** Program Lesson Plan Template**

This template should be used to prepare your project-centered lesson plan as a stand-alone .pdf to be distributed. Additional worksheets, diagrams, or pictures (especially useful for complex setups) must be combined into this single document. This form is designed so you can also use it to copy and paste your responses directly into the STAR database using the online form.

**Lesson Title**: Linear Growth Practicum

**Subject:** Mathematics **Grade Level:** 6-8

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**Lab Site:** Pacific Northwest National Laboratory

**Research Presentation Title:** Development of Innovative Nuclear and Energy Sector Cybersecurity Educational Tools

**Lesson Plan Summary (***250 Words Max. Please indicate the expected time period of this Lesson Plan):*

After completing the lesson, the students will be able to recognize how to develop a generalizable counting strategy. The students will be able to generate a function for the nth term. The students will create the connection between the table, the equation, and the visual pattern.  
Students will use tablet or cellphone to take the e-Learning lesson to discover Mathematic, students will work in a group of 4 students to build the teamwork skills.

**Unique Research Connections**

*Briefly describe how your lesson plan utilizes your unique insight and/or resources from your research experience.*

This lesson plan uses the idea that cyber security is very important in our daily life and our society nowadays. Most of the nuclear facilities is controlled by the computer; therefore, if we are not aware of cyber attack, the damage will be huge!

**Prior Student Knowledge**

*What do you expect students to already know before starting this unit?*

Story Line 2 is an amazing Educational Tools because it helps teachers/educators to build an e-Learning lesson. The lesson will contain many graphic, music, hyperlink; moreover, it is an interactive interface, so students can study in their pace, and they can discover Math in an interesting way.

**Students Objectives / Outcomes**

*Students will know and be able to…*

Students will be able to recognize the counting strategy/ to construct the linear functions/ to create the connections between the table, the equation, and the visual pattern

**NGSS and CCSS STEM Practices**

*Choose up to three practice(s) that your students will be engaged in during this lesson. Briefly describe how lesson demonstrates the practice(s):*

NGSS - Asking questions (for science) and defining problems (for engineering)

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NGSS - Developing and using models

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NGSS - Planning and carrying out investigations

Click here to enter text.

NGSS - Analyzing and interpreting data

Click here to enter text.

NGSS - Using mathematics and computational thinking

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NGSS - Constructing explanations (for science) and designing solutions (for engineering)

NGSS - Engaging in argument from evidence

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NGSS - Obtaining, evaluating, and communicating information

Click here to enter text.

CCSS Math - Make sense of problems and persevere in solving them

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CCSS Math - Reason abstractly and quantitatively

Students will have to count boxes without counting them 1-by-1, so students have to built the abstract reasoning to explain the way they count.

CCSS Math - Construct viable arguments and critique the reasoning of others

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CCSS Math - Model with mathematics

Students will construct the linear function to calculate boxes. After that students will build the graph and a data table to fully understand the connetion between the function, the data table, and the graph.

CCSS Math - Use appropriate tools strategically

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CCSS Math - Attend to precision

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CCSS Math - Look for and make use of structure

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CCSS Math - Look for and express regularity in repeated reasoning

Students will count the number of boxes that has the same pattern at 5th minute and 10th minute; therefore, students will recognize the growth pattern of the given boxes.

None of the above

Click here to enter text.

**Suggestions for Special adaptations** *(e.g. ELL, Special Needs, etc.)***:**

In an e-Learning lesson will have a tool for English Learner students to search for the definition of new terminology.   
Write down new terms: Equation, data table, linear equation

**Formative Assessments** *(How will you evaluate student learning during the unit? Examples include class discussion, free writes, etc.):*

Students will have to write “Ticket to get out classroom” by the end of each class section. Students will create the new function that apply to their daily life. They will have to write the reason why they come up with that equation (background information).   
Teacher will use it for the next class day as a warm up question. Students will receive a random equation, and they will have to create a data table, and draw that function.

**Summative Assessments** *(How will you evaluate student learning at the end of the unit? Examples include: final project, paper, exam, etc.):*

Teacher will provide the closure question for students, 10 minutes before the class ends. Based on the result, teacher will know whether students successfully understand the material or not.

**Required Common Materials** *(Rulers, paper products, etc. )***:**

1. **Textbook**
2. **Pencil and graph paper**

**Required Less Common Materials** *(Please suggest sources for these items like reagents, sensors, etc. )***:**

1. **1 tablet for group of 4 students**

**Pre-Lesson Preparations Guide** *(Please indicate timing issues or expectations.)*

**Teacher will ask students to form a group of 4 students. Teacher will hand out 1 tablet per group. The tablet is already connected to the website of the e-Learning lesson; therefore, students will start to take a e-Learning lesson right away. Back-up plan in case the tablet will not able to open the file, teacher already had picture of the virus at 5th and 10th minute. Also, teacher have printed out the outline of the e-Learning lesson, so teacher is able to teach the lesson without connecting to the e-Learning lesson.**

**Step-By-Step Guide** *(Be Specific / List the Co – Teach Strategies with each step):*

Please be specific and efficient, describe how the teacher will capture students’ engagement and hook them on the concept, describe how to conduct the hands-on/minds-on activities, list higher-order thinking questions which teachers may use to solicit student explanations and help them to justify their explanations, provide citations if you include others’ work, and indicate the time required for your steps.

1. (5 minutes) Teacher starts class by asking students to close their eyes, and teachers will say: “Add 4 to itself 11 times… Everyone has the two digits number right? … Add two digit and show me the number by using your finger”. Teacher will check answers from students. If teachers realize that majority does not get it, teacher has to say the phrase above slower and clearly. If necessary, teacher has to ask students to write the calculation on the paper.
2. (5 minutes) Teacher will form a group of 4 students, and teacher will hand out the tablet per group (Student can use his/her cellphone) to participate on e-learning program. The e-Learning lesson will show the picture of the boxes in 5th minute for 7 seconds. After 7 seconds, the program gives the task to students to count boxes without counting them 1-by-1. In 30 seconds to 1 minute, teacher asks students to discuss with neighbor. Teacher will record data from 3 students. The e-Learning lesson will provide a chance for those students who do not get the correct answer by showing the picture again in 5 seconds. Teacher will circulate the classroom to make sure every students get the correct result, and teacher will record the group discussion.
3. (5 minutes) The e-Learning lesson will show the picture of the boxes in 10th minute for 7 seconds. The e-Learning lesson will provide the picture again for those students who do not get it. For 2 to 3 minutes, teacher asks student to discuss within group how to count boxes without counting them 1-by-1, and what is the differences from the previous pattern. Teacher will circulate the classroom to check the discussion of each group.
4. (15 minutes) The e-Learning will ask students to draw the pattern of boxes in 15th minute and to make a guess of how many boxes are they? It also requests student to write the “Ticket to exist”. Teacher will ask students to share their picture and to explain the reason to neighbor. Teacher will walk around the classroom to check off the “Ticket to exist” paper, then teacher will ask 3 students who get it correct to come up to share their graph and reason. The e-Learning lesson will end at this step, so teacher will take over the attention of the classroom.
5. (10 minutes) Teacher will show the picture of the boxes in nth minute. Then teacher asks each group to compose the equation to count boxes. Teacher will check off groups who get the equation correctly. Then teacher will ask 2 groups to share their result for the entire class.
6. (10 minutes) Teacher will hand out the homework, and teacher will ask student to work on problem 1 and problem 3, so students will have the basic understand what will be in their homework for today.
7. (10 minutes) Teacher will hand out the closure question to check the knowledge of students. Teacher will collect the closure question before students leave.