TATA CONSULTANCY SERVICES | Discovery EDUCATION

IGNITE MY FUTURE

THINK | SOLVE | CREATE | CONNECT

LESSON TITLE

Get Moving!

Guiding Question: How could we improve the world?

SUBJECTS

Engineering
Health

COMPUTATIONAL THINKING PRACTICE

Creating Computational Artifacts

COMPUTATIONAL THINKING STRATEGIES

Find Patterns
Building Models

MATERIALS

Health and Fitness
student capture sheet

Pens, markers and/or pencils

Drawing paper

Finding Patterns in Faulty Fitness
student capture sheet

Computers with access to the Internet (optional)

Prototype Design
student capture sheet

Ignite Curiosity

- Wearable fitness trackers are really popular, but do they work?
- Do you know how to get and stay healthy?
- Why might it be hard for people to be active every day?
- What are some of common health issues you know or have heard about?

In this lesson, students will use the computational thinking strategies of finding patterns and building models to assess the effectiveness of various sports and exercise tools such as wearable tech, apps, and analog methods of tracking exercise.

In **THINK**, students will simulate the role of public health researchers who have identified an alarming trend: childhood obesity is increasing and teenagers are exercising less and less, leading to an increasingly unhealthy adult population that needs significant medical care. To do this, they will study the most effective forms of exercise tracking, decomposing the elements of these tools that make them more appealing and habit-forming. In **SOLVE**, students will find patterns in data from many different types of fitness trackers (including wearables, apps, and analog methods), students will evaluate what characteristics of these tools appeal most to children and teens. They will then create a hybrid health and fitness tracker with features selected from the most successful trackers. In **CREATE** students will use the computational thinking strategy of building models to design a prototype of a fitness tracker that appeals to teenagers. This prototype may or may not be tech-based, but it must be based on students' findings on the most habit-forming fitness tracking systems. In **CONNECT**, students discuss how doctors and other health professionals design outreach programs that help the general population to get healthier.

Students will be able to:

- **Apply** the scientific method to research tools for tracking exercise,
- **Evaluate** data to redesign or reimagine a tool for tracking exercise, and
- **Create** a prototype of a fitness tracker that appeals to teenagers.

Students act as public health researchers challenged to produce an appealing and habit-forming exercise tracking system to combat obesity.

1 **Introduce** the lesson by reading the following scenario to students:

Every year, it seems like there's a new "toy" designed to get people moving. From heart rate monitors to fitness apps, you'd think that we're getting healthier and healthier. You will work as public health researchers who have identified an alarming trend: despite new fitness technology, childhood obesity is increasing and teenagers are exercising less. Your team has been challenged to produce an appealing and habit-forming exercise tracking system that will motivate people to exercise regularly.

2 **Distribute** the Health and Fitness student capture sheet. Ask students to work in small groups to brainstorm responses concerning the issue of technology tools and analog methods designed to help people be active in their daily lives.

3 **Next,** allow individual members to identify a specific fitness tracker or exercise program based on their brainstormed responses from the Health and Fitness student capture sheet that they would like to research for their group.

4 **Allow time for students to conduct** their individual research. Encourage students to use a wide variety of research methods as they obtain their data. In addition, remind students that there are several ways that the field of health can treat the problem of inactivity. Encourage students to consider all options that may involve technology processes.

Optional Extension: Lead students in a study where the class conducts field experiments on their own fitness habits by journaling over a set amount of time. You may also lead a field trip to a local gym or community center in order to record data on different activity types.

5 **Once students have collected data,** ask students to share their information with their groups and conduct an analysis of the combined data. Students will begin to decompose the problems and benefits of using existing technology tools and analog methods to maintain healthy lifestyles. Distribute the Finding Patterns in Faulty Fitness student capture sheet. Ask students to record both positive and negative points for each fitness tracker in one- to three-word statements that they discovered during their individual research.

Students evaluate characteristics of appealing and effective fitness trackers to design a hybrid health and fitness tracker.

1 **Using a large space on the wall,** create the following table:

Fitness Trackers

POSITIVE POINTS	NEGATIVE POINTS

2 **Ask** student groups to add the one-to three-word positive and negative points they discovered during their data analysis in Think to the table on the wall shown in their Finding Patterns in Faulty Fitness student capture sheets.

3 **Once all groups have added their information,** review all positive points and negative points. Ask groups to clarify any statement that does not make sense.

4 **Tell** students that their group will use this information to generalize characteristics they want to include in their design for a hybrid health and fitness tracker. Allow time for groups to meet and generalize characteristics for their group's project. Remind students that their new design can be some new type of technology, a new analog method, or a combination of technology and analog method based on the characteristics of multiple existing systems. They must consider how the new tracking system will appeal to teenagers and be an effective method for promoting regular physical activity. For example, if students identify a characteristic of "fun," they may want to consider a gamification method for a hybrid health and fitness tracker.

Student groups will use the computational thinking strategy of building models to design a prototype of a fitness tracker that appeals to teenagers.

1. **Ask** students to prioritize the characteristics they identified in Step 2 of Solve based on which they think are the most important to include as they develop a prototype for their model fitness tracker.

2. **Inform** students that this list of characteristic priorities and corresponding method should become the parameter for building their prototype.

