Examples of Tasks from
CCSS Edition Course 1, Unit 3

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 3

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

- recognize patterns in tables of sample values, in problem conditions, and in data plots that can be described by linear functions.

- write linear function rules to describe linear, or approximately linear, patterns in graphs or numerical data.

- use table, graph, or symbolic representations of linear functions to answer questions about the situations they represent: (1) calculate y for a given x (i.e., evaluate functions); (2) find x for a given y (i.e., solve equations and inequalities); and (3) describe the rate at which y changes as x changes (i.e., determine slope).

- rewrite linear expressions in equivalent forms.

What Solutions are Available?

Lesson 1: Investigation 1—Applications Task 1 (p. 168), Review Task 38 (p. 184)
Investigation 2—Applications Task 8 (p. 171), Applications Task 9 (p. 171), Connections Task 16 (p. 175)
Investigation 3—Applications Task 10 (p. 171), Applications Task 12 (p. 173), Applications Task 13 (p. 174), Connections Task 19 (p. 176), Extensions Task 34 (p. 182), Extensions Task 35 (p. 183)

Lesson 2: Investigation 1—Applications Task 1 (p. 224), Reflections Task 14 (p. 228)
Investigation 2—Applications Task 6 (p. 225)
Investigation 3—Connections Task 15 (p. 205), Connections Task 18 (p. 206), Reflections Task 23 (p. 208), Review Task 38 (p. 212)
Investigation 4—Applications Task 10 (p. 204), Extensions Task 30 (p. 210)

Lesson 3: Investigation 1—Applications Task 1 (p. 224), Reflections Task 14 (p. 228), Review Task 27 (p. 230)
Investigation 2—Applications Task 6 (p. 225), Review Task 30 (p. 231)

Technology

Many data sets used in this unit are available in *CPMP-Tools*. This public domain software can be downloaded from www.wmich.edu/cpmp/CPMP-Tools/ or on ConnectED. Alternatively, students can enter the data into a graphing calculator with statistics capabilities for analysis purposes.

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 1 (p. 168)

a. **i.** In the rule $C = 150 + 2n$, the 150 tells us that the fixed cost of recording the show is $150, and the 2 tells us that reproduction of individual copies of the DVD will cost $2 apiece.

  ii. The rule says that the ordered pair (0, 150) will appear in the table and that as n increases in steps of 1, the values of *C* will increase in steps of 2.

  iii. The graph will be a line with *y*-intercept (0, 150) and slope 2.

  iv. The *NOW-NEXT* rule describing the pattern of change in total cost will be *NEXT = NOW + 2*, starting at 150.

b–c. To be completed by the student.

Lesson 1, Investigation 1, Review Task 38 (p. 184)

a. $x = \frac{1}{3}$

b. $x = \frac{3}{4}$

c. $x = 3$

d–f. To be completed by the student.

Lesson 1, Investigation 2, Applications Task 8 (p. 171)

a. The constant term tells that (0, –4) appears in the table and that the *y*-intercept is (0, –4). The coefficient of *x* tells that the table *y* values increase by 2 for each increase of 1 in *x* and that the slope of the graph is 2.

b–d. To be completed by the student.

Lesson 1, Investigation 2, Applications Task 9 (p. 171)

a–b, d. To be completed by the student.

c. $y = x + 1$

There are multiple ways to get the rule. One could purely use algebra or use a plot of the points to aid in finding the slope and *y*-intercept.

Lesson 1, Investigation 2, Connections Task 16 (p. 175)

Only solutions for Graph I are listed here. The others are to be completed by the student.

a. The rate of change for Graph I is 2.

b. The *NOW-NEXT* rule for Graph I is *NEXT = NOW* + 2, starting at 0.

c. The function rule for Graph I is $y = 2x$.

d. The rate of increase/decrease is the number added/subtracted from *NOW* in the *NOW-NEXT* rule. In this case, that number is 2 and is the coefficient of the term in the "$y = \ldots$" rule. The start value in the *NOW-NEXT* rule is 0 and is the constant term in the "$y = \ldots$" rule.

Lesson 1, Investigation 3, Applications Task 10 (p. 171)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Riverdale Adventure Club. You can then use the software to plot the data and find a linear model asked for in Task 10 Part a. Alternatively, you can use your graphing calculator and enter the data in lists, produce a scatterplot, and find a model using **linreg**.

Lesson 1, Investigation 3, Applications Task 12 (p. 173)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Selected Fast Food.

Lesson 1, Investigation 3, Applications Task 13 (p. 174)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Median Income.

Lesson 1, Investigation 3, Connections Task 19 (p. 176)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Taking Chances.
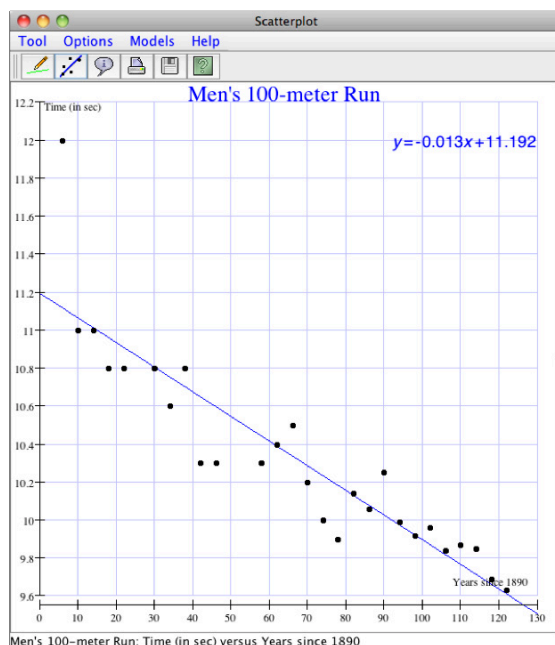
Lesson 1, Investigation 3, Extensions Task 34 (p. 182)

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Men's 100-meter Run. They can also be called up directly by launching the "Modeling Line" custom tool under the Statistics menu.

a. World War I accounts for the 1916 gap, while World War II accounts for the 1940 and 1944 gaps.

b. The data are approximately linear, particularly if you ignore the first data point.

