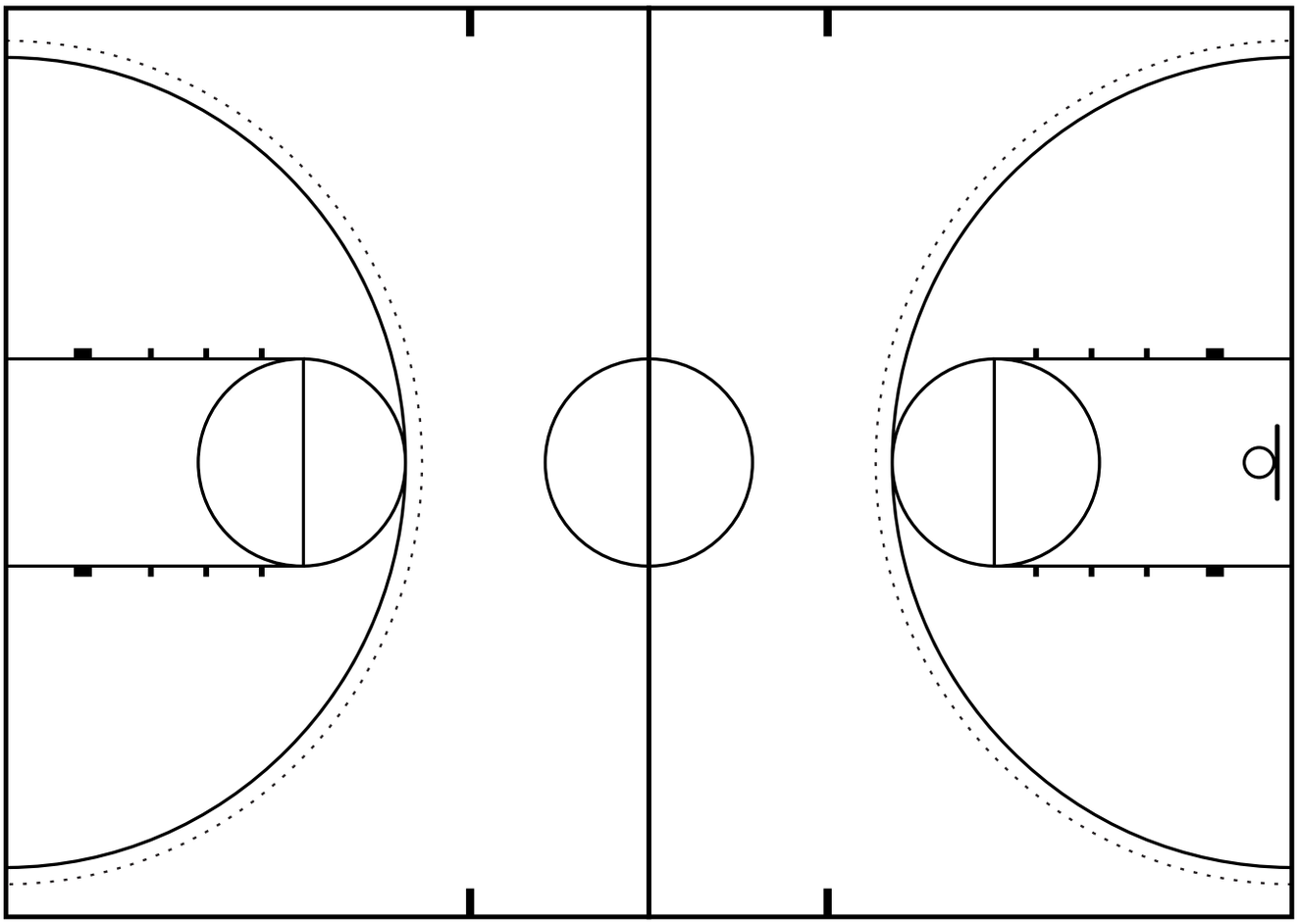
Module 1.1

Name: _____ Class: _____

Basketball Measurements

GRADES 6-8

Label the following diagram with the actual lengths of your basketball court.



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Name: _____ Class: _____

Basketball Measurements

GRADES 6-8

Measurement	Actual	Scale Size
Endline to endline		10 inches
Half court line		
Area of court Endline to Endline x Half Court line		
Endline to backboard		
Backboard to foul line		
Three point to backboard		
Height of rim from court		

Do the sizes of the courts change proportionally?

