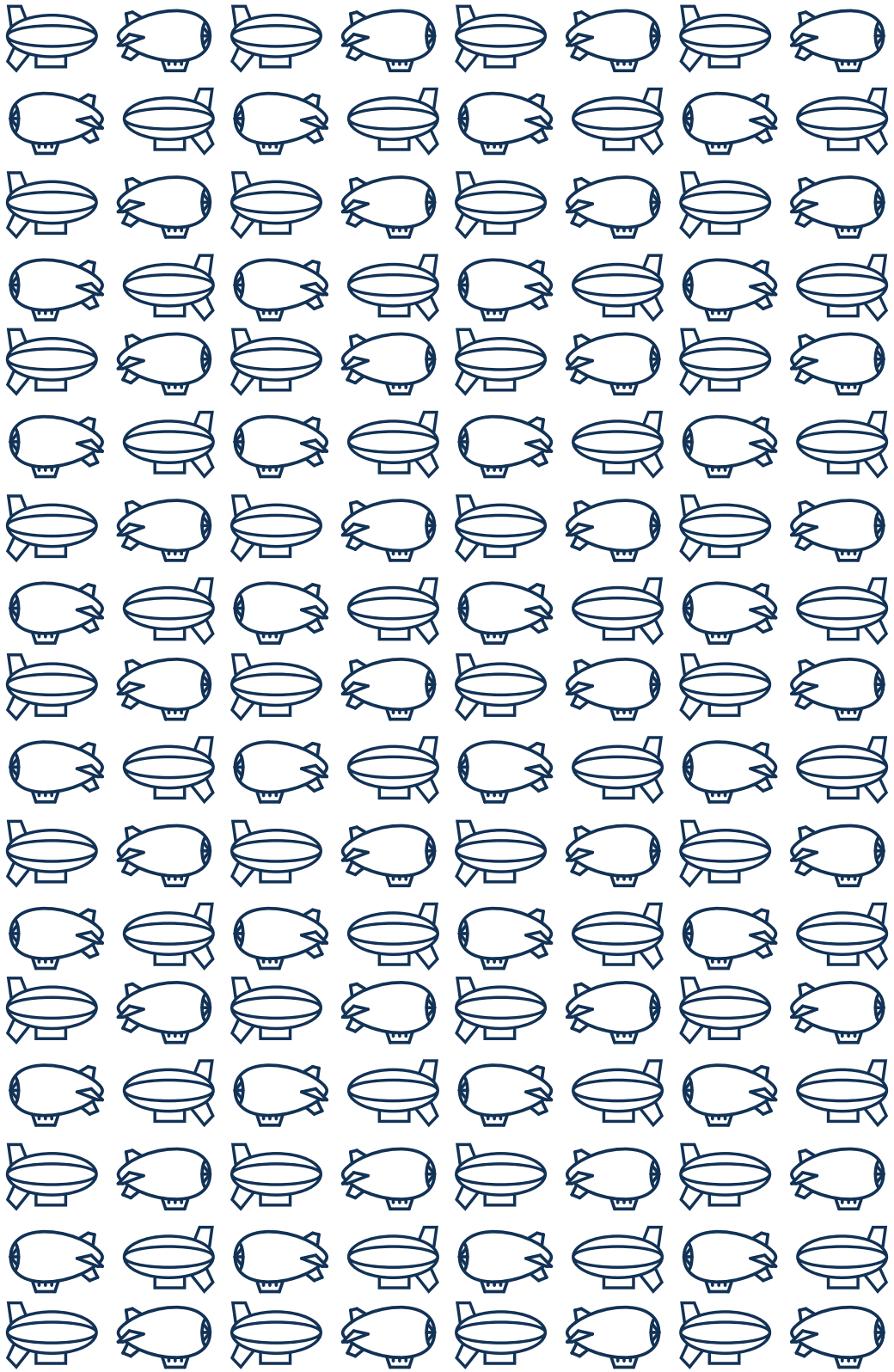
Using the five above questions as a guide, students should briefly describe their creation in words and add the description to their finished design.

GAME STATS

- The cabin windows of a blimp can be opened, allowing passengers to lean out and wave to people on the ground.

GOING PRO

- **Blimp Pilot:** A blimp pilot must have a commercial pilot's license. Since no flight school is dedicated to blimps or zeppelins, a new blimp pilot learns on the job from a trained blimp pilot. There are very few qualified blimp pilots, and they are paid to watch sporting events while hovering above the playing field in their airship with one of the best seats in the house.



A FOOTBALL STORY

STANDARDS

Mathematics:

GSE MGSE9-12.A.CED.1
GSE MGSE9-12.A.CED.2
GSE MGSE9-12.A.CED.3

Art:

GSE VAHSDR.CR.2a
GSE VAHSDR.CR.4a

Common Core Mathematics:

CCSS.Math.Content.HSA.CED.A.1
CCSS.Math.Content.HSA.CED.A.2
CCSS.Math.Content.HSA.CED.A.3

EQUIPMENT

- Journal and writing utensil

KICKOFF QUESTION

- What do stories have to do with math?

PREGAME

(Before the Hall of Fame)

Give your students this background information about stories and problem solving:

Stories help us relate more broadly to people, cultures and life. When problems arise and getting to a solution requires mathematics, it's important to clearly state both the problem and the needed solution, considering potential impact on people, places and things. A word problem is a story or situation that needs a solution.

- As a class, discuss what makes a good word problem.Think about real-world situations you've encountered. Be clear and concise; avoid unnecessary information.
- Tell students that they and their partners will create a word problem from information they collect at the College Football Hall of Fame. Two tips:
  - ☐ The story should explain the situation the person is in, any numbers or information relevant to the problem, and what solution is needed.
  - ☐ You'll need enough data from the Hall of Fame to choose from several stories when you are back in the classroom.

FIRST HALF

(At the Hall of Fame)

- Put students in groups to look for data from the Hall of Fame and its exhibits to create fabulous word problems.
- Each group should develop several ideas and collect data for each.

SECOND HALF

(Back in the Classroom)

- Have each group of students create a mathematical word problem.
- Have groups exchange word problems and try to work them.
- Return word problems to their original group with feedback from the group who tested them.
- Using the feedback, each group will resolve any issues uncovered.

Story problems improve our understanding and creativity. Use the following list to facilitate a discussion on how story problems can open insight into areas beyond math. Remember that story problems can represent someone's real-life experiences.

- How might story problems help you in relationships?
- How might story problems help you in your continued education?
- How might story problems help you in your future jobs?

EXTRA POINT

Discuss: What is a portrait?

After students offer answers, explain that a portrait is any work an artist creates of another person. On the surface that sounds as if the artist produces a realistic rendering. But there are many other ways to create a portrait. A portrait, in fact, needs no actual images of that person. It could be made of anything that represents that person in any way.

While students are at the Hall of Fame, have every person select a player to be the subject of a portrait. This portrait, however, contains no actual images of the player. It contains only objects or facts about that player, which could range from where he's from, where he played ball, something about his childhood, or any other interesting item. The

goal is to collect as much information as possible at the Hall of Fame and create a portrait using that information only.

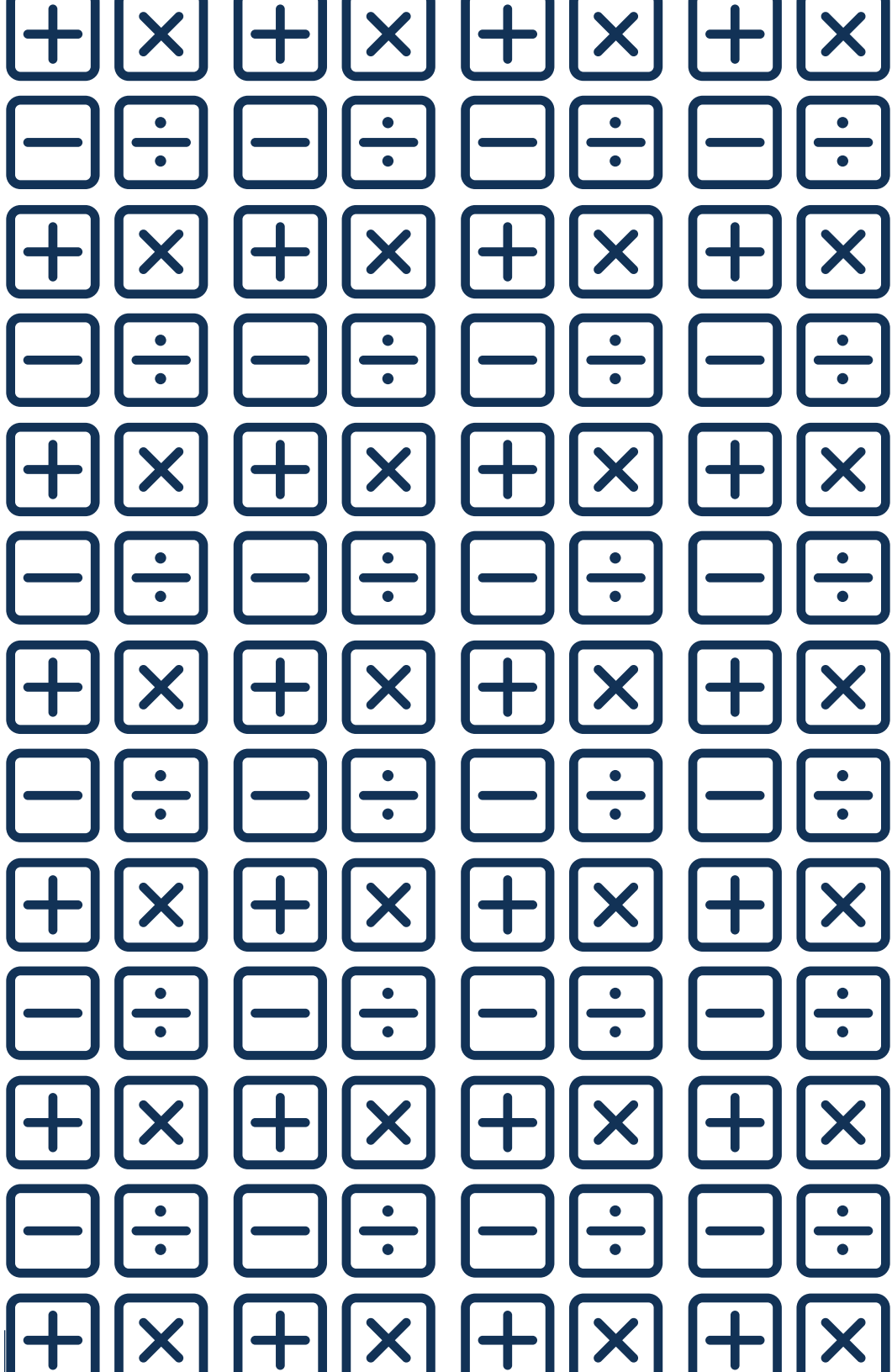
When finished, display the works and challenge the students to guess the subjects of the different portraits. Every artist should present his or her portrait and discuss what it's composed of and why those things reflect that player.

