

**PHOENIX SUNS**  
**STEM**

POWERED BY **Honeywell**



Phoenix Suns  
Phoenix Mercury  
FOUNDATION



***Phoenix Suns STEM Fest***  
***Student Project Guidelines***

***March 2026***

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## ***Phoenix Suns STEM Fest Overview***

The **Phoenix Suns/Phoenix Mercury Foundation STEM Program**, powered by **Honeywell**, and the **2025–26 City Edition campaign** come together to celebrate innovation, education, and community pride across *The Valley*.

Just as the City Edition uniform honors the region's heritage, community, swagger, and innovation, the Phoenix Suns STEM Fest challenges students to bring those same qualities to life through hands-on STEM projects.

This year's STEM Fest invites 6th–8th grade students to design and test creative solutions inspired by the spirit of The Valley — a place that's *moving faster, shining brighter, and setting trends instead of chasing them*.

Through **City Edition-themed projects**, students will explore real-world problems and design innovative solutions connected to sustainability, technology, engineering, and community impact. Projects may include designing eco-friendly basketball courts, creating smart sports technology, improving school sustainability, or reimagining the future of sports through science.

By combining the energy of the game with the power of STEM, the Suns' STEM Fest empowers students to become innovators who elevate their schools, their neighborhoods, and their city — one project at a time.

## **STEM Fest Criteria**

All projects must:

1. **Connect to STEM** — Demonstrate clear use of science, technology, engineering, or math concepts.
2. **Show Creativity & Innovation** — Present original ideas, solutions, or designs that reflect critical thinking and imagination.
3. **Use Data & Evidence** — Include measurable results shown through charts, graphs, or visuals.
4. **Demonstrate Real-World Impact** — Explain how the project could improve your community, school, or environment.
5. **Communicate Clearly** — Display information neatly and logically on a tri-fold board and/or digital presentation.

## **Timeline & Deadlines**

- **Project Title & Category Due:** February 2, 2026
- **Final Project Submission:** February 13, 2026
- **STEM Fest Showcase Event:** March 18, 2026

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## Topic Ideas for STEM Showcase

### 1. Option 1: City Edition Jersey Design – Energy in Every Thread

- a. You will engage in an experiment/investigation to determine which jersey material (polyester, cotton, recycled blend, mesh) provides the best comfort, breathability, or sustainability.
- b. Develop a hypothesis (e.g., “If a recycled polyester blend is used, then it will dry faster and retain shape better than cotton”).
- c. Perform simple tests — measure drying time, weight, or breathability after simulated activity.
- d. Create a bar chart comparing performance metrics (e.g., drying time or comfort rating).

### 2. Option 2: Community Innovation Project – Hoops for Change

- a. You will engage in an experiment/investigation to determine which community basketball innovation (solar lighting, recycling bins, hydration stations) makes the biggest impact on accessibility or sustainability.
- b. Develop a hypothesis (e.g., “If solar lighting is added to courts, then energy use and maintenance costs will decrease”).
- c. Use survey data or model-based estimates to evaluate potential improvements.
- d. Create a bar chart comparing results (e.g., energy saved, satisfaction score, or cost reduction).

### 3. Option 3: The Court of the Future — City Edition Basketball Court Design

- a. You will engage in an experiment/investigation to determine which basketball court design or material (concrete, rubberized, recycled surface, or turf-based) best reduces environmental impact while staying playable.
- b. Develop a hypothesis about which design will be most sustainable and efficient (e.g., “If we use recycled rubber, then the court will absorb heat better and last longer”).
- c. Test by comparing energy efficiency, heat absorption, or durability using research or simulations.
- d. Incorporate data visualization by creating a bar chart showing the performance or efficiency rating of each surface tested.

### 4. Option 4: Sustainability Innovation – Play Green, Live Gold

- a. You will engage in an experiment/investigation to determine which sustainability innovation (reusable cups, recycling programs, compost bins) best reduces waste at basketball events.
- b. Develop a hypothesis (e.g., “If fans switch to reusable cups, then total waste per game will decrease by at least 30%”).
- c. Collect or estimate data on waste amounts from different methods.
- d. Create a bar chart showing waste reduction or materials reused across each method.

**5. Option 5: Smart Basketball – Bounce to the Future**

- a. You will engage in an experiment/investigation to determine whether the material, brand, or price of a basketball affects its bounce height or energy return.
- b. Develop a hypothesis (e.g., “If the basketball is made from composite leather, then it will bounce higher than rubber or synthetic balls”).
- c. Drop each ball from the same height and record bounce heights in inches or centimeters.
- d. Create a bar chart comparing bounce height for each material or brand to visualize performance.

**6. School Innovation Project – The Valley of Tomorrow**

- a. You will engage in an experiment/investigation to determine which school innovation or improvement (solar roofs, LED lighting, water recycling) provides the most sustainability benefits.
- b. Develop a hypothesis (e.g., “If LED lights are installed, then total energy consumption will decrease compared to fluorescent bulbs”).
- c. Use school energy data, calculators, or models to test your prediction.
- d. Create a bar chart comparing energy or resource savings for each innovation.

