Name _____ Date _____

SOCCER AND SCIENCE

Physics is the science that studies matter and energy, and how the two relate to each other. You can apply physics to soccer in several different ways. You just have to take a look at how soccer **matter** (such as the players, the ball, and even the field) interacts with soccer **energy** (such as the players or ball moving or being moved across the field). Below are several physics terms you can consider when learning how physics works when playing soccer.

Speed—Speed is how fast something is moving. You measure speed by seeing how much time it takes the object to cover a certain distance. You can measure the speed of a soccer player or the ball.

Velocity—Velocity is how fast something is moving in a certain direction. If a soccer player or soccer ball changes how quickly it's moving or changes what direction in which it's moving, then it is changing its velocity.

Inertia—Inertia is when an object doesn't change its velocity. Newton's First Law of Motion says that an object will remain inert until it is forced to change. When a soccer ball sits on the pitch without moving, inertia is keeping it still.

Acceleration—Acceleration is a change in velocity. In physics, even if an object is slowing down, it is accelerating. When a soccer player or soccer ball changes its speed or direction, it is accelerating. Newton's Second Law of Motion says that force will make an object accelerate.

Force—A force is something that makes an object accelerate, even if it makes the object stop. When the goalie catches a soccer ball, the goalie becomes a force that stops the ball. The ball is also a force against the goalie. Newton's Third Law of Motion says that the forces two objects have in each other is equal and opposite. The ball pushes the goalie in one direction, and the goalie pushes the ball with equal force in the opposite direction to stop it.

Friction—Friction is a force caused by two objects pushing against each other. When a soccer ball is kicked across the pitch, the ground pushes up and against the ball, making the ball slow down and eventually stop.

Energy—In simple terms, energy is an object's ability to apply force, or to work. Force almost always uses energy (gravity is one exception). A foot kicking a ball has energy that allows it to create the force that moves the ball.

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Answer the following questions. Explain your answers.

1. What do you measure to see how quickly a ball is kicked toward the goal?

2. When the ball slows down after it is kicked across the pitch, what is it doing?

3. What does an object need in order to apply force?

4. What is acting on a soccer ball when it stays in one place until a player moves it?

5. When a player kicks a ball, what is being applied to the ball?

6. What do you measure to see how quickly a player runs?

7. When a player slides across the pitch to kick the ball and comes to a stop, what helped stop the player?

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Answers
Note: Explanations should vary; accept reasonable explanations.

1. Velocity.
2. Accelerating.
3. Energy.
4. Inertia.
5. Force.
6. Speed.
7. Friction.

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