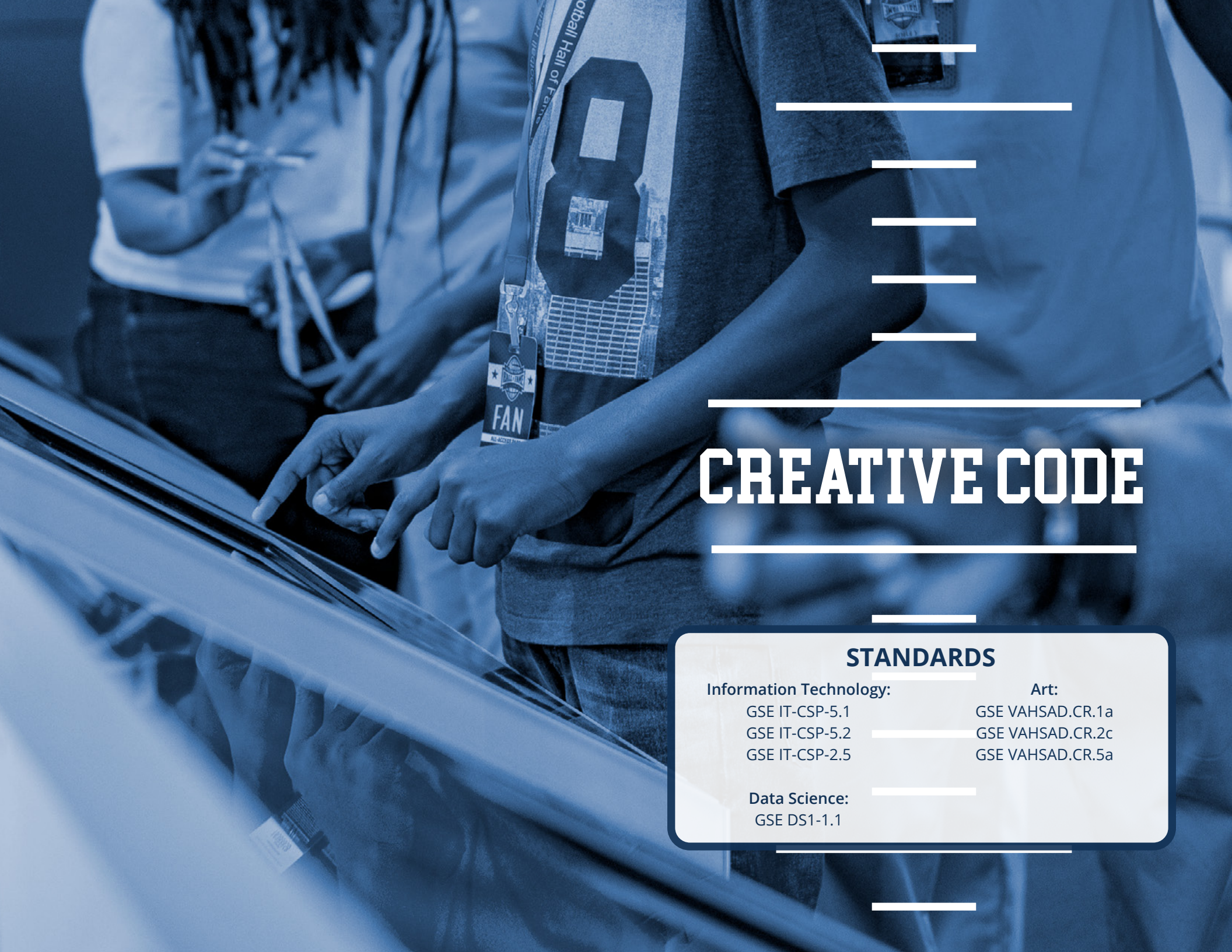
GAME STATS

- On September 23, 2000, a Penn State football player named Adam Taliaferro suited up to play against Ohio State. This game would change his life. That day, while making a tackle, he suffered a severe spinal injury, leaving him motionless on the field. Doctors said Taliaferro would never walk again, but five months after the injury, having undergone spinal fusion surgery, he walked again. The next season, as Taliaferro led his team out of the tunnel and onto the field, the cheers brought everyone in the stadium to tears.

GOING PRO

- **Writers:** Writers typically achieve a bachelor's degree in English. Usually an expert in one or more fields, writers research topics, edit, proofread and write. Sports writers support college football by covering games as journalists, creating promotional copy, identifying public relations strategies, serving as team historians, and writing books that tell the stories of players, coaches and teams.





CREATIVE CODE

STANDARDS

Information Technology:

GSE IT-CSP-5.1
GSE IT-CSP-5.2
GSE IT-CSP-2.5

Data Science:

GSE DS1-1.1

Art:

GSE VAHSAD.CR.1a
GSE VAHSAD.CR.2c
GSE VAHSAD.CR.5a

EQUIPMENT

- Journal and writing utensil

KICKOFF QUESTION

- Why are algorithms and step-by-step instructions important in computer coding?

PREGAME

(Before the Hall of Fame)

Discuss these facts and questions with your students:

- To create a unique experience for everyone, the College Football Hall of Fame uses RFID technology.
- RFID stands for Radio Frequency Identification.
- RFID technology compares to barcode scanners, except:
  - ☐ Barcode scanners require a straight line to scan and can only scan one thing at a time.
  - ☐ RFID can read multiple codes at the same time and only needs to be near the reader.
- RFID often reads things you may be unaware of. When might RFID become an invasion of privacy?
- Where do you think you've seen RFID in use?
- Have students record the list in their journals.
- Tell students that an algorithm is a set of step-by-step procedures. After they experience the College Football Hall of Fame, they'll create an algorithm and a program based on their experience.

FIRST HALF

(At the Hall of Fame)

As they enter the College Football Hall of Fame, remind your students to receive and register their All-Access Pass, which allows the building to recognize them as they move about the Hall of Fame. The students will receive an RFID-enabled badge.

As students tour the Hall of Fame, ask them to record the following in their journals.

- A detailed list of the order of their actions, such as viewing the exhibits, stopping for discussion, playing games, etc., and
- Include in the sequence of events any selections/choices they make, when/where they are recognized through the RFID technology, and any iterations (repetition).

SECOND HALF

(Back in the Classroom)

Based on their notes from their time at the Hall of Fame, have students:

- Create an algorithm in their journal.
- Use their algorithm to create a flowchart.
- Use a computer language (teacher's choice) to write a program from their flowchart. (Languages can vary from block coding like scratch to a compiled language like java or python.)
- Note any areas that may use "recursion," meaning "when you call a section of the program again".

EXTRA POINT

Explain to students that robots are programmed by algorithms to complete many kinds of tasks--and have them create an algorithm to improve someone's life.

Have them think of someone they know who could use a program. Maybe someone with special needs or an elderly person. How could a program help this kind of end user or users? What are the priorities for that user? What problem could be solved with this program?

Keeping that end-user in mind and using a language of their choice, have each student create an algorithm, flowchart and code. They may use block coding like scratch or a compiled language such as java or python.

Direct student groups to create a design for a "robot" based on one of their programs, brainstorming with their end user in mind. The students should create preliminary sketches and a final drawing. If possible, have them create a prototype of their design in modeling clay.

When finished, have your students present their designs and programs to the class, answering three questions:

- What problem are they solving?
- How does this design meet the needs of the end user?
- How does the robot's design fit with the program for the end user?

GAME STATS

- Many college players wear a GPS tracking device during practices and games which can measure their sprint distance, total distance and top speed. Not only does the data help them improve their game, but NFL recruiters can also use the data to evaluate prospective draft candidates.

GOING PRO

- **Computer Programmer:** A computer programmer should hold a bachelor's degree in computer science. The sports industry needs computer programmers to design and test new equipment and build sports applications. Football teams use data science to improve performance and hire computer programmers to develop software and analytics platforms to manage the data.

FOOD AS FUEL

STANDARDS

Science:
GSE SC2
GSE SB1

Next Generation Science Standards:
NGSS HS-LS1-6

Art/Applied Design:
GSE VAHSAD.CR.1a
GSE VAHSAD.CR.2c
GSE VAHSAD.CR.2e
GSE VAHSAD.CN.2b

EQUIPMENT

- Journal and writing utensil
- Anchor chart paper
- Anchor chart markers
- Packaging from a variety of food products (at least one for every two students) with nutrition labels.

KICKOFF QUESTION

- What are macromolecules, vitamins, and minerals? How much of each does the human body need to function well?

PREGAME

(Before the Hall of Fame)

Before the lesson, collect packaging from a variety of food products, enough for at least one package to every two students. Be sure every package has a nutrition label.

Around your classroom, hang one sheet of anchor paper for each of these categories:

- protein
- fat
- carbohydrates
- Vitamin D
- calcium
- iron
- sodium

Put the students in pairs and give each pair a food package. Allow time for student pairs to visit each poster and to write the food name and the measurement of the corresponding nutrient on the poster. This may be by mass and/or percentage daily value--whatever is on the label. For example, at the "carbohydrates" poster, a pair of students with an Oreos package would write: "Oreos -- 12g - 9% DV."

After every pair of students has visited every poster, walk to each poster and identify 1) the food product with the highest measurement, and 2) the food product with the lowest measurement for that nutrient. Ask students what the values say about these foods.

As a class, define each of the nutrients along these lines:

- protein: a macromolecule made of many amino acids, essential for normal cell function
- fat: a macromolecule made of fatty acids that store energy and provide body insulation
  - saturated: single-bonded macromolecules of fat; found mainly in animal-based food products; considered the "less healthy" fat
  - unsaturated: double-bonded macromolecules of fat; found mainly in plant-based food products; considered the "healthier" fat
- carbohydrate: a macromolecule made of sugars, starches, and fibers that energize the body
  - simple: broken down quickly into energy; found in fruits, milk products, and processed and refined sugars
  - complex: sugar molecules in long, complex chains; found in vegetables, whole grains, and beans
- Vitamin D: a fat-soluble vitamin that promotes calcium absorption; critical for bone growth
- calcium: a mineral that builds bones and teeth
- iron: a mineral that carries oxygen in the hemoglobin of red blood cells throughout the body
- sodium: a mineral that allows for muscle and nerve function and keeps bodily fluids in balance

Point out that all of these terms fall into three categories: macromolecules, vitamins, and minerals. Ask students what they know about these three categories.

- Macromolecules are large molecules containing a large number of atoms. Science identifies four macromolecules: proteins, lipids (fats), carbohydrates, and nucleic acids. Proteins, fats, and carbohydrates relate to nutrition.

- Vitamins are organic and found in plants and animals. The 13 essential vitamins are Vitamins A, C, D, E, K, and eight types of Vitamin B.
- Minerals are inorganic, found in soil and water. Of the 5,000-plus minerals in the world, our bodies need these 16: calcium, phosphorus, sodium, potassium, magnesium, manganese, sulfur, chloride, iron, iodine, fluoride, zinc, copper, selenium, chromium, and cobalt.
- Ask students this question: If minerals originate in soil and water, why do we find them in plant and animal food products?

Emphasize that although every body has specific needs, standard guidelines can inform our eating choices. One set of guidelines comes from the US Food & Drug Administration. Have students write down these recommended daily intakes:

- protein: 50 g
- fat: 78 g
- carbohydrates: 275 g
- Vitamin D: 20 mcg
- calcium: 1,300 mg
- iron: 18 mg
- sodium: less than 5g

Lead a class discussion about which foods provide which nutrients and what happens to the human body that receives too much or too little of each.

FIRST HALF

(At the Hall of Fame)

In the College Football Hall of Fame, tell students to look for the following nutrition-related plaques on the pillars next to the Evolution of Equipment exhibit on the second floor.

- Georgia Tech's Total Person program
- The Training Table
- New School (the varied team menu at the University of Kentucky)

SECOND HALF

(Back in the Classroom)

Arrange students in pairs or small groups with this assignment:

- You are a nutrition coach for a university football team. You ask the players to track their food intake for two weeks. Patterns in the data indicate widespread deficiencies in protein, Vitamin D, and iron, as well as excess fat and sodium.
- Create a list of healthful food recommendations to increase players' protein, Vitamin D, and iron intake. Create a list of appealing foods low in fat and sodium. Be sure to mention which nutrients go with each food. Explain the differences between macromolecules, vitamins, and minerals.
- Prepare a means ((e.g., poster, slidedeck, video, brochure) to share the information with the team.

Have each small group present its product to the class. Invite feedback and questions.

EXTRA POINT

Have each student design a poster to visually explain the importance of one of the following nutritional categories:

- protein
- fat
- carbohydrates
- Vitamin D
- calcium
- iron
- sodium

Each poster must both inform and be visually appealing. It should be simple and make good use of the elements of design. Display finished posters around the room; ask students to explain their design choices.

