Examples of Tasks from
CCSS Edition Course 2, Unit 1

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 1

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

- review familiar families of single variable functions (especially linear, exponential, and quadratic functions).
- recognize direct and inverse variation functions with one or more independent variables, express those relationships in symbolic form, and manipulate those expressions into equivalent useful forms.
- recognize and represent graphically and symbolically relationships in which one variable is a linear function of two independent variables and to graph solutions of equations in the form "$ax + by = c$."
- set up and solve systems involving two linear equations with two variables by use of graphing, substitution, and elimination methods. Recognize whether systems have 0, 1, or 2 solutions by inspecting the equations.

What Solutions are Available?

Lesson 1: Investigation 1—Applications Task 1 (p. 16), Applications Task 3 (p. 17), Connections Task 8 (p. 19), Connections Task 10 (p. 20), Review Task 22 (p. 24), Review Task 24 (p. 24), Review Task 25 (p. 24)
Investigation 2—Applications Task 5 (p. 18), Applications Task 6 (p. 18), Connections Task 12 (p. 21), Review Task 27 (p. 24)

Lesson 2: Investigation 1—Applications Task 1 (p. 34), Applications Task 2 (p. 34), Review Task 32 (p. 47), Review Task 33 (p. 47)
Investigation 2—Applications Task 10 (p. 38), Connections Task 13 (p. 39), Connections Task 15 (p. 40), Extensions Task 27 (p. 45), Review Task 36 (p. 48)

Lesson 3: Investigation 1—Applications Task 2 (p. 61), Review Task 27 (p. 68)
Investigation 2—Applications Task 4 (p. 62), Review Task 29 (p. 68)
Investigation 3—Connections Task 15 (p. 64), Reflections Task 20 (p. 66)

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. 16)

These tasks give the students opportunities to practice their understanding of direct and inverse variation. Direct variation must be in the form $y = k \cdot x$ and inverse variation must be in the form $y = k/x$. Selected answers are given to help see the correct form. Not all of the equations are in the correct form initially, but if they can be manipulated to be in that form, they are still a direct or inverse variation.

a. This is an example of a direct variation since it is of the form $y = k \cdot x$. Wages earned are directly proportional to the number of hours worked with constant of proportionality 7.5, or wages varies directly with the hours worked.

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

f. This is an example of an inverse variation since it is of the form $y = \frac{k}{x}$ because average speed is equal to distance divided by time. Average speed s is inversely proportional to time t with constant of proportionality 26; $s = \frac{26}{t}$. Another way to express it is average speed s varies inversely with time t.

g. By multiplying both sides of the equation by the variable s, $\frac{d}{s} = \sqrt{2}$ transforms into $d = \sqrt{2}\,s$, so it is a direct variation. The length of the diagonal d of a square is directly proportional to the length of a side s with constant of proportionality $\sqrt{2}$.

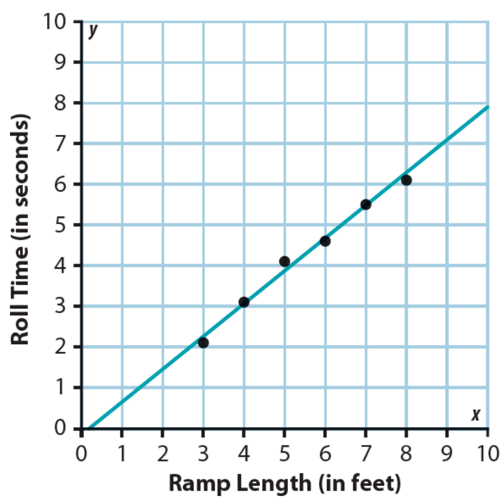
Lesson 1, Investigation 1, Applications Task 3 (p. 17)

a. One form is $T = \frac{400}{s}$. The second equivalent form is to be completed by the student.

b–c. To be completed by the student.

Lesson 1, Investigation 1, Connections Task 8 (p. 19)

a. **Plot for Ramp Height 0.5 Feet**



b. The approximating line shown in the preceding diagram has rule $y = 0.8x - 0.1$. The coefficient of x tells that for every increase of one foot in ramp length, the roll time should increase about 0.8 seconds. The –0.1 constant term suggests that a ramp of length 0 will require –0.1 seconds to roll. This obviously makes little sense physically. However, since the constant term is really quite small, the model is not far off what is theoretically reasonable.

c. The rule in Part b is the linear regression equation (with numbers rounded to nearest tenth). To three decimals, it is $y = 0.791x - 0.103$.

d. To be completed by the student.