- NBA Professional and College: 94 feet long and 50 feet wide
- High School: 84 feet long and 50 feet wide
- Junior High: 74 feet long and 42 feet wide

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Name: _____ Class: _____

Science of Basketball

GRADES 6-8

Part 1

# of bounces	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
48 inches						
24 inches						

Part 2

# of bounces	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Average
48 inches Dropped						
48 inches Dribbled						
24 inches Dropped						
24 inches Dribbled						

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Name: _____ Class: _____

Science of Basketball

GRADES 6-8

QUESTIONS:

1. How does dropping the ball and dribbling the ball change how Newton's Third Law is demonstrated?

_____

_____

_____

_____

_____

2. Make a hypothesis on how bouncing the ball on a harder surface would change the forces acting on the ball. _____

_____

_____

_____

_____

_____

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Module 3.1

Name: _____ Class: _____

Understanding Basketball

GRADES 6-8

Part 1

Bounce Height	Trial 1	Trial 2	Trial 3
Indoor basketball: Cool Environment			
Indoor basketball: Warm Environment			
Outdoor basketball: Cool Environment			
Outdoor basketball: Warm Environment			

1. How does temperature affect the bounce height? Write a hypothesis that supports why this may happen.

_____

_____

2. Did you notice a larger or smaller difference in bounce height based on the ball type? Why would the ball type influence bounce height? _____

_____

Part 2 Record detailed observations about the ball materials. Include both qualitative and quantitative observations.

Ball type	Observations (cut sample)	Observations after heating (cut sample)	Observations after heating (basketball)
Indoor			
Outdoor			

Ball type	Observations (cut sample)	Observations after cooling (cut sample)	Observations after cooling (basketball)
Indoor			
Outdoor			

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Name: _____ Class: _____

Understanding Basketball

GRADES 6-8

3. Draw a diagram at a molecular level of what would happen to the ball if they played on a winter day outside.

4. Based on your data from part one and your observations from part two: Predict which ball (indoor v. outdoor) will have the greatest change in behavior based on the difference in material. Support your answer with evidence.

_____

_____

_____

_____

_____

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Module 4.1

Name: _____ Class: _____

Velocity and Acceleration

GRADES 6-8

Force Diagram

Chest Pass	Bounce Pass	Overhead Pass

Data Collection

	Distance (meters)	Time (seconds)
Chest Pass		
Bounce Pass		
Overhead Pass		

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Name: _____ Class: _____

Velocity and Acceleration

GRADES 6-8

Data Collection

	Initial Speed	Final Speed (distance divided by time)	Acceleration (initial- final divided by time)	Mass of ball	Force Acting on ball (N) (Mass times Acceleration)
Chest Pass	0 m/s			0.625 kg	
Bounce Pass	0 m/s			0.625 kg	
Overhead Pass	0 m/s			0.625 kg	

Calculate the force acting on the ball when the NBA's Steph Curry shoots a free throw at the acceleration of 8.3 m/s2 (mass of the ball: 0.625 kg).

_____

_____

_____

_____

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Module 5.1

Name: _____ Class: _____

Engineering Design Challenge

GRADES 6-8

Test your initial design

	Test 1	Test 2	Test 3	Average
Distance				
Time				
Acceleration				
Force (N)(Mass of a marshmallow is 0.007g)				

Brainstorm ways to Increase the Motion in the Design

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Name: _____ Class: _____

Engineering Design Challenge

GRADES 6-8

Select a single Design (draw in detail, label materials and provide measurements)

Build and Re-Test

	Test 1	Test 2	Test 3	Average
Distance				
Time				
Acceleration				
Force (N)(Mass of a marshmallow is 0.007g)				

Communicate: Did it work? What evidence supports you improved? Would you make any changes?

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Module 6.1

Name: _____ Class: _____

Calculating Calories

GRADES 6-8

Kids burn an average of 200 calories per hour of play.
How many 8 oz Coconut Waters do you need to drink? *(Please note: Label is 8 fl oz)*

_____

_____

CALCULATING CALORIES:

- **Step 1:** Convert your weight in pounds to kilograms by dividing by 2. Round to the nearest whole number, if needed.
- **Step 2:** Multiply the MET value by your weight in kilograms. Use the MET value of 7.0.
- **Step 3:** Multiply the product by the time you performed the activity in hours to get the number of calories you burned.
- **Equation:** (Weight/2) x 7 x number of hours.