GAME STATS

- The term protein, coined in 1838 by a Swedish chemist, derives from the Greek term proteios, meaning "primary" or "first place"--indicating proteins' essential function in the human body.

GOING PRO

- **Dietician:** Dietitians identify and treat malnutrition due to disease. They work with patients to determine and address which macromolecules, vitamins, and minerals are deficient in that person's diet. They often work in hospitals and other healthcare facilities. About half of registered dietitian hold graduate degrees. Dietitians and other medical professionals can become board-certified in sports medicine, allowing them to work as part- or full-time physicians for college football teams.

IT'S ABOUT TIME

STANDARDS

Mathematics:
GSE MGSE9-12.N.Q.1
GSE MGSE9-12.N.Q.2
GSE MGSE9-12.N.Q.3

Health:
GSE HEHS.7.a
GSE HEHS.7.b

Next Generation Science Standards (Engineering Design):
NGSS HS-ETS1-2
NGSS HS-ETS1-3

Art:
GSE VAHSDR.CR.2a
GSE VAHSDR.CR.1a
GSE VAHSDR.RE.3a

National Arts Standards:
Cr1.1.1a
Cr1.2.1a

EQUIPMENT

- Journal and writing utensil
- Paper
- Colored pencils or markers

KICKOFF QUESTION

- How do college football players manage their time?

PREGAME

(Before the Hall of Fame)

Ask each student to create an itinerary for an average day in his or her own life. This includes time in class, in recreational activities, with friends, with family, doing chores, sleeping, consuming media (books, movies, social media), morning and nighttime routines, cooking, eating, etc. Say to be as thorough as possible and to include the hours and minutes spent in each area. They should account for nearly every minute of a 24-hour period. You might model what you expect by showing your students an example of your own.

Now students create a pie chart of their itinerary.

Tell them to categorize their activities, assign a color to each category, and determine total time spent in each category. All similar activities should fall into one category; for example, all meals, including breakfast, lunch, snack and dinner should be grouped together. Students should also create a color key to accompany their pie chart.

Next, they draw a large circle and, like a pizza, divide it into 24 "slices." Each slice represents one hour of time. They color in the number of slices to match the number of hours they spend in each category of activities. For example, if they spend two hours total at meals, they color two slices with that color. All slices of the same color should be consecutive. For greater precision, students may color in fractions of a single slice for durations of less than one hour.

If time allows, students can use a free, on-line tool to input their data to generate a pie chart, as well as calculate the percentage of time spent in each category.

Arrange students into pairs: Student A and Student B. In every pair, Student A shares her itinerary and pie chart with Student B. When Student A presents her data, Student B asks the follow-up questions below. Student A responds, and then the two students switch roles: Student B presents; Student A asks questions; Student B responds.

- According to your itinerary and pie chart, how do you spend most of your time? On what do you spend the least time?
- How do you feel about where your time goes?
- What, if anything, about your pie chart surprised you?
- What would you like to change about how you spend your time? How might you do that?

Reconvene the class. Ask students to share anything interesting in their data or conversations. You might poll the class to find patterns in how students spend their time.

Ask the students to write down one or two measurable goals for themselves regarding how they spend their time each day. Revisit these goals one week later by asking students whether and how they adjusted their behaviors and activities. Encourage them to continue this mindful approach to how they spend their time.

FIRST HALF

(At the Hall of Fame)

Let students know how much time they have to tour the College Football Hall of Fame and which exhibits* are required. Give them a few minutes with a partner to map out a rough itinerary guided by these questions:

- If you spend the same amount of time at each required exhibit, how much time will that be?
- At which exhibits might you spend more time? Less time?

- Will you visit all of the required exhibits first and then visit the electives? Or will you alternate?
- How will you keep track of the time you spend at each exhibit?

Tell students to try to stick to their itinerary and to track the actual time spent at each. Before departing the College Football Hall of Fame, ask students how much their real visit deviated from their planned itinerary and why. Ask how this data might inform how they plan future visits to places like the College Football Hall of Fame.

*Alternative: Inform students that there are three floors, with the majority of exhibits on the second floor. Have them allot their time by floor rather than by exhibit.

SECOND HALF

(Back in the Classroom)

Ask students these three questions:

- How do you think college athletes spend their time?
- How do you think they keep track of their busy schedules and responsibilities?
- What do you think they may sacrifice to succeed both as athletes and as college students?

Share with students the following information:

- The NCAA (National Collegiate Athletic Association) restricts student athletes to no more than 20 hours per week in practice. Related activities including team meetings, conditioning, weight-lifting, visiting the trainer, and independent cross-training do not count. Game days count officially as three hours, though they typically require more time than that (travel, suiting up, postgame debriefs, etc.).
- A survey by the NCAA found that most Division I student athletes invest 30 to 40 hours per week in their sport. This number is typically highest for students playing football.

Arrange students in pairs or small groups and give each group the following case. Based on the information provided, each group must devise a one-week itinerary for this college athlete. Each group also creates a corresponding pie chart similar to the one they generated for themselves earlier in the lesson. (Note: Because this pie chart will represent one week of activities rather than just one day, students will need to think critically about how many uniform "slices" to make rather than default to 24.)

- Samuel is a Division I football player for a major university. He is enrolled as a sophomore and takes five classes, a normal load for a full-time undergrad student. For each class, Samuel spends three hours a week on homework and studying. Here is his class schedule:
  - ☐ Chemistry on Mondays and Wednesdays, 11 AM to 12:30 PM.
  - ☐ Psychology on Tuesdays and Thursdays, 1 PM to 2:30 PM.
  - ☐ Chemistry lab on Mondays, 9:30 to 10:30 AM.
  - ☐ English on Mondays and Wednesdays, 1 PM to 2:30 PM.
  - ☐ Economics on Tuesdays and Thursdays, 10 AM to 11:30 AM.
  - ☐ No classes on Fridays.
- Besides his classes, Samuel spends 30 hours a week on football-related activities:
  - ☐ Weightlifting on Mondays, Wednesdays, and Fridays, 5:30 AM to 7:30 AM.
  - ☐ Meeting with trainers, two hours total every week (flexible schedule).
  - ☐ Team meeting Mondays, Wednesdays, and Fridays, 8 AM to 9 AM.
  - ☐ Team practice Mondays, Tuesdays, Wednesdays, Thursdays, 3:30 PM to 6 PM.
  - ☐ Games on Saturdays, 1 PM to 10 PM.
- Samuel also:
  - ☐ Likes to get at least seven hours of sleep each night,
  - ☐ Takes time to eat three healthful meals a day,

- ☐ Spends three hours total throughout the week to do laundry and clean his dorm room, and
- ☐ Visits his family every Sunday for four to five hours

- In his free time, Samuel likes to:
  - ☐ Play videogames with friends,
  - ☐ Read science fiction,
  - ☐ Take naps, and
  - ☐ Watch TV, especially sports

Have each group present their proposed itinerary and pie chart(s) to the class. Invite the audience to ask questions and give feedback.

As a class, discuss what this activity teaches about time management, how to prioritize events and activities, and the daily lives of college athletes.

EXTRA POINT

Data Art relies on a set of data to convey emotions through its creative representation. Artists who use this technique start with datasets and then tell a story in some way through pattern and connection.

Explain to students they will use the data they collected either before they went to the Hall of Fame, at the Hall of Fame, or from their project back at the classroom to create data art.

To better understand data art, show the students the following TED Talk titled, "The Beauty of Data Visualization" by David McCandless. The video is almost 18 minutes long. If pressed for time, stop the video at the 4:48 mark. In that time, the speaker in the video reviews two examples of data art and what it entails.

David McCandless: The beauty of data visualization | TED Talk

Once the video ends, check for understanding among the students. They should be free to manipulate their data in any way they wish, to evoke an emotion based on the subject matter of their data. When everyone is finished, create a gallery walk: Display the projects and ask for students to discuss their choices in the data art, how they feel it conveys the information in it, and how it might evoke emotion.

GAME STATS

- The 20-hour rule restricting college athletes from practicing for more than 20 hours a week was set by the NCAA in 1991 to ensure that colleges and universities respect the amateur status of college athletes and support their pursuit of a well-balanced college career.

GOING PRO

- **Operations/Scheduling Coordinator:** Operations and scheduling coordinators manage itineraries, arrange appointments and book travel for professionals in a wide variety of industries. An individual in this type of career must be highly organized and have first-rate communication skills. Though not required, a bachelor's degree in business, communications or economics can provide key knowledge and skills to succeed in this position. College football teams hire operations coordinators to create and maintain their complex calendars that include games, on- and off-season practice schedules, team travel, and individual athlete activities such as training, physical therapy and tutoring.

ONE FOR THE AGES

STANDARDS

Statistics:

GSE MSR.FQ.1
GSE MSR.FQ.2
GSE MSR.CD.1
GSE MSR.CD.2
GSE MSR.AD.1

Art:

GSE VAHSPA.CR.2a
GSE VAHSPA.CR.4b

EQUIPMENT

- Journal and writing utensil
- Image of a baby or small child wearing a football helmet
- Internet access to statistical analysis tools (optional)

KICKOFF QUESTION

- What can we learn from surveys and how can we visualize the data?

PREGAME

(Before the Hall of Fame)

Display a photograph of a baby or small child in a football helmet as a clue to this lesson. Ask your students to predict, on paper or aloud, what the lesson is about.

Say there's no age requirement (minimum or maximum) to play collegiate football. A candidate simply must be a high school graduate. Typically a person graduates high school at age 17 or 18. However, in 1990, an American named Michael Kearney got his high school diploma when he was six years old. Technically, he was immediately eligible to join a college football team.

Ask students:

- Do you think there should be an age minimum to play college football?
  - ☐ If yes, what age and why?
  - ☐ If not, why not?

Tell students you'll now pivot to something seemingly unrelated. Ask them to think about (but not yet say) their favorite day of the week (or something similarly low-stakes). Collect their answers by ballots or raised hands and discuss the results.

Ask: Why do we conduct surveys? How might a survey be useful? What are you curious to learn that you could investigate using a survey?

Now for the assignment:

- Outside this class, students will conduct a survey of at least 20 people (family members, faculty, staff, students, etc.) with this question:
  - ☐ There is no age requirement to play football at the collegiate level. Do you think there should be?
  - ☐ If the respondent answers "Yes," ask: What should be the minimum age to play football at this level?
  - ☐ Collect all responses with your own tracking system--on paper or on a device--and save to refer to later.

FIRST HALF

(At the Hall of Fame)

As your students visit the Hall of Fame, have them collect data of their choosing. For example, they could track their favorite players' birth years, how many colleges or universities have the same colors, how many times a specific position is featured, etc. Students should record the data in their journal. At the end of the visit, ask them to visually represent their collected data.

SECOND HALF

(Back in the Classroom)

Introduce the following types of data. Once you explain and give at least one example of each, ask your students to share more examples of each.

- qualitative v. quantitative
- numerical v. categorical v. ordinal
- discrete v. continuous (within numerical)
- binary yes/no (within categorical)
- nominal (within quantitative)

You might also go into random sampling, sample size, population parameters, and other concepts in statistical reasoning.

Now discuss data visualizations (graphical representations of data) around some or all of the following:

- population pyramid
- dot plot
- box-and-whisker plot (boxplot)
- sociogram
- line graph
- progress bar
- pie graph
- bar graph
- quantogram
- column chart
- stacked column chart
- waterfall chart
- bullet graph

Ask students what type of data might best serve each of these visualizations. For example, binary data like the yes-no question in the "football player minimum age" survey slots easily into a two-column bar graph. A histogram makes more sense for continuous data like the follow-up question in the survey.