**7. Option 6: Student’s Choice**

- a. You will engage in an experiment/investigation of your own design, choosing a topic that connects STEM.
- b. Develop a hypothesis that predicts which solution, material, or design will produce the best results for your chosen problem.
- c. Test your idea through research, simulation, or prototype modeling.
- d. Create a bar chart or data table showing measurable outcomes (performance, savings, or improvement).

## **Pacing Plan**

### **Objective**

To submit the project title and category by **February 3rd** and have your project for the Phoenix Suns STEM fest completed and submitted by **February 13th**.

### **Planning**

You are highly encouraged to create a timeline to plan ahead and ensure you have ample time to complete each component of the project guidelines.

### **Review project objectives and assign projects**

You will be presented with the five recommended project ideas that you may choose to complete or complete a project of your own choosing. Alternatively, you may work on projects unrelated to basketball as long as they meet the format requirements and due dates. Please note that projects will be judged according to a rubric that assesses how well you met the guidelines. The judging rubric assesses the creativity and innovation of your project, procedure explanation, and the tri-fold board display.

### **Guidelines for Experiment/Investigation Projects:**

#### **Background research**

Once you have chosen a project, you should perform a literature search. This research involves finding news articles, books, and other internet sources related to the experiment. Specific keywords are provided for each project. Good starting points are Google Scholar (<https://scholar.google.com>) and Wikipedia (<https://www.wikipedia.org>). You will determine how to obtain the necessary materials to experiment.

#### **Write hypotheses, gather materials, and write out procedures**

All experiment or investigation projects should have a testable hypothesis that describes a predicted outcome. You must also explain why you think that will be the outcome. An example hypothesis is that the basketball ball will bounce higher with a higher PSI than a lower PSI. Gather the necessary materials to perform the experiment and write out the step-by-step procedure you will follow to perform the experiment.

### **Identify variables, collect data, take photos, and create drawings**

Identify variables that are relevant to the experiment and determine which variables will be changed (independent variables) and which will be kept the same (dependent variables). Only one variable should be changed at a time. Otherwise, it will be impossible to isolate the effects of a single variable on the result. For example, if the effects of the angle of trajectory on the distance of flight are being explored, then everything should be kept constant (materials, field, direction of launch, weather conditions, etc.) while only changing one variable (angle of trajectory). Collect data in a lab notebook and document their procedure with photos or drawings so that others may replicate their experiment.

### **Analyze results, and create a tri-fold board**

Once numerical data are collected, results should be summarized in a table, chart, or graph. You must also provide a discussion of the results and an assessment of whether the hypothesis was correct or incorrect. Following the standard science fest format, you will create a tri-fold board with a visual summary of the results. Specific requirements for tri-fold are listed below.

## **Guidelines for Engineering Projects:**

### **Background research**

Once you have chosen a project, you should search the literature. This research involves finding news articles, books, and other internet sources related to the experiment. Specific keywords are provided for each project. Good starting points are Google Scholar (<https://scholar.google.com>) and Wikipedia (<https://www.wikipedia.org>). You will determine how to obtain the necessary materials to perform the experiment.

### **Define a need/fix a problem, and establish design criteria and constraints**

The need/problem is the Engineering Goal you are working to solve. The need should be described in a simple statement that includes what is being designed, who it is for, what need it satisfies, and how it improves previous designs (or designs still need to be created). You should establish what decisions will be made about how to build and evaluate the product; think of physical and functional characteristics that can be measured. You should also consider possible

constraints that will arise during this process, such as; cost, time, knowledge, materials, location, etc.

### **Build a working prototype of design, test, and evaluate the prototype**

You will build a prototype based on your design. A prototype is the first full-scale and usually functional form of a new type or design. You must test your prototype under actual or simulated operating conditions. All criteria and constraints must be tested to evaluate the prototype's success.

### **Analyze test results, make design changes, retest, and create a tri-fold board**

Testing of the prototype will disclose any deficiencies of the design and prototype. Sometimes the testing fails, requiring the designer to return to the beginning; other times, it succeeds. During this process, be sure to make any necessary corrections or changes to your design and prototype to retest, OR you should prepare an analysis of what went wrong and how it will be fixed. All information should be documented. You will create a tri-fold board with a visual summary of the results. Specific requirements for tri-fold are listed below.

## **Guidelines for Design Projects:**

### **Background research**

Once you have chosen a project, you should search the literature. This research involves finding news articles, books, and other internet sources related to the experiment. Specific keywords are provided for each project. Good starting points are Google Scholar (<https://scholar.google.com>) and Wikipedia (<https://www.wikipedia.org>). You will determine how to obtain the necessary materials to perform the experiment.

### **Funding proposal, describe the need for investors**

Use the information from your research to draft a proposal to potential investors asking for funding for their arena. This proposal should take a similar form as a persuasive essay and explicitly detail what sets your arena apart from others. You should state the name of your arena, as well as highlight specific features of the arena that make it unique and worth investing in. In the proposal, reference other arenas that inspired your thinking for your arena, and explain how building this arena will be an asset to the community it is being built in.