Lesson 1, Investigation 1, Connections Task 10 (p. 20)

a. Since the ramp is the hypotenuse of a right triangle, students should consider using the Pythagorean Theorem to find the missing side length. Let a represent the platform height, c represent the ramp length, and b represent the distance from the base to the end of the ramp. Use the equation $a^2 + b^2 = c^2$, so for the first entry in the table $1^2 + b^2 = 8^2$, so $b^2 = 63$ and $b = \sqrt{63}$.
$slope = \frac{rise}{run} = \frac{1}{\sqrt{63}}$

b. To be completed by the student.

Lesson 1, Investigation 1, Review Task 22 (p. 24)

a. $x = 7$

b. $x = 10$

c–f. To be completed by the student.

Lesson 1, Investigation 1, Review Task 24 (p. 24)

a. $y = 3x$

b–c. To be completed by the student.

Lesson 1, Investigation 1, Review Task 25 (p. 24)

a. $y = 4x^{-1}$

b. $y = -7x^{0.5}$

c–f. To be completed by the student.

Lesson 1, Investigation 2, Applications Task 5 (p. 18)

a. *Surface area of a cube* is directly proportional to (or varies directly with) the *square of each edge length* with constant of proportionality *6*.

b, c, e–f. To be completed by the student.

d. *Diameter of a circular tree* is directly proportional to (or varies directly with) the *circumference* with constant of proportionality $\frac{1}{\pi}$.

Lesson 1, Investigation 2, Applications Task 6 (p. 18)

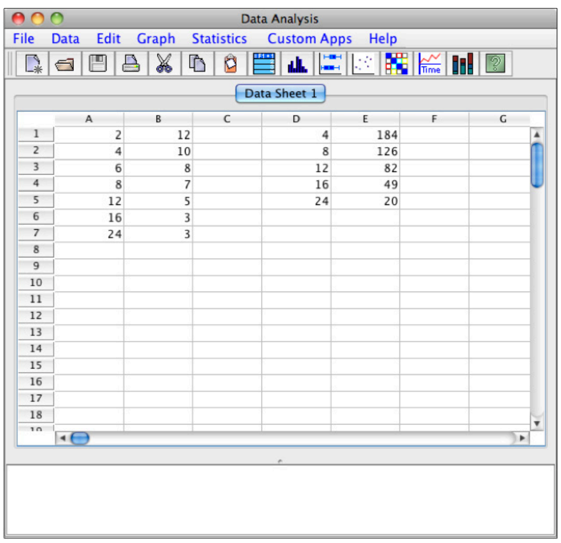
The intensity of light I is measured in lumens per square foot. So, the function would look like $I = (\textit{number of lumens})/(\textit{area})$.

a. $I = \dfrac{250}{0.1x^2}$

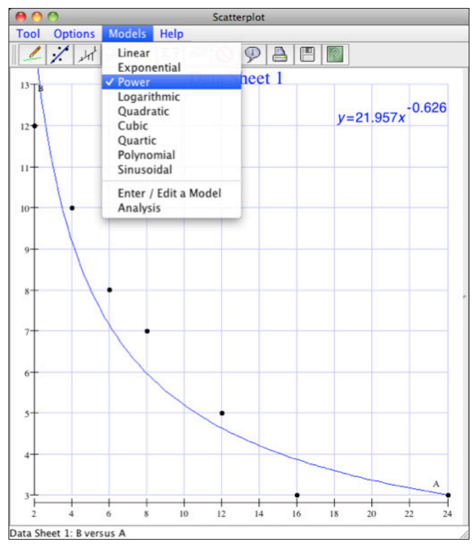
b. To be completed by the student.

Lesson 1, Investigation 2, Connections Task 12 (p. 21)

TECHNOLOGY NOTE Students will need to use a technology tool that calculates regression equations. The data for this task can be entered in *CPMP-Tools* under Statistics, Data Analysis, as seen here. This software is available at www.wmich.edu/cpmp/CPMP-Tools/. Whatever tool students use, they must be careful to correctly interpret the table in the student text. The table in the student book is formatted differently than most tables students have analyzed. The independent variable is in row 1 of the table. The (*distance*, *TV front EMF measurements*) and (*distance*, *TV back EMF measurements*) are shown in the data sheet below. The power regression for TV front EMF measurements is found by making a scatterplot; press . Then select Models > Power. The output is shown at the right below.



	A	B	C	D	E
1	2	12		4	184
2	4	10		8	126
3	6	8		12	82
4	8	7		16	49
5	12	5		24	20
6	16	3			
7	24	3			



a–c. To be completed by the student.

Lesson 1, Investigation 2, Review Task 27 (p. 24)

a. 157.1 ft

b. 7,068.6 ft^2

c. 39,269.9 ft^3

d. 294,524.3 gallons

Lesson 2, Investigation 1, Applications Task 1 (p. 34)

INSTRUCTIONAL NOTE The concept of expressing a relationship in the language of direct and inverse variation is a crucial concept for students to master, especially when more than one variable influences another. Help your student formulate sentences like "Current is directly proportional to voltage and inversely proportional to resistance."

a. Earned wages *E* varies directly with hours worked *h* and pay rate *r*.

b–d. To be completed by the student.

