

Unleash the Power of Mathematical Thinking with PLTW Launch

Overview

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- Overview of the Math Connections in PLTW Launch
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 - Connections to Common Core State Standards for Mathematics
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PLTW Launch Instructional Development Team



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How Did We Get Here?

- Math inventory
- Identifying standard gaps
- Enhancements throughout the modules

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
		Counting and Cardinality			Number and Operations in Base Ten		Measurement & Data		Geometry		Mathematical Practices							
https://www.illustrativemathematics.org/HSIndex	Know number names and the count for objects.	Count to tell the number of objects.	Compare numbers.	Work with numbers 11–99.	Understand addition as joining together and subtracting as taking apart.	Describe and classify objects.	Classify objects and count the number of objects in categories.	Identify and describe shapes.	Analyze, compare, create, and compose shapes.	Make sense of problems & persevere in solving them.	Reason abstractly & quantitatively.	Construct viable arguments & critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for & make use of structure.	Look for & explain regularity in repeated reasoning.	
Structure and Function: Exploring Design	K.OA.A.1 A2: Counting blocks to determine height of beanstalk. Counting coins in the egg.	K.OC.B.4 and K.OC.B.6 A2: Counting blocks to determine height of beanstalk. Counting coins in the egg.				K.MD.A.2 A2: Measuring beanstalk.		K.OA.1 A2: Add a question about the shape. Students use in their beanstalk.		Problem: Students analyze given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"	A2: Egg Challenge: Weighted Beanstalks chart	Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.	A2: Measured Beanstalk chart	A2: Using measuring tools.				
Pushes and Pulls	K.OA.A.2 A2 and A3: Pushes and Pulls Centers	K.OC.B.4 K.OC.B.6	K.OC.C.8 Performance Task		K.OA.A.1 K.OA.A.2 Performance Task	K.MD.A.2 A2: Centers	K.MD.B.3 A2: Centers			Problem: Students create given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"		Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.		A2: Centers Using measuring tools.				
Structure and Function: Human Body	K.OA.A.3 PE: count the number of pages.	K.OC.B.4 and K.OC.B.6 PE: count the number of pages.	K.OC.C.8 PE: Compare the number of pages.		K.OA.A.1 K.OA.A.2 K.OA.A.4 Performance Task			K.OA.2 Performance Task		Problem: Students analyze given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"		Project: After having their fingers, students try to remove paper from 4 boxes. They record the number of legs per each try and explain quantitatively how it relates to the number of boxes in the hand.	Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.	PE: Using number lines to count.	Project: Using number lines to count.			
Animals and Algorithms	K.OA.A.1 A2: Use to Scratch, a Motion blocks, Number options vs separate blocks.	K.OC.B.4 and K.OC.B.6 A1: Count number of steps in Animal Maze Game.	K.OC.C.8 A2: Compare blocks with different numbers OR Compare sequence with different number of motion blocks.				Project	K.OA.1 Every APE K.OA.1 and K.OA.2 PE: Use: Optional activity to create a matching game with shapes.	K.O.B.6 PE: Use: Optional activity to create a matching game with shapes.	Problem: Students analyze given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"		A3: Problem: Students understand how the symbols/words represent strategies for addition.	Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.					
Sunlight and Weather	K.OA.A.3 A2: Writing dates and temperature on the class calendar in L.L.	K.OC.B.4 and K.OC.B.6 Add to Standards doc	K.OC.C.8 Add to Standards doc		K.MD.A.3 and K.OA.A.4 Performance Task	K.MD.A.3 A1: Describe and compare the temperature of Earth incidents. A2: Weather Control app iteration.				Problem: Students analyze given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"		Project: Students to look at the weather data to identify patterns.	Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.					
Living Things: Needs and Impacts	K.OA.A.1 - Pre: count number of reusable materials that were used in all of the designs in the class. K.OA.B.1 - Pre: count number of reusable materials that were used in all of the designs in the class. PE in squares on a hundreds chart as each group shares. Write the number in their Launch Log.	K.OC.B.6 - Pre: count the number of reusable materials used in design.				Remove	K.MD.B.1 A1 and A2: PE: Use: Optional activity to create a matching game with shapes.			Problem: Students analyze given criteria and constraints. Students monitor and evaluate their progress and change course if necessary and they continually ask themselves "Does this make sense?"			Problem: Engineering Design Process: Model stage. Students work in their small group to share their designs with the group. Students share their wealth and provide evidence for how the design solves the problem.					

Math Enhancements

[1st Grade: Designs Inspired by Nature Activity 3](#)



- What materials did you choose for your model? Why did you choose them?
- Why did you choose this specific structure? What is its function?
- What shape are your ears? How does the shape of the ears impact their function?
- What would you like to do to improve your model? Why do you think this will be a better solution?
- Did your final model look like your sketch? Why or why not?