CPMP-Tools Display

Men's 100–meter Run: Time (in sec) versus Years since 1890

c. $y = 11.192 - 0.013x$, where x is the number of years after 1890. This model is used for the remainder of the task.

d–f. To be completed by the student.

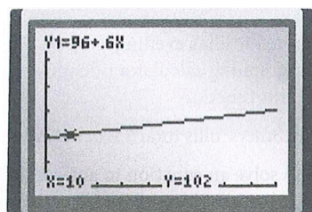**Lesson 1, Investigation 3, Extensions Task 35 (p. 183)**

These data are located in *CPMP-Tools* under Statistics, Data Analysis, Data>Unit 3 Linear Functions> Women's 100-meter Run. They can also be called up directly by launching the "Modeling Line" custom tool under the Statistics menu.

Lesson 2, Investigation 1, Applications Task 1 (p. 201)

a. Rachel weighed 96 ounces at birth.

b.

c. Students should use their tables or graphs to find the solutions below.

    i. $y = 102$. When Rachel is 10 days old, she will weigh 102 ounces.

   ii–iv. To be completed by the student.

Lesson 2, Investigation 2, Applications Task 5 (p. 202)

Unless specified, some students may solve algebraically and others using technology. Multiple approaches promote access for all students.

a. $g = 8$. Victoria can only miss 8 games if she wants to earn \$306.

b–f. To be completed by the student.

Lesson 2, Investigation 3, Connections Task 15 (p. 205)

a. If $3x + 12 = 45$, then $3x = 45 - 12$, or 33. If we suppose $a = 3x$, $b = 12$, and $c = 45$, then this matches the addition … subtraction property.

If $3x = 33$, then $x = 33 \div 3$, or 11. If we suppose $a = x$, $b = 3$, and $c = 33$, then this matches the multiplication … division property.

b. To be completed by the student.

Lesson 2, Investigation 3, Connections Task 18 (p. 206)

These data are located in CPMP-Tools under Statistics, Data Analysis, Data>Unit 3 Linear Functions> 100-meter Freestyle.

Lesson 2, Investigation 3, Reflections Task 23 (p. 208)

a. Four possible (and reasonable, or productive) first steps:

(1) subtracting 8 from both sides, $2x > 5x - 12$;

(2) adding 4 to both sides, $2x + 12 > 5x$;

(3) subtracting $2x$ from both sides, $8 > 3x - 4$;

(4) subtracting $5x$ from both sides, $-3x + 8 > -4$.

b. The solution tells the x values where the graph of $y = 2x + 8$ is above the graph of $y = 5x - 4$. (The solution is $x < 4$.)

c. The solution tells the x values that will have y values for $y = 2x + 8$ that are greater than the y values for $y = 5x - 4$. ($x < 4$.)

Lesson 2, Investigation 3, Review Task 38 (p. 212)

List of two-digit numbers: 33, 34, 35, 43, 44, 45, 53, 54, 55

a–d. To be completed by the student.

Lesson 2, Investigation 4, Applications Task 10 (p. 204)

a. $y = 3.95 + 0.03x$, where x is the number of minutes used in a day and y is the total daily charge.

b. The two service charges begin at the same base price, so both graphs have the same y-intercept. Since the original charge per minute was greater than the new, the graph of the original pricing plan is steeper.

c. The cost of 30 minutes of online gaming access the new plan is $4.85.

   Hint: $4.85 can be found using the table, graph, or rule.

d–e. To be completed by the student.

Lesson 2, Investigation 4, Extensions Task 30 (p. 210)

a. They will cross at or before $(20, 4)$, since Digital Domain charges $4 for 20 minutes of online gaming use in a day.

b. $2.95 + p(20) = 4$; $p = 0.0525$. Around $0.05 per minute will meet the condition.

c–d. To be completed by the student.

Lesson 3, Investigation 1, Applications Task 1 (p. 224)

a. $C = 2.5n + 2,500$, where n represents the number of posters printed and C represents the cost.
$I = 7.95n$, where n represents the number of posters printed and I represents the income.
$P = 5.45n – 2,500$, where n represents the number of posters printed and P represents the profit.

b. $7.95n – (2.5n + 2,500)$ and $7.95n – 2.5n – 2,500$
To justify equivalence, students should note that table entries or graphs for their two expressions entered as functions are the same. Students might also verify equivalence using algebraic reasoning.

Lesson 3, Investigation 1, Reflections Task 14 (p. 228)

a. Students might explain equivalence by comparing graphs, tables, or algebraic thinking.

b. One possible response: The best expression showing all the conditions is the first one, $35.50N – 4.75N – 5,000,000$, because it shows each condition separately—sale price, production cost, and fixed development cost.

Lesson 3, Investigation 1, Review Task 27 (p. 230)

a. $x = –8$

b. $x = 8$

c–d. To be completed by the student.

Lesson 3, Investigation 2, Applications Task 6 (p. 225)

a. $11x + 5$

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

c. $4 + 16x$

e. $2x – 8$

Lesson 3, Investigation 2, Review Task 30 (p. 231)

Students should explain why the following answers are correct.

a. True   **b.** False   **c.** True   **d.** False