Curriculum Sample Template – 8 Pages Max. (12 pages for integrated ELA sample)

Grade Level	8	**Content Area**	Mathematics
Course Title (grades 9-12 Only)	n/a		
Expected Prior Knowledge *List the knowledge/skills mastered earlier in the year that are foundational to the mastery of the Required Standard(s).*	Squaring Numbers, Square Roots, Perfect Squares, Real Number System, Placing numbers on a number line Place value with "exactness" (The hundredths is more exact then the tenths).		
Alignment to Program of Instruction *Describe how the methods of instruction found in this sequence of lessons align to the Program of Instruction described in the application package.*	Pensar Academy utilizes a Blended Learning (BL) educational model that includes Direct Instruction (DI), Small Group Intervention, and Projects Based Learning (PBL) for students to achieve mastery of the Arizona College and Career Readiness Standards (ACCRS). Lessons are comprised of the 21st century skills of critical thinking, collaboration, communication, and creativity. Pensar Academy ensures that all students can reach mastery through the use of Universal Design for Learning (UDL) in the preparation of lessons that incorporate multiple learning styles, such as visual, auditory, tactile and kinesthetic. Pensar Academy's rotational model has embedded Response to Intervention (RTI) logistics to ensure that students who did not meet mastery are provided intervention immediately following the lesson to increase their understanding of the material. Students who are at the mastery level (a minimum of 80%) after the direct instruction will have the opportunity for enrichment through the use of Study Island and teacher constructed online learning activities. All students will apply learned content and skills learned through this rotational model in PBL extension periods. These components ensure that, at Pensar Academy, will students receive an individualized education comprised of 21st century skill building and optimal success in surpassing the ACCRS.		
Standard Number* and Description *The standard number and description of the Required Standard(s) being instructed and assessed to mastery in the curriculum sample.*	**8.NS.A.2.** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., p2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.		
Materials/Resources Needed *List all items the teacher and students will need for the entire sequence of instruction (excluding common consumables)*	Computer Projector, Document Camera, Calculator, Whiteboards		

* ***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, Cluster, Standard (e.g., 6.EE.B.7). For HS Math, use Conceptual Category-Domain, Cluster, Standard (e.g., A-REI.C.6).*

Lesson (add as needed)	**Instructional Strategies -** *List and describe teacher actions, lesson by lesson, which will provide students with opportunities to engage the grade-level rigor defined by the Required Standard(s). Indicate alignment of instructional strategies to specific component(s) or content/skill(s) of the Required Standard/component.*	**Student Activities -** *Describe the activities, lesson by lesson, in which students will engage to allow them to master the grade-level rigor defined by the Required Standard(s). Indicate alignment of student activities to specific component(s) or content/skill(s) of the Required Standard/component.*
1	**Objective:** IWBAT (I will be able to…) estimate non-perfect square roots between whole numbers. **Anticipatory Set (AS):** Teacher will place a chart on the board for squaring whole numbers 1-20 **Teacher Model/Inquiry:** Teacher will ask students to think about the numbers that are not perfect squares for example 27, and how it relates to the table they created. **Guided Practice:** Teacher will explain that 27 falls between the perfect squares of 25 and 36, therefore the square root of 27 must be between the square roots of 25 and 36 so it will be between 5 and 6. Teacher will model another example of 50. 50 is between the perfect squares of 49 and 64. The square roots of those perfect squares are 7 and 8 so the square root of 50 must be between 7 and 8. Students will attempt to do 80 on their own. Students will then be assigned as partners to work on 95. Teacher will go over student assigned problems as whole group when completed. Model will look like: ___ <27<___ 25 < 27 < 36 √25 < *√27<√36* 5 < *√27* < 6 **Check for Understanding:** Teacher will put 3 different problems on the whiteboard. **Independent Practice:** Teacher will generate a worksheet with 5 problems for students to work on. **Closure:** Teacher will have students explain the process to estimate non-perfect square roots between whole numbers on exit ticket. **Extension:** Teacher will generate more questions with complex whole numbers (larger numbers) that do not have as common perfect squares. **Small Group Re-teaching:** Teacher will pull small group and give students more modeling and more practice with easier numbers.	**Objective:** Students will state aloud as whole group and write the objective in notebook. **Anticipatory Set (AS):** Students will fill in the chart given by the teacher in their notebooks with the perfect squares of 1-20. **Teacher Model/Inquiry:** Students will brainstorm ideas in notebook with their partner of what the non-perfect squares would look like as it relates to the table they created. **Guided Practice:** Students will write down teacher examples. Students then will attempt to estimate the square root of 80 on their own followed by estimating the square root of 95 with their partner. **Check for Understanding:** Students will hold up their whiteboards for each of the 3 problems written on the white board showing their understanding with the model given, given about 3 minutes per problem. **Independent Practice:** Students will work on teacher-generated worksheet to solve 5 problems. If student shows mastery (4 of 5 correct), they will move on to extension. If student does not show mastery they will move to Small Group Re-teaching. **Closure:** Students will fill out an exit ticket explaining the process of estimating non-perfect square roots. **Extension:** Students will start working with more complex whole numbers (larger numbers) that do not have common perfect squares surrounding them. **Small Group Re-teaching:** Students will work in small group and receive more instruction with smaller numbers to build understanding of estimating non-perfect square roots.
2	**Objective:** IWBAT Estimate non-perfect square roots between whole numbers and identify which whole number it is closer to. **Anticipatory Set (AS):** Teacher will put on the board one problem covering previous lesson. **Teacher Model/Inquiry:** Teacher will ask students which whole number the non-perfect square root is closer to and explain their reasoning	**Objective:** Students will state the objective aloud and write it in their notebooks. **Anticipatory Set (AS):** Students will solve the problem from the whiteboard on previous lesson in their notebooks.

