Algebra 2 Unit 4: Exponential Functions and Equations
Lessons 1–7: Growing and Shrinking with Non-Integer Inputs

Explore, Play, and Discuss

- I understand how to calculate values that are changing exponentially.
- I can determine the value of exponential functions at non-whole number inputs.

Activity Suggestions:

- ➢ Lesson 1: Students respond to questions in an online or paper journal, or talk them over with someone at home. Attention should be given to how to address the material in the launch and instructions.
- ➢ Activity 3.2: Students respond to questions in an online or paper journal, or talk them over with someone at home.

Assessment Suggestions:

- ➢ Check Your Readiness assessment: Administer items 1–6 within the first day or two of this section. Use the guidance provided with each problem to adjust instruction so that students can access the math in the unit.
- ➢ Lesson 1 cool-down

Deep Dive

- I understand how to calculate a growth or decay factor of an exponential function for different input intervals.
- I can explain why an exponential function changes by the same factor over equal intervals, even when those intervals are not whole numbers.

Activity Suggestions:

- ➢ Lesson 4: sync discussion
- ➢ Activity 5.2: sync discussion

Assessment Suggestions:

- ➢ Lesson 4 cool-down

Synthesize and Apply

- I can use the half-life of elements to calculate how much of the element remains over time.

Activity Suggestions:

- ➢ Activity 6.3: Students respond to questions in an online or paper journal, or talk them over with someone at home.
- ➢ Lesson 7: Students respond to questions in an online or paper journal, or talk them over with someone at home.

Assessment Suggestions:

- ➢ Lesson 7 cool-down
- ➢ Mid-Unit Assessment questions 1–7
- ➢ Revisions to previous assessment prompts
- ➢ Students use learning targets to decide what additional practice they need.

Ongoing Practice	• Assign one or more of the distributed practice problem sets from Lessons 1–7 to be completed over the time period that the section is being worked on. • These could also be lagging, so that students are working on practice problems from the previous section or unit during this section or unit. • Specify which problems students should submit or let them choose. • Note: Several existing platforms already have IM's practice problems loaded so that students can complete and submit them online. Some can be autoscored.

Anytime Resources	• Delve into one of the modeling prompts (1, 2, 3, or 4). • Teach and encourage students to study the lesson summaries (at the end of every lesson) and refer back to them.

Lessons 8–11: Missing Exponents

Explore, Play, and Discuss	• I can approximate the value of unknown exponents.	
	Activity Suggestions: ➢ Lesson 8: Students respond to questions in an online or paper journal, or talk them over with someone at home. ➢ Activity 9.2 preview: Students respond to question 1 only in an online or paper journal, or talk it over with someone at home.	**Assessment Suggestions:** ➢ Lesson 8 cool-down

Dive Deep

- I understand that a logarithm is a way to represent an exponent in an exponential equation.

Activity Suggestions:

- ➢ Lesson 9: sync discussion. If possible, incorporate students' thinking from question 1 of 9.2. Then proceed with the activity as written.
- ➢ Activity 10.2: sync discussion

Assessment Suggestions:

- ➢ Lesson 9 cool-down

Synthesize and Apply

- I understand how to evaluate a logarithmic expression.
- I can use known values of logarithms to estimate the value of other logarithms.

Activity Suggestions:

- ➢ Activity 10.3: Students respond to questions in an online or paper journal, or talk them over with someone at home. Consider providing a worked example to illustrate the important aspects.
- ➢ Lesson 11: Students respond to questions in an online or paper journal, or talk them over with someone at home. Instead of playing the game in Activity 2, assign the launch (put the expressions in order from least to greatest).

Assessment Suggestions:

- ➢ Lesson 10 cool-down
- ➢ Lesson 11 cool-down
- ➢ End-of-Unit Assessment question 1
- ➢ Revisions to previous assessment prompts
- ➢ Students use learning targets to decide what additional practice they need.

Ongoing Practice

- Assign one or more of the distributed practice problem sets from Lessons 8–11 to be completed over the time period that the section is being worked on.
- These could also be lagging, so that students are working on practice problems from the previous section or unit during this section or unit.
- Specify which problems students should submit or let them choose.
- Note: Several existing platforms already have IM's practice problems loaded so that students can complete and submit them online. Some can be autoscored.

Anytime Resources	
	• Delve into one of the modeling prompts (1, 2, 3, or 4). • Teach and encourage students to study the lesson summaries (at the end of every lesson) and refer back to them.

Lessons 12–18: The Constant *e*, Logarithmic Functions, and Graphs

Explore, Play, and Discuss		
	• I know that *e* is an irrational constant, like π, that has a value of about 2.718.	
	Activity Suggestions: ➢ Lesson 12: Students respond to questions in an online or paper journal, or talk them over with someone at home. Attention should be given to how to address the material in the synthesis of 12.2. ➢ Activity 13.1: Students respond to questions in an online or paper journal, or talk them over with someone at home. ➢ Activity 14.1: Students respond to questions in an online or paper journal, or talk them over with someone at home.	**Assessment Suggestions:** ➢ Lesson 12 cool-down

Dive Deep		
	• I can solve simple exponential equations using logarithms. • I can solve exponential equations using logs or by graphing.	
	Activity Suggestions: ➢ Activity 14.2: sync discussion ➢ Lesson 15: sync discussion	**Assessment Suggestions:** ➢ Lesson 14 cool-down ➢ Lesson 15 cool-down

Synthesize and Apply

- I can calculate where two exponential graphs meet using logarithms.
- I can interpret the intersection of the graphs of two exponential functions in context.
- I can interpret logarithmic functions in context.

Activity Suggestions:

- ➢ Activity 16.2: Students respond to questions in an online or paper journal, or talk them over with someone at home. Consider providing a worked example to illustrate the important aspects.
- ➢ Lesson 17: Students respond to questions in an online or paper journal, or talk them over with someone at home.

Assessment Suggestions:

- ➢ Lesson 16 cool-down
- ➢ Lesson 17 cool-down
- ➢ End of Unit Assessment questions 2–7
- ➢ Revisions to previous assessment prompts
- ➢ Students use learning targets to decide what additional practice they need.

Ongoing Practice

- Assign one or more of the distributed practice problem sets from Lessons 12–18 to be completed over the time period that the section is being worked on.
- These could also be lagging, so that students are working on practice problems from the previous section or unit during this section or unit.
- Specify which problems students should submit or let them choose.
- Note: Several existing platforms already have IM's practice problems loaded so that students can complete and submit them online. Some can be autoscored.

Anytime Resources

- Delve into one of the modeling prompts (1, 2, 3, 4, or 5).
- Teach and encourage students to study the lesson summaries (at the end of every lesson) and refer back to them.