Individually or in pairs, have students visualize their raw data from the 20-person survey, and choose one of the following:

- Option 1, to encourage computational and critical thinking: Have students manually process their data, choose the best visualization for it, and create it on paper.
- Option 2, to encourage computer and technology skill development: Have students process their data using free online software and analytics tools. These programs automate visualizations depending on the data processed. Students should transfer any generated visualizations to a sharing platform.

Have students either write about or present to the class both their raw data and their graphical representations. Ask them to include the steps of their data collection (survey) process, patterns they observed in the responses, their rationale for visualization choice, and any conclusions. Students presenting to the class may exhibit either their hand-drawn visualization or the visualization developed by software on a sharing platform. Encourage peer feedback and questions.

EXTRA POINT

From their survey at the Hall of Fame or outside class, have each student create a "data painting."

- Assign a different color to each variable in their data collection. For example, for data about a football player's minimum age, assign a different color to each age or age-range option.
- Brainstorm and sketch ideas. When they settle on a design, create a painting using those colors to visually display the data as art -- representational or nonrepresentational.

GAME STATS

- At age 16, Nigerian-born Amobi Okoye became the youngest football player in the NCAA (National Collegiate Athletic Association). As a defensive tackle for the University of Louisville, he played in all 13 games his first season. He went on to play pro football at age 19.

GOING PRO

- **Data Scientist:** A data scientist uses scientific methods and systems to gain knowledge from data and apply that knowledge to a broad range of fields. Data scientists make sense of messy information gathered from sources like smart devices, social media feeds and surveys. They typically earn a bachelor's degree in computer science or math and may opt for a master's degree in data science. Since data analysis is important to nearly every field and industry, data scientists can work for nearly any organization, agency or company. College sports teams often employ data scientists to analyze team statistics and consumer trends.

PUT A LID ON IT

The Science of Helmet Design

STANDARDS

Science:
GSE SAP1 (Anatomy & Physiology)
GSE SP2 (Physics)

Next Generation Science Standards:
NGSS HS-PS2-3

Health:
GSE HEHS.1.h.

Art:
GSE VAHSAD.CR.4b
GSE VAHSAD.CR.5a

EQUIPMENT

- Journal and writing utensil
- Student Playbook for every student
- One plastic egg for every group of 2-4 students
- Five marbles for every group
- A variety of makerspace materials

KICKOFF QUESTION

- Why do football players wear helmets?

PREGAME

(Before the Hall of Fame)

Put the students in pairs and have each pair list ways to protect objects from damage, e.g., safety belts and bubble wrap. Reconvene and have all students share their lists to compile one comprehensive list.

Ask students these questions:

- What are some of the features common to these kinds of protection?
- What happens to certain objects that are left unprotected? How much might it cost?
- How might we improve some of the ways we protect objects?

Now to the human body:

- What can we wear to protect the soles of our feet from uncomfortable surfaces, harsh temperatures and debris?
- What can we wear to protect our knees and elbows when skateboarding?
- What can we wear to protect our heads when we're on a bicycle or horse?
- What can we wear to protect our skin from overexposure to natural elements such as sun, wind, rain, and temperature?
- What can we wear to protect our eyes from chemicals during a lab experiment?
- What can we wear to protect our teeth when playing a sport like hockey?
- What can we wear to protect our ears from very loud sounds?

Give students this case:

- Ashley is preparing for summer camp, where she knows she'll swim at the lake, ride a mountain bike, make s'mores over a campfire, play basketball on the outdoor court, hike on rocky terrain, canoe on the river on a hot day, and set off a model rocket during a STEM activity.
- Create a complete list of what Ashley should pack for camp that includes all the protective clothing and equipment she needs to stay safe and injury-free. Tell students to be prepared to defend their reasoning.

When students have their lists, hang the lists around the room. Tell the students to check every other list for items they may have overlooked. Reconvene and create an "ultimate" list of all the protective items Ashley will need.

FIRST HALF

(At the Hall of Fame)

Note: Students will use the Student Playbook for grades 9-12 for the following activities.

Ask students to answer the following questions in their playbook.

- What is the purpose of wearing a helmet?
- What design features make a helmet effective?
- How does a helmet mimic structures found in nature?

Direct students to The Evolution of Equipment exhibit on the

second floor, then ask them to read and answer the following in their Student Playbook:

- Your brain is a powerful machine controlling your every move, every thought, every word. From the brain, messages go throughout the body, telling every organ, tissue, and cell what to do. Our brains are encased in a collection of bones known as the skull. Football players wear helmets for additional protection. How do helmets protect the brain?

Ask students to read the following and respond in their playbook:

- Certain materials are better at absorbing impact than others. Think about dropping a basketball on a hard court. It probably bounces. Now think about dropping the same basketball on a stack of pillows. What happens? Not the same reaction as on the court. Look at the helmets in the display case. Why do you think the designers used different materials inside the helmets than on the outside?

Next, ask students to read and answer the the following in their playbook:

- Helmets have radically evolved since the late 1880s. Designers, medical professionals, and physicists continue to explore how to improve on even the most modern versions. Imagine you are asked to develop a new football helmet for a major company with endless resources (read: money!). With an unlimited budget, how would you test your design before testing on a real person?

Finally, ask students to read and respond to the following in their playbook:

- Biomimicry means to design a structure or system inspired by something in nature. Early airplanes, for example, were modeled after birds in flight. Other than helmets, what part of a football player's gear or uniform may have been inspired by something in nature? Why do you think so?

SECOND HALF

(Back in the Classroom)

Show students a plastic egg and open it to show five marbles inside. Say the egg is a human skull; the marbles inside are the brain.

Arrange the class into groups of 2-4 students. Give each group a plastic egg holding five marbles and this challenge:

- Develop a "helmet" for this egg to prevent it from breaking open when it's dropped from 3 meters above the ground. (Measure out 3 meters for the students.)
- As with a real helmet, the egg helmet must be easy to remove.
- Use at least 3 of the different materials provided.
- Use ONLY the materials provided.

Tell students to sketch and label a helmet design so that anyone else could understand its structure and function. (Optional: Students develop their helmet designs using free online tools.) After peer feedback and teacher approval, each group should adjust its design and begin to build a prototype.

Give students a variety of makerspace materials (tape, rubber bands, pipe cleaner, cardboard, etc.). Divide the materials to give the same quantity to each group.

Students may test their designs along the way or wait for a final class demonstration.

Every group presents its design (labeled sketch and prototype) to the class and invites peer feedback. During the presentation, ask the students:

- How did you decide what materials to use?
- What are the disadvantages of your helmet design?
- How effective would your helmet be if your egg dropped from 6 meters above ground? 12 meters? 30 meters?

- If you could use one other type of material not provided, what would it be and why?

Optional extension: Tell the class that a college football team needs a new helmet design. Each group will develop a visual sales pitch for their design offering practical reasons supporting the materials used and helmet efficacy.

EXTRA POINT

Ask students to read these bullets and follow the instructions:

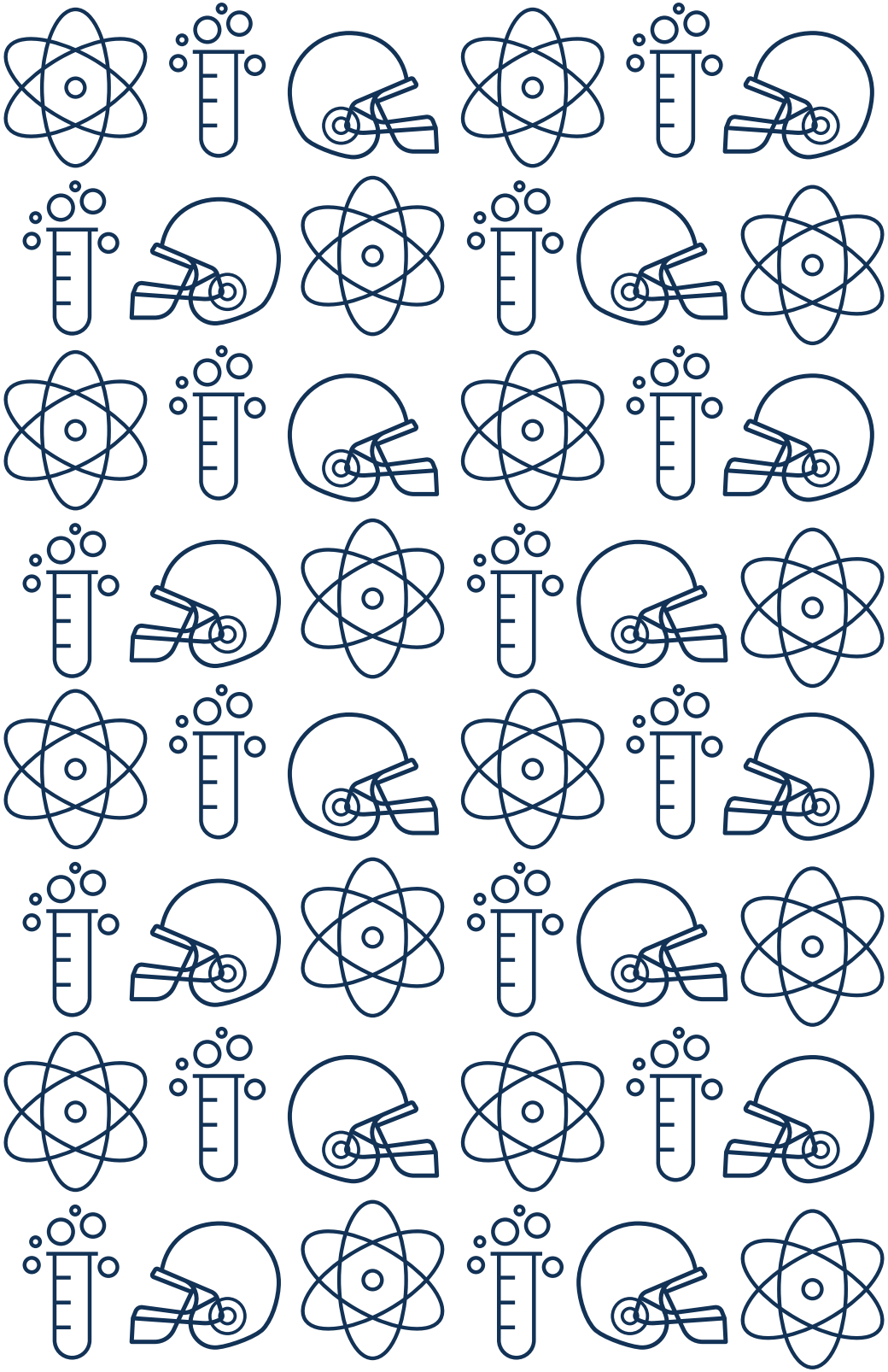
- Football players sometimes sport stickers or decals on their helmets. Some represent that player's individual or team accomplishments. Some may stand for a cause important to the player. Without knowing the player personally, viewers know more about him.
- If you were an athlete in front of hundreds of viewers, what would you want crowds to know from your helmet? Draw a helmet with the images important to you. Ask your friends or family to do the same and compare your choices. Next time you watch a football game, check for helmet stickers and guess what they might represent.

GAME STATS

- Helmets were not mandatory for pro football players until 1943, shortly after John T. Riddel invented the first plastic helmet.

GOING PRO

- **Neurologist:** A neurologist diagnoses and treats disorders affecting the brain, spinal cord and nerves. This type of physician earns a bachelor's degree in a science or medical field and then attends medical school. A residency to gain practical experience in neurology is also required. A neurologist may work in a traditional hospital, research hospital, private practice, or at a university as an academic researcher. Neurologists and other medical professionals can become board-certified in sports medicine, allowing them to work as part- or full-time physicians for college football teams.