[1st Grade: Designs Inspired by Nature Project](#)

Criteria	Constraints
<p>The mask must:</p> <ul style="list-style-type: none">• Be inspired by nature.• Include false eyes as part of the design.• Include two-dimensional shapes in the design.	<ul style="list-style-type: none">• Time• Available materials

Math Connections

Multiple PLTW Launch modules now include optional math connections that allow students to apply mathematical thinking in a purposeful way.

[1st Grade: Animal Adaptations](#)

Optional: Math Connection

Guide students to use nonstandard units to measure the length of the wingspans. Students can use items such as paperclips, cubes, or counters. Have them compare the lengths.



Optional: Math Connection

Guide students to look at the number of patterned butterflies and the number of solid-colored butterflies they caught.

- Have students write a number sentence to find the difference between the number of patterned and number of solid-colored butterflies.
- Guide students to compare the two numbers of butterflies using comparison symbols ($>$, $=$, and $<$).



[5th Grade: Earth's Water and Interconnected Systems](#)

Optional: Math Connection

Guide students to write a numerical expression using parentheses to calculate the percentage of water on their map and round the decimal to the nearest tenth or hundredth.



Example

$$(645 \div 1254) \times 100 = 51.44\%$$

- Area of water = 645 squares
- Total area = 1254 squares
- $645 \div 1254 = 0.51435407$
- $0.51435407 \times 100 = 51.435407\%$
- Round = 51.44%

Math Performance Tasks


Some PLTW Launch modules now include optional performance tasks that require students to apply math skills that go beyond the math connections found in the activities, project, and problem. These performance tasks are found in the Summative Assessment.

PLTW Launch Sunlight and Weather

Math Performance Task

Name: _____

Look and Count



1. 

Sunny days _____

Rainy days _____

How many more ☀️ days than ☁️ days?

_____ - _____ = _____

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[Sunlight and Weather Math Performance Task](#)

PLTW Launch Stability and Motion: Forces and Interactions

Math Performance Task Answer Key

Name: _____

The Animal Park

Now that you have saved the tiger, let's design an animal park where animals can be happy and safe.

The animal park must include:

- Outer border
- Concession area
- Visitor restrooms
- Four animal exhibits
- Animal hospital
- Gift shop

Create a Plan

Brainstorm the four animal exhibits you would like to include in the animal park. Explain why you chose those animals.

You may choose from the following list of animals:

- Elephant
- Panda
- Dolphin
- Lion
- Sea turtle
- Gorilla
- Zebra
- Snake
- Bald eagle

Student responses will vary. Possible response:

Animal Exhibit	Explanation of Choice
Elephant exhibit	I love elephants. They are large, beautiful animals. Elephants make me feel small.
Panda exhibit	Pandas are one of my favorite animals. It will be nice to see them at the animal park, since they are not native to our country.
Snake exhibit	Snakes are pretty, but they must be behind the glass. I am scared of snakes.
Dolphin exhibit	Dolphins are very cute and smart. I love seeing them splash and play.

For the remainder of the answer key, all possible responses are based on these animals.

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[Stability and Motion: Forces and Interactions Math Performance Task](#)

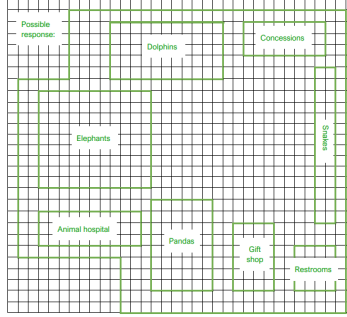
PLTW Launch Stability and Motion: Forces and Interactions

Design the layout of the animal park. The layout should include:

- The "must have" areas
- Animal exhibits in the shape of a quadrilateral (four-sided shape)
- Labels for each area or exhibit

Note Each box equals one square unit.

If your students are unfamiliar with park maps, consider sharing a map of their local zoo or park.



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PLTW Launch Matter: Properties and Reactions

Math Performance Task

Name: _____

Let's Celebrate!

The school cafeteria staff plans to bake chocolate cake and white cake to celebrate the end of a fantastic year. But they need your help! Can you help them figure out how much of each ingredient they need if they bake cakes for every class in the school?

What Do We Know About the School?

- The school has students in kindergarten through 5th grade.
- Each grade level has four classes.
- The cafeteria staff plans to bake one chocolate cake and one white cake for each class.
- The cafeteria staff will use the same recipes for each chocolate cake and each white cake.

