Planning Commentary

In Planning Task 1, you will write a commentary, responding to the prompts below. Your commentary should be ***no more than 9 single-spaced pages, including the prompts****.*

1. ***Central Focus***

   a. *Describe the central focus and purpose of the content you will teach in the learning segment.*

      The central focus of my learning segment is Exponential Functions and Growth. The purpose of my learning segment is to teach the students how to recognize an exponential function when given a function rule, graph, or table of values, graph exponential functions, use exponential functions to model real-life situations, and make conclusions about the situation based on the exponential function.

   b. *Given the central focus, describe how the standards and learning objectives within your learning segment address*

      - *conceptual understanding,*
      - *procedural fluency,* ***AND***
      - *mathematical reasoning and/or problem-solving skills.*

      My learning segment will address conceptual understanding by incorporating important and necessary vocabulary into every lesson. The bellwork, lessons, homework, and activities for the unit are filled with the use and reuse of important vocabulary. In order for the student to conceptually compare linear and exponential functions they must have the vocabulary to communicate their similarities and differences.

      My learning segment will address procedural fluency by walking the students through deeply reading a situational story problem, using the information from the story problem to create an exponential function rule, creating a table of values for their exponential function rule, graphing an exponential function from the table of values, and using the function rule to answer a related real-life situational questions. Throughout the unit students will be expected to complete all of the procedures for solving an exponential story problem.

      My learning segment will address mathematical reasoning and problem-solving by using exponential functions to model real-life situations. Students will then use their function rule and data to answer questions about the given situation. Exponential functions are used to model different real-life situations for many different reasons. Students will be learning problem solving skills because they will have to make decisions about real-life situations based on an exponential functions.

   c. *Explain how your plans build on each other to help students* ***make connections*** *between concepts, computations/procedures,* ***AND*** *mathematical reasoning or problem-solving strategies to build understanding of mathematics.*

Each lesson is built to help reinforce the similarities and differences of linear and exponential functions. At the beginning of the learning segment the lessons are structure so that students have as many opportunities as possible to make the comparisons between linear and exponential functions. The materials for each lesson are used to help reinforce the comparisons between linear and exponential functions. The learning segment is about the student using their prior knowledge of linear functions to help them write exponential functions and graph them.

In my first lesson we start graphing problems that are best modeled using exponential functions. They know how to build exponential function from story problems, now we will create a table of values using the function rule, and then graph the function. We will continue to build off of the work they have done in previous lessons, by comparing and contrasting linear and exponential functions. We will check to see if any of their conjectures about exponential graphs are true.

The second lesson begins with an activity (mathegories) where students work in pairs to determine whether a given function, graph, table of values, or story problem (out of 10 given functions, graph, table of values, and story problems) are for linear or exponential functions. From here we continue the lesson by pulling everything they have done in the lesson so far together. Now they will start answering questions for the situations they have model. They will have to interpret the data to help them answer the situational question. We will look at how to interpret the data, and come to the best conclusion.

During the third lesson we discuss the difference between exponential growth and decay. During the lesson we will read two different story problems, build function rules for both problems, create tables of values, and then graph the functions. Using these story problems I will have the students compare exponential growth and decay. They will have to use essential vocabulary to describe the similarities and differences between the two graphs. We will also compare exponential growth and decay to the rise/fall of the slopes of linear functions. We will discuss what types of story problems will be modeled using exponential growth and which will be exponential decay.

The fourth lesson is about the students bringing together all of the pieces we have learned. Today the lesson is a class long group activity called “Modeling Exponential Growth”. They will be working in groups to model situations using exponential functions. They will be required to go through all the steps and procedures we have learned this unit. In this activity they will be completing a problem with their group members, and then after a predetermined amount of time everyone will move into new groups (where every group member completed a different problem), and each student will teach their new group members about their problems.

