Examples of Tasks from CCSS Edition Course 1, Unit 5

Getting Started

The tasks below are selected with the intent of presenting key ideas and skills. **Not every answer is complete**, so that teachers can still assign these questions and expect students to finish the tasks. If you are working with your student on homework, please use these solutions with the intention of increasing student understanding and independence. A list of questions to use as you work together, prepared in English and Spanish, is available. Encourage students to refer to their class notes and Math Toolkit entries for assistance. Comments in red type are not part of the solution.

As you read these selected homework tasks and solutions, you will notice that some very sophisticated communication skills are expected. Students develop these over time. This is the standard for which to strive. See Research on Communication.

The Algebra and Functions page might help you follow the conceptual development of the ideas you see in these examples.

Main Mathematical Goals for Unit 5

Upon completion of this unit, students should be able to:

- recognize and give examples of growth and decay situations in which exponential functions are likely to match the patterns of change that are observed or expected. This function-recognition skill should apply to information given in data tables, graphs, or verbal descriptions of related changing variables.
- use reasoning, estimation, and curve-fitting utilities to find exponential functions to match patterns of change in exponential growth and decay situations. This should include rules in the "$y = \ldots$" and *NOW-NEXT* forms.
- use exponential rules to produce tables and graphs to answer questions about exponential change of variables.
- interpret an exponential function rule in order to sketch or predict the shape of its graph and the pattern of change in tables of values.
- describe major similarities and differences between linear and exponential patterns of change.
- develop skill in rewriting exponential and radical expressions in equivalent forms.

What Solutions are Available?

Lesson 1: Investigation 1—Applications Task 2 (p. 307), Connections Task 18 (p. 313)
Investigation 2—Applications Task 6 (p. 309), Connections Task 20 (p. 314)
Investigation 3—Applications Task 8 (p. 309), Extensions Task 32 (p. 318)
Investigation 4—Applications Task 10 (p. 310), Applications Task 11 (p. 311), Review Task 42 (p. 321)
Investigation 5—Applications Task 13 (p. 311), Applications Task 14 (p. 312), Applications Task 15 (p. 312)

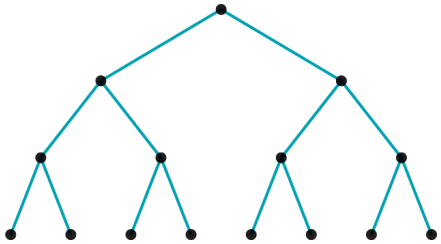
Lesson 2: Investigation 1—Applications Task 1 (p. 338)
Investigation 2—Applications Task 6 (p. 340), Connections Task 20 (p. 345), Review Task 40 (p. 352)
Investigation 4—Applications Task 12 (p. 343), Applications Task 13 (p. 343), Applications Task 16 (p. 344), Connections Task 22 (p. 346), Review Task 45 (p. 354)
Investigation 5—Applications Task 17 (p. 344), Extensions Task 35 (p. 351)

Selected Homework Tasks and Expected Solutions

(These solutions are for tasks in the CCSS Edition book.
For homework tasks in books with earlier copyright dates, see Helping with Homework.)

Lesson 1, Investigation 1, Applications Task 2 (p. 307)

a. The vertices in the graph at the right represent the families placing/receiving calls, and the edges represent the phone calls.



b. Students should fill in the missing table entries.

Stage of Texting Tree	1	2	3	4	5	6	7	8	9	10
Number of Texts Made	2					64				1,024

c. To be completed by the student.

Hint: Rules should be in the forms:

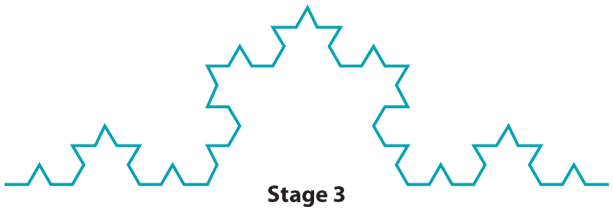
- $NEXT = b \cdot NOW$, starting at ____
- $y = b^x$

d. To be completed by the student.

Hint: This question is *not* asking when the number of calls at a stage reaches 1,000.

Lesson 1, Investigation 1, Connections Task 18 (p. 313)

a.



There is one vertical line of symmetry through the center of the whole figure.

Hint: To make the sketch of Stage 3, it may help to think of it this way: Look at each segment of Stage 2 and put a "hat" ∧ on it.

b. To be completed by the student.

c. *Hint:* Rules should be in the form $NEXT = b \bullet NOW$, starting at ____.

d. *Hint:* Rules should be in the form $y = b^x$.

e. To be completed by the student. Students do *not* need to write out a table for the 15 stages but should include a graph.

Lesson 1, Investigation 2, Applications Task 6 (p. 309)

a. The first entry in the table should be as shown. The rest of the table is to be completed by the student.

10-min Periods	0	1	2	3	4	5	6
Bacteria Count	50						

b. To be completed by the student.

c. 13,107,200 bacteria

Lesson 1, Investigation 2, Connections Task 20 (p. 314)

a. To be completed by the student.

b. Using the texting tree idea, it would take fewer than 6 full stages of the tree, or less than 6 minutes: $2 + 4 + 8 + 16 + 32 + 64 = 126$.

Lesson 1, Investigation 3, Applications Task 8 (p. 309)

a. Student should fill in the missing table entries.

