STEM with Keva Planks

~ A Returning Developer ~

For further information contact…

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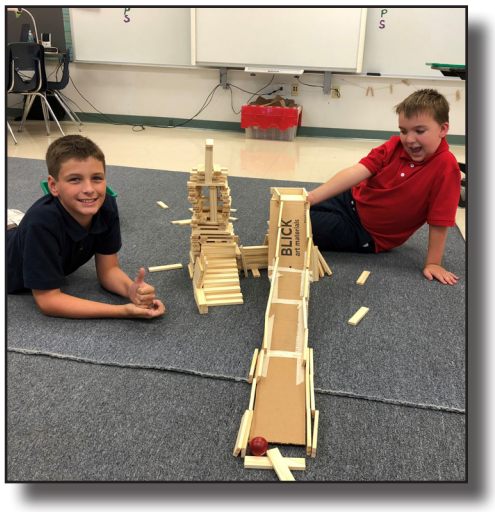

2018 - 2019 IDEA CATALOG OF EXCELLENCE

■ *PROGRAM OVERVIEW*

For a large amount of my school's fifth graders, science and math are challenging areas as is evident in our standardized test scores. If students are exposed to more hands on activities to reinforce and learn new science and math skills, they will improve understanding and test scores.

Math skills such as measurement, using standard and non-standard tools, require students to use manipulatives and that is what this program provides.

Science skills such as gravitational pull can be experimented with time and time again using the Keva Planks. Keva Planks are wooden pieces that are about 4 1/2" long and a little less than 1/2" thick. Students can use Keva Planks to build a variety of items. One such item can be a ramp for a ping pong ball to travel on. Students will try various ways to slow the ball down, making their ball travel the longest amount of time. Students will have to work together to design and build their project. An added benefit to this activity is the use of social skills to work with a group and engineering skills to build the ramp so that it is functional.

■ *OVERALL VALUE*

The overall value for this project can be found on the faces of the students as they gain a better understanding of the skills and concepts taught in the lessons. Students will be able to delve into hands on learning of science and math skills that may otherwise be too abstract to understand.

Using the Keva Planks, students will be able to create and test their own hypothesis involving gravity, force and motion as well as real world application of measurement.

■ *LESSON PLAN TITLES*

- Tower and Ramp
- Slowest Ball
- Investigation!

■ *MATERIALS*

See individual lesson plans.

■ *ABOUT THE DEVELOPER*

Theresa Meyer received her Bachelors in ESE from University of Central Florida and her Masters in ESE from Nova Southeastern University. She is a twenty plus year veteran teacher who has taught in self-contained ESE classes for 8 years, first grade classrooms for 9 years, and is currently a K-5 art teacher. She loves integrating math and science into her art lessons is a passion and STEAM is a favorite.

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"STEM with Keva Planks" Theresa Meyer

Lesson Plan No 1: Tower and Ramp

SUBJECTS COVERED

Science and Math

GRADES

Fifth

OBJECTIVES

Students will build a tower for a ramp so that a toy car successfully rolls all the way down.

STANDARDS FSS / NGSS

MAFS.5.MD.1.1

Convert among different-sized standard measurement units (i.e., km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec) within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

SC.5.P.13.1

Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.

MATERIALS

- Keva Planks
- Toy car
- Cardboard

DIRECTIONS

The teacher will show a brief video (found on various school approved sites) of a toy car rolling down a cardboard ramp. Discussion will take place about the force and gravity used to move the car down the ramp. Students will be told they will reproduce this ramp and toy car experiment, BUT their ramps will have to be at a certain height. Groups of students will be given different heights in centimeters. This will be the tallest height of their tower. Groups will need to discuss and plan how they want to build their tower and connect a ramp to it. Each group will only have 100 Keva Planks to work with. Somewhere in their tower, they need to place the cardboard ramp so that the toy car can roll down it.

As a group, they will build their tower and connected ramp and make trial runs with the car. The teacher will rotate through the groups and discuss the progress they are making and help them problem solve if necessary.

Once all of the groups have created their towers and ramps successfully they will share them with the class. Students will write to explain what they did and how force and gravity played a part in it.

EVALUATION/ ASSESSMENT

Students will be evaluated on their ability to build their tower to the given height and their written explanations.

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"STEM with Keva Planks" Theresa Meyer

Lesson Plan No 2: Slowest Ball

SUBJECTS COVERED

Science and Math

GRADES

Fifth

OBJECTIVES

Students will build a ramp, making their ball spend the most time rolling down the ramp.

STANDARDS FSS / NGSS

MAFS.K12.MP.8.1:

Look for and express regularity in repeated reasoning.

MAFS.K12.MP.3.1:

Construct viable arguments and critique the reasoning of others.

S.C.5.P.13.2

Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.

SC.5.P.13.3

Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.