	Guided Practice: Teacher will model using the same numbers from previous lesson as to help students grasp the concept better. Model will look like: ___ <27<___ 25 < 27 < 36 √25 < *√27<√36* 5 < *√27* < 6 27 is 2 units away from 25, but is 9 units away from 36. This makes the square root of 27 is clearly closer to the square root of 25. Since the Square root of 25 is 5, the square root of 27 will be closer to 5 than it will be to 6. With this information we can conclude that the square root of 27 is between 5.0-5.5. Teacher will then have students attempt the square root of 80 on their own and square root of 95 with their partner. Students are using the same problems as before because teacher wants them to understand that they are just getting a more exact approximation of the non-perfect square root. **Check for Understanding:** Teacher will put three problems on the whiteboard for students to estimate. **Independent Practice:** Teacher will assign students the same worksheet from previous lesson but make them get the more specific approximation as given in teacher model. **Closure:** Teacher will have students explain why their answers today are more exact approximations than their answers yesterday on an exit ticket. **Extension:** Teacher will generate more questions with complex whole numbers (larger numbers) that do not have as common perfect squares. **Small Group Re-teaching:** Teacher will pull small group and give students more modeling and more practice with easier numbers.	**Teacher Model/Inquiry:** Students will brainstorm ideas in notebook as to how to decide which whole number the non-perfect square root is closer to, they must explain their reasoning. **Guided Practice:** Students will copy down teacher notes in their notebook. They will solve the square root of 80 independently and work with their partner to solve the square root of 95 **Check for Understanding:** Students will answer the 3 problems on the whiteboard, holding up their answers after about 3 minutes for each question. **Independent Practice:** Students will use the same worksheet from previous lesson to identify which whole number the non-perfect square root is closer to, labeling it as given in teacher model. If students demonstrate mastery (at least 4 of 5 correct), then they will go to extension. If they do not reach mastery, they will go to small group re-teaching. **Closure:** On exit ticket, students will explain why their answers today are more exact approximations than their answers yesterday. **Extension:** Students will start working with more complex whole numbers (larger numbers) that do not have common perfect squares surrounding them. **Small Group Re-teaching:** Students will work in small group and receive more instruction with smaller numbers to build understanding of estimating non-perfect square roots.
3	**Objective:** IWBAT estimate non-perfect square roots between decimals to the nearest tenth. **Anticipatory Set (AS):** Teacher will put on the board one problem covering previous lesson. **Teacher Model/Inquiry:** Teacher will ask students which decimal to the nearest tenth the non-perfect square root is closer to and explain their reasoning. **Guided Practice:** Teacher will model squaring each decimal to the nearest tenth and which is closest to the original non-perfect square root. Teacher will model using the same numbers from previous lesson as to help students grasp the concept better. Model will look like: ___ <27<___ 25 < 27 < 36 √25 < *√27<√36* 5 < *√27* < 6	**Objective:** Students will state the objective aloud and write it in their notebooks. **Anticipatory Set (AS):** Students will solve the problem from the whiteboard on previous lesson in their notebooks. **Teacher Model/Inquiry:** Students will brainstorm ideas to which decimal to the nearest tenth the non-perfect square root is closer to and explain their reasoning. **Guided Practice:** Students will copy down teacher notes in their notebook. They will solve the square root of 80 independently and work with their partner to solve the square root of 95 **Check for Understanding:** Students will answer the 3 problems on the whiteboard, holding up their answers after about 3 minutes for each question. **Independent Practice:** Students will use the same worksheet from previous lesson to identify which decimal to the nearest tenth the non-perfect square root is closer to, labeling it as given in teacher model. If students demonstrate