Recipes

Chocolate Cake	Chocolate Frosting
<ul style="list-style-type: none">2 cups sugar$1\frac{1}{2}$ cups all-purpose flour$\frac{3}{4}$ cup cocoa powder$1\frac{1}{2}$ tsp baking powder$1\frac{1}{2}$ tsp baking soda1 tsp salt2 eggs1 cup milk$\frac{1}{2}$ cup vegetable oil2 tsp vanilla extract1 cup boiling water	<ul style="list-style-type: none">$\frac{1}{2}$ cup butter$\frac{1}{2}$ cup cocoa powder3 cups powdered sugar$\frac{1}{2}$ cup milk$1\frac{1}{2}$ tsp baking soda1 tsp vanilla extract

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[Matter: Properties and Reactions Math Performance Task](#)

Connections to Common Core State Standards for Mathematics

Each module now includes Connections to Common Core State Standards for Mathematics found in the [Introduction to the Module](#). This document indicates the connections to the Standards for Mathematical Practices and the Standards for Mathematical Content.

Connections to Common Core State Standards for Mathematics (July 2023)

PLTW Launch offers an integrated approach to STEM learning. Science, technology, engineering, and math (STEM) concepts are purposefully intertwined to build STEM literacy. We know that mathematical thinking can be strengthened through the application of math skills in investigations and problem-solving.

This document outlines the connections to the Standards for Mathematical Practices and Standards for Mathematical Content in PLTW Launch third grade modules.

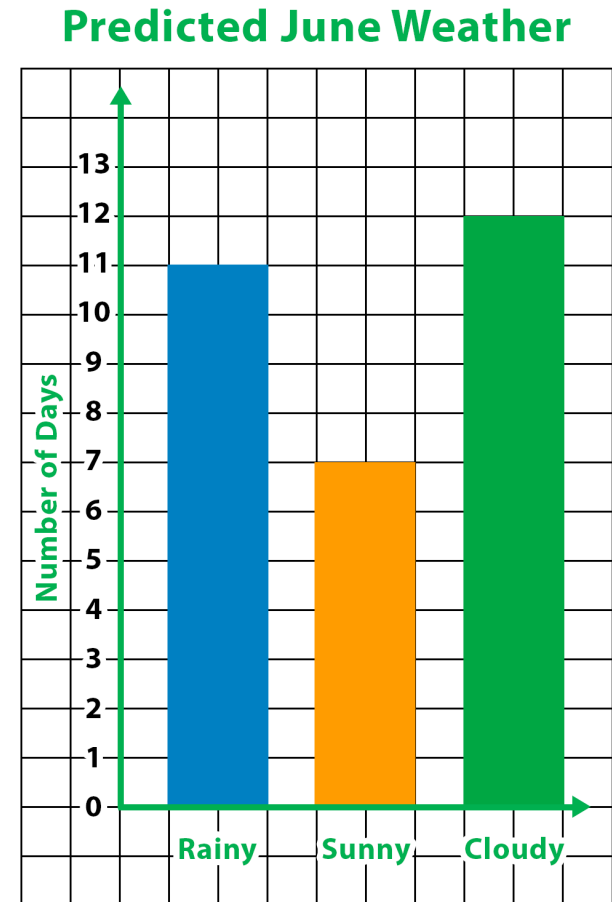
Note The standards highlighted in green are optional opportunities to incorporate math into PLTW curriculum.

Standards for Mathematical Practices in PLTW Launch

Standard	Stability and Motion: Science of Flight	Stability and Motion: Forces and Interactions	Variation of Traits	Programming Patterns	Weather: Factors and Hazards	Life Cycles and Survival	Environmental Changes
CCSS.MATH.PRACTICE.MP1	✓	✓	✓	✓	✓	✓	✓
CCSS.MATH.PRACTICE.MP2	✓	✓	✓	✓	✓	✓	✓
CCSS.MATH.PRACTICE.MP3	✓	✓	✓	✓	✓	✓	✓
CCSS.MATH.PRACTICE.MP4		✓	✓		✓	✓	✓
CCSS.MATH.PRACTICE.MP5	✓	✓	✓	✓	✓	✓	✓
CCSS.MATH.PRACTICE.MP6	✓	✓	✓	✓	✓	✓	✓
CCSS.MATH.PRACTICE.MP7		✓	✓		✓		✓
CCSS.MATH.PRACTICE.MP8	✓	✓	✓	✓			✓

Math Performance Tasks

- Work with your group to complete a performance task
- Be prepared to share out:
 - A brief summary of the task
 - Your initial impressions
 - How you see the performance task being implemented



Collaborative Brainstorm

Work with your group to brainstorm ideas for new performance tasks for the following modules:

- Structure and Function: Exploring Design (K)
- Animals and Algorithms (K)
- Living Things: Needs and Impacts (K)
- Animated Storytelling (1)
- Designs Inspired by Nature (1)
- Materials Science: Properties of Matter (2)
- Grids and Games (2)
- Programming Patterns (3)
- Input/Output: Computer Systems (4)
- Infection: Modeling and Simulation (5)



Q & A