Lesson 2, Investigation 1, Applications Task 2 (p. 34)

a. As speed increases, one would probably expect the rate of fatalities to also increase. The greater the mass of the passenger's vehicle, one might expect a lesser rate of fatalities. (Some students may express this relationship as $F = \frac{s}{m}$.)

b–c. To be completed by the student.

Lesson 2, Investigation 1, Review Task 32 (p. 47)

a–b. To be completed by the student.

c. $x = 5.2$

Lesson 2, Investigation 1, Review Task 33 (p. 47)

a. $y = 1.4x - 4$

b. To be completed by the student.

Lesson 2, Investigation 2, Applications Task 10 (p. 38)

a. To be completed by the student.

b. $y = -4 + \frac{8}{5}x$; slope of $\frac{8}{5}$, y-intercept of $(0, -4)$

c. To be completed by the student.

Lesson 2, Investigation 2, Connections Task 13 (p. 39)

a. $d = \frac{C}{\pi}$

i. $d = \frac{200}{\pi} \approx 63.7$ feet

ii. $d = \frac{50}{\pi} \approx 15.9$ feet

b–d. To be completed by the student.

Lesson 2, Investigation 2, Connections Task 15 (p. 40)

a. Fill in the missing table entries.

$z = 2x + 3y$

y \ x	0	1	2	3
0				
1	3		7	
2				12
3		11		

$z = 5x - 4y$

y \ x	0	1	2	3
0		5		
1				11
2			2	
3	−12			

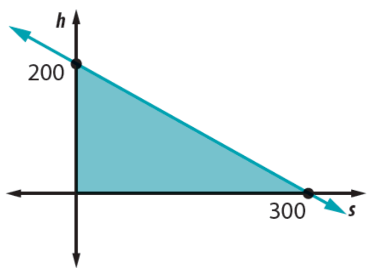
b–e. To be completed by the student.

Lesson 2, Investigation 2, Extensions Task 27 (p. 45)

a. **i.** $20L + 10C \geq 2{,}000$

ii. Shade the appropriate region.

b. $8s + 12h \leq 2{,}400$



c. To be completed by the student.

Lesson 2, Investigation 2, Review Task 36 (p. 48)

a. $2\sqrt{5}$

b. $4\sqrt{3}$

c. $6\sqrt{2}$ or $3\sqrt{8}$ or $2\sqrt{18}$

d–f. To be completed by the student.

Lesson 3, Investigation 1, Applications Task 2 (p. 61)

Two of these systems should be solved algebraically. Students should use the substitution method. Students' notes for Problems 3–6 on page 52 should be helpful. The instructions say to use the graphing method to solve one system. It makes sense to use this method on Part c because the equations are in the "$y = \ldots$" form which makes them easy to graph. You could find the intersection point of the two lines using graph paper or using features of technology such as tracing to estimate the coordinates of the intersection point or using an intersect command.

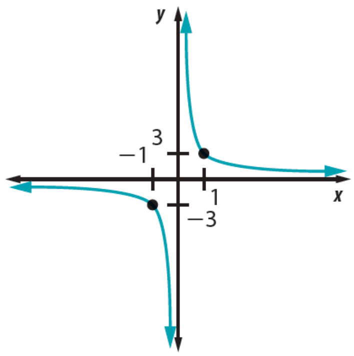
Lesson 3, Investigation 2, Applications Task 4 (p. 62)

a. $200x + 180y = 950$

b–c. To be completed by the student.

Lesson 3, Investigation 2, Review Task 29 (p. 68)

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



b–c. To be completed by the student.

Lesson 3, Investigation 3, Connections Task 15 (p. 64)

a. Solve $x^2 + 5x + 6 = 0$ for x. From this equation, we see that $a = 1$, $b = 5$, and $c = 6$.

So, $\frac{-b}{2a} = -2.5$.

$$\frac{\sqrt{b^2 - 4ac}}{2a} = \frac{1}{2}$$

So, the solutions are $-2.5 + 0.5 = -2$ or $-2.5 - 0.5 = -3$.

b–c. To be completed by the student.

Lesson 3, Investigation 3, Reflections Task 20 (p. 66)

a. The coefficients of x and y in the second equation are not common multiples of the corresponding coefficients in the first equation.

If the coefficients of x and y in the first equation are multiples of the corresponding coefficients in the second equation and the equations are not multiples of each other, then the lines are different but parallel indicating no solution to the system. If the two equations are multiples of each other, they would be the same line, meaning the solution set would have infinitely many solutions.

b. Substitution might be chosen since the bottom equation could quickly be written as $y = 6x - 160$. Elimination is an option since only one equation needs to be multiplied by a factor to allow the combination to result in an equation with one variable.

