

Name: _____ **KEY** _____

Module 1.0: Playing Footsie: Forces in Soccer

Data Table: Results may vary among students. Data examples below.

Drill	Observations	Time
Dribble ball with inside of the foot	The ball was easy to dribble and control with the inside of my foot because the inside of my foot is curved.	3 minutes
Trap the ball with the bottom of the foot	The ball was very easy to stop and control with the bottom of my foot because the bottom of my foot is flat and large.	2 minutes
Stop the ball with the inside of the foot	It was a little more difficult to control the ball with the outside of foot than stopping with the bottom of my foot.	4 minutes
Pass the ball with the outside and inside of the foot	It was easier to pass the ball with the inside of my foot because it was easier to control. Just like dribbling with the inside of my foot.	5 minutes
Shoot with the top and inside of the foot	This was the toughest drill because I needed a lot of strength to kick the ball through the goal. I found it equally difficult to shoot with both the top and inside of my foot.	6 minutes

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Evaluate:

Rate drills from highest energy transfer (most motion) to least.

1. Shoot
2. Dribble
3. Pass
4. Trap the ball with the inside of my foot.
5. Stop the ball with the bottom of my foot.

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Module 2.0: Penalty Shootout: Kicks and Probability

Results may vary among students. Example data below.

1. How many penalty shots can I make out of 10?

4

2. Hypothesis: I will score 6 goals out of 10.

X - Shot made O - Shot missed

	1	2	3	4	5	6	7	8	9	10	TOTAL Made
Partner 1	X	X	O	O	O	X	O	X	O	X	5
Partner 2	O	X	O	X	X	X	O	X	X	O	6

Ask students the following the questions:

1. How many shots did I take?

10

2. How many shots did I make?

6

3. How many shots did I miss?

4

4. Can you write it as a math equation?

$10 - 4 = 6$ makes

5. Can you find the percentage of shots made? Divide.

$6 / 10 = 60\%$ made

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Results: Refer back to your hypothesis:

1. Were you correct?

No

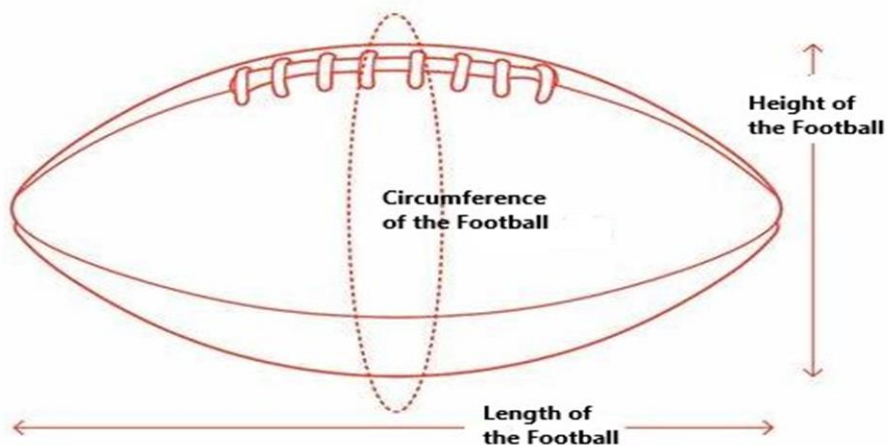
2. Was it over/under your actual shots made?

It was under by 1.

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Module 3.0: Football Properties: Pee-Wee Football vs Foam Football
Observations of the footballs: Results may vary among students. Example data below.

	Color	Shape	Texture	Length, Height and Circumference	Mass (ounces)	Materials
Pee-Wee Football	Red	Round and little like a rectangle	Squishy	L – 7 inches H – 4 inches C – 13 inches	4.5 oz	Nerf or foam-like
Foam Football	Blue	Longer than the Pee-Wee football and like a diamond	Squishy, but heavier and firmer than the Pee-Wee ball.	L- 9.5 inches H- 5.5 inches C- 17 inches	6 oz	Nerf



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Observations for throwing and catching a Foam vs. Youth football:

Results may vary among students. Example data below.

