



**SPORTS FOR  
LEARNING**



**STUDENT  
WORKBOOK**

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# STUDENT WORKBOOK

**SPORTS FOR LEARNING** 'Challenges' extend your learning from the field to the classroom and beyond. To earn extra credit complete the investigation of each activity by reading the directions, watching the video and answering the questions.

## Workbook Guideline

- All challenges are directly aligned with the sports games and activities that the students participate in while out on the field.
- Each Challenge includes 4 sections:
  - An introduction to this STEM topic aligns with sports
  - A Discussion question
  - A sports-science video (2-4 min)
  - Three open-ended questions
- All questions can be answered by students of every grade level.

We hope that you have enjoyed the activities with our coaches and that this workbook helps your understanding of how sports and science are connected in so many ways.

Yours in Sport,

The Sports For Learning Team

# CHALLENGE 1

## Unlocking Energy For Performance



Energy is everywhere. It can never be destroyed, only transformed from one state to another. In sports we see changes in energy all the time. There are two kinds of energy that are obvious when playing sports, dancing or just playing around with friends or family - these are potential and kinetic energy.

### DISCUSSION QUESTION:

What is the connection between kinetic & potential energy and kicking a soccer ball or dancing on stage?

### VIDEO:

Watch this video on the [energy needed to perform on stage.](#)

# Challenge # 1: Answer Sheet

1) What do you know about energy, and how does having lots of energy help you in sports or dance?

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2) If the food you eat at breakfast provides the starting energy you need to move throughout the day, in what are **two** ways could you improve (increase) the amount of energy you have available on a daily basis?

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3) What might be some things that happen to your body when you have to use lots of energy to do something?

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# CHALLENGE 2

## The Science Of Speed



In sports speed can make a great difference to the success of a single player or a team. Almost every sport requires speed - in terms of how fast you can get from point A to point B. For example, on a soccer pitch you need to be able to sprint fast in a straight line, but on a tennis court, the speed of your reactions with your feet and racket are more important for success.

### DISCUSSION QUESTION:

Can you think of various sports where different forms of speed are important?

### VIDEO:

Watch this video about the speed and reactions of legendary NBA star [Kyrie Irving](#).

# Challenge # 2: Answer Sheet

1) How does having more speed in sports give you an advantage over the other players?

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2) What kind of training would you need to do to improve your speed?

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3) How could you find out how fast you can run?

*(hint: use the formula  $Speed = Distance/Time$ )*

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# CHALLENGE 3

## Building A Better Heart



Your heart is a muscle that is only about the size of your fist, but it plays a BIG role in keeping blood pumping inside you from head to toe. Because it is a muscle, you can train it to become stronger and last longer. When we play sports, we improve the performance and health of our heart, blood and blood vessels.

### DISCUSSION QUESTION:

What are the benefits to your heart from regular exercise and playing sports?

### VIDEO:

Watch this video about the [playing sports at elevation](#).

# Challenge # 3: Answer Sheet

1) What are some things you have learned about your body when you have been exercising?

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2) Why do you think it is harder to play sports at higher elevations?