	27 is 2 units away from 25, but is 9 units away from 36. This makes the square root of 27 is clearly closer to the square root of 25. Since the Square root of 25 is 5, the square root of 27 will be closer to 5 than it will be to 6. With this information, we can conclude that the square root of 27 is between 5.0-5.5. We now know that the square root of 27 is between 5.0 and 5.5 so square 5.1, 5.2, 5.3 5.4 and 5.5. 5.1^2=26.01 5.2^2=27.04 5.3^2=28.09 5.4^2=29.16 5.5^2=30.25 Students will note that 26.01 is too small but 27.04 is too big. They will conclude that the square root of 27 is between 5.1 and 5.2 but closer to 5.2 from previous lessons. Teacher will then have students attempt the square root of 80 on their own and square root of 95 with their partner. Students are using the same problems as before because teacher wants them to understand that they are just getting a more exact approximation of the non-perfect square root. **Check for Understanding:** Teacher will put three problems on the whiteboard for students to estimate. **Independent Practice:** Teacher will assign students the same worksheet from previous lesson but make them get the more specific approximation as given in teacher model. **Closure:** Teacher will have students explain why their answers today are more exact approximations than their answers yesterday on an exit ticket. **Extension:** Teacher will generate more questions with complex whole numbers (larger numbers) that do not have as common perfect squares. **Small Group Re-teaching:** Teacher will pull small group and give students more modeling and more practice with easier numbers.	mastery (at least 4 of 5 correct), then they will go to extension. If they do not reach mastery, they will go to small group re-teaching. **Closure:** On exit ticket, students will explain why their answers today are more exact approximations than their answers yesterday. **Extension:** Students will start working with more complex whole numbers (larger numbers) that do not have common perfect squares surrounding them. **Small Group Re-teaching:** Students will work in small group and receive more instruction with smaller numbers to build understanding of estimating non-perfect square roots.
4	**Objective:** IWBAT estimate non-perfect square roots between decimals to the nearest hundredth. **Anticipatory Set (AS):** Teacher will put on the board one problem covering previous lesson. **Teacher Model/Inquiry:** Teacher will ask students which decimal to the nearest tenth the non-perfect square root is closer to and explain their reasoning. **Guided Practice:** Teacher will model squaring each decimal to the nearest tenth and which is closest to the original non-perfect square root. Teacher will model using the same numbers from previous lesson as to help students grasp the concept better. Model will look like: ___ <27<___	**Objective:** Students will state the objective aloud and write it in their notebooks. **Anticipatory Set (AS):** Students will solve the problem from the whiteboard on previous lesson in their notebooks. **Teacher Model/Inquiry:** Students will brainstorm ideas to which decimal to the nearest hundredth the non-perfect square root is closer to and explain their reasoning. **Guided Practice:** Students will copy down teacher notes in their notebook. They will solve the square root of 80 independently and work with their partner to solve the square root of 95

