Curriculum Sample Template

Max. 8 Pages

Grade Level	8	**Content Area**	Mathematics
Course Title (grades 9-12 Only)			
Length of Unit	1 week	**Time of Year**	Block 2 of 10
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Students will be able to solve problems involving equal ratios. Students will be familiar with the properties of similar triangles in that the proportions of the sides are equal ratios.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	This lesson involves the students applying knowledge of similar triangles to develop an understanding of slope. Students will be using a real life situation along with a hands on graphing method to construct the knowledge that slope is constant. This aligns with the rigor/ relevance framework outlined in the Program of Instruction. Students are using high levels of learning and applying it to real-world situations.		
Standard Number and Description *List the Number* and full description for the required Standard.*	8.EE.6. Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at *b*.		
Summative Assessment *Describe a cumulative and comprehensive activity, clearly separate from instruction and guided or independent practice, which allows each student to individually demonstrate mastery of the required Standard. A copy of the summative assessment must be attached to the curriculum sample.*	The summative assessment will be a paper pencil test. Students will determine the slope of lines. They will then show that the slope of the lines are constant by graphing similar triangles and showing that the ratios of the sides are proportional and equal to the slope.		
Scoring Scale and Mastery Level *Explain how the assessment is scored, to include points per question, how points are awarded, total points possible, criteria necessary to demonstrate mastery, and grading scale. A copy of the answer key and scoring rubric (whichever applicable) must be attached to the curriculum sample.*	The summative assessment will consist of 5 problems each worth 2 points. Students will receive 1 point for determining slope, and 1 point for using similar triangles to show the slope is an equal ratio of the proportions of sides of similar triangles, and therefore constant. The following is the grading scale: 0-6 = No Grade (required retake), 7 = C, 8 = B, 9-10 = A. Students will demonstrate mastery by scoring 7 (70%) or better.		
Materials/Resources Needed	Graphing paper, rulers, protractor, computer with Internet access, document camera and projector		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

Lesson (add as needed)	**Instruction**	**Student Activities**
1	Students will review similar triangles for their bell work. Students will be using the lengths of sides of similar triangles and determining the ratios of sides. Students will show that the ratios are the same for similar triangles. Students will also, as review, find the length of a missing side knowing that for equal ratios one can cross multiply to find the unknown. This will be a lengthy bell work and review because the concepts are essential for understanding that slope is constant. Teacher will choose students to describe and demonstrate their solutions to the class using the document camera. Students will then be introduced into the concept of angled roofs and why it is important to angle roofs. Students will be asked if there are different weather conditions that might call for a steeper or larger angle roof than other weather conditions. Students will be introduced to the term pitch. After the students discuss roof pitch and angle of roofs they will, with a partner, conduct Internet research to find a pitch to angle calculator, and to find out if there are codes for how steep a roof needs to be angled for different weather conditions. Groups will report their findings back to the class. Students will finish class with a vocabulary exercise on pitch.	Students will calculate ratios of lengths of similar triangles Students will use cross multiplication to find the unknown lengths of sides in similar triangles. Students will record information about Internet research on pitch to angle calculators and codes for pitches of roofs in different climates Students will present Internet search information to the class Students will create a vocabulary card on pitch
2	For bell work students will be given graph paper and asked to plot a positive integer point (x, y). Students will then be instructed to use a ruler to draw a line through the point and the origin. Students will then measure the angle created by the x-axis and the line they drew. After bell work teacher will demonstrate how to draw triangles using points along the line the students drew for bell work (triangles will be right triangles with the drawn line as the hypotenuse for a triangle that has the other sides parallel to the axis). Students will use a protractor and ruler to show that all 3 angles are equal demonstrating that the triangles are congruent (if side lengths are the same) or similar (if side lengths are different). Students will then pair up and be asked to plot another point and line that runs through the origin. Students will have to construct two similar triangles and two congruent triangles. Students will then be asked	Students will plot a point, draw a line, and determine angle on a graph Students will, as a class, create triangles that are on their plotted line Students will, in teams, plot a point, draw a line, and create two congruent and two similar triangles on that line Students will, in teams, calculate the proportions of side lengths for their triangles. Students will write and report ways in which they can communicate the steepness of the line other than angle. Students will solve problems involving slopes of graphed lines using triangles and the proportion of their sides to communicate slope.