## **Option 1: City Edition Jersey Design – Energy in Every Thread**

### **Introduction**

Every NBA jersey tells a story — of pride, community, and innovation. The Phoenix Suns' City Edition jerseys represent the culture and energy of The Valley, while celebrating the team's connection to its fans. But modern jersey design is not just about appearance — it's about function, sustainability, and technology.

In this project, students will explore how science, art, and engineering come together in sports apparel. They will design a City Edition basketball jersey that celebrates the Suns' heritage and incorporates sustainable materials, innovative features, and cultural design elements.

### **Objectives**

You will engage in the scientific and engineering design process to design and test ideas for a sustainable and high-performance basketball jersey. You'll apply material science and design thinking to create a concept that is both functional and environmentally conscious.

### **Procedures**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
  - a. How can we design a basketball jersey that is both high-performing for athletes and sustainable for the environment, while reflecting the identity and culture of Phoenix?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Study current NBA jersey materials (polyester, mesh, recycled yarns, etc.) and their properties (weight, flexibility, breathability).
  - b. Research textile engineering concepts: moisture wicking, heat regulation, and dye sustainability.
  - c. Explore eco-friendly alternatives, such as recycled PET plastics, organic cotton, or biodegradable fabrics.
  - d. Look into Suns City Edition jersey designs and their cultural inspirations.

3. *Hypothesis: Predict*

- a. Predict which combination of materials and design features (fabric, stitching, dye, or ventilation) will result in a jersey that best balances performance, comfort, and sustainability.

4. *Materials: List the materials that will be needed to conduct the experiment.*

- a. Fabric samples (polyester, cotton, mesh, or recycled materials)
- b. Markers, colored pencils, and design paper (for sketches)
- c. Ruler, scissors, tape or glue (for prototypes)
- d. Research tools: internet, design databases, or manufacturer sustainability reports
- e. Optional: access to fabric dye or swatches

5. *Experiment and Data Collection:*

- a. Design the Jersey
  - i. Create a sketch or digital design for your Suns City Edition jersey.
  - ii. Incorporate symbols, patterns, or colors that represent The Valley.
- b. Identify Variables
  - i. Independent Variable: Fabric type or dye method (traditional vs. sustainable).
  - ii. Dependent Variable: Comfort, breathability, or sustainability rating.
  - iii. Control Variables: Jersey size, color palette, and design layout.
- c. Build / Prototype
  - i. Make a fabric panel or small sample to demonstrate your chosen material.
  - ii. Conduct simple tests if possible — such as stretch, weight, or moisture absorption.
- d. Data Collection / Testing
  - i. Measure characteristics like texture, weight, or water absorption.
  - ii. Use a rating scale (1–5) to evaluate comfort, flexibility, and eco-friendliness.

*Data Visualization Suggestion*

Create a bar chart comparing your materials on three criteria:

- Comfort
- Breathability
- Sustainability

6. *Results: Document what happened during the experiment.*

- a. Summarize the outcomes of your material comparisons or performance tests. Identify which fabric or combination offers the best results for athletic comfort and eco-friendly production. Highlight any unexpected findings or trade-offs.

7. *Conclusion:*

- a. Reflect on your design process
  - i. Was your hypothesis correct?
  - ii. Which material proved most effective and sustainable?
  - iii. How does your design reflect The Valley's culture and innovation?
  - iv. How might your jersey inspire sustainable fashion or sports design in the future?

**Pitch Requirement (STEM Fest Element)**

Your team will present your City Edition Jersey Design at the Suns STEM Fest Pitch Competition.

*Your pitch must include:*

1. A sketch or prototype of your jersey.
2. A short explanation of material science — why your fabric choice is sustainable and high-performing.
3. A visual data chart comparing materials.
4. A clear statement of how your design connects to the City Edition theme — “Energy in Every Thread,” celebrating sustainability, science, and community identity.

**Tri-Fold Board**

Create a visual representation of your experiment, procedures, data, and conclusions and display them on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Research question
  - Research & Bibliography
  - Hypothesis
  - Visuals
- Center:
  - Title of project
  - Materials
  - Experiment conducted
    - Step-by-step instructions

- Variables
  - Data visualization (data collected and organized into charts, tables, graphs, etc.)
- Visuals
- Right side:
  - Results of your experiment
  - Conclusions
  - Visuals

## **Option 2 Community Innovation Project – Hoops for Change**

### **Introduction**

Basketball isn't just a game — it's a powerful tool for bringing people together and inspiring change. Communities across The Valley rely on basketball courts, recreation centers, and youth programs as safe spaces to connect, play, and learn. But what if science and innovation could make those spaces even better?

In this project, students will combine STEM, creativity, and social impact to design a community-based basketball innovation. The challenge is to use technology, sustainability, or engineering to solve a real problem in your community — from safer courts to cleaner parks or more energy-efficient facilities.

### **Objectives**

You will use the scientific method and engineering design process to identify a community need related to basketball, develop an innovative solution, and present your idea as a project proposal at the Suns STEM Fest.