MATERIALS

- Keva Planks
- Ping-pong balls
- Books
- Tape
- Timer

DIRECTIONS

This lesson is a follow-up to the Tower and Ramp lesson. Have students think about a roller coaster and how the coaster climbs to the top and uses momentum and force to continue on the track. What if there was gum on the track? What would happen to the coaster? These questions lead up to the project. This time instead of building a tower and being given a ramp, groups will be given books to stack (each group's stack will be of equal height). The teacher will show the students how to build a secure ramp out of Keva Planks for the ball to travel on (two planks flat next to each other, on either side of those, a plank on its side to keep the ball on track). Each group will be given 100 planks and a ping pong ball. Students will also be given a roll of masking tape to slow the ball down but it can't stop. Groups are encouraged to test their ramp until time is up in order to make any adjustments. When the allotted time is up, each group will run their ball down the ramp while being timed and the slowest one wins. Upon the conclusion of the contest, students will write to explain their ramp and how they slowed down the ball.

EVALUATION/ ASSESSMENT

Students will be evaluated on the effectiveness of their ramp and their written explanation.

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"STEM with Keva Planks" Theresa Meyer

Lesson Plan No 3: Investigation!

SUBJECTS COVERED

Science and Math

GRADES

Fifth

OBJECTIVES

Students will follow the scientific method to create a problem involving the Keva Planks and follow the steps to solve the problem.

STANDARDS FSS / NGSS

MAFS.K12.MP.8.1:

Look for and express regularity in repeated reasoning.

MAFS.K12.MP.3.1:

Construct viable arguments and critique the reasoning of others.

SC.5.N.1.1

Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

MATERIALS

- Keva Planks
- Scientific Method Lab
- Keva Planks Worksheet

DIRECTIONS

This culminating lesson allows for students to explore something that they would like to use the Keva Planks to experiment with. Students may not replicate the two previous lessons but they may alter them in some way (creating their own tower and ramp with the Keva Planks but not the cardboard for example). Students may pair up or work in a group if there is more than one person with the same idea. Provide students a copy of the Scientific Method Lab with Keva Planks Worksheet and walk them through the first three questions.

Once those questions have been answered, students may get their materials and begin their experiments. Students should have some sort of plan for how they will record and chart their data. If they do not, brainstorm various ways together and allow the students to find a data recording process that fits their needs.

Once the trials have been completed and the data has been recorded, allow for some reflection time. Students need to know that a failed hypothesis is just as important as a successful one because it allows for growth and better understanding of the concept.

The final step for this lesson is for the students to answer question number 5 of the worksheet making sure that they are thorough in their explanation.

EVALUATION/ ASSESSMENT

Students will be evaluated on the effectiveness of their ramp and their written explanation.

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Materials Budget

SUPPLIER	ITEM # AND DESCRIPTION	COST	QUANTITY	TOTAL COST
Midware	Keva Contratptions 400 Plant Set	89.95	4	359.80
Walmary	Ping Pong Balls	2.36	1	2.36
	Matchbox Cars	.94	4	3.76

	Subtotal	$365.92
	Tax if applicable	
	Shipping if applicable	$35.98
	TOTAL BUDGET AMOUNT	**$401.90**

Teacher *Theresa Meyer*

School *Caldwell Elementary*

Student Name _____

Investigation! Scoring Rubric

Worksheet Questions	Outstanding Work	Acceptable Work	Needs Some Work	Needs Lots of Work
Question 1	Student writes a question that meets both of the requirements (observable and measurable)	Student writes a question that only meets 1 of the 2 requirements	Student writes a question but it does not meet either requirement	Student does not write a question
Question 2	Student creates a plan that includes materials needed and an explanation of how data will be collected	Student creates a plan that is vague in either the materials needed or explanation of data collection	Student creates a plan that is vague in both areas	Student does not create a plan
Question 3	Student develops a complete and reasonable hypothesis	Student's hypothesis is either complete or reasonable but not both	Student creates a hypothesis but it is neither complete or reasonable	Student does not create a hypothesis
Question 4	Student completes at least 3 trials and accurately documents the data	Student either completes at least 3 trials or accurately documents the data	Student attempts the trials and data documentation but neither are complete	Student does not attempt any trials and does not document any data
Question 5	Student constructs a thorough conclusion that explains the outcome of the trials	Student constructs a conclusion that explains the outcome of the trials	Student constructs a weak conclusion	Student does not write a conclusion

Scientific Method Lab with Keva Planks

1. You have built a tower for a cardboard ramp and built a ramp that would allow a ball to spend the most time rolling down it. Now, what is something else that you think you can question and observe using the Keva Planks? Remember, this needs to be measurable through repeated trials.

2. Create a plan in order to answer your question. What will you need? How will you document your findings?

3. Construct a hypothesis. What do you think will happen during your trials? An example format is "If I do _____ then _____ will happen."

4. Test your hypothesis doing experiments. You need to complete at least three trials and create a chart to show the results of your experiments. If you need to complete more than three trials, you may but explain why more than three is necessary.

5. Analyze your data and draw a conclusion. Look at your chart and determine if your hypothesis was correct or not. Why was your experiment successful or not successful? If it was not, what could you possibly change for it to be successful?