3. **Distribute** the Prototype Design student capture sheet. Ask students to design their fitness tracker prototype based on these parameters. Remind students to consider what type of input and output their fitness tracker will require. Also, remind students to consider any limitations for their prototype. For example, if the prototype includes heavy cardio exercise, there may be a physical restriction for people with a heart condition placed on the prototype. Each prototype should also estimate the cost of production.

4. **Once students have a basic design** for their fitness tracker, allow groups to share their ideas as a soundboard or focus test group for their prototype. Encourage students to discuss each prototype after a group presents their design.

5. **Allow students time to modify their design** as needed based on possible issues raised during the class discussion.

IGNITE MY FUTURE

THINK SOLVE CREATE CONNECT

Select one of the strategies listed below to help students answer these questions:

- **How do this problem and solution connect to me?**
- **How do this problem and solution connect to real-world careers?**
- **How do this problem and solution connect to our world?**

1. **Write** the three questions on PPT or flip chart slides and invite students to share out responses.
2. **Display** chart paper around the room, each with one question written on it. Ask students to write down their ideas on each sheet.
3. **Assign** one of the questions to three different student groups to brainstorm or research, and then share out responses.
4. **Invite** students to write down responses to each question on a sticky note, and collect them to create an affinity diagram of ideas.

How does this connect to students?

Building a healthy lifestyle and understanding the tools available to support a fitness plan can help students maintain healthy behaviors and improve their personal health. Programs like the Rising New York Road Runners provide students with a fun and accessible way to stay active, regardless of economic status or ability.

In addition, the chance to conduct research, collect and evaluate data, and make recommendations to enhance a product design is a valuable skill in today's labor force.

How does this connect to careers?

Athletic Trainers design individual exercise programs that inspire the general population to work out more.

Occupations in the **Health Professions (such as Physicians, Registered Nurses, and Physical Therapists)** treat medical conditions and injuries and help people make lifestyle choices to stay healthy.

Health Educators and Community Health Workers teach people about behaviors that promote wellness. They develop and implement strategies to improve the health of individuals and communities.

Industrial Designers develop concepts for manufacturing products. They consider the function, aesthetics, production costs, and usability of products when they develop plans.

How does this connect to our world?

Increasing exercise throughout society is a concern for many professions, most notably those involving health and medicine.

Advancements in society often come from collaborative activities. By working together, people can develop solutions more quickly and with more insight than by working alone. A collaborative design process brings incremental changes that spur growth.

Many fields require the ability to transfer concepts into drawings that can be shared, simulated, tested, and modified. This process of design allows us to choose the best initial idea, develop prototypes, and consider alternatives before developing a final solution.

Find more easy-to-implement resources to integrate computational thinking practices into your classroom by visiting **ignitemyfutureinschool.org**

National Standards

NEXT GENERATION SCIENCE STANDARDS

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1) **Developing and Using Models** Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4) **Analyzing and Interpreting Data** Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3) **Engaging in Argument from Evidence** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2)	**ETS1.B: Developing Possible Solutions** ▪ A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) ▪ There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3) ▪ Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) ▪ Models of all kinds are important for testing solutions. (MS-ETS1-4)	**Influence of Science, Engineering, and Technology on Society and the Natural World** The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. (MS-ETS1-1)

National Standards

THE NATIONAL HEALTH EDUCATION STANDARDS

Standard 1:
Students will comprehend concepts related to health promotion and disease prevention to enhance health.

Grades 6-8
1.8.1
Analyze the relationship between healthy behaviors and personal health.

K-12 COMPUTER SCIENCE FRAMEWORK

Practice 5: Creating Computational Artifacts
The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Students create artifacts that are personally relevant or beneficial to their community and beyond. Computational artifacts can be created by combining and modifying existing artifacts or by developing new artifacts. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.

By the end of Grade 12, students should be able to:

- Plan the development of a computational artifact using an iterative process that includes reflection on and modification of the plan, taking into account key features, time and resource constraints, and user expectations.
- Create a computational artifact for practical intent, personal expression, or to address a societal issue.
- Modify an existing artifact to improve or customize it.

Health and Fitness Worksheet

Brainstorm to identify as many responses as possible for each category below.

- **Exercise or Fitness Plan:** What are some possible plans you would develop to help someone be active every day?
- **Possible Methods:** Identify any technology or analog method you can think of that would help the person implement and stick with the exercise or fitness plan. (For example, a regular exercise regimen could include using Kidnetic's Fitness Challenge on a regular basis.)
- **How does it work?** Give a brief description of how someone would use the technology or analog method to implement the exercise or fitness plan. Remember to include an evaluation of the information on how appealing the program is or why it may not work.

Fitness or Exercise Plan	Possible Method	How Does it Work?

Find more easy-to-implement resources to integrate computational thinking practices into your classroom by visiting **ignitemyfutureinschool.org**

Finding Patterns in Faulty Fitness

(Insert name of fitness tracker or analog method researched here)

POSITIVE POINTS	NEGATIVE POINTS

Prototype Design

Priority #1	
Characteristic:	Method:

Priority #2	
Characteristic:	Method:

Priority #3	
Characteristic:	Method:

Provide a description of how the prototype works:

What limitations may exist with this prototype?

Estimated costs associated with production for this prototype:

Estimated costs associated with the use of this prototype:

Sketch a drawing of the prototype (if possible) on the back side of this paper.