The fifth lesson is about students asking any questions on creating or graphing exponential functions, about how to answer situational questions, or any question from their homework or practice test. They have a unit test soon, so the bulk of today’s purpose is helping them feel prepared and confident for their test.

2. *Knowledge of Students to Inform Teaching*

*For each of the prompts below (2a–c), describe what you know about **your** students **with respect to the central focus** of the learning segment.*

Consider the variety of learners in your class who may require different strategies/support (e.g., students with IEPs or 504 plans, English language learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students).

a. *Prior academic learning and prerequisite skills related to the central focus—**Cite evidence of what students know, what they can do, and what they are still learning to do.***

The prior knowledge that is being utilized by my central focus is my students' knowledge of linear functions, and their ability to write a linear function rule and graph that function. Students have been studying linear functions consistently for several units, so creating a linear function should be a skill they have already acquired. They have also used linear functions to model real-life situations

I am also using the fact that prior to my first lesson the students have already been comparing and contrasting the set-up of linear and exponential functions, and their respective rates of change. They discussed those similarities and differences by looking at linear and exponential functions as well as their corresponding table of values. They discussed the fact that linear functions have a constant rate of change and a graph that looks like a straight line, while exponential functions have a non-constant rate of change, and the students have made conjecture about what an exponential graph looks like. The students have also started writing function rules from story problems.

Students can take linear function, create a table of value, and from that table of values they can graph the linear function. These skills will be utilized in my learning segment.

They are still learning how to create a linear function rule from a real-life situation. They are still learning how to translate English words into math. But I will use the basics of this skill they are still trying to master, for my unit. Unfortunately for my students with IEPs, LEPs, and gaps in academic knowledge, they are still learning to write linear function rules and how to graph those functions.

b. *Personal, cultural, and community assets related to the central focus—**What do you know about your students' everyday experiences, cultural and language backgrounds and practices, and interests?***

Most of my students are Athletes or participate in extracurricular activities. All of my students like to listen to music, and I have gotten several to say that Rap/Hip Hop is their favorite genre of music.

c. *Mathematical dispositions—What do you know about the extent to which your students*

- *perceive mathematics as "sensible, useful, and worthwhile"*[1]
- *persist in applying mathematics to solve problems*
- *believe in their own ability to learn mathematics*

Most of my students perceive math as a class they are forced to take in order to graduate. Some of my students tell me how much they hate math as they are walking into the classroom. Most do not see a use for Algebra outside of high school, and some do not understand why it is a graduation requirement.

Over 75% of my students will persevere through solving a problem. But my remaining students get discouraged easily. If they fail at a problem after one try, they do not see any reason to try again. For a lot of my students if they encounter a problem on the homework, or test that does not look exactly like an example done in class, they do not even start trying to solve it.

A lot of my students lack confidence in math. For some they have always felt like they did poorly at math, but for others they have had their confidence shaken by entering Algebra I. Some say "middle school math was easy, why is this stuff so much harder?" Somehow their middle school teachers did not prepare them for the hard work that is needed to succeed in a high school math class. Most students believe that either they can or cannot learn math. Some, unfortunately, believe they are too stupid to learn/do math.

3. *Supporting Students' Mathematics Learning*

Respond to prompts below (3a–c). To support your justifications, refer to the instructional materials and lesson plans you have included as part of Planning Task 1. In addition, ***use principles from research and/or theory to support your justifications.***

a. *Justify how your understanding of your students' prior academic learning; personal, cultural, and community assets; and mathematical dispositions (from prompts 2a–c above) guided your choice or adaptation of learning tasks and materials. Be explicit about the connections between the learning tasks and students' prior academic learning, their assets, their mathematical dispositions, and research/theory.*

Though I have to use departmental bellwork, lessons, and homework, I plan to put more of an emphasis on comparing and contrasting linear and exponential functions. Student have been working with linear functions for over 3 months now. Since they have been working with linear functions for a while, I want to reference back to that. They have interpreted story problems to create linear function. They have already modeled situations using linear functions. I want to connect exponential functions back to all the work they have been doing with linear functions. I want them to make the connection

between linear functions and exponential functions. I plan to use this connection to make the transition into exponential functions easier.