	How does it bounce?	How far can you throw it?	How far can you kick it?	Is it easy to catch?	Is it easy to squish?
Pee-Wee Football	It bounced a little	20ft	59ft	Yes	It was pretty squishy and smooth
Foam Football	Poorly with not much bounce	30ft	55ft	Yes. Easier than the Pee-Wee football.	It was a little squishy and smooth

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Module 4.0: Catch Me If You Can

Results may vary among students. Example data below.

What is the best distance to play catch?

15 yards

Hypothesis: We think _____ **20** _____ yards is the best distance to play catch.

Experiment: Set-up 5 distances to play catch and collect data.

Results may vary among students. Example data below.

Distance	Effort 1 (easy) – 5 (hardest)	Observation
3 yards	1	It was very easy to play catch when we were this close.
5 yards	1	It was pretty easy to play catch when we were this close.
10 yards	3	It was a bit more difficult but fun to play catch from this distance.
15 yards	4	It was a challenge and kind of fun to play catch from this distance.
20 yards	5	It was more difficult than we thought to play catch from this distance.

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Analyze: Results may vary among students. Example data below.

1) Which distance was easiest? Which distance was the hardest?

3 yards was the easiest and 20 yards was the hardest.

2) Does the ball you used matter?

Yes. It seemed like the heavier ball was easier to control, so it went a bit farther.

3) What other factors contributed to your findings?

I felt like when I stepped and threw the ball it went further. So, using my body as well as my arm strength helped with my total distance.

Report:

1) Look back at your hypothesis, were you correct?

No. I thought I could throw the ball and play catch from a further distance.

2) Based on your experiment, what is the ideal distance to play catch?

What factors influenced your answer?

I enjoyed playing catch with my partner from 10 – 15 yards because we could get it to each other, but it still required some effort and was a good challenge.

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Module 5.0: Basketball Matters

Flat ball: Results may vary among students. Example data below.

	Observations
Color	Orange
Texture	Rubber-like with a little bit of stick.
Ability to stretch	It is difficult to stretch or expand with my hands.
Ability to bounce	Not good. It does not bounce at all.

Inflated ball: Results may vary among students. Example data below.

	Observations
Color	Orange, but not as dark as when the ball was flat.
Texture	Rubber-like with a little bit of stick.
Ability to stretch	It stretched a lot when we filled it with air from the pump.
Ability to bounce	Very good and bouncy and fun to dribble.

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Module 6.0: Design a Shoe

Have students observe the below shoes images.

How have shoes changed over time (technology vs. innovation)? What is new? What is the same?

Teacher note: Younger students may verbalize their responses.

Results may vary among students. Example data below.

Shoe	Observations with numbers	Observations with words	Inference about why there was a design change
	1 material	Thin sole Flat Made of leather	Needed more comfort
	12 holes for laces 2 or more materials	Made of cotton/fabric Flat	Needed more sole support
	Multiple materials	Shaped well to my foot Thicker material	Pretty good ankle support
	Multiple materials	Thicker material Good heel support Little high ankle support	Good for jumping and landing when playing
	Multiple materials 9 holes for laces	Made of thinner material Less heel support Good for high ankle support	Lighter and made with stronger material for support

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Design your shoe in the box below: *Design results will vary among students.*



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Describe your shoe: *Design results will vary among students.*

Shoe	Material	Reason
Sole		
Covering		
Laces		
Height		

Shoe Name: *Answers will vary among students.*

What are your shoes designed for (sport, dressing up, causal, etc.)?

Results will vary among students.

If you were to sell your pair shoes, what would the cost be and why?

Results will vary among students.

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Module 7.0: Finding the Sweet Sport: Force of a Golf Swing

Review and complete the following with students:

- 1) If the force of a golf swing is stronger, the ball will go a **farther** or **shorter** distance.

Farther

- 2) The angle of the golf club's face affects the ball's **distance** or **direction**.

Direction

Review and define key vocabulary with students. Explain to students that each of these shots require a different amount of force for accuracy and precision to make a good shot!