RIGHTIES VS. LEFTIES

STANDARDS

Mathematics:	Common Core Mathematics:
GSE MGSE9-12.S.ID.1	CCSS.Math.Content.HSS.ID.A.1
GSE MGSE9-12.S.ID.2	CCSS.Math.Content.HSS.ID.A.2
GSE MGSE9-12.S.ID.3	CCSS.Math.Content.HSS.ID.A.3
GSE MGSE9-12.S.ID.4	CCSS.Math.Content.HSS.ID.A.4

Art:
GSE VAHSDR.CR.6b

EQUIPMENT

- Journal and writing utensil
- Student Playbook for every student

KICKOFF QUESTION

- Are there differences between right-handed and left-handed people?

PREGAME

(Before the Hall of Fame)

- Survey the group for righties and lefties.
- As a class, discuss the difference.
- In their journals, have students recreate this table to use at the College Football Hall of Fame.

Right handed	
Left handed	
Right angle (center)	
Acute angle (to the left)	
Obtuse angle (to the right)	

FIRST HALF (At the Hall of Fame)

Note: Students can use their journals or the Student Playbook for grades 9-12.

- Send students to the Air Force Air Raid on the second floor. Some college football players use this AI (Artificial Intelligence) system to prepare for games.
- As students await their turn, have them watch other players and make tally marks for each player in the table in their journals or playbooks.
  - ☐ A ball thrown near the center is close to a right angle.
  - ☐ A ball thrown to the left is an acute angle.
  - ☐ A ball thrown to the right is an obtuse angle.

SECOND HALF (Back in the Classroom)

Using their data from the Hall of Fame, have students complete these tasks In their journals:

- Create a frequency table of the data.
- Graph the data using a histogram.
- Add together the right-handed and left-handed people for the total number of people.
- Use that and the tally marks from your table to find:
  - ☐ The ratio of people who were right handed, and
  - ☐ The ratio of people who were left handed.

Discuss these questions with your class:

- Were there more right- or left-handed people?
- What percentage of this population is left handed?
- How does that compare to the world population of 12 percent?
- In which direction was the ball thrown most?
- What patterns do you notice?
- From the data you collected, what can you infer about left- and right-handed people?
- From the data you collected, what hypothesis can you form?
- Explain your findings using a ratio relationship.

EXTRA POINT

- Ask students if they have ever tried to use only their non-dominant hand. If so, what was it like?
- Was it more difficult?
- How did it feel?
- Do you think with enough practice you could use either hand the same way? Why or why not?

Ask students to choose an object in the classroom, draw it with their dominant hand, and then draw the same object with their other hand. When everyone is finished, discuss the experience and invite volunteers to share their work.

Next have students work up to larger drawings. If possible, have them create a large drawing with only their non-dominant hand.

Finally, have students explore using their non-dominant hand with various types of media: watercolor, crayon, pastel, etc. After some time, discuss which media was most challenging and why that might be.

Tell students that although it's much harder using your non-dominant hand, it can actually create some very interesting lines and shapes.

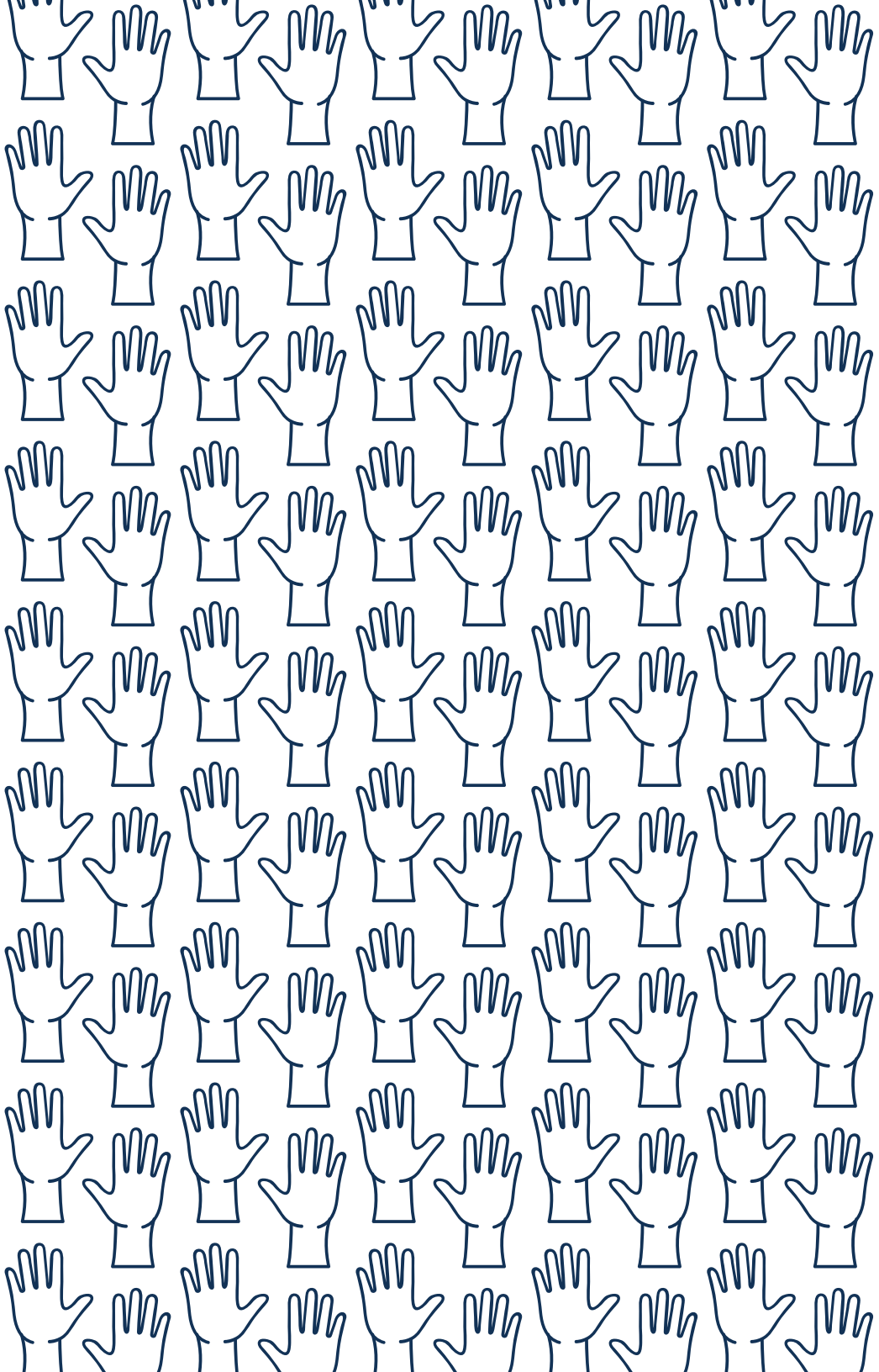
They should particularly focus on how they manipulated lines throughout their piece--by focusing on the movement, size, or shapes of the lines they created.

GAME STATS

- Of the last 11 presidents, five were left handed. Other famous left-handers include Lady Gaga, Leonardo da Vinci, Bill Gates, Tim Tebow, Justin Bieber and Steve Young.

GOING PRO

- **Sports Statistician:** Sports Statisticians combine a knowledge of sports with bachelor's degree in mathematics, statistical analysis or computer science. Employed primarily by teams and television networks, some sports statisticians focus on recording statistics data in real-time at games while others analyze data to improve team performance.



RUN, JUMP, PLAY

STANDARDS

Science:

GSE SAP1 (Anatomy & Physiology)
GSE SAP2 (Anatomy & Physiology)
GSE SAP4 (Anatomy & Physiology)

Next Generation Science Standards:

NGSS HS-PS3-3
NGSS HS-LS1-3

Art:

GSE VAHSDR.CR.1a
GSE VAHSDR.CR.2a
GSE VAHSDR.PR.1a

EQUIPMENT

- Journal and writing utensil
- Student Playbook for every student
- A timer for every two students
- Enough 5' sheets of butcher paper for every two to four students
- Markers

KICKOFF QUESTION

- How do various exercises affect our body's systems?

PREGAME

(Before the Hall of Fame)

Show students how and where to find their own heartbeats.

- Foot: Place your index and middle fingers above the highest point of the bone along the top of your foot. You may have to move your fingers along the bone or slightly to either side to feel the pulse.
- Wrist: Use the tip of the index and third fingers of your other hand to feel the pulse in your radial artery between your wrist bone and the tendon on the thumb side of your wrist. Apply just enough pressure to feel each beat.
- Neck: Press your first finger and middle finger to the side of your neck, just under your jaw and beside your windpipe. Don't use your thumb. Press your skin lightly to feel your pulse. If you can't find it, try pressing a bit harder or move your fingers around.

Ask everyone to find their pulse and count the beats, then put the students in pairs. Each pair has a Student A and a Student B. Give Student B a timer. Student A must stand or sit for 30 seconds to ensure a normal heart rate, then find her pulse. Student B starts his timer to measure one minute while Student A counts her heartbeats. When the minute ends, she writes down her final heartbeat count.

Now, Student A ups her heart rate by running or jumping in place. (Students with limited mobility can breathe faster to increase their heart rates.) Repeat the first procedure: Student B sets the timer for one minute while Student A counts her heartbeats. When the timer sounds, she records her heartbeats.

Option: Student A and Student B switch roles so that Student B also determines his heart rate at rest and after exercise.

As a class, discuss the results with these questions:

- Was your heartbeat faster at rest or after exercise? Why is that?
- How long do you think it took your heart to return to its resting rate after you exercised?
- What were some other ways you could feel your body respond to the exercise? [e.g., sweating, temperature increase, turning red, getting thirsty, etc.]

Create a classwide graph on which every student anonymously plots their two heart rates (at rest and after exercise). As a class, find the averages of either. You may want to point out anomalies (rates relatively high or low). Tell your students that a low resting heart rate can indicate a healthy heart, low blood pressure, and a high level of physical fitness. Professional athletes typically have very low resting heart rates. If a very low heart rate is accompanied by other symptoms, however, such as fatigue and dizziness, that person should consult a physician.

FIRST HALF

(At the Hall of Fame)

Note: For these activities, students will use the Student Playbook for grades 9-12.

Direct students to the Kia Performance Challenge on the second floor. Students should read and respond to each paragraph below in their Student Playbook:

Sure, it might be fun to slam down to send a car's accelerator from

0 to 60 mph in three seconds like Dom in "The Fast & The Furious," but it puts big stress on the transmission. Likewise, when you exercise hard without warming up, you stress your body, especially your heart and other muscles. In what other ways is care of your body like care of a car?

- Ever used a slingshot? The further back you pull the elastic, the greater the distance your missile flies. That mechanical principle is a lot like jumping from a standing position. The lower to the ground you squat, the higher you jump.
- Perform the vertical jump twice. For the first one, start from a normal standing position. For the second jump, squat down to the ground. In the table below, record your jump heights and calculate the difference.
- Most modern athletic clothing is made of sweat-wicking fabric. Cotton absorbs moisture but it stays wet a long time. Sweat-wicking fabrics like nylon and polyester help moisture evaporate quickly. Besides fabric, what are other elements a designer should consider when developing athletic clothing?

SECOND HALF

(Back in the Classroom)

Set up groups of 2-4 students each and give each group a sheet of butcher paper about 5' long. In each group, one student lies on the butcher paper while the rest uses markers to trace the outline of his body.

After the first student stands up and moves, the group should fill in the outline showing all the ways strenuous exercise affects various parts of the body. (Option: Students with Internet access can research some of these effects.) Students should use words and drawings to depict the effects, such as:

- increased heart rate
- increased blood flow
- increased breathing rate
- increased internal and external temperatures
- reddening of the skin (increase in lactic acid production)
- sweat
- hunger
- thirst
- fatigue

As they label and caption different effects, have your students include the names of body systems (respiratory, digestive, endocrine, etc.). Ask them also to include the potential long-term effects of regular exercise (decreased blood pressure, muscle development, etc.) on the organs and organ systems.

