

Examples of Tasks from CCSS Edition Course 2, Unit 6

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 [Discrete Mathematics](#) page might help you follow the conceptual development of the ideas you see in these examples.

Main Mathematical Goals for Unit 6

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

- understand and apply minimum spanning trees, Hamilton circuits, the Traveling Salesperson Problem, and critical paths (including ideas from the Critical Path Method, CPM, which is also called the Program Evaluation and Review Technique, PERT). (comprender y aplicar los mínimos a los árboles de expansión, los circuitos de Hamilton, el problema del vendedor que viaja, y caminos críticos (incluyendo las ideas del Método de la Ruta Crítica, MRC, que también se llama el Programa de Evaluación y Revisión Técnica, PERT).)
- further develop skill in mathematical modeling and solving problems with vertex-edge graphs. (continuar desarrollando la habilidad de modelar matemáticamente y resolver problemas con gráficas de orilla de vértice.)
- further develop skill in algorithmic problem-solving by designing, using, and analyzing systematic procedures for solving problems involving vertex-edge graphs. (continuar desarrollando la habilidad de resolver problemas algorítmicos por diseñando, usando y analizando procedimientos sistemáticos para resolver problemas con gráficas de orilla de vértice.)
- further develop the ability to recognize, formulate, and solve optimization problems, particularly network optimization problems. (continuar la habilidad de reconocer, formular y resolver problemas de optimización, en particular los problemas de optimización de la red.)

What Solutions are Available?

Lesson 1: Investigation 1—Applications Task 2 (p. 418), Applications Task 3 (p. 419)
Investigation 2—Applications Task 6 (p. 421), Connections Task 12 (p. 425),
Extensions Task 22 (p. 430)
Investigation 3—Applications Task 7 (p. 422), Review Task 31 (p. 433)

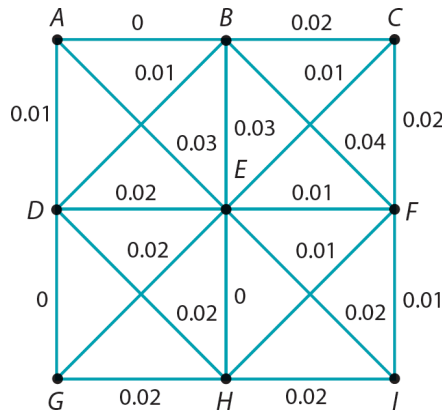
Lesson 2: Investigation 1—Connections Task 10 (p. 447), Connections Task 11 (p. 447),
Review Task 24 (p. 451)
Investigation 2—Applications Task 1 (p. 443), Applications Task 8 (p. 446),
Extensions Task 21 (p. 451), Review Task 25 (p. 452)

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. 418)

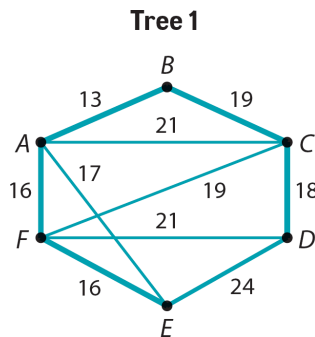
- a. The graph for the grid on the left is shown below. Both graphs are available in *CPMP-Tools* under Discrete Math, *Vertex-Edge Graph* software under the Sample Graphs menu. (El gráfico para la red a la izquierda se muestra a continuación. Ambos gráficos están disponibles en *CPMP-Tools* debajo de “Discrete Math, *Vertex-Edge Graph* software” en el menú de “Sample Graphs”.)



- b–d. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 1, Investigation 1, Applications Task 3 (p. 419)

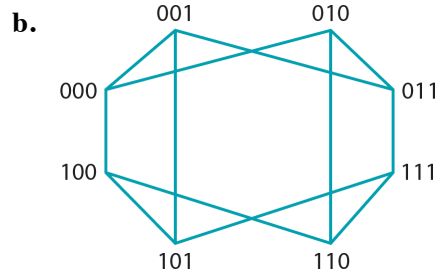
- a. There are two minimum spanning trees. Both trees have a total length (weight) of 82 miles. One such tree is shown below. (Hay dos árboles de expansión mínima. Ambos árboles tienen una longitud total (peso) de 82 millas. Uno de estos árboles se muestra a continuación.)



- b–e. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 1, Investigation 2, Applications Task 6 (p. 421)

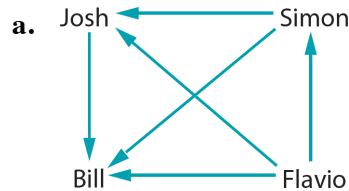
- a. There are four possible strings of length two, all of which are included in the list. The other two properties can be verified by inspection. (Hay cuatro posibles cadenas de longitud dos, los cuales están incluidos en la lista. Las otras dos propiedades pueden ser verificadas por la inspección.)



- c. One possible Hamilton circuit is 000, 001, 011, 111, 101, 100, 110, 010. (Un circuito posible de Hamilton es 000, 001, 011, 111, 101, 100, 110, 010.)

d–f. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 1, Investigation 2, Connections Task 12 (p. 425)



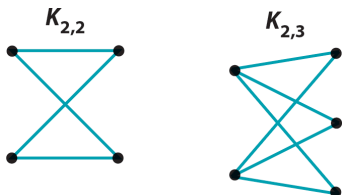
- b. The only Hamilton path is $F-S-J-B$. (El único camino de Hamilton es $F-S-J-B$.)

c, d. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 1, Investigation 2, Extensions Task 22 (p. 430)

- a. To be completed by the student. (Para ser completado por el estudiante.)

- b. The graphs $K_{2,2}$ and $K_{2,3}$ are shown below. (Los gráficos $K_{2,2}$ y $K_{2,3}$ se muestran abajo.)



Lesson 1, Investigation 3, Applications Task 7 (p. 422)