Nutrition Facts

Real Coconut Water - From Taste Nirvana

8 fl oz (224.8g)

Servings Per Container 3

Amount Per Serving	
Calories 50	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 50mg	2%
Total Carbohydrates 13g	4%
Dietary Fiber 0g	0%
Sugars 10g	
Protein 0g	
Vitamin C	6%
Calcium	4%
Iron	2%

* Percent Daily Values are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

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Name: _____ Class: _____

Calculating Calories

GRADES 6-8

Example: LeBron James: 250 ÷ 2 x 7 x .5 hours = 437.5 Calories Burned

1. How many calories did you burn for 15 minutes?

_____

_____

_____

_____

2. Using the equation, how many calories will you burn if you play for 30 minutes? 1 hour?

_____

_____

_____

_____

3. Bonus: How long would it take you to burn 450 calories?

_____

_____

_____

_____

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Name: _____ Class: _____

Shot Tracking with Technology

GRADES 6-8

Probabilities of Success

	Self	Partner 1	Partner 2	Partner 3
FT				
2PT				
3PT				

Calculate your frequency of success for the following:

If you attempted 27 - 3PT shots: _____

If you attempted 93 - 2PT shots: _____

If you attempted 21 - FT shots: _____

Based on the graph you constructed with your class data, and your frequency and probability above, make a claim that expresses who would be the highest paid player on your class' team. Support your claim with evidence and reasoning.

_____

_____

_____

_____

_____

_____

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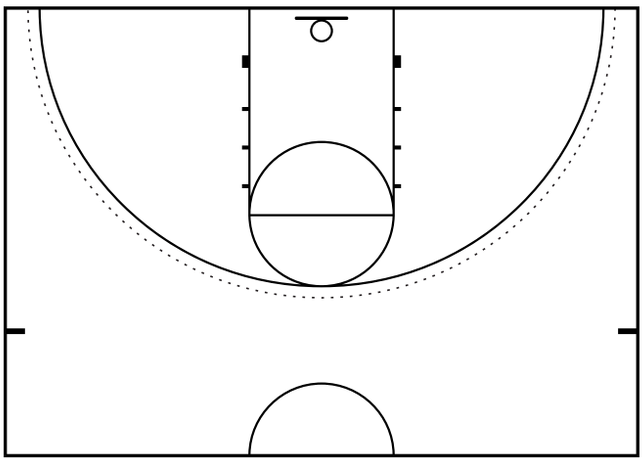
Name: _____ Class: _____

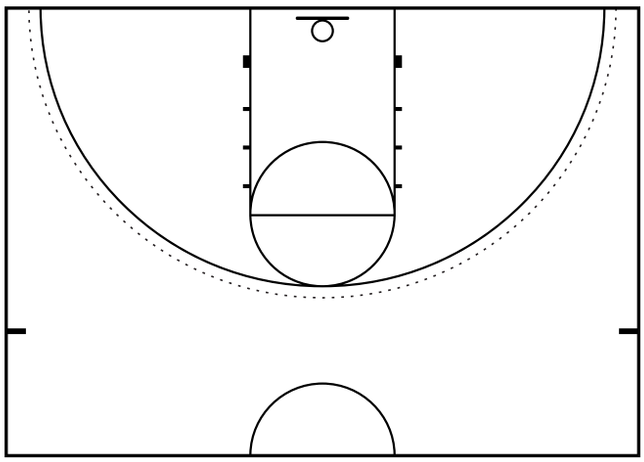
Shot Tracking (Non-Technology Option)

GRADES 6-8

O - Shots Made



X - Shots Missed



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL Made
Free Throws																
Lay-Ups																

Write a mathematical expression that states if your free throw accuracy is greater than or less than your layup accuracy. Justify it with evidence.

_____

_____

_____

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Module 8.1

Name: _____ Class: _____

Advancements in Shoe Technology

GRADES 6-8

Shoe	Observations with numbers	Observations with words	Inference about why there was a design change

1. What would you consider the single greatest advancement in basketball shoe technology in the last 100 years? Why? Explain. _____

   _____

   _____

2. Hypothesize why basketball shoes have changed more in the last 45 years (1972 – present) than they did the previous 60+ years (1910 to 1972). _____

   _____

   _____

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Name: _____ Class: _____

Advancements in Shoe Technology

GRADES 6-8

3. Do you think high-top shoes reduce ankle injuries compared to low-top shoes? Why? Explain.

_____

_____

4. For many athletes, Converse Chuck Taylor sneakers lasted an entire season, if not more. Now most players change their shoes every week, if not every day. Explain.