Using the fact that most of my students lack confidence in their mathematical ability, I tried to use more social learning in my unit by incorporating more engaging group activities.

b. *Describe and justify why your instructional strategies and planned supports are appropriate for* ***the whole class, individuals, and/or groups of students with specific learning needs****.*

Consider the variety of learners in your class who may require different strategies/support (e.g., students with IEPs or 504 plans, English language learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students).

I plan to use a variety of strategies depending on the agenda for each lesson. I will primarily use Guided Practice/Direct Instruction and Class/Group Discussion for my main instructional strategies for lessons that involve acquisition of content knowledge of skills. I chose these because the students are not confident in their abilities as mathematicians, and they need some extra support while they learn new concepts. I plan to give them that support by using Guided Practice with AgileMind lessons. I will also utilize Class/Group Discussion so that students do not feel isolated or put on the spot. These strategies were chosen to help the class function as a whole class while also giving support to the students who have specific learning or language needs. During group work I will use the Jigsaw and Think, Pair, Share strategies. I chose these to incorporate more social learning into my classroom. It will also allow the students to work on their math communication skills, while in a small group setting. Jigsaw will also help build student's confidence in their mathematical ability because they are given the chance to become the expert.

c. *Describe common mathematical preconceptions, errors, or misunderstandings within your central focus and how you will address them.*

Common mathematical preconceptions within my central focus is that exponential functions are harder and extremely different from linear functions. Though both functions have their differences, they have more similarities. Throughout the unit I will compare and contrast exponential and linear functions. Students are used to linear functions, so they think they are easy. They hear exponential and think it must be hard. I will address these misconception by referring back to linear functions throughout the unit. We, as a class, will discuss the similarities and differences of exponential and linear functions.

4. *Supporting Mathematics Development Through Language*

As you respond to prompts 4a–d, consider the range of students' language assets and needs—what do students already know, what are they struggling with, and/or what is new to them?

a. ***Language Function.*** *Using information about your students' language assets and needs, identify* ***one*** *language function essential for students to develop conceptual understanding, procedural fluency, and mathematical reasoning or problem-solving skills within your central focus. Listed below are some sample language functions. You may choose one of these or another language function more appropriate for your learning segment.*

Compare/Contrast	*Justify*	*Describe*	*Explain*	*Prove*

Please see additional examples and non-examples of language functions in the glossary.

For my unit I chose the language function Compare/Contrast, because the entire unit is centered on the students using their prior knowledge of linear functions, and comparing that to exponential functions. I want the students to notice the similarities between exponential and linear functions, but the differences are also important. The differences allow the students to identify the functions, create a proper function rule and tables of values, and graph the function properly.

b. *Identify a key learning task from your plans that provides students with opportunities to practice using the language function identified above. Identify the lesson in which the learning task occurs. (Give lesson day/number.)*

My learning task which gives the students the opportunity to use my chosen language function is my Mathegories activity in Lesson 2. In the activity the students, in groups of 2 or 3, categorize function rules, tables of values, graphs, and story problems that are either linear of exponential.

c. ***Additional Language Demands.*** *Given the language function and learning task identified above, describe the following associated language demands (written or oral) students need to understand and/or use:*

- *Vocabulary and/or symbols*
- *Mathematical precision[2] (e.g., using clear definitions, labeling axes, specifying units of measure, stating meaning of symbols), appropriate to your students' mathematical and language development*