Have each group show their drawings to the group as a gallery walk or in a presentation. You also may display them around your classroom or throughout your campus.

EXTRA POINT

Ask students how they might depict objects or bodies in motion in drawings.

- How would you draw a figure to look as if it's running?
- How would you draw a ball so it appears to be bouncing?

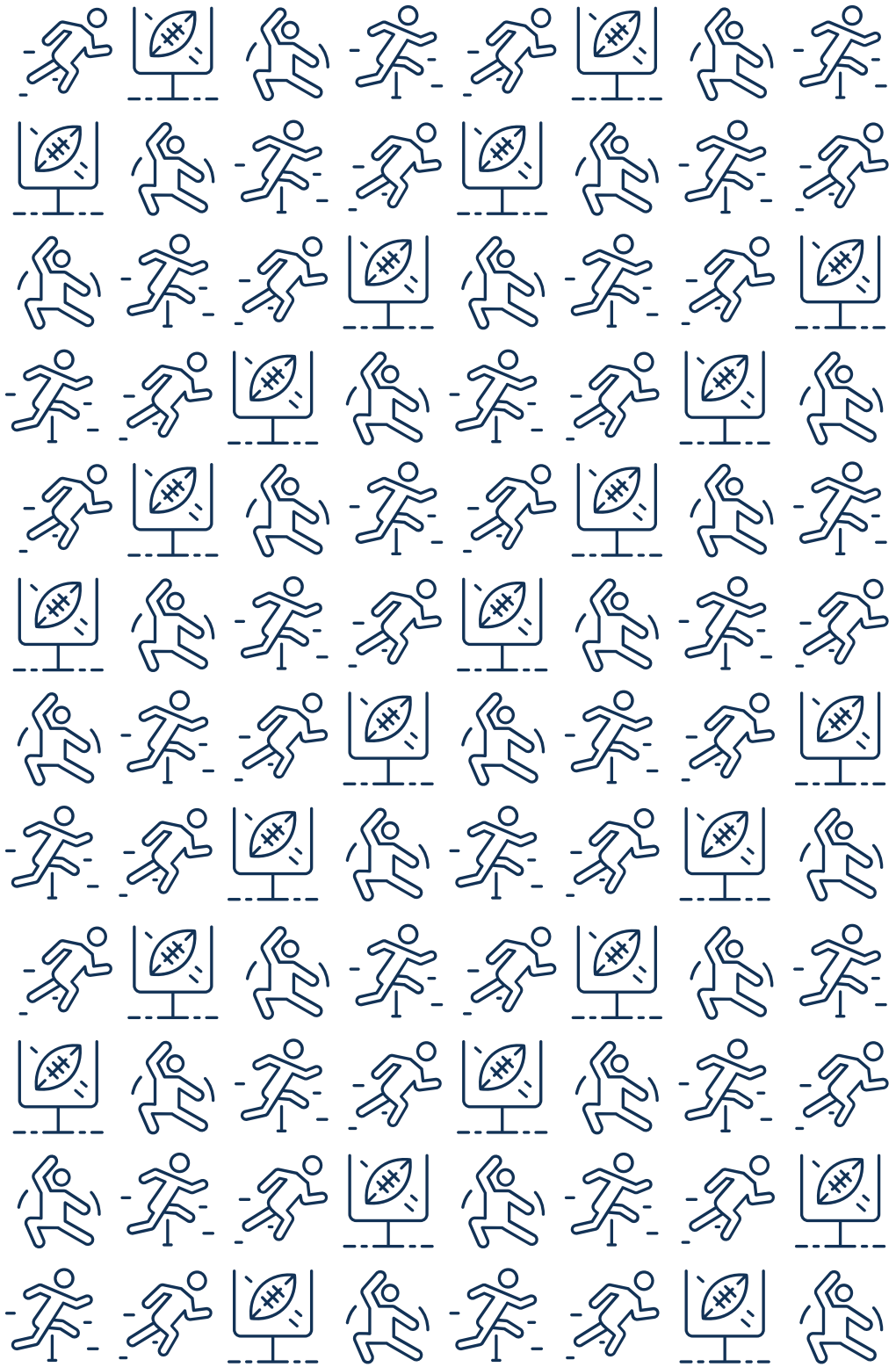
Many artists will simply draw lines behind the object as shown in this example with a ball. Ask the students to practice drawing this ball with motion lines, and then move on to bigger objects, such as a car or a figure. This project can be a series of sketchbook drawings or more refined larger drawings for presentation.

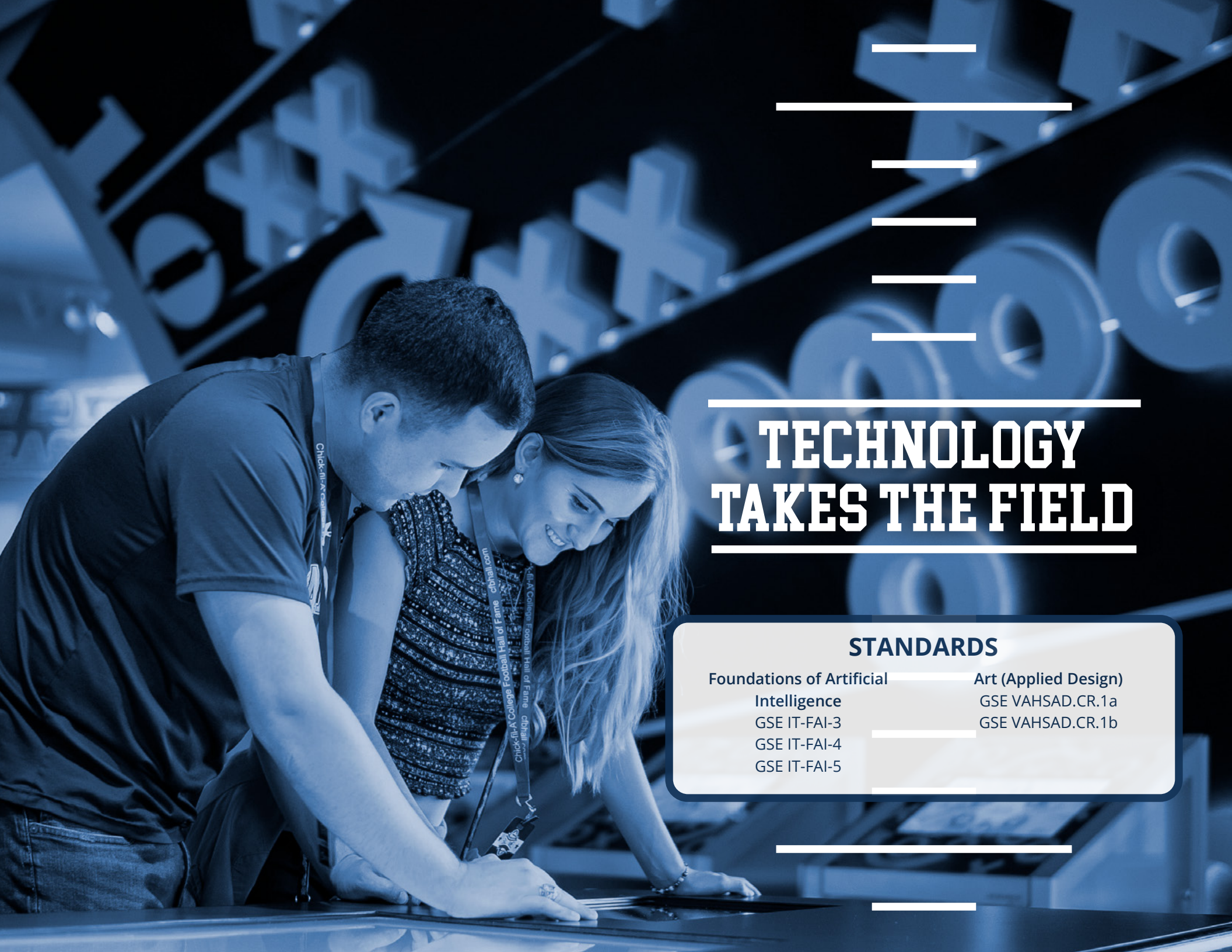
GAME STATS

- In ancient Greece, bodybuilders relied on their own body weight for exercises such as pushups and pullups. When their body weight was insufficient, they'd lift stones, logs, and even large animals.

GOING PRO

- **Cardiologist:** A cardiologist is a physician focused on heart health, able to diagnose and treat patients with cardiovascular issues. Cardiologists perform tests, prescribe treatments for chronic conditions and conduct surgeries as needed. They earn a bachelor's degree and attend medical school where they specialize in cardiology. They work at research hospitals, clinics or in private practice. Cardiologists and other medical professionals can become board-certified in sports medicine, allowing them to work as part- or full-time physicians for college football teams.





TECHNOLOGY TAKES THE FIELD

STANDARDS

Foundations of Artificial Intelligence

GSE IT-FAI-3
GSE IT-FAI-4
GSE IT-FAI-5

Art (Applied Design)

GSE VAHSAD.CR.1a
GSE VAHSAD.CR.1b

EQUIPMENT

- Journal and writing utensil
- Computer with coding software

KICKOFF QUESTION

- How can artificial intelligence (AI) help the world?

PREGAME

(Before the Hall of Fame)

Tell the students that AI mimics human intelligence by creating and building algorithms into a dynamic computing environment.

Ask students to:

- Make a list of the many ways AI serves in everyday life.
- Discuss their lists and the data that supports those uses.
- Brainstorm together where AI programs can enhance more lives. In healthcare, for instance, or in school, business, art, etc.
- Discuss in detail how those ideas can happen.

FIRST HALF

(At the Hall of Fame)

While they're at the Hall of Fame, give the students this checklist:

- On the second floor, visit the Air Force Air Raid, an AI system used by football teams, to experience how some players prepare for their games.
- While waiting in line, watch others play and take notes of what they do that seems most effective.
- Write down what steps the computer takes during the experience.

SECOND HALF

(Back in the Classroom)

Direct your students to:

- Discuss together what steps the computer takes through the Air Force Air Raid Experience.
- Report from their notes what the players at the College Football Hall of Fame did well, and discuss how the code might be changed to allow for more successful players.
- Write pseudo code for the Air Force Air Raid Experience.
- Compare their pseudo codes with each other and discuss ways to make the pseudo code concise.

EXTRA POINT

Give your students this background information:

A chatbot is a computer program that simulates and processes human conversation, written or spoken, so humans can interact with digital devices as if with a real person.