### **Procedures**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
  - a. What problem in your community can be solved through basketball and STEM innovation?
    - i. How can solar lighting make outdoor basketball courts safer at night?
    - ii. How can recycled materials be used to build better playgrounds or benches?
    - iii. How can technology promote youth wellness or engagement through basketball?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Explore community challenges connected to local recreation, sports access, or environmental issues.
  - b. Investigate existing STEM-based community improvement projects (lighting systems, water reuse, waste reduction, etc.).

- c. Research how sports organizations (like the Suns) use sustainability and outreach to serve their communities.
  - d. Gather data: survey your school or neighborhood to learn what people want improved.
3. *Hypothesis: Predict*
- a. Predict how your proposed innovation or product will positively impact your community. For example:
    - i. If solar lighting is installed on public courts, then night usage and safety will increase while energy costs decrease.
4. *Materials: List the materials that will be needed to conduct the experiment.*
- a. Poster board or digital presentation software (e.g., Canva, Google Slides)
  - b. Building materials for prototype (recycled cardboard, plastic, solar model kits)
  - c. Measuring tools (ruler, tape measure)
  - d. Internet access for research
  - e. Optional: LED models, small solar cells, or sensors (if available)
5. *Experiment and Data Collection:*
- a. Define the Problem
    - i. Identify a specific issue (e.g., waste, energy, safety, or access).
  - b. Research and Brainstorm
    - i. Explore at least 3 possible solutions and select one based on feasibility and community impact.
  - c. Build or Design a Prototype
    - i. Create a scaled model or diagram of your innovation (court lighting, recycling system, hydration station, etc.).
  - d. Identify Variables
    - i. Independent Variable: Your design or innovation feature (e.g., solar panels, recycled material).
    - ii. Dependent Variable: Community improvement outcome (safety, cost savings, engagement).
    - iii. Control Variables: Size, materials, or user group.
  - e. Test and Analyze
    - i. Use data, surveys, or cost calculators to estimate impact.
    - ii. Example: calculate potential energy savings or waste reduction.

*Data Visualization Suggestion*

- Create a before-and-after comparison chart or infographic showing projected improvements (e.g., energy saved, CO<sub>2</sub> reduced, or user satisfaction increased).
6. *Results: Document what happened during the experiment.*
    - a. Summarize your findings and prototype performance.
    - b. Did your innovation meet its goals?
    - c. What measurable impact could it have on the community?
    - d. Were there any unexpected outcomes or improvements?
  7. *Conclusion:*
    - a. Reflect on your innovation:
      - i. Was your hypothesis supported?
      - ii. How would this project improve your school or neighborhood?
      - iii. What STEM principles were most important in your solution (engineering, energy, materials, etc.)?
      - iv. How can this project inspire community action and sustainability?
      - v.

### **Pitch Requirement (STEM Fest Element)**

Your group will present your Hoops for Change project as part of the Suns STEM Fest Pitch Competition.

*Your presentation must include:*

1. Problem Statement: What issue are you solving and why does it matter?
2. Design Solution: Explain your innovation and how it works.
3. Data & Visualization: Use graphs or images to show projected community impact.
4. Prototype or Model: Display your design concept.
5. City Edition Connection: Describe how your project represents The Valley's values — innovation, teamwork, and sustainability.

### **Tri-Fold Board**

Create a visual representation of your experiment, procedures, data, and conclusions and display them on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Research question
  - Research & Bibliography
  - Hypothesis

- Visuals
- Center:
  - Title of project
  - Materials
  - Experiment conducted
    - Step-by-step instructions
    - Variables
    - Data visualization (data collected and organized into charts, tables, graphs, etc.)
  - Visuals
- Right side:
  - Results of your experiment
  - Conclusions
  - Visuals

## **Option 3 The Court of the Future — City Edition Basketball Court Design**

### **Introduction**

Basketball courts are more than places to play—they are community spaces that bring people together. But traditional courts can use large amounts of energy for lighting and require maintenance that impacts the environment.

In this project, students will apply science, engineering, and sustainability to design an eco-friendly, technology-powered basketball court that reflects the culture and innovation of the Valley. The goal is to create a City Edition community court that saves energy, celebrates local identity, and inspires future generations.

### **Objective**

You will engage in the scientific and engineering design process to determine what materials, technologies, and innovations create the most sustainable basketball court design while maintaining safety and playability.

### **Steps of the Engineering Design Process:**

It is important to note that engineers do not always follow the process steps in order, one after another. Sometimes a design is made and tested, a problem is found, and then it will return to an earlier step to modify or change the design. This sequence of events is called iteration, which might be the process you follow along the way.

1. *Purpose: Question (Define the problem)*
  - a. What features and materials can make a basketball court both environmentally sustainable and community-focused?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Investigate how energy is used in existing outdoor or indoor basketball courts.
  - b. Research solar lighting systems, recycled court surfaces, and smart irrigation for cooling or cleaning.
  - c. Explore design inspiration from Phoenix landmarks and Suns City Edition art themes.
3. *Hypothesis: Predict*
  - a. Predict what design features (solar lighting, recycled materials, smart cooling) will have the greatest impact on sustainability and community engagement.