_____

_____

Brainstorm three designs that improve shoe technology to increase performance and decrease injury.

Select your best design: Use your observations and inferences from the shoe advancement data table to justify why your design will increase performance and decrease injury.

_____

_____

_____

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Name: _____ Class: _____

Capstone

GRADES 6-8

Peer Feedback Form

Student name:_____ Selected Career: _____
Summary of career: _____
_____

Are you interested in the career they researched? Why or why not?

_____
_____
_____
_____

Based on the information they share with you, what are they missing on their action plan timeline?

_____
_____
_____
_____

Peer Feedback Form

Student name:_____ Selected Career: _____
Summary of career: _____
_____

Are you interested in the career they researched? Why or why not?

_____
_____
_____
_____

Based on the information they share with you, what are they missing on their action plan timeline?

_____
_____
_____
_____

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Name: _____ **Class:** _____

Career List: STEM Jobs in Sports

- ❑ Adaptive Sports Equipment Coordinator
- ❑ Assistant Athletic Trainer
- ❑ Assistant Coach
- ❑ Associate Athletic Director
- ❑ Athletic Director
- ❑ Athletic Program Development Director
- ❑ Athletic Quality Control Coordinator
- ❑ Athletic Trainer
- ❑ Audio Video (AV) Technician
- ❑ Ball Engineer
- ❑ Ball Manufacturer
- ❑ Basketball Court Manufacturer
- ❑ Bioinformatics
- ❑ Biomechanics Coach
- ❑ Biomedical Engineer
- ❑ Broadcasting Engineer
- ❑ Coach
- ❑ Computer/Application Coder (App)
- ❑ Dietitian
- ❑ Digital Data Engineer
- ❑ Director of Broadcast Technology
- ❑ Director of Facilities
- ❑ Engineer Technician
- ❑ Equipment Manager
- ❑ Event/Gameday Coordinator
- ❑ Exercise Physiologist
- ❑ Facility Operations Manager
- ❑ Groundskeeper
- ❑ Head Coach
- ❑ Internet Sports Producer
- ❑ Market Researcher
- ❑ Marketing and Promotions Coordinator
- ❑ Materials Chemist
- ❑ Materials Engineer
- ❑ Mechanical Engineer
- ❑ Nutritionist
- ❑ Official/Referee/Umpire
- ❑ Orthopedic Doctor/Surgeon
- ❑ Patent Agent
- ❑ Patent Examiner
- ❑ Performance Coach
- ❑ Personal Trainer
- ❑ 3D Print Engineer
- ❑ Product Development Scientist
- ❑ Quarterback Coach
- ❑ Radar Engineer
- ❑ Radio Sports Producer
- ❑ Sales and Marketing Director
- ❑ Scoreboard Operator
- ❑ Scorekeeper
- ❑ Scout
- ❑ Sports Agent
- ❑ Sports Analyst
- ❑ Sports and Fitness Nutritionist
- ❑ Sports Columnist
- ❑ Sports Commissioner
- ❑ Sports Doctor/Physician
- ❑ Sports Equipment Manufacturer
- ❑ Sports Information Director
- ❑ Sports Massage Therapist
- ❑ Sports Metric Analyst
- ❑ Sports News Reporter
- ❑ Sports Patent Attorney
- ❑ Sports Photographer
- ❑ Sports Physicist
- ❑ Sports Psychologist
- ❑ Sports Statistical Analyst
- ❑ Sports Statistician
- ❑ Sports Talk Show Host
- ❑ Sports Theory Teacher (HS)
- ❑ Sportscaster
- ❑ Sportswriter
- ❑ Stadium/Arena Designer or Architect
- ❑ Stadium/Arena PA (Public Address) Announcer
- ❑ Stadium/Arena: Quality Control Coordinator
- ❑ Stadium/Arena: Safety Engineer
- ❑ Stadium/Arena: Safety Inspector
- ❑ Statistician
- ❑ Strength and Conditioning Coach
- ❑ Supply Chain Coordinator
- ❑ Synthetics Chemist
- ❑ Systems Engineer
- ❑ Team Merchandise Designer
- ❑ Team or Sports Physician
- ❑ Team President
- ❑ Team General Manager
- ❑ Telecommunications Engineer
- ❑ Television Sports Producer
- ❑ Ticket Operations Manager
- ❑ Videographer
- ❑ Youth Sports Administrator
- ❑ Youth Sports Director

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