Years After 2009	0	1	2	3	4	5	6	7	8	9	10
AIDS Cases (in millions)				41.9	45.3				61.6		

b, d. To be completed by the student.

c. The model estimates that about 114.1 million people will be living with HIV/AIDS in the year 2025.

Lesson 1, Investigation 3, Extensions Task 32 (p. 318)

a. With quarterly compounding of 1%, after 5 years the account will have a value of $1,220.19.

Hint: This can be found by using the function $y = 1{,}000(1.01^x)$, where x is the number of times compounded. In this situation, $x = 20$ because you are compounding quarterly for 5 years. Alternatively, you could look at the table or use the graph.

b–c. To be completed by the student.

Lesson 1, Investigation 4, Applications Task 10 (p. 310)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 5 Exponential Functions> Dow Jones Averages. Students may wish to print their display.

a. To be completed by the student.

Hint: After you make a scatterplot of the data, you can find both linear and exponential functions under the Models menu. The equations of the models can be found under the Options menu by selecting Show Equation(s).

b–c. To be completed by the student.

Lesson 1, Investigation 4, Applications Task 11 (p. 311)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 5 Exponential Functions> Voters in U.S. Elections. Students may wish to print their display.

Lesson 1, Investigation 4, Review Task 42 (p. 321)

a. 16 **b.** 16 **c.** 20 **d.** 72

e–i. To be completed by the student.

Lesson 1, Investigation 5, Applications Task 13 (p. 311)

a, c–d, f. To be completed by the student.

b. $y = 10$

e. Any combination of w and x adding to 6

Lesson 1, Investigation 5, Applications Task 14 (p. 312)

a. 7^{13}

b–e, g–h. To be completed by the student.

f. $7a^3b^5m^7$

Lesson 1, Investigation 5, Applications Task 15 (p. 312)

a. $z = 10$

b. $x = 4.5$

c. $x = 4$

d–h. To be completed by the student.

Lesson 2, Investigation 1, Applications Task 1 (p. 338)

a. Student should fill in the missing table entries and make a scatterplot.

x	0	1	2	3	4	5
y	10	5				$\frac{5}{16}$

b. The fourth bounce will be less than 1 foot (seen in the table). This is the plot point that rises to a y-coordinate less than 1.

c. $NEXT = \frac{1}{2} NOW$, starting at 10; $y = 10\left(\frac{1}{2}\right)^x$, where x is the number of bounces.

d–e. To be completed by the student.

Lesson 2, Investigation 2, Applications Task 6 (p. 340)

a. The distributive property guarantees the identity:

$$\begin{aligned} x - 20\%x &= x - 0.2x \\ &= (1 - 0.2)x \\ &= 0.8x \\ &= 80\%x \end{aligned}$$

You can calculate depreciated values by calculating 80% of the value of the truck, or by calculating 20% of the truck value and subtracting that amount from the truck value.

b. To be completed by the student.

Hint: There are two correct forms of the *NOW-NEXT* rule. The "$y = \ldots$" should be in the form $y = ab^x$, where x is the number of years after purchase.

c. To be completed by the student.

The student should include a picture of the graph in their answer with appropriate labels. The answer to the question can be estimated using the trace function on their calculator or, alternatively, they can graph their "$y = \ldots$" equation from Part b along with the equation $y = 1{,}000$ and find the intersection of these two functions.

d. To be completed by the student.

Lesson 2, Investigation 2, Connections Task 20 (p. 345)

a. Exponential decay function

b, d, f–i, k–l. To be completed by the student.

c. Exponential growth function

e. Neither linear nor exponential function

j. Increasing linear function

Lesson 2, Investigation 2, Review Task 40 (p. 352)

a. **i.** The slope for the linear function displayed graphically (3) is larger than that of the linear function in the table (2).

ii. The y-intercepts are the same for both functions, $(0, -3)$.

b. To be completed by the student.

Lesson 2, Investigation 4, Applications Task 12 (p. 343)

a. $x = \frac{125}{64}$

b–d. To be completed by the student.

Lesson 2, Investigation 4, Applications Task 13 (p. 343)

a. $\frac{16x^2}{n^2}$

b–c. To be completed by the student.

Lesson 2, Investigation 4, Applications Task 16 (p. 344)

a. $4.5^{-2} = ((4.5)^{-1})^2 = \left(\frac{1}{4.5}\right)^2 = \frac{1^2}{4.5^2} = \frac{1}{4.5^2}$

b–h. To be completed by the student.

Lesson 2, Investigation 4, Connections Task 22 (p. 346)

a. **i.** 2.346×10^8

b. **i.** 2.34×10^{-2}

c. **i.** 782,000,000

All other parts to be completed by the student.

Lesson 2, Investigation 4, Review Task 45 (p. 354)

a. $y = -0.5x + 2$

b. $y = \frac{15}{4}x + 5$

c–d. To be completed by the student.

Lesson 2, Investigation 5, Applications Task 17 (p. 344)

a. 7

b–d, f–h. To be completed by the student.

e. 12

Lesson 2, Investigation 5, Extensions Task 35 (p. 351)

a. $b^{\frac{1}{4}}$ is the number multiplied by itself 4 times that results in b. Another way to say this is that $b^{\frac{1}{4}}$ is the number that when it is raised to the fourth power is b, or the fourth root of b; $\left(b^{\frac{1}{4}}\right)^4 = b$.

b. To be completed by the student.