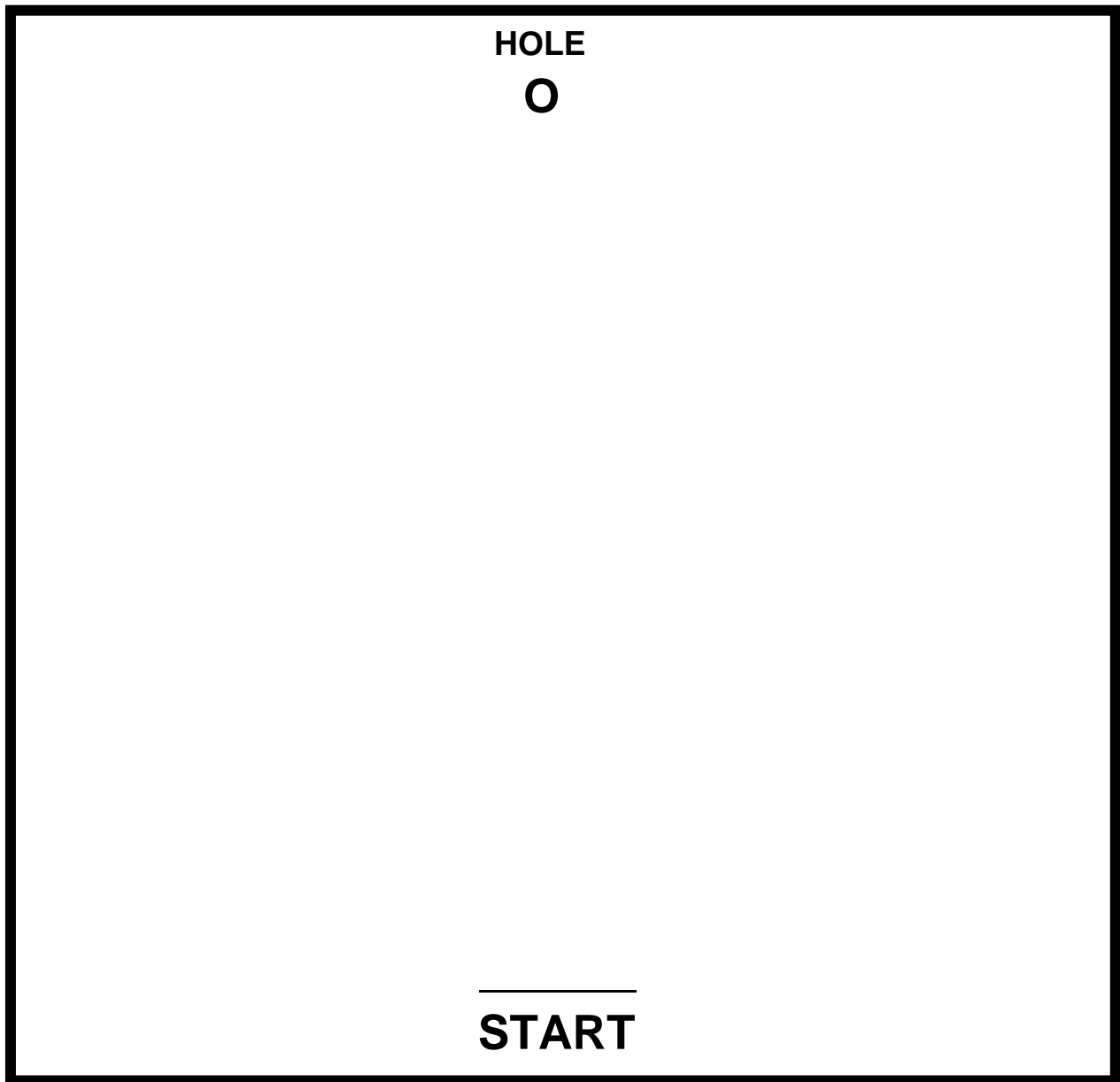
Please reference the [STEM Sports® glossary](#) for key vocabulary terms.

- **Putting (or a Putt)** is a golf stroke made on a green to cause the ball to roll into or near the hole.
- **Chipping (or Chip Shot)** is a golf stroke played close to the green that pops the ball briefly into the air, then rolls toward the hole.
- **Driving (or a Drive)** is a long-distance shot intended to move the ball a great distance down the fairway towards the green. This is sometimes referred to as a “tee shot”.

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Module 8.0: Engineer a Hole-In-One

Design your Hole-In-One: *Design results will vary among students.*



Once students have designed (drawn) his/her "Hole-In-One", have them construct their design using available classroom materials (books, boxes, paper towel rolls, etc.).

**Students are encouraged to make adjustments as they test their designs, as engineers often make adjustments.*