	to calculate the proportion of side length for the sides that are parallel to the axis. Students will ask if there is something interesting about their results and if they can explain it. Students should be able to come to the understanding that because they are similar or congruent triangles the proportions are all the same, meaning that they have equal ratios. In their groups students will be asked to write a way that they can describe the steepness of the line without using angle. Teacher will walk through at this time and help students who are having difficulty. When finished, teams will be selected to report on their ideas. Students should see that the proportion of side length is a way to describe the steepness of the line. At this point the teacher will introduce the concept of slope as a measure of the rise over the run. Students will be given a homework assignment in which they must calculate the slope for lines that run through the origin on graph paper by reporting the slope as the simplified ratio of rise over run (proportion of sides) for a triangle on that line.	
3	Students will calculate slope of graphed lines using the proportion of sides of triangles on the line for bell work. Teacher will circulate during bell work to check for understanding and help with any misunderstandings. After bell work students will with a partner convert the pitches for roofs in different environments found in their Internet searches into angles using a pitch angle calculator from the Internet. Students will then graph the roof angle through the origin using a protractor and 3 pieces of graph paper for three different pitches of roofs. Students graph the roof out to what represents 24 feet on their graph paper. Students will then create 3 similar triangles that use the roof line. Students will determine the proportion of sides for the triangles. The ratios should be the same for all triangles showing that slope is constant. Students will next be asked to calculate the ratio for the pitch. Students should see that the pitch is an equal ratio set up with a run of 12, meaning that the pitch and slope are equal ratios. Students are then given 5 problems in review for a test in which students have to calculate slope for a line and use similar triangles to show that the simplified proportion of sides is equal to the slope.	Students will calculate slopes of graphed lines using the proportion of sides of triangles Students will use Internet to convert pitches to angles Students will graph the angles of roofs Students will determine slopes of roofs using similar triangles Students will simplify pitch ratio and hypothesize on how it relates to slope Students will complete 5 review problems in which they calculate slope and use similar triangles to demonstrate slope is the simplified proportion of side lengths
4	Students will be given a bell work in which they review problems for the assessment. Students will be given lines and asked to calculate the slope. Students will show that the proportions of sides of similar triangles are equal ratios. Students will then complete the assessment. After the	Students will determine slope of lines using proportions of similar triangles Students will complete summative assessment

	assessment students will be introduced to the idea that slope can be determined by a formula instead of by using triangles, but that it is essentially the same method.	

Paste Summative Assessment Here

Determining Slope Using Similar Triangles

Determine the slopes of the following lines. Use 2 similar triangles to prove that the slope is equal to the proportion of sides of the triangle

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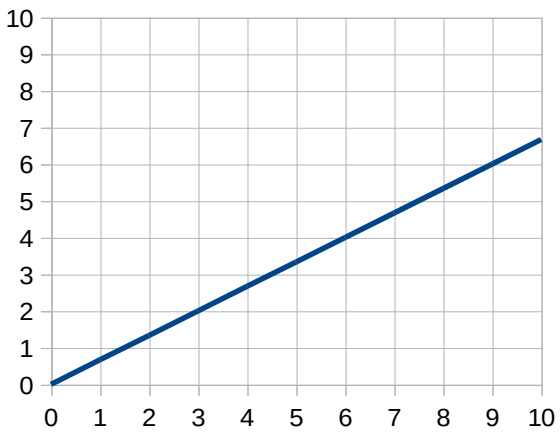

