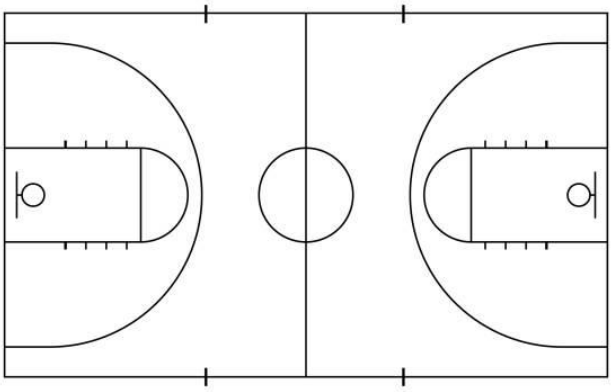
Name: KEY

Module 1.1: BASKETBALL MEASUREMENTS

Results may vary among students.

	Estimate	Measurement
Number of tiles in a basketball court		2088 (18in x 18in) 1044 full court



Results may vary based on court size;
example values provided are from NBA court sizes.

	Measurement		Perimeter	Area
Endline to Endline	94 ft	Whole Court	388 ft	4700 ft^2
Half court line	50 ft	Half Court	194 ft	2350 ft^2
Endline to foul line	15 ft	Foul Box	54 ft	180 ft^2
Half court line to end line	47 ft			
Foul Line	12 ft			

What is the area and perimeter of each court?

Answers may vary among students.

- NBA and College: 94 feet long and 50 feet wide
  Perimeter: 388 ft Area: 4700 ft^2
- High School: 84 feet long and 50 feet wide
  Perimeter: 270 ft Area: 4200 ft^2
- Junior High: 74 feet long and 42 feet wide

Perimeter: 232 Area: 3108 ft^2

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Module 2.1: FORCES IN BASKETBALL

Part 1: Results may vary among students. Sample data

# of bounces	Trial 1	Trial 2	Trial 3
48 inches	8	8	11
24 inches	4	5	3

Part 2: Results may vary among students. Sample data

# of bounces	Trial 1	Trial 2	Trial 3
48 inches dropped	12	9	10
48 inches Dribbled/Pushed	11	12	10
24 inches Dropped	4	5	6
24 inches Dribbled/Pushed	6	8	6

1. Why does the motion of the ball change when you push on it vs. drop it? Because gravity is the only force acting on the ball when "dropped". Whereas pushing increases motion through "applied" force.
2. How does gravity change the motion of a basketball if it is further away from the ground? Because the higher you drop the ball from the ground, the longer gravity/force is acting on the ball, or an increase in motion.
3. Predict what would happen if you dropped the basketball from 12 inches and 50 inches. At 12 inches, the ball will bounce less (half of number) than the higher drops. At 50 inches, the will bounce from more (double)

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Module 3.1: UNDERSTANDING BASKETBALL

I wonder…..	I notice…..
Answers may vary based on student results.	Answers may vary based on student results.

Describe the ball: Answers may vary among students.

Please note: The below measurements and weights are a baseline to ensure consistency among students.

Observations	Basketball	Golf Ball	Tennis Ball	Helium Balloon
Describe the ball	Interpretation will vary among students.	Interpretation will vary among students.	Interpretation will vary among students.	Interpretation will vary among students.
Measure the ball	29.5 inches or 75 cm	1.7 inches or 4.3 cm	2.7 inches or 6.9 cm	11 inches or 28 cm
Weigh the ball	22 oz or 623.7 g	1.62 oz or 45.9 g	2.0 oz or 56.7 g	.35 oz or 10 g

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Module 4.1: MOTION AND BASKETBALLS

Prediction: Results may vary among students. Sample data.

Measurements	Trial 1	Trial 2	Trial 3
Time of ball (s)	1 seconds	2 seconds	1 second
Time of runner (s)	4 seconds	4 seconds	5 seconds

Results may vary among students. Sample data.

Calculations	Trial 1	Trial 2	Trial 3
Speed of the ball	10 feet/second	5 feet/second	10 feet/second
Speed of the runner	2.5 feet/second	2.5 feet/second	2 feet/second

What was faster, the ball or the person? Use evidence from the experiment to support your answer.

Answers may vary based on student results.