	$25 < 27 < 36$ $\sqrt{25} < \sqrt{27} < \sqrt{36}$ $5 < \sqrt{27} < 6$ 27 is 2 units away from 25, but is 9 units away from 36. This makes the square root of 27 is clearly closer to the square root of 25. Since the Square root of 25 is 5, the square root of 27 will be closer to 5 than it will be to 6. With this information, we can conclude that the square root of 27 is between 5.0-5.5. We now know that the square root of 27 is between 5.0 and 5.5 so square 5.1, 5.2, 5.3 5.4 and 5.5. $5.1^2=26.01$ $5.2^2=27.04$ $5.3^2=28.09$ $5.4^2=29.16$ $5.5^2=30.25$ Students will note that 26.01 is too small but 27.04 is too big. They will conclude that the square root of 27 is between 5.1 and 5.2 but closer to 5.2 from previous lessons. Since the square root of 27 is closer to 5.2 the decimal range we are dealing with is 5.16-5.20. Squaring each will allow us to see which decimal to the nearest hundredth the square root of 27 is closer to. $5.16^2=26.6256$ $5.17^2=26.7289$ $5.18^2=26.8324$ $5.19^2=26.9361$ $5.20^2=27.04$ Since 5.19 is too small and 5.20 is too big we know it falls between them and is closer to 5.20. This means the range over numbers will be 5.195-5.199. Teacher will then have students attempt the square root of 80 on their own and square root of 95 with their partner. Students are using the same problems as before because teacher wants them to understand that they are just getting a more exact approximation of the non-perfect square root. **Check for Understanding:** Teacher will put three problems on the whiteboard for students to estimate. **Independent Practice:** Teacher will assign students the same worksheet from previous lesson but make them get the more specific approximation as given in teacher model. **Closure:** Teacher will have students explain why their answers today are more exact approximations than their answers yesterday on an exit ticket.	**Check for Understanding:** Students will answer the 3 problems on the whiteboard, holding up their answers after about 3 minutes for each question. **Independent Practice:** Students will use the same worksheet from previous lesson to identify which decimal to the nearest hundredth the non-perfect square root is closer to, labeling it as given in teacher model. If students demonstrate mastery (at least 4 of 5 correct), then they will go to extension. If they do not reach mastery, they will go to small group re-teaching. **Closure:** On exit ticket, students will explain why their answers today are more exact approximations than their answers yesterday. **Extension:** Students will start working with more complex whole numbers (larger numbers) that do not have common perfect squares surrounding them. **Small Group Re-teaching:** Students will work in small group and receive more instruction with smaller numbers to build understanding of estimating non-perfect square roots.

	Extension: Teacher will generate more questions with complex whole numbers (larger numbers) that do not have as common perfect squares.	
	Projects Based Learning	**Projects Based Learning Component-**The corresponding project will be determined by the curriculum team during the summer of 2016. Please refer to A.5 for essential details of the committee.
S.A.	*Provide an opportunity for the student to complete the summative assessment items which is clearly separate from instruction and guided or independent practice, and in which the student is assessed independently. In the Student Activities column, provide a brief description of the summative assessment (S.A.) items that will allow students to demonstrate mastery of the rigor of the Required Standard(s)/components, and the context in which the items will be administered.*	S.A. assesses mastery of estimating the square root of a rational number. Students will complete the 3 Summative assessment items below. The questions point value totals 10 points. Students must receive a total of 8 or more points to show mastery of standard.

Summative Assessment Items and Scoring: *Below, provide at least three Summative Assessment Items that together accurately measure student mastery of the application of the content and/or skills as defined by the grade-level rigor in the Required Standard(s). For each assessment item, provide an answer key or scoring rubric which clearly describes how assessment items are to be scored and how points will be awarded, such that mastery of the application of the content and/or skills as defined by the grade-level rigor in the Required Standard is clearly demonstrated by an acceptable score.*

Summative Assessment Item 1 (clearly identify answer key/scoring rubric, and acceptable score):

Directions:

Estimate the square root of 50 to the nearest hundredth and place on a number line. (4 points)

Answer key:

1 point for correctly identifying the square root of 50 is between 7 and 8.

1 point for correctly identifying the square root is between 7.0 and 7.5.

1 point for correctly identifying the square root is between 7.07 and 7.08.

1 point for correctly placing 7.08 (rounded correct answer to the nearest hundredth) on a number line.

Summative Assessment Item 2 (clearly identify answer key/scoring rubric, and acceptable score):

Directions:

Estimate the square root of 134 to the nearest hundredth and place on a number line. (4 points)

Answer Key:

1 point for correctly identifying the square root of 134 is between 11 and 12.

1 point for correctly identifying the square root of 134 is between 11.5 and 12.0.

1 point for correctly identifying the square root of 134 is between 11.57 and 11.58.

1 point for correctly placing 11.58 (rounded correct answer to the nearest hundredth) on a number line.

Summative Assessment Item 3 (clearly identify answer key/scoring rubric, and acceptable score): (add as needed):

Directions:

Describe the process of estimating non perfect square roots to the nearest 100th. (2points)

Answer Key:

2 points for:

a. Describing the two whole numbers, it would fall between.
b. Describing the two decimals to the nearest tenths it would fall between
c. Describing the two decimals to the nearest hundredths it would fall between.

1 point for:

Completing 2 of the previously stated requirements.

0 points for:

Completing less than 2 of the previously stated requirements.