Have the class discuss the chatbots they're aware of and how they can help people. After that, have them:

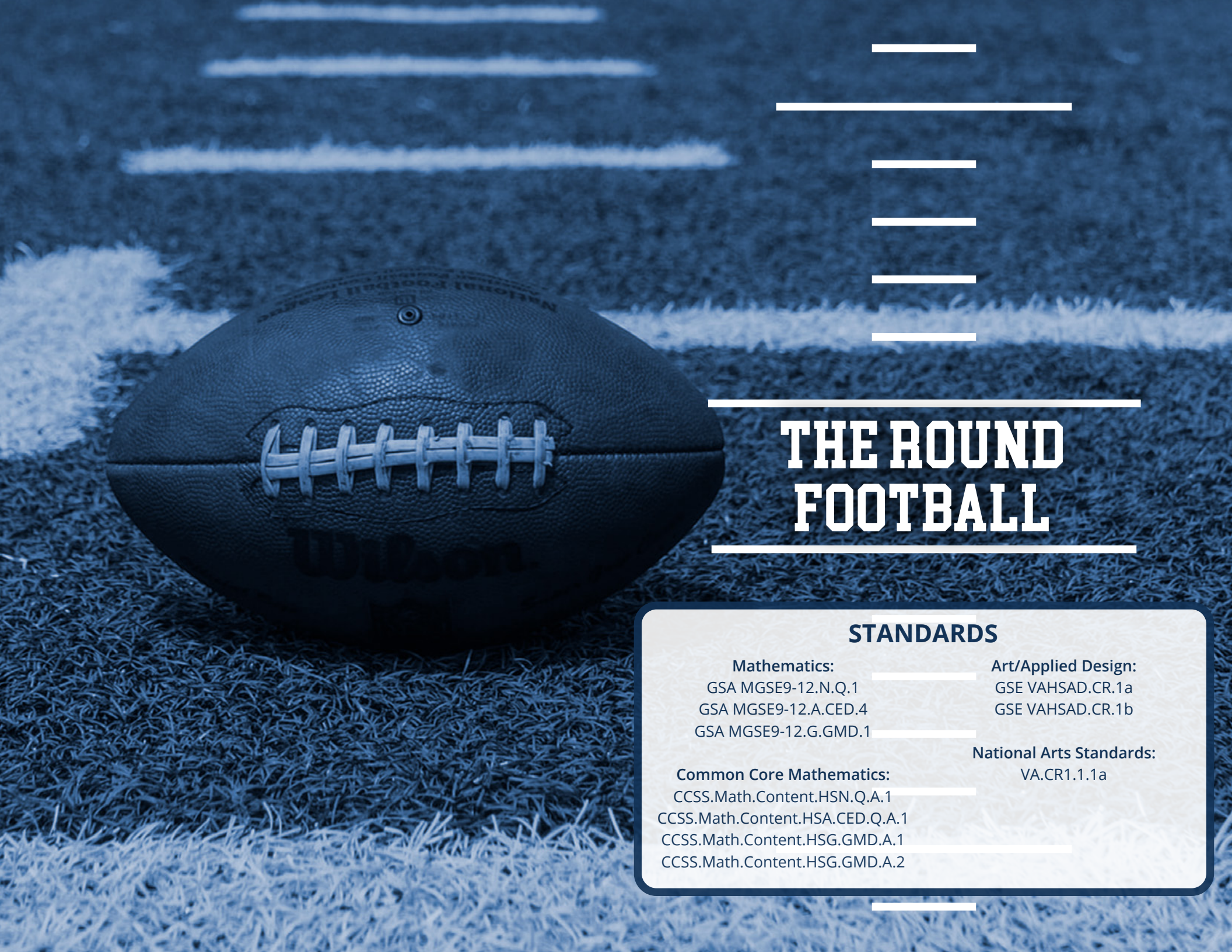
- Work in groups to design and develop a Chatbot program to help others; then brainstorm what this Chatbot would "look" like and create a visual design to "humanize" it in marketing
- Have students test and debug the code
- After the programs are written, have students test each other's codes
- Have students brainstorm AI programs to help people in their community, and even create code for those groups

GAME STATS

- AI is starting to be used to collect data on individual football players, using historical statistics to predict a given player's future performance.

GOING PRO

- **Machine Learning (ML) Engineer:** An ML engineer uses a degree in computer science to create programs that enable machines to act without being directed. A machine learning (ML) engineer can build state of the art learning modules for fitness equipment to fine tune football team training strategies.



THE ROUND FOOTBALL

STANDARDS

Mathematics:

GSA MGSE9-12.N.Q.1
GSA MGSE9-12.A.CED.4
GSA MGSE9-12.G.GMD.1

Common Core Mathematics:

CCSS.Math.Content.HSN.Q.A.1
CCSS.Math.Content.HSA.CED.Q.A.1
CCSS.Math.Content.HSG.GMD.A.1
CCSS.Math.Content.HSG.GMD.A.2

Art/Applied Design:

GSE VAHSAD.CR.1a
GSE VAHSAD.CR.1b

National Arts Standards:

VA.CR1.1.1a

EQUIPMENT

- Journal and writing utensil
- Measuring tape
- Football
- Basketball
- Volleyball
- Soccer ball

KICKOFF QUESTION

- What if footballs were round?

PREGAME

(Before the Hall of Fame)

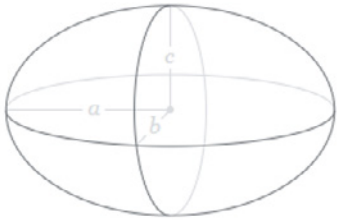
Give your students this information:

Throughout history football-like games have employed all manner of balls, starting with a round air-filled bladder of a pig. Players would inflate the bladder by mouth, stuff it in a leather covering, and stitch the leather together over the bladder. Hence the football's nickname "pigskin." Some later balls were leather stuffed with rags. The first college football, in 1869, was round and rubber. In the mid 1870s, game balls became more egg shaped and varied in size.

After the 1905 football season, new rules to make the game safer included one regarding the ball's shape. Prolate spheroid or ellipsoid-shaped footballs quickly gained ground as players and coaches saw that they threw farther than the sphere-shaped versions--even when of similar size and weight. In 1912, new football rules called for a prolate spheroid ball slightly larger than today's version. Since 1935, when the rules changed again, the official football has stayed approximately the same size.

As a class, compare, contrast and discuss the surface area of the ellipsoid to the surface area of a sphere:

$$S \approx 4\pi\left(\frac{(a\,b)^{1.6}+(a\,c)^{1.6}+(b\,c)^{1.6}}{3}\right)^{1/1.6}$$



Surface area of a sphere:

$$A = 4\pi r^2$$

Using the formulas provided, have students calculate the surface area of the ellipsoid- and sphere-shaped sports balls also listed and record the data in their journals.

Ball	Weight	Measure-ments	Surface area
Soccer	16 oz	Diameter = 8.66 inches	
Basketball	22 oz	Diameter = 9.5 inches	
Volleyball	10 oz	Diameter = 8.15 inches	
Football	15 oz	a=5.5 inch-es b=c=3.34 inches	

FIRST HALF

(At the Hall of Fame)

At the Hall of Fame, have your students visit the "Touchdown Timeline" in Building a Champion on the second floor. Football began in the U.S. soon after the Civil War ended. In 1869 in New Brunswick NJ, Princeton and Rutgers played the first college football game using a soccer-style round ball. In "The Evolution of Equipment" exhibit at the Hall of Fame, have students compare a reproduction of the 1869 football to a modern ball.

In their journals, have your students note differences besides the shape of the ball and why some balls may be harder to play football with than others.

SECOND HALF

(Back in the Classroom)

Discuss with students their thoughts on playing football with the different balls. Make sure to include shape, size and weight. Then:

- Go outside or to the gym to kick, throw, catch, and run with the different balls.
- For each of those activities, make notes regarding the different balls. Consider what makes a ball easier or harder to kick, throw, catch and carry while running.
- Back in the classroom, discuss whether the football shape is better or worse and how a ball's weight affects its performance.
- Have students brainstorm about other ball shapes and sizes that might also work in playing football.

EXTRA POINT

Challenge students to create a new type of football.

Instruct them to design an all-new and improved gameday football. Emphasize no parameters. Besides the ball's shape, consider its capabilities. For example, what technologies might be part of the ball? What information might that technology record?

Students may sketch first in their journals, then draw final designs on large paper. When finished, have them present their new designs to the class and explain its changes and benefits.

GAME STATS

- The oldest football still in existence, thought to have been made circa 1540, was discovered behind a wall panel in the Queen's Chamber at Stirling Castle, Scotland, in 1981. The round ball, which measures 15 centimeters in diameter, is currently in the collection of the Smith Museum in Stirling, Scotland.

GOING PRO

- **Sports Equipment Manager:** Equipment managers are essential to college football teams with job descriptions that include ordering, cleaning and maintaining all game-related equipment, including uniforms, as well as managing the equipment budget and ensuring the team's equipment complies with safety and league rules. Most college equipment positions require a bachelor's degree with a focus on business operations or sports management, in addition to a certificate in Athletic Equipment Management.

THE ULTIMATE FOOTBALL PLAYER

STANDARDS

Art:

GSE VAHSDR.CR.2a
GSE VAHSDR.CR.2e
GSE VAHSDR.CR.4a
GSE VAHSDR.PR.1a

EQUIPMENT

- Journal and writing utensil
- Student Playbook for each student
- Large paper
- Markers and colored pencils

KICKOFF QUESTION

- What characteristics and skills would you put together to create the ultimate football player?

PREGAME

(Before the Hall of Fame)

Ask students what it takes to be inducted into the College Football Hall of Fame. Is it more than physical ability? What characteristics do Hall of Famers share?

When every student has had a chance to weigh in, report that every player in the College Football Hall of Fame must meet specific criteria. For example:

1. The candidate received First Team All-America recognition by a selector organization recognized by the NCAA and utilized to comprise their consensus All-America teams.
2. Completed their final year of intercollegiate football.
3. While college football achievements are primary, in their community life the player reflects the ideals of football. Judges may also consider academic honors and whether the player earned a college degree.
4. They played their final year of intercollegiate football in the last 50 years. Professional players and coaches must be retired.
5. A coach is eligible three years after retirement or, if age 70 or older, immediately after retirement. Active coaches must be at least age 75, have been head coach for 10 years minimum, and coached at least 100 games with a .600 winning percentage.

Discuss these requirements with the students.

- Are any of them a surprise?
- Why should a candidate also be a positive role model or good citizen?

Tell the students that on the Hall of Fame's third floor they will see touch screens with information about every player ever inducted into the College Football Hall of Fame. At those screens, they will survey the players, choose their favorite team and find the Hall of Famers from that team. When they find their players, they will write this information in their journals or playbooks:

- What positions did the players fill?
- What do they have in common?
- How are they different?
- How did these players give to the community or embody the qualities of a model citizen?

FIRST HALF

(At the Hall of Fame)

Note: During their Hall of Fame visit, students can refer to the Student Playbook for grades 9-12.

At some point in the visit, send your students to the third floor to find their favorite team and record the information reviewed before you left. The touch screens will have stories, videos, and stats. Allow time for students to find and write down all the information they can.

SECOND HALF (Back in the Classroom)

Now every student will design or create the "ultimate" football player with the strengths and skills to play the following positions well enough to qualify for the College Football Hall of Fame.

Quarterback: As the leader of the team, the quarterback decides what plays will be called and signals the plays to the other players. After receiving the ball from the center, they either hand off the ball to the running back, throw it to a receiver or run with the ball. Important attributes for a quarterback include the ability to throw the ball far and accurately, as well as think on their feet and react quickly when a play doesn't go as planned.

Running Back: This player's job is to run with the football toward the end zone to score a touchdown. Running backs are also referred to as tailbacks, halfbacks and rushers. A running back needs to be able to run fast and maneuver quickly to dodge tackles.

Wide Receiver: The successful wide receiver moves quickly past defenders to catch the football and run as far as possible toward the end zone. Wide receivers must have good hands to catch the passes thrown to them by the quarterback and speed to elude defenders.

Defensive Lineman: The main job of the defensive lineman is to keep the other team from scoring. Depending on their position in the line, they work to overcome offensive blocking, pressure the opposing team's quarterback, disrupt the offense's backfield formation, and stop running plays by tacking the ball carrier or pushing them out-of-bounds. Linemen need to be big, strong and powerful.

Linebacker: Linebackers can have a wide range of duties as they defend against both running and passing plays. They are required to be all-around athletes with strength and speed so they can stop ball carriers, chase down the opponent's quarterback, and cover fast-running wide receivers.

Secondary: Players in the secondary defense such as the safety and cornerback provide the last line of defense against the opposing team's end zone. Positioned deep and wide on the field, defensive backs must be fast, tough and outstanding tacklers.

After your students sketch preliminary ideas, each creates his or her "ultimate" player on a large sheet of paper. What are the player's physical qualities? What intangible qualities (ones you can't see) does the player require?

Every drawing should show the qualities of good artwork, including proper use of the elements and principles of design. Encourage students to use a variety of media--and to emphasize key features, movement, color, etc,

Now have every student write out his or her player's characteristics and qualities, and why they're important. Write at least one paragraph explaining how those qualities come together to create the ultimate football player.