Example: The ball was faster than the runner. Based on the data above, the ball moved almost 5 times faster than the person.

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Module 5.1: ENGINEERING DESIGN CHALLENGE

Results may vary among students.

	Shot 1	Shot 2	Shot 3	Shot 4	Shot 5
Location on model court					
Distance					
Observations					

Brainstorm ways to Increase the Motion in the Design:

Results may vary among students.

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Select a single Design (draw in detail, label materials and provide measurements): Answers may vary based on student results.

Build and Re-Test: Results may vary among students.

	Shot 1	Shot 2	Shot 3	Shot 4	Shot 5
Location on model court					
Distance					
Observations					

Was your redesign successful? Did it increase the motion of the marshmallow? Answers may vary based on student results.

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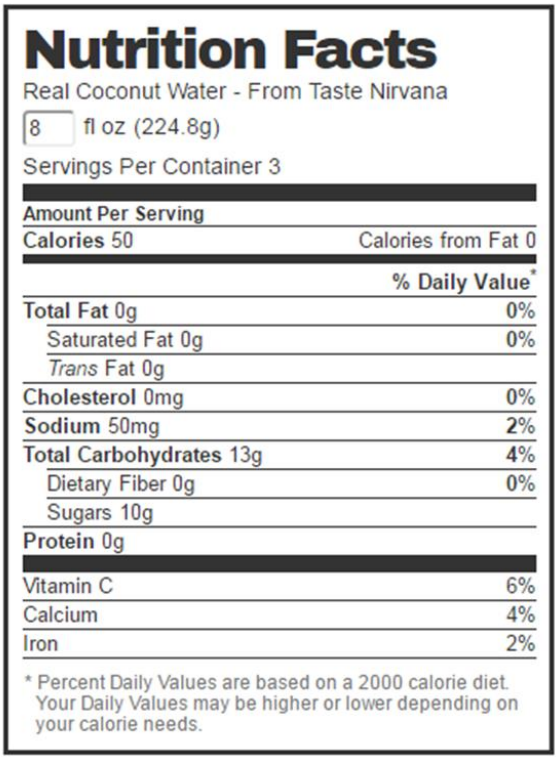
Module 6.1: CALCULATING CALORIES

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

(8 oz = 50 cals) 4

32 oz = 200 calories or **4 containers of coconut water**



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.

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.

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

1. How many calories did you burn for 15 minutes (¼ or 0.25)?
   Apply the above formula to ensure accuracy.
   Based on a student who weighs 80 pounds.
   80 ÷ *2 x 7 x 0.25 = 70 calories*

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2. Using the equation, how many calories will you burn if you play for 30 minutes? 1 hour?
   Answers may vary based on the student's weight.

   Based on a student who weighs 80 pounds.

   30 minutes: 80 ÷ *2 x 7 x 0.5 = 140 calories*
   1 hour: 80 ÷ *2 x 7 x 1 = 280 calories*

3. Bonus: How long would it take you to burn 450 calories?
   Answers may vary based on the student's weight.

   Based on a student who weighs 80 pounds.

   80 ÷ *2 x 7 x ? = 450 calories (or guess and check*
   1.6 hours)

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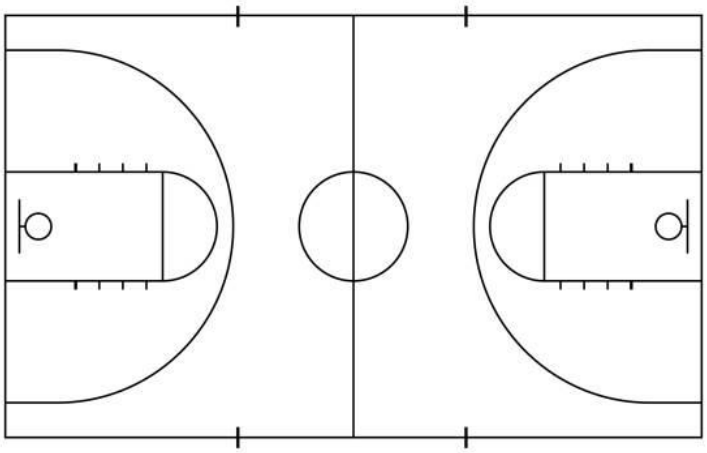
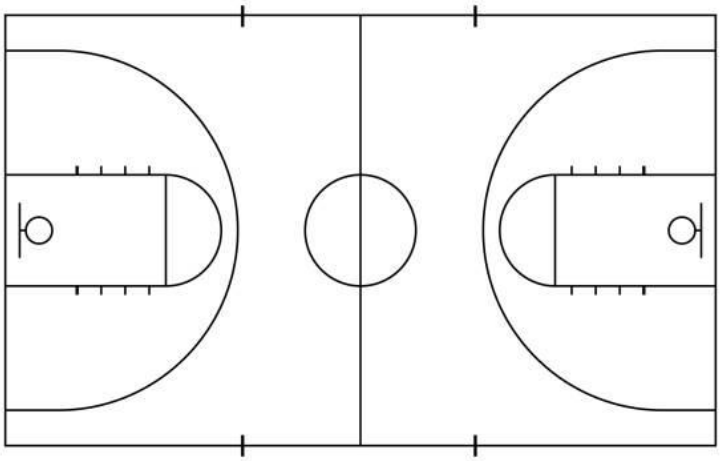
Module 7.2: SHOT TRACKING