4. *Materials: List the materials that will be needed to conduct the experiment.*
  - a. Poster board or CAD software for design blueprint
  - b. Research sources (internet, articles, arena specs)
  - c. Optional: model materials (foam board, cardboard, 3D print materials, solar LED model)
  - d. Ruler, markers, recycled materials for model court

5. *Experiment and Data Collection:*

- a. Design the Court:
  - i. Create a model or 3D rendering of your sustainable basketball court.
- b. Identify Control Variables:
  - i. Keep dimensions (standard court size) consistent.
- c. Describe Experimental Variables:
  - i. Add unique features such as solar panels, recycled surfacing, or cooling systems.
- d. Test / Simulation:
  - i. Estimate potential energy savings or materials reused.
  - ii. Use available data or online calculators to compare traditional vs. sustainable materials.

*Data Visualization Suggestion:*

- Create a chart showing the potential percentage of energy saved or waste reduced compared to a standard court.

6. *Results: Document what happened during the experiment.*

- a. Summarize what design choices produced the best combination of sustainability, playability, and cost-effectiveness.

7. *Conclusion:*

- a. Explain which design elements are most effective and why.
  - i. Did your design align with your hypothesis?
  - ii. How can your court bring pride and sustainability to your city?

**Pitch Requirement (STEM Fest Element)**

Your final design will be pitched to judges as part of the Suns STEM Fest.

Include:

- A short 3-minute presentation
- Your court model or visual

- Data or reasoning to support your design choices
- A statement on how your project reflects the City Edition theme: sustainability, innovation, and community pride

### **Tri-Fold Board**

Create a visual representation of your experiment, procedures, data, and conclusions and display them on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Problem
  - Research & Bibliography
  - Brainstorm ideas
  - Visuals
- Center:
  - Title of project
  - Materials
  - Procedures
    - Step-by-step instructions
  - Sketch of prototype
  - Visuals
- Right side:
  - Test and redesign process
  - Conclusions
    - Analyze results from test
  - Future Directions
    - Any changes or corrections that could be made to improve prototype to solve/fix the problem
  - Visuals

## **Option 4 Sustainability Innovation – Play Green, Live Gold**

### **Introduction**

From arenas to outdoor courts, basketball events generate energy use, waste, and carbon emissions. As our cities grow, sustainability has become essential to keeping communities healthy and vibrant. The Phoenix Suns are leading the charge in sustainability through arena design, recycling programs, and renewable energy initiatives — but there’s always more that can be done.

In this project, students will act as environmental engineers and innovators, creating a new sustainability product, campaign, or system that encourages fans, athletes, or teams to “Play Green and Live Gold.” The goal is to design something that reduces waste, saves energy, or promotes sustainable habits — all connected to the world of basketball.

### **Objectives**

You will use the scientific method and engineering design process to research, design, and test a sustainability-focused innovation that can be implemented in basketball environments — arenas, schools, or community courts.

### **Procedure**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
  - a. How can we make basketball — and the culture surrounding it — more sustainable for both fans and the environment?
  - b. How can waste be reduced at basketball games or community events?
  - c. What energy-saving technologies could be added to arenas or schools?
  - d. How can fans be encouraged to make greener choices during events?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Investigate environmental challenges related to sports: energy use, waste, and carbon emissions.
  - b. Research examples of sports sustainability initiatives, such as solar arenas, reusable drinkware, or recycling programs.

- c. Explore green engineering solutions, such as renewable energy systems, water reuse, or biodegradable materials.
  - d. Study how fan behavior impacts sustainability (transportation, food waste, merchandise production).
3. *Hypothesis: Predict*
- a. Predict what kind of sustainability innovation — product, technology, or system — will have the greatest positive environmental impact while being practical for sports teams, schools, or fans to adopt.
  - b. Example hypothesis
    - i. If we create a reusable water bottle refill system for basketball arenas, then plastic waste will decrease by 50%.
4. *Materials: List the materials that will be needed to conduct the experiment.*
- a. Poster board or presentation slides
  - b. Recycled materials for building a prototype (plastic bottles, cardboard, containers)
  - c. Measuring tools, rulers, glue, and scissors
  - d. Optional: small solar cell, LED, or circuit components for energy-based designs
  - e. Research sources: websites, environmental databases, sustainability reports
5. *Experiment and Data Collection:*
- a. Define the Problem:
    - i. Identify a sustainability challenge related to basketball, arenas, or fans (waste, energy, transportation, materials).
  - b. Brainstorm Solutions:
    - i. List possible innovations — eco-friendly merchandise, renewable energy systems, recycling bins, awareness campaigns, etc.
  - c. Design and Build: Create a model, prototype, or digital design of your solution.  
Examples include:
    - i. A biodegradable fan product (like a recyclable game-day cup)
    - ii. A solar-powered court light system
    - iii. A mobile app for tracking green fan behavior
  - d. Identify Variables:
    - i. Independent Variable: The type of sustainability solution implemented.
    - ii. Dependent Variable: The environmental impact (waste reduced, energy saved).