Remind the students to describe what kind of person the player is; a Hall of Famer also must have a proven record of good citizenship both on and off the field. How does the player give back to the community? How does the player embody the qualities of a model citizen?

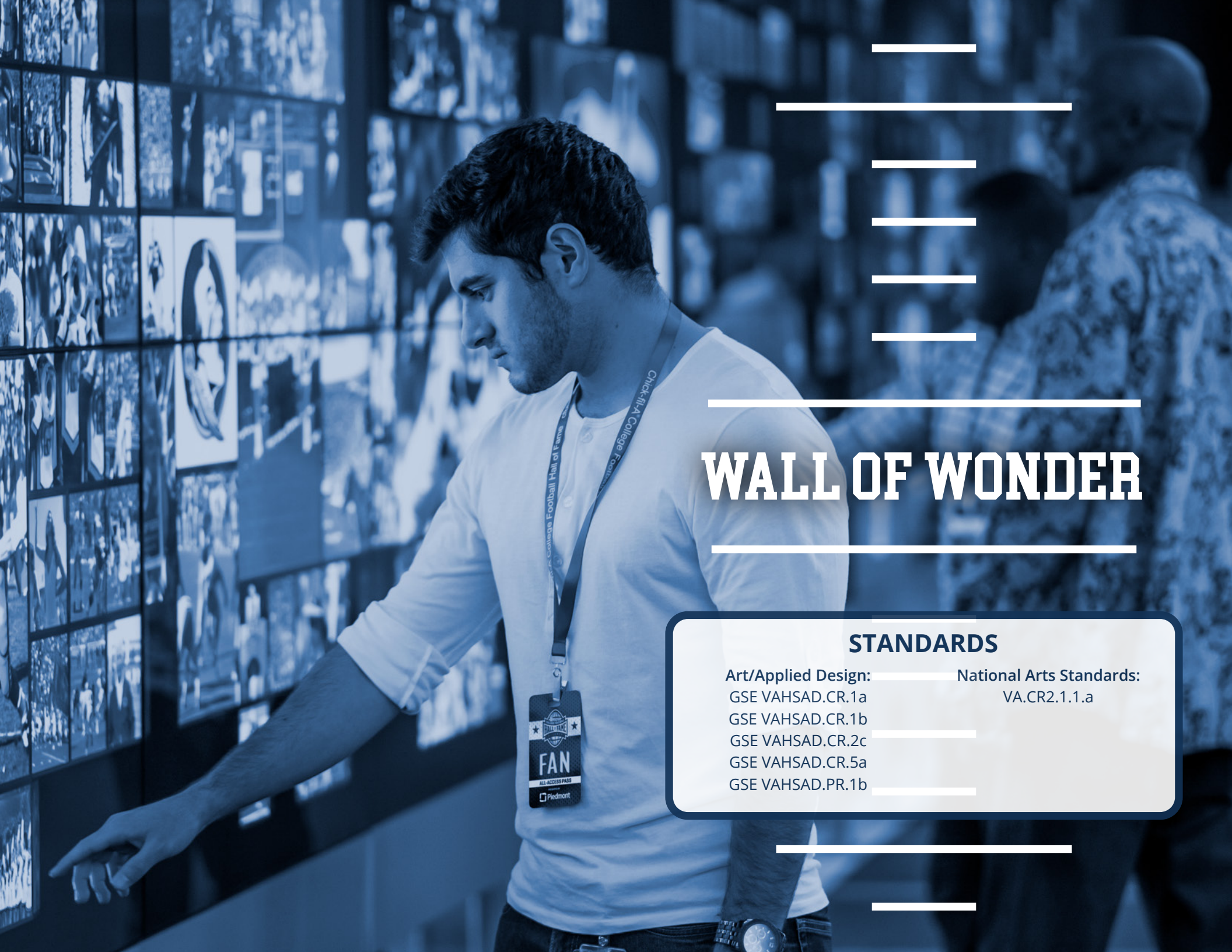
When they're finished, the students should present their ultimate players to the class and describe each of the characteristics they chose and why. Display drawings and written descriptions with the piece in the classroom or in another space for exhibit.

GAME STATS

- Of the 5.1 million people who have coached or played college football, fewer than 1,300 have been inducted into the Hall of Fame.

GOING PRO

- **College Football Coach:** A college football coach has at least a bachelor's degree. Often coaches hold a master's degree or higher, along with various certifications. Most college football coaches began at the high school level, where they also taught classes (requiring teacher certification), then moved up through smaller colleges to the university level.



WALL OF WONDER

STANDARDS

Art/Applied Design:

GSE VAHSAD.CR.1a
GSE VAHSAD.CR.1b
GSE VAHSAD.CR.2c
GSE VAHSAD.CR.5a
GSE VAHSAD.PR.1b

National Arts Standards:

VA.CR2.1.1.a

EQUIPMENT

- Journal and writing utensil
- Large paper
- Markers and colored pencils

KICKOFF QUESTION

- Can an immersive experience with an interactive wall create or enhance interest in college football?

PREGAME

(Before the Hall of Fame)

Ask your students a few starter questions:

- Do you enjoy going to football games or watching them? Why or why not?
- What's your favorite aspect of the game? (Record students' responses somewhere visible for later reference.)
- If you're not a football fan, is there anything that might spur interest in the game for you?

As a student arriving at the Hall of Fame registers their favorite team, that information shoots to the Chick-fil-A Why We Love College Football interactive wall on the second floor. When students arrive on the second floor, the wall presents images and information about their teams.

Tell your students to spend time at the interactive wall. Tell them to note what features of the wall work well. If there's anything they'd change, note that too.

Starting with their time at the interactive wall and throughout their visit to the Hall of Fame, have students gather information and examples regarding anything that interests them about college football. Anything. No limits. Back in the classroom, your students' notes from the interactive wall and the examples they jot down will inform their projects.

FIRST HALF

(At the Hall of Fame)

Arriving at the Hall of Fame, remind students about the interactive wall on the second floor. Tell them to note what they like about the experience, and how they'd redesign it if they could. Throughout the Hall of Fame, have students write down anything at all that interests them. They may record their impressions with photos or in a notebook or sketchbook.

SECOND HALF

(Back in the Classroom)

Use these questions to stir a discussion:

- What was your experience at the interactive wall?
- What did you like best about it?
- What did you learn from it that surprised you?

Now direct students to create their own version of an interactive wall. The goal is to create an experience so rich that people with no interest in college football or who know nothing about it become engaged. Tell students to let this question drive their design:

- How can an immersive experience with an interactive wall create or enhance interest for college football?

Students' notes from the field trip may inspire ideas. A design may include features already on the interactive wall--or completely new ideas. As the Hall of Fame experience confirms, college football is far more than playing the game. Other areas of interest might include:

- Coaches
- Cheerleaders
- Bands
- Fans
- Rivalries
- Tailgating
- Uniforms
- Helmet Design
- Stadium Design
- Mascots

Students might sketch their ideas first. When they have a final design, they can draw it on a large sheet of paper and add color. On that large sheet of paper, they may label the various elements of their design or create a key to accompany their drawing.

When finished, students may present their design ideas to the class and answer the following questions:

- What can/will visitors learn from your design?
- How is your wall similar to the wall at the Hall of Fame?
- How is it different?
- What did your visit to the Hall of Fame inspire you to include in the design?
- How might your design enhance or create visitor interest for college football?

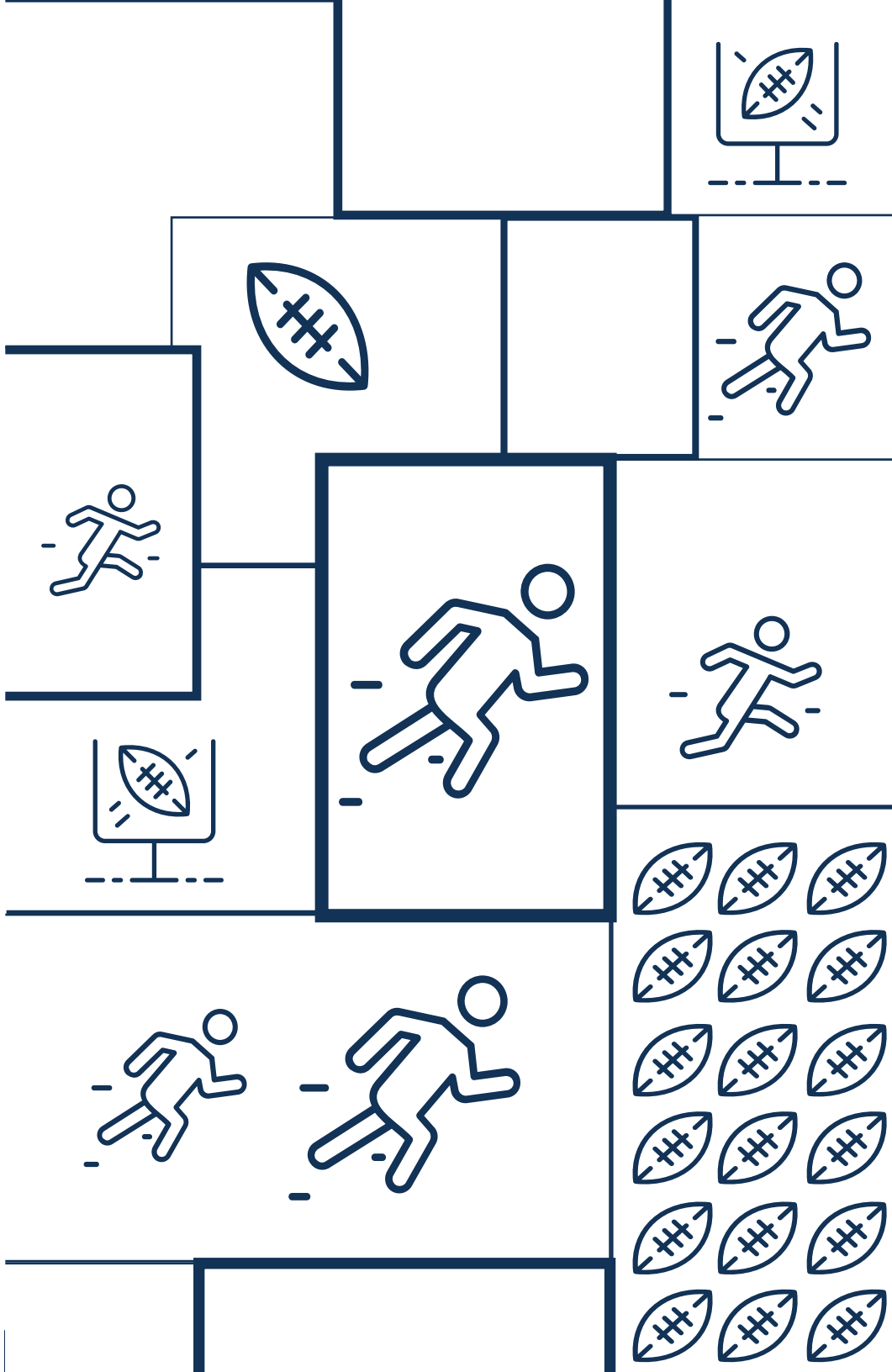
If possible, hang the designs in a space for visitors to view the student's work.

GAME STATS

- According to the National Football Foundation, college football is the nation's second most popular sport. In 2019, football games drew some 47.5 million fans in person while 145 million viewed games on television.

GOING PRO

- **Information Systems Specialist:** College athletics departments require specialists to keep the information technology aspects of the department working efficiently. Responsibilities can include maintaining and repairing computer hardware, providing technical support for hardware, software and peripheral devices, training staff in the use of computer-related equipment, and providing game day technical support. Most positions require a bachelor's degree in computer science.



NOTES, THOUGHTS & SKETCHES

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