

# **Dear Educator:**

It is never too early to encourage students to become problem-solvers.Understanding how to identify a problem and use their creativity to develop a solution is a life-long skill that can be used in every facet of their lives.

Inventing does just that. Learning about inventions and understanding the process that inventors go through to develop their inventions helps students to become **critical thinkers** and **problem-solvers**. To identify a problem and use their creativity to develop a solution is a life-long skill that can be used in every facet of their lives. Students will ultimately be the ones to "invent" the future. Starting this learning process at a young age will *set them up for success*.

After you complete all of the provided activities review them with your students and break down the different parts of the invention process that they have learned: Observing, problem identification, solution brainstorming, and creating/designing solutions! Want to keep inventing? Coming soon, we are even providing a guide to run an invention fair at your school!

## **Standards:**

Below find overarching Next Generation Science Standards for the unit. In addition, at the end of this guide you will find a chart that shows alignment for each activity with NGSS and Common Core standards for each activity.

#### Next Generation Science Standards

#### 3-5-ETS1-1.

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

#### 3-5-ETS1-2.

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

#### 3-5-ETS1-3.

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.



Have your students join the Young Inventor's Club by going to: theyounginventorsclub.com



### **Components:**



#### Educator Guide:

This guide will assist you in navigating through the activities, with implementation suggestions and alignment to standards where applicable.



#### 8 Activities:

The 8 activities outlined in this guide are available for download and designed with your kindergartners in mind. They offer challenges that can be done in the classroom or at home.



#### Young Inventor's Invention Fair:

A great way to end the unit on Invention with an Invention Fair in your classroom, with other classes, or even schoolwide to encourage young inventors everywhere.

## How to Use This Program:

We suggest that you review the activities outlined below, download them from your dashboard, and copy as needed. Each activity can be completed in a class period or can be done at home for extended learning.

The activities do not need to be done in the order presented below. You can mix and match to align to your current curriculum. Be sure to read through each activity to be sure you have all of the materials needed before you start.



## Overview

The Young Inventor's Club offers a free resource to introduce inventive thinking to children through a series of hands-on, project based activities. With each activity students will use creativity and critical thinking to solve challenges presented. The activities incorporate S.T.E.A.M. lessons and are based on the "If Not You, Then Who" book series.

We encourage you to purchase a set of books with a bonus Inventor's Journal at IfNotYouBooks.com. These books bring the educational lessons and activities to life with engaging stories of young inventors.

#### **Program Objectives:**

- Engage students in development of key 21st Century skills including creativity, critical thinking and problem solving
- Introduce the invention process
- Support existing S.T.E.A.M. curriculum with fun and inspiring content
- Empower students to view problems as opportunities with the tools to invent solutions



## Challenge #1: From Paper to Helicopter

Challenge your students to follow the instructions provided to make a helicopter out of paper.

- 1. Introduce this activity by talking with your students about the invention of the helicopter. Igor Sikorsky invented the helicopter with the first helicopter taking off in Stratford, CT in 1939. Ask students why the helicopter might have been invented to get people from one place to another faster? What would an inventor need to learn in order to invent a helicopter? You can talk about airflow causing lift and drag.
- 2. Have your students follow the instructions on the activity to make their own paper helicopter and then safely have them drop it from various heights to see how it spins to the ground.
- **3.** You can enhance the activity by having students make the copters in different sizes and using different weight paper and see how it changes the way the copter spins to the ground.

## Challenge #2: Design Marble Run In a Box

This activity incorporates all aspects of S.T.E.A.M. as students design and create their own marble runs.

- 1. Introduce this activity by discussing gravity and friction to show how the marble moves down the run from the start to the finish. Students will also use planning to determine the pathway their marble will take to get to the bottom of the run.
- 2. Have the students follow the instructions in the activity to build their marble run. They will need to be sure the marble fits through the pathways they have designed.

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## Challenge #3: Higher, Faster, Farther

In this activity students will experiment with different sizes and weights of paper to create paper airplanes and see which flies the fastest, the highest, and the farthest. They will learn about the forces acting on the paper airplane (thrust, gravity, drag, and lift).



Inspired by Book 3: "Let The Games Begin!"

- Introduce this activity by talking about common toys that fly such as the Frisbee ®. How does a Frisbee stay in the air? The Frisbee flies due to lift and thrust. The air pressure on the top and the bottom along with the thrust moving the disc forward keeps it in the air.
- 2. Challenge students to follow the instructions in the activity to create paper airplanes of different sizes and weights and then measure how far and fast they fly.

# Challenge #4: Design The Coolest Kite

In keeping with the flight theme, this activity allows students to be creative with design. They will follow instructions to make their own kites that they will be able to fly with air flow lifting the kite into the air.