- iii. Control Variables: Number of users, event size, or energy source
- e. Test or Simulate:
  - i. Estimate environmental improvements using available data or calculators (e.g., CO<sub>2</sub> reduction, plastic saved).
  - ii. Compare your innovation's performance to a traditional method.

*Data Visualization Suggestion:*

- Create a before-and-after graph or impact chart showing your innovation's potential results — for example, waste reduction per event or energy savings per month.
- f. Results
  - i. Summarize what you learned from testing or modeling your sustainability solution.
  - ii. How effective is your idea in reducing environmental impact?
  - iii. What data supports your results?
  - iv. What feedback would help refine your design?
- g. Conclusion
  - i. Reflect on your sustainability innovation:
  - ii. Was your hypothesis supported?
  - iii. How could this innovation change basketball culture and fan behavior?
  - iv. What larger environmental issue does it address?
  - v. How does it represent the Suns' City Edition values — sustainability, innovation, and pride in The Valley?

### **Pitch Requirement (STEM Fest Element)**

Your group will present your Play Green, Live Gold Sustainability Innovation at the Suns STEM Fest Pitch Competition.

Your presentation must include:

1. Problem Identification: Define the sustainability issue you are solving.
2. Innovation Description: Show your model or prototype and explain how it works.
3. Data Visualization: Use charts or visuals to demonstrate the environmental impact.
4. Call to Action: Explain how your project can be implemented in the real world.
5. City Edition Connection: Share how your innovation reflects Phoenix's role as a leader in clean energy and community progress.

## **Tri-Fold Board**

Prepare arena design projects by creating a display on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Research & Bibliography
  - Add pictures of and identify at least two arenas that inspired the design.
  - Visuals
- Center:
  - The name and location of the arena
  - Design of the arena
  - Funding proposal
  - Materials
  - Visuals
- Right side:
  - Features of the arena such as food, ticket prices, capacity, parking, etc.
  - Visuals

## **Option 5: Smart Basketball – Bounce to the Future**

### **Introduction**

In modern basketball, data is driving performance like never before. Coaches, trainers, and even players rely on advanced technology to track shooting accuracy, ball speed, and player movement. But what if the basketball itself could collect that data?

In this project, students will explore the science and engineering behind smart technology by designing or prototyping a Smart Basketball. The challenge is to imagine how sensors, materials, and physics can work together to track data while keeping the ball functional, safe, and sustainable.

### **Objectives**

You will use the scientific method and engineering design process to investigate how a basketball can be designed to measure key data (spin, force, or bounce height) while maintaining traditional feel and performance.

### **Procedures**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
  - a. How can we design a basketball that collects data to improve performance without changing how it bounces, spins, or feels during play?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Investigate how sensors, accelerometers, and pressure gauges work in sports equipment.
  - b. Study the materials used in professional basketballs (leather, rubber, composites).
  - c. Learn how motion data is used in training and analytics (e.g., spin rate, release angle, shot arc).
  - d. Examine sustainable materials and how they could reduce environmental impact.
3. *Hypothesis: Predict*
  - a. Predict which design features (e.g., internal sensors, smart outer coating, or data-transmitting chips) will provide the most accurate performance feedback while maintaining natural bounce and grip.
4. *Materials: List the materials that will be needed to conduct the experiment.*
  - a. Existing basketballs (different brands or materials)
  - b. Measuring tape, scale, or bounce test setup
  - c. Optional: small sensors (if available), microchip models, or mockups
  - d. Stopwatch or mobile device (for bounce test timing)
  - e. Notebook or spreadsheet for recording data
5. *Experiment and Data Collection:*
  - a. Design Phase:
    - i. Create a concept drawing or 3D model of your Smart Basketball, labeling where sensors or chips would be embedded.
  - b. Build/Simulation:
    - i. If materials allow, modify a sample ball by adding mock “sensor” placements (e.g., paper inserts).
    - ii. If testing physical basketballs, drop them from the same height to compare bounce height and energy retention.
  - c. Identify Variables:

- i. Independent Variable: Ball material or design (traditional vs. smart prototype).
  - ii. Dependent Variable: Bounce height, spin rate, or rebound consistency.
  - iii. Control Variables: Drop height, surface type, temperature.
- d. Data Collection:
  - i. Record the bounce height (in cm or inches) for each test.
  - ii. If available, collect additional data (spin or air pressure changes).

*Data Visualization Suggestion:*

  - Create a bar graph comparing bounce height or energy loss for each design.
  - X-axis: Type of Basketball
  - Y-axis: Average Bounce Height (cm or in)
- e. Results
  - i. Summarize your data. Did the material or design change the bounce performance or energy efficiency? Identify patterns or unexpected results.
- f. Conclusion
  - i. Discuss your findings and reflect:
  - ii. Was your hypothesis correct?
  - iii. What features make the best Smart Basketball design?
  - iv. How could your design help players improve training or reduce injuries?
  - v. How might using sustainable materials make this innovation better for the environment?