***Plus** at least one of the following:*

- *Discourse*
- *Syntax*

For the learning task, and in order for the students to use the language function, students will need to know essential vocabulary. This vocabulary includes: linear function, exponential function, y-intercept, constant, rate of change, common difference, common multiplier, growth decay, exponent, base, and function rule. Using this important vocabulary they will better development how the different functions Compare/Contrast. This development will help with their mathematical precision when using vocabulary terms. They will learn that they have to be precise when talking about functions became one small change can completely change a function. This precision with vocabulary will help them better at identifying functions. Students will also develop better mathematical syntax in this unit, through the use of essential vocabulary in the learning tasks. As previous mention precision is necessary for mathematics. Whether we are discussing functions or their graphs. Precision is the key. In order to help the students gain and develop this precision, I must teach them the proper syntax to use. This way they can properly learn the universal language of mathematics.

d. ***Language Supports.*** *Refer to your lesson plans and instructional materials as needed in your response to the prompt.*

- *Identify and describe the planned instructional supports (during and/or prior to the learning task) to help students understand, develop, and use the identified language demands (function, vocabulary and/or symbols, mathematical precision, discourse, or syntax).*

At the beginning of each lesson I have a Bellwork which will help engage student's prior knowledge and give them a chance to recall some of the important vocabulary, from their linear functions unit, that they know and are still learning to use properly. This routine gets the students thinking about the vocabulary whether it is a preview of what is to come later in the lesson, or review of the previous day's vocabulary, this gives students the chance to become proficient, and later master, the vocabulary essential to success in this unit. During the learning task I plan to support the student's language development by giving them multiple examples using the vocabulary. I plan to give visual, verbal, and written examples of the essential vocabulary and syntax needed for the unit.

5. ***Monitoring Student Learning***

In response to the prompts below, refer to the assessments you will submit as part of the materials for Planning Task 1.

a. *Describe how your planned formal and informal assessments will provide direct evidence of students' conceptual understanding, procedural fluency,* ***AND*** *mathematical reasoning and/or problem-solving skills* ***throughout*** *the learning segment.*

My informal assessments will provide direct evidence of student learning when I hear students using the unit vocabulary during normal, routine classroom conversations with their peers, and the homework they turn in. These conversations will not be fueled my agenda but their own confidence in their growing knowledge. This will show me how prepared the students are to continue on in the unit. Mathegories is one of my biggest informal assessments where the conversations I hear will tell me whether or not the students really understand the vocabulary they are supposed to be using, and if they understand the differences between linear and exponential functions. This activity will tell me if the class is truly prepared to move on in the unit, or if I need to add extra support in the next lesson. The homework will also give me information about their ability to write and solve exponential functions when they are not in class. This will also give me information on the pace of the unit and if extra support is needed.

My formal assessments of the Modeling Exponential Growth and the Unit test, will provide me with evidence that the students have met the unit objectives. These assessments will show me how well the students can read a story problem, write an exponential function rule, create a table of values for that function rule, graph the function, and solve the function to answer situational story problems.

b. *Explain how the design or adaptation of your planned assessments allows students with specific needs to demonstrate their learning.*

Consider the variety of learners in your class who may require different strategies/support (e.g., students with IEPs or 504 plans, English language learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students).

My informal assessments of listening to students and looking at homework assignments are looking for improvement in better use of the key unit vocabulary, better problem-solving skills, and better identification skills. I will always look for improvement within each student's body of work.

My formal assessments, Modeling Exponential Function and Unit Test, are about putting all of the skills together, which will be harder for students with specific learning and language needs. Taking that into account, there are so many different areas where students get points. They are tested on whether they can create the function rule, create a table of values, graph the function, and solve the function for a specific situational question.

The only assessment I modified for my learners with specific needs is the end of unit test. I modified the test for the student with little to no academic English and the student with a learning disability. I modified the test by underlining key words that highlight the true meaning of the problem. On the modified test for the student with small amounts of academic English, I also modified the options offered for the multiple choice questions. I removed choices that would confuse the student with no academic English. For my student with gaps in academic knowledge, I did not modify an assessment because I am testing the student on his/her ability to use concepts we learned in the unit.