- Introduce this activity by talking about the importance of design to inventors. Inventors work to design their inventions so they are not only functional but also attractive. Have them think of one of their favorite toys. What do they like about it? What makes it cool is it the shape? The color?
- 2. With this challenge, students will use the instructions to create a cool kit and then decorate it to make their own. Encourage them to be creative and make the design something that represents them. Maybe their initials or name are part of the design or they might use their favorite color. When all the kites are in the air, they want to be able to easily find theirs!

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## Challenge #5: Straw Tower Game

Inventing also involves Math. When an inventor designs something they often look at shapes (geometry) and use measurements to create the shape and size of their invention. This activity will challenge your students to use math to create a fun game of building straw towers.



Inspired by Book 2 : "Noah's Treehouse"

- Introduce this activity by talking about skyscrapers and towers. What shapes and measurements are used to build a skyscraper? How do geometric shapes go together to create new shapes?
- 2. With this challenge, students will use shapes and measurements to create a game where the object is to build towers out of straws. They will be able to come up with their own rules for the game. This is a fun activity to do in teams!

# **Challenge #6: A Quest For A Solution**

Most inventors set out to solve a problem. Observation and listening are good ways to learn what problems people are experiencing might be solved with a new invention or an improvement on an existing product. With this activity students will practice communication and listening skills along with learning to brainstorm solutions.

- **1.** Introduce this activity by talking about the steps of inventing that include observing, identifying problems and brainstorming solutions.
- 2. With this activity, students will interview someone to understand what problems they may have with things they do daily and then brainstorm solutions.



## Challenge #7: Inventing Transportation Of The Future

Transportation, whether on land, sea or air is important to our lives. With this activity, students will be challenged to look into the future to envision what transportation might be years from now.



Inspired by Book 4 : "We're Going Green!"

- 1. Introduce this activity by discussing transportation and the environment. How is transportation changing?
- 2. With this activity, students will use their imagination and creativity to invent some form of transportation in the future. How will we get from one place to another? Airplane? Boat? Helicpoter? Flying car? What will it look like? How will it run? And they need to remember that it must be good for the environment.

## Challenge #8: Game Time!

Inventors are problem-solvers. This activity will encourage students to observe and identify problems in something they enjoy doing and come up with their own solutions.



Inspired by Book 1: "The Inventor In The Pink Pajamas"

- Introduce this activity by discussing how inventors solve problems. You can use an example such as the invention of the windshield wiper. It was hard to see the road in front of you while driving in the rain, so Mary Anderson invented the windshield wiper to clean the window while driving.
- 2. This activity will challenge students to pick a sport or game they enjoy doing and find 2-3 problems that they could solve to make the sport better. They will ultimately pick the solution they think is best and plan it out in a drawing.





English Language Arts Standards	From Paper to Helicopter	Design A Marble Run In A Box	Higher, Faster, Farther	Design The Coolest Kite	Straw Tower Game	A Quest For A Solution	Inventing Transportation Of The Future	Game Time!
CCSS.ELA-LITERACY.L.4.3.A Choose words and phrases to convey ideas precisely.			×		×	×	×	×
<b>CCSS.ELA-LITERACY.L.4.4.A</b> Use context (e.g., definitions, examples, or restatements in text) as a clue to the meaning of a word or phrase.	×	×	×	×	×	×	×	×
<b>CCSS.ELA-LITERACY.L.4.4.C</b> Consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation and determine or clarify the precise meaning of key words and phrases.	×				×	×	×	×
<b>CCSS.ELA-LITERACY.L.4.5.A</b> Explain the meaning of simple similes and metaphors (e.g., as pretty as a picture) in context.				×	×	×	×	×
<b>CCSS.ELA-LITERACY.L.4.5.C</b> Demonstrate understanding of words by relating them to their opposites (antonyms) and to words with similar but not identical meanings (synonyms).					×	×	×	×



# Educator's Guide GRADE: 4TH

Mathematical Practice Standards	From Paper to Helicopter	Design A Marble Run In A Box	Higher, Faster, Farther	Design The Coolest Kite	Straw Tower Game	A Quest For A Solution	Inventing Transportation Of The Future	Game Time!
<b>CCSS.MATH-CONTENT.4.NF.B.3.A</b> Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.	×	×	×	×	×			
<b>CCSS.MATH-CONTENT.4.MD.A.3</b> Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.	×		×		×		×	
<b>CCSS.MATH-CONTENT.4.MD.C.6</b> Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	×		×	×	×			×
<b>CCSS.MATH-CONTENT.4.G.A.1</b> Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	×	×	×	×	×		×	×
<b>CCSS.MATH-CONTENT.4.G.A.2</b> Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	×		×	×	×			×