### **Pitch Requirement (STEM Fest Element)**

Your team will present your Smart Basketball design at the Suns STEM Fest Pitch Competition.

Each group will:

1. Showcase their prototype or concept drawing.
2. Explain how their design works and what data it collects.
3. Use their data chart to justify why their design is effective.
4. End with a short statement on how this technology reflects the City Edition theme of innovation, performance, and sustainability.

### **Tri-Fold Board**

Create a visual representation of your experiment, procedures, data, and conclusions and display them on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Research question
  - Research & Bibliography
  - Hypothesis
  - Visuals
- Center:
  - Title of project
  - Materials
  - Experiment conducted
    - Step-by-step instructions
    - Variables
    - Data visualization (data collected and organized into charts, tables, graphs, etc.)
  - Visuals
- Right side:
  - Results of your experiment
  - Conclusions
  - Visuals

## **Option 6: School Innovation Project – The Valley of Tomorrow**

### **Introduction**

The Phoenix Suns' City Edition theme celebrates the spirit of innovation, sustainability, and community pride that defines The Valley. Schools are a cornerstone of that community — places where the next generation of innovators learns, grows, and creates.

In this project, students will act as engineers, architects, and environmental scientists to redesign a part of their school. The challenge: make your school more energy-efficient, environmentally friendly, and community-centered, using the same principles of innovation that power The Valley.

### **Objectives**

You will apply the scientific method and engineering design process to identify a sustainability or efficiency problem at your school and propose a STEM-based solution that improves the learning environment and reduces the school's environmental footprint.

### **Procedures**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
  - a. How can we make our school more sustainable, energy-efficient, and connected to our community through science and innovation?
2. *Research: Observe (What has been done? What tools and materials can I use?)*
  - a. Identify how schools use energy and resources: electricity, lighting, water, waste, and transportation.
  - b. Research green school initiatives, such as solar panels, recycling programs, water conservation, and energy-efficient lighting.
  - c. Study examples of LEED-certified schools or eco-friendly building practices.
  - d. Explore technologies used in sustainable building design, such as insulation materials, solar glass, or smart thermostats.
3. *Hypothesis: Predict*

- a. Predict which sustainability feature or STEM innovation (solar power, water collection, recycling system, smart classroom design) will make the biggest positive impact on your school's efficiency and environment.
4. *Materials: List the materials that will be needed to conduct the experiment.*
- a. Poster board or digital software for model design (Canva, SketchUp, or PowerPoint)
  - b. Ruler, colored pencils, markers
  - c. Recycled materials for building a physical model (cardboard, plastic, paper)
  - d. Measuring tools for energy or resource estimation (optional: light meter, thermometer)
  - e. Internet for sustainability data and research sources
5. *Experiment and Data Collection:*
- a. Define the Problem:
    - i. Identify a challenge at your school (e.g., high energy use, water waste, limited recycling, outdated lighting).
  - b. Brainstorm Solutions:
    - i. Create at least three ideas for how your school can improve sustainability or community impact. Choose one to develop further.
  - c. Design and Build:
    - i. Sketch or build a scaled model of your proposed improvement (e.g., solar-powered classroom, water-saving garden, green roof, or recycling station).
    - ii. Include labeled features and explain their purpose.
  - d. Identify Variables:
    - i. Independent Variable: The design or feature implemented (solar panels, recycled materials, etc.).
    - ii. Dependent Variable: The measurable benefit (energy saved, water conserved, waste reduced).
    - iii. Control Variables: School size, student population, hours of use.
  - e. Data Collection / Simulation:
    - i. Estimate potential impact: e.g., kilowatts saved per day, gallons of water saved per year, or waste reduced.
    - ii. Use online energy calculators or comparative data from real schools.

*Data Visualization Suggestion:*

- Create a bar or pie chart showing how your design reduces energy or resource usage compared to the current system.

#### 6. *Results*

- a. Summarize your findings.
- b. How much energy or waste could your innovation save?
- c. How does it affect students and teachers?
- d. What long-term benefits could your design have for the school and community?

#### 7. *Conclusion*

- a. Reflect on your school innovation
- b. Was your hypothesis supported by your data?
- c. Which design elements worked best and why?
- d. How can this project make your school a model of sustainability for The Valley?
- e. How does your innovation reflect the Suns' City Edition values — innovation, teamwork, and pride in community?

### **Pitch Requirement (STEM Fest Element)**

Your team will present your “Valley of Tomorrow” project at the Suns STEM Fest Pitch Competition.

Your presentation should include:

1. Problem Statement: What issue does your school face, and why is it important?
2. STEM Solution: How does your design solve the problem?
3. Prototype or Model: A physical or digital representation of your innovation.
4. Data and Impact: Use charts, visuals, or calculations to show your project's measurable results.
5. City Edition Connection: Explain how your idea reflects the Suns' commitment to innovation, sustainability, and community growth.