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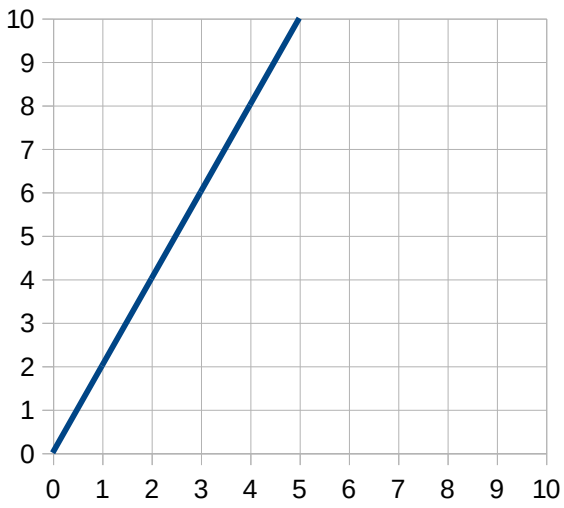

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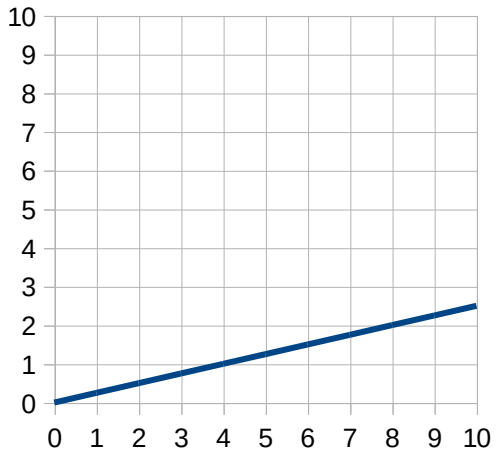
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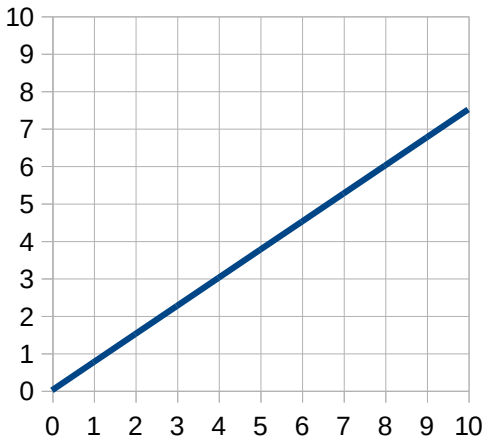
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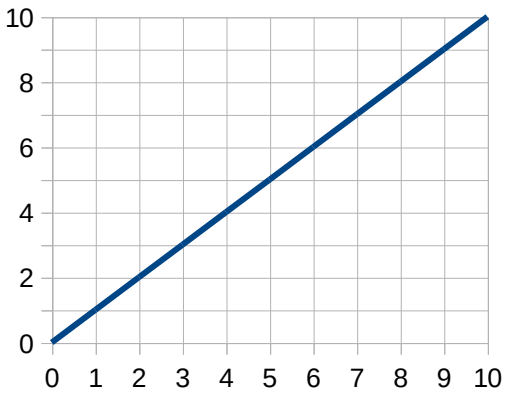
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Paste Answer Key/Scoring Rubric Here:

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Answer Key: Determining Slope Using Similar Triangles

1. Slope of line is 2/3.

The triangles students might use to prove that the slope is equal to the proportion of sides of the triangles could be different. For this reason I will demonstrate a possible selection. For the rest of the problems I will only include the slope. Teacher will determine if triangles used are appropriate.

One possible triangle the students could use would be the triangle that has point A at (0,0), point B at (3,2), and point C at (3,0). The proportion of sides on this triangle BC to AC is 2/3. For another triangle the students could choose point A at (0,0), point B at (6,4), and point C at (6,0). The proportion of sides on this triangle BC to AC would be 4/6 which simplifies to 2/3. This shows the slope to be constant and equal to the simplest ratio of proportional sides of similar triangles.

2. Slope = 2/1
3. Slope = 1/4
4. slope = 3/4
5. slope = 1/1