

Marble Track Lesson Plan

Name: Christine M. Robbins	Subject/Grade: Math II / 6-8	Date: 2012
Content/Skills Connection: _____ English Language Arts <u>XX</u> Math _____ Science _____ Social Studies _____ Arts _____ Phys. Ed/Health _____ Social/Emotional Learning <u>XX</u> STEM		
Curriculum Framework Standard(s): Tech/Eng Grades 6-8: 2.1 and 2.3, Math: 4.G.1,4.MD.5,6.RP.3D		
Student Grouping: _____ Whole group <u>XX</u> Small group _____ Partner _____ Individual		
Materials: White boards and markers, twelve inches of masking tape, six (6) 3 x 5 inch index cards, one marble, one paper cup (bathroom size), ten (10) cotton swabs, ¼ stick of modeling clay, MCAS metric rulers, and student worksheet, scissors		
Accommodations/Sheltered English Adjustments: Small group instruction, calculators if part of accommodations.		
Goal: Students in the grades 6-8 Math II classroom will incorporate the Engineering Design Process and Math skills review through a hands-on activity. This activity is planned for one class period, which is approximately 55 minutes, on a “Fun Friday”.		
<p>Objectives and Assessments</p> <p>Objective 1: Involve students in active learning, inquiry, and problem solving by building a paper track to allow a marble to roll down the track and land in a paper cup located at the bottom.</p> <p>Assessment 1: Teacher will observe students as they apply the design process, communicate, and work collaboratively in small groups.</p> <p>Objective 2: Students obtain as many points as possible and learn from any failures that may arise.</p> <p>Assessment 2: Five marble “runs” will be performed on completed tracks. Students review and apply basic mathematical computation skills to calculate their scores, geometry for right angle configuration, and measurement in metric units.</p>		
Procedures		
Anticipatory Set: Discussion of angles and amusement park rides.		
<p>Lesson Progression (step by step progression): 1. Ask student volunteer to read aloud the lesson objectives as posted on the front board. Teacher will answer any questions that may arise. 2. Pair students into groups of three. The students will count by ones and then be grouped into “prime and composite” groups. The student with number 1 will be used to “even off” the groupings. 3. Groups will gather in the classroom, putting desks together to work on. 4. The timer will be set for 10 minutes of collaboration and design time. The teacher will move around the classroom as a facilitator and observe the group discussions. 5. Once the timer has gone off the students will be asked to show their design to the teacher and will be given their necessary materials. The teacher may pose a few questions for the group regarding their designs. 6. Students will be allowed approximately twenty five minutes to construct their tracks. 7. Testing of their tracks may be completed during the twenty-five minutes building time. 8. Students will be encouraged to use the classroom digital camera or flip camera to document their progress/project during the class period.</p>		

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Closure: As their “ticket out” students will describe their marble track in their math journals and make suggestions for redesign in the Spring semester.

Extensions/Practice: Students will complete this assignment in Trimester 1 as an early review activity and Open House display. The lesson will be reassigned in Trimester 3 as a student activity to be used at Family Math Night. Students will be allowed, and encouraged to use their math journals and pictures/video documentation to aid in their redesign.

Resources used in planning: FSU STEM 915 activity, Massachusetts Science and Technology/Engineering Frameworks Strand 4 October 2006, Massachusetts Curriculum Framework for Mathematics, March 2011 including Guiding Principles for Math Programs in Massachusetts, [A Whole New Mind](#) by Daniel H. Pink.

Reflection: While a reflection is usually written after the lesson takes place, ideas and suggestions for what worked, or did not work would be noted. Student journals will be read weekly, with teacher comments provided for the student to reflect on their work. The audience this lesson is planned for is middle grades, and earlier grades standards have been listed under Curriculum Frameworks as the goal for the audience is to review and practice basic math skills. This lesson is meant to be the first of weekly hands-on activities, completed in class. Other activities have been purchased for the purpose of including STEM activities in the Math II classroom. Documentation of the activity would be posted to the teacher website, and the finished products would be displayed at an school Open House held the week after the lesson would be completed.

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Student worksheet:

DESIGN STAR CHALLENGE 1

You have been asked to create a paper race track for the upcoming Open House at Auburn Middle School. Your group will be given 10 minutes to collaborate and draw any design ideas you have on the white board provided. Do not erase any ideas you have, as you may need to refer back to them. You may use the flip cameras or digital cameras to document your progress.

Materials provided:

Ten (10) cotton swabs

Six (6) 3 x 5 inch index cards

1/4 stick of modeling clay

Small paper or plastic "bathroom cup"

12 inches of masking tape

1 marble

Scoring sheet

White boards, markers, and erasers

GROUP SCORING SHEET/RUBRIC

Category criteria	Number of points	Your points	Total points for category
Height of track	1 point per centimeter		
Number of 90° angles	5 points per 90° angle		
Marble traveling the entire length of the track	1 point per marble		
Marble traveling entire length of the track AND staying in a container at the end of the track	5 points per marble		
		Total points:	