

We are so excited to have you visit The Franklin Institute with your learners!

The following document is meant to help you guide learners in making connections between the *Science of Soccer* activities and interactives at The Franklin Institute.

The museum exhibits will give learners opportunities to engage further with some of the *Science of Soccer* ideas and help them broaden their understanding of these science and engineering concepts. We hope the museum continues to inspire your young learners and foster their curiosity.

SportsZone, 3rd Floor

Train your Brain	<p>Soccer players rely on quick reaction times to perform their best.</p> <ul style="list-style-type: none"> Have learners follow the prompts to test their reaction speed and observe how it changes with practice. Ask: <ul style="list-style-type: none"> <i>What did you notice about your reaction time before and after practicing?</i> <i>Why do you think practice helps improve reaction time?</i> <i>How might being tired or distracted affect your reaction time?</i> <i>What strategies could help someone improve their reaction time?</i>
Ball Spin	<p>Sometimes, soccer players add spin to the ball to curve it around a defender and reach their target.</p> <ul style="list-style-type: none"> Have learners follow the prompts to apply spin to the ball and aim for the target. Ask: <ul style="list-style-type: none"> <i>What happened when you added spin to the ball?</i> <i>How did the direction or speed of the ball change?</i> <i>Why do you think the ball curves when it spins?</i> <i>How could changing the amount of spin affect your accuracy?</i>
Bodies in Motion	<p>Soccer players are constantly moving, and sometimes they need to jump to head the ball.</p> <ul style="list-style-type: none"> Have learners follow the prompts to compare how high they can jump from a standing position versus a running start Ask: <ul style="list-style-type: none"> <i>Was your jump higher when you started running or when you stood still?</i> <i>Why do you think running before jumping makes a difference?</i> <i>What muscles help you jump higher?</i> <i>How could soccer players use this skill during a game?</i> <i>What techniques might help improve your jumping height?</i>

Weighing Impacts	<p>Sports equipment engineers make more than soccer cleats—they also create helmets to protect athletes.</p> <ul style="list-style-type: none"> • Have learners follow the prompts to test the helmets. • Ask: <ul style="list-style-type: none"> ○ <i>Which helmet absorbed the most impact?</i> ○ <i>How does the material or design of a helmet affect safety?</i> ○ <i>How do engineers decide what materials to use for helmets?</i> ○ <i>Can you think of other sports or activities where impact protection is important?</i> ○ <i>How could testing help improve helmet designs in the future?</i>
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<h3 style="text-align: center;">Sir Issacs Loft, 3rd Floor</h3>	
Momentum Table	<p>Both soccer players and the soccer ball are always in motion during a soccer game.</p> <ul style="list-style-type: none"> • Have learners follow to put the ball and ring in motion. • Ask: <ul style="list-style-type: none"> ○ <i>What did you notice about the motion?</i> ○ <i>How do they roll across the surface?</i> ○ <i>What affects how far or fast they travel?</i> ○ <i>Can you predict where the ball or ring will go next?</i>
Energy Transfer	<p>Soccer players transfer energy from their feet to the ball to make it move.</p> <ul style="list-style-type: none"> • Have learners follow the prompts to set the strings in motion and observe the energy transfer. • Ask: <ul style="list-style-type: none"> ○ <i>What happened when you moved the strings?</i> ○ <i>How did the energy from your hands transfer to the strings?</i> ○ <i>Did all parts of the string move the <u>same</u> way? Why or why not?</i> ○ <i>How is this similar to how a soccer player kicks a ball?</i> ○ <i>How could you make the string move faster or farther?</i>
Gravity Well	<p>When soccer players hit a ball they put it into motion.</p> <ul style="list-style-type: none"> • Have learners follow the prompt to release the ball into the gravity well. • Ask: <ul style="list-style-type: none"> ○ <i>What did you notice about the way the ball moves?</i> ○ <i>What happens when you release the ball faster or slower?</i> ○ <i>How is this similar to the way a soccer ball moves when it's kicked?</i>

Body Odyssey, 2nd Floor

How do you get your muscles strong?

- Have learners follow the prompt to explore how exercise makes your muscles stronger.
- **Ask:**
 - *Why do you think your muscles get stronger with regular exercise?*
 - *What types of movements seem to make your muscles work the most?*
 - *How might exercise help prevent injuries or improve performance in sports?*

Design Your Best Kicks

- Have learners follow the prompts to select design features for their sneakers.
- **Ask:**
 - *Which design factors did you choose and why?*
 - *How do you think each factor will affect performance or comfort?*
 - *How do professional athletes' sneakers differ from everyday shoes?*
 - *How might testing and feedback help improve your sneaker design?*

The Brain, 2nd Floor

Count the Hits

Our brain helps us pay attention and make quick decisions during a soccer game.

- Have learners follow the prompt to hit the tennis ball as many times as they can.
- **Ask:**
 - *Did you notice the background changing?*
 - *Why do you think you might have missed it?*
 - *What happens when our brain is distracted?*