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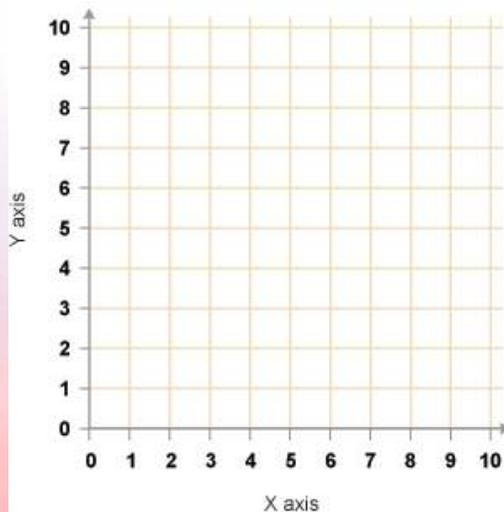
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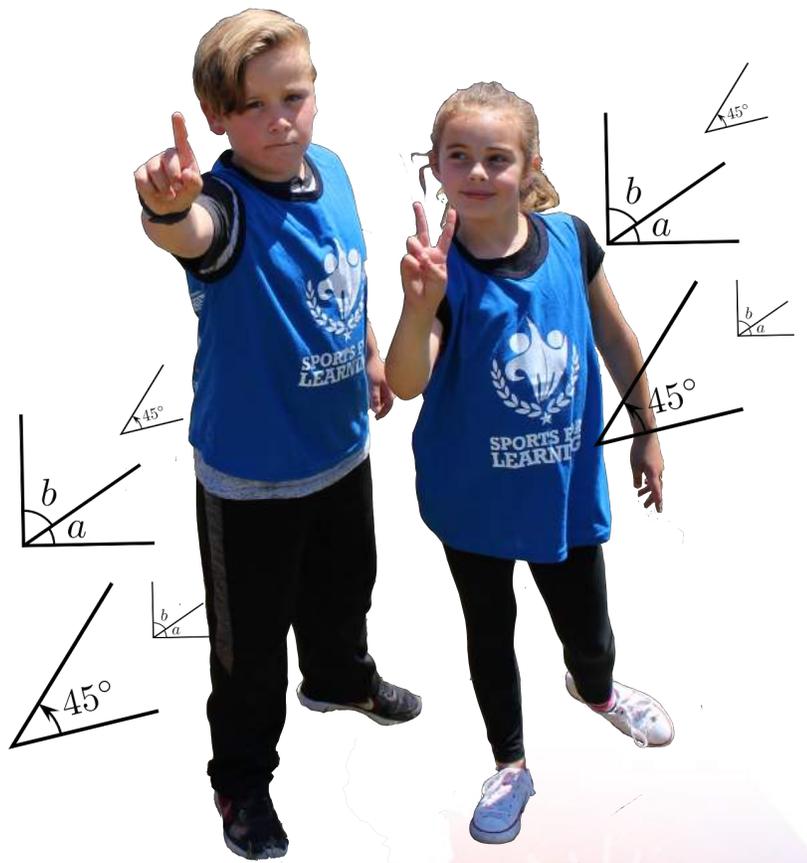
3) Pair up with a partner. You will need a digital timer on a watch or cell phone and this form on a clipboard to complete the Challenge.

- Take turns completing each of these 3 exercises inside or outside your classroom: 5 push-ups; 10 squat jumps, 10 curl-ups.
- Following each exercise check your pulse rate for 10 seconds immediately following each exercise and multiply by 6 to get your beats per minute.  
Formula:  $10 \text{ sec Pulse Rate} \times 6 = \text{BPM}$
- Create a graph of your results below.



# CHALLENGE 4

## Finding The Angle



In almost all sporting games and situations, players use angles. These angles can literally be the fine line between success and failure. A one degree change in the angle of a shot can be the difference between an amazing goal or a heartbreaking miss. Athletes are always trying to use angles to their advantage- this might mean, blocking off an angle for an opponent or finding a better small angle to score into.

### DISCUSSION QUESTION:

Describe some situations in games or sports where players must think about the angle to score?

### VIDEO:

Watch this video about [basketball & angles](#) with Golden State Warriors star player Steph Curry.

# Challenge # 4: Answer Sheet

1) Describe some sports where you see angles in action.

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2) Pick a sport and explain how you can use angles to your advantage on offense or defense.

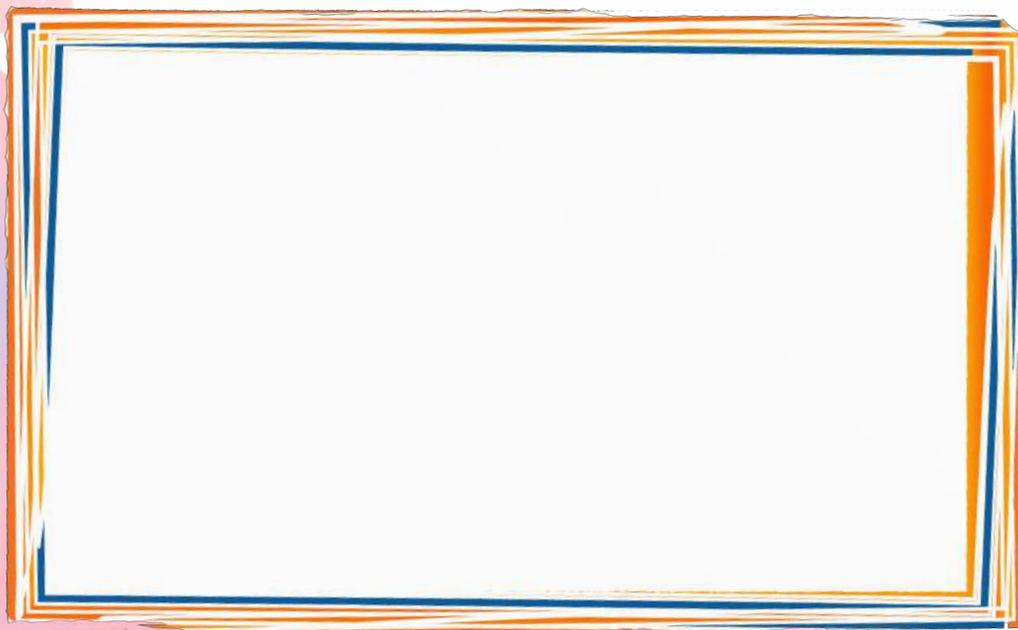
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3) Sketch out a basketball court or a soccer field and indicate on the diagram, the shapes and angles that you can identify. You can include the players and the indicate the angles that they need to create to shoot and score.