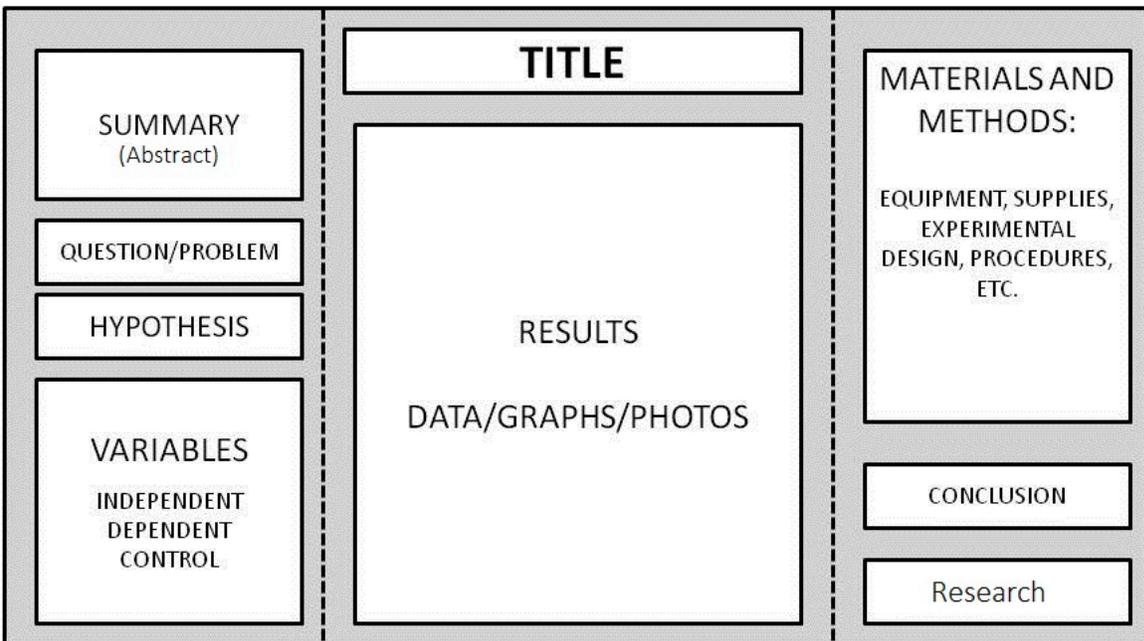
### **Tri-Fold Board**

Create a visual representation of your experiment, procedures, data, and conclusions and display them on a tri-fold board.

On your board, include the following (typed or neatly written by hand):

- Left Side:
  - Research question
  - Research & Bibliography
  - Hypothesis

- Visuals
- Center:
  - Title of project
  - Materials
  - Experiment conducted
    - Step-by-step instructions
    - Variables
    - Data visualization (data collected and organized into charts, tables, graphs, etc.)
  - Visuals
- Right side:
  - Results of your experiment
  - Conclusions
  - Visuals



## **Option 7: Student Choice Project – Your Vision for The Valley**

### **Introduction**

The City Edition STEM Fest celebrates creativity, science, and the future of our communities. Every idea — big or small — has the potential to create real change. This project gives you the chance to dream up your own STEM innovation that connects to basketball, the Phoenix Suns, or the greater Phoenix community.

Whether you're inspired by technology, sustainability, engineering, art, or social impact, your job is to use science and innovation to design something that improves the game, the fan experience, your school, your city, or anything you'd like. This is your opportunity to show what it means to build The Valley of the Future.

### **Objectives**

You will use the scientific method and engineering design process to research, design, and test an original idea that demonstrates innovation, problem solving, and community impact.

### **Procedures**

Using the scientific method and engineering design process, set up and conduct an experiment. Record your steps, research, experiment, and data in a journal you will display with your project.

1. *Purpose: Question (Define the problem)*
2. *Research: Observe (What has been done? What tools and materials can I use?)*
3. *Hypothesis: Predict*
4. *Materials: List the materials that will be needed to conduct the experiment.*
5. *Experiment and Data Collection:*
6. *Results*
7. *Conclusion*

### **Pitch Requirement (STEM Fest Element)**

For the Suns STEM Fest Pitch Competition, your team will present your Student Choice Innovation as a 3–5 minute pitch. Your presentation must include:

1. Problem Statement: The challenge you identified.
2. STEM Innovation: Your solution and how it works.

3. Data or Evidence: Any measurements, visuals, or comparisons.
4. Prototype or Concept: A model, sketch, or product demonstration.
5. City Edition Connection: Explain how your idea embodies The Valley's innovation, sustainability, and community spirit.

**Tri-fold**

	<b>TITLE</b>	
<b>SUMMARY</b> (Abstract)	<b>RESULTS</b>  DATA/GRAPHS/PHOTOS	<b>MATERIALS AND METHODS:</b>  EQUIPMENT, SUPPLIES, EXPERIMENTAL DESIGN, PROCEDURES, ETC.
<b>QUESTION/PROBLEM</b>		
<b>HYPOTHESIS</b>		
<b>VARIABLES</b>  INDEPENDENT DEPENDENT CONTROL		
		<b>CONCLUSION</b>
		Research