O - Shot Made X- Shot missed





Sample data.

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

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

-> Free Throws: 7 / 15

-> Lay-Ups: 12 / 15

Free Throws < Lay-Ups: The free-throw fraction 7/15 compared to 12/15 lay-ups made and is “less than” your free-throw accuracy.

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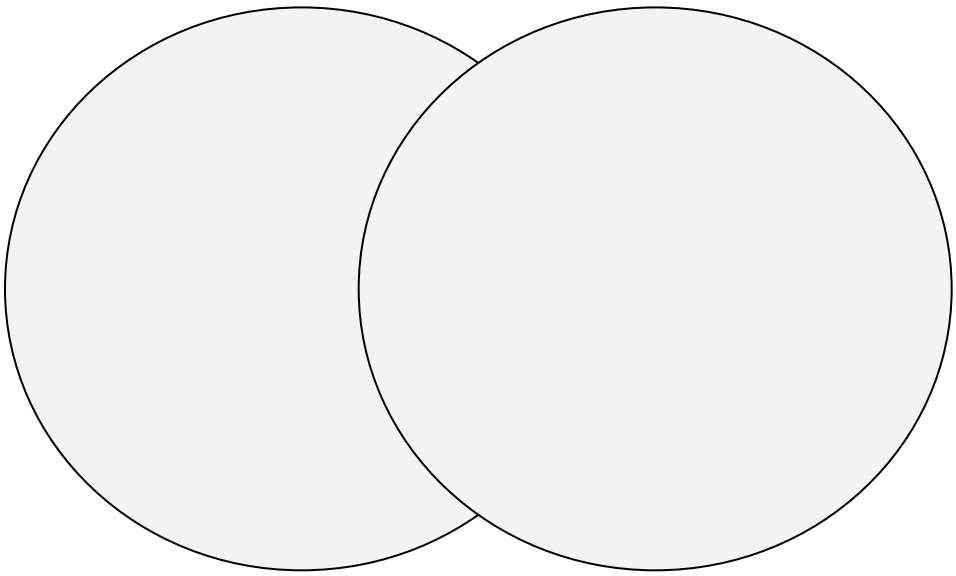
Module 8.1: ADVANCEMENTS IN SHOE TECHNOLOGY

Results may vary among students.

Diagram your Shoe	Measurements of your Shoe	Observations (texture, shape, color, etc)

What is the difference between an Inference and an Observation?
Observation is carefully watching or examining a person or object.
Inference is drawing logical conclusions from known facts or circumstances.

Example: Detailed "observations" of your shoes can provide good scientific data to make "inferences".



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Results may vary among students.

Shoe	Observations with numbers	Observations with words	Inference about why there was a design change
	1 material	Thin sole Flat Made of leather	
	12 eyelets 2 or more materials	Made of cotton/fabric Flat	Needed more sole support
	Multiple (3+) materials	Shaped foot bed (rise in the toe) Thicker material	Needed more ankle support
	Multiple (3+) materials	Thicker material Thicker heel support Lower ankle support	Need better jumping/landing absorption
	Multiple (3+) materials 9 eyelets	Made of synthetics Thinner material Taller ankle support Flexible foot bed	Lighter and better material