# CHALLENGE 5

## The Magic Of Numbers



Pro athletes in all kinds of sports use statistics to measure performance. For example, how many goals they scored, how many yards they have run during a game, or how many successful passes they have made. Statistics can help us develop a love for math and appreciation of its use in daily life. A person who takes data from a sports game and is able to find out information from this data is known as Sports Statistician.

### DISCUSSION QUESTION:

Can you think of some statistics in soccer or basketball that a player or team would want to know?

### VIDEO:

Watch this video about the [data statisticians at ESPN](#) and answer the questions.

# Challenge # 5: Answer Sheet

1) How can math help us in the real world outside of the classroom?

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2) How can performance data and statistics be helpful in evaluating a player or a team?

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3) List the kinds of data that you would want to see on yourself in whatever sport you play. Then explain how you would use this data to learn if you were improving.

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# CHALLENGE 6

## Fuel Up



Eating healthy food is important to keep your brain and body fueled up. Drinking enough of the right kinds of fluids will also keep you alert, focused and ready play all day long. In sports you must be careful to eat the right foods and drinks the right fluids, during and after a game so you have the right amount of energy to perform.

### DISCUSSION QUESTION:

What kinds of fluids do you think are good for sports people to drink both during and after exercise?

### VIDEO:

Watch this video about [how playing sports in the heat can affect athletes.](#)

# Challenge # 6: Answer Sheet

1) Why it is important to eat well and drink enough of the right fluids before, during and after playing sports?

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2) What do you think might be are some of the negative effects of drinking sugary drinks?

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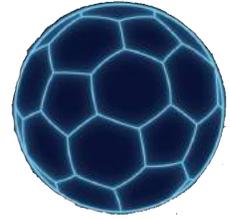
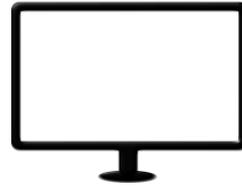
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3) Imagine you are in the World Cup final. You will need to be in top shape to perform at your maximum potential. Plan out your meals, drinks and snacks for the day and explain what those foods will do for you.

Meal	Day 1	What These Foods Do For Me
Breakfast		
Snack 1		
Lunch		
Snack 2		
Dinner		

# CHALLENGE 7

## The Rise Of Technology In Sports



Digital devices, including video replay and technology are becoming a very important part of professional sports and can determine who wins games. Digital video is used to replay and decide controversial plays. It can tell us if a ball has crossed the goal line and gather important data on the players performance that the coaches want to see. Coaches then use these technologies to decide on tactics and formations during games. Technology can also help us to analyze and practice our techniques and form in order to improve performance.

### DISCUSSION QUESTION:

What do you think might be some ways a coach could use technology to collect information on one of his/her players?

### VIDEO:

Watch this video about how technology can be used to analyze and improve a pro golfer's driving distance using the [Happy Gilmore](#) golf swing.

# Challenge # 7: Answer Sheet

1) What examples can you give on how and where you see technology being used in sports?

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2) What are some ideas you have about using video to track or improve performance in sports?

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3) All referees should be robots! Explain why you would agree or disagree with this statement.

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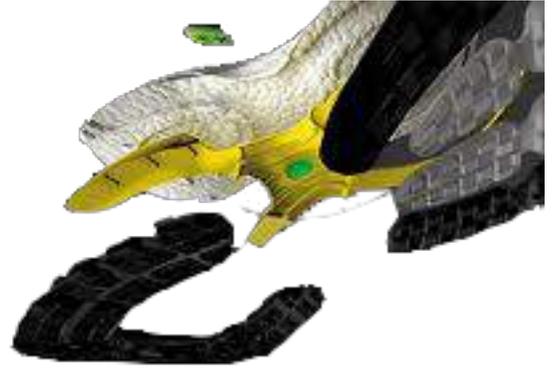
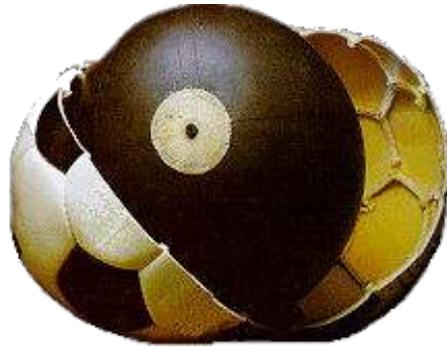
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# CHALLENGE 8

## How It's Made



When you play sports, you are probably not thinking about 'Engineering'. However for you to enjoy almost any sport, it requires you to use some equipment. These balls, bats, shoes and goals all require years of research and design before the final product is released. This is just another example of how sports and science overlap and interact.

### DISCUSSION QUESTION:

Think of your favorite sport. How many different pieces of equipment are needed for you to play that sport?

### VIDEO:

Watch this video by [how a pitcher can make changes to a baseball](#) to change how it moves.

# Challenge # 8: Answer Sheet

1) Pick a sport and write down all equipment that would be needed to play that sport. What materials and tools would you use to make that equipment?

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2) What are some improvements to sports equipment that you have noticed since you started playing and watching sports?

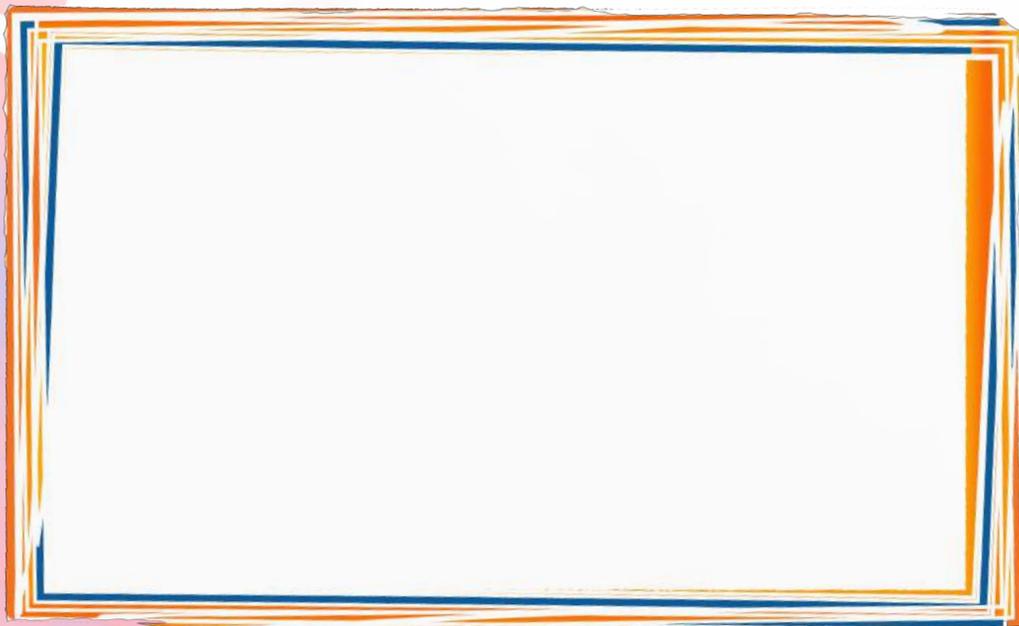
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3) Design and sketch out a ball (used for any sport). You can include any design features, or specifications you would like.



# CHALLENGE 9

## Amazing Anatomy



To succeed in sports, you need to train your body. Although training your heart and lungs are important, building strength and speed of your muscles is also crucial to sporting success. Players will train different muscles depending on what sport they play the needs and demands of their position that they play in their team. You should have a very good understanding on what your main muscles groups are and how to train them.

### DISCUSSION QUESTION:

What are some exercises you can do to improve the strength and power of your main muscles groups?

### VIDEO:

Watch this video on a world champion [arm wrestler](#).

# Challenge # 9: Answer Sheet

1) Why can having bigger muscles be helpful in sports?

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2) Do you think that improving your technique can be more helpful to you in sports than having stronger muscles? Explain.

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3) Write out a work-out routine for what muscles you would need to train in order to improve at your own sport.

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# CHALLENGE 10

## Force Of Friction



Each time you play a sport there are tons of forces at play at all times. Of course, Gravity is a force that is always acting on us and keeping our feet on the ground. When you strike a ball there is also a lot of force generated to propel the ball towards the target. A force that you might not notice is Friction. This allows you to start and stop but also slows down the ball.

### DISCUSSION QUESTION:

What does the word **friction** mean?

### VIDEO:

Watch this video on [friction in the Winter Olympics](#).

# Challenge # 10: Answer Sheet

1) Why do you think objects move faster on ice?

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2) In everyday life, can you think of examples of when you see the force of friction in action?

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3) Pick a sport and list the ways in which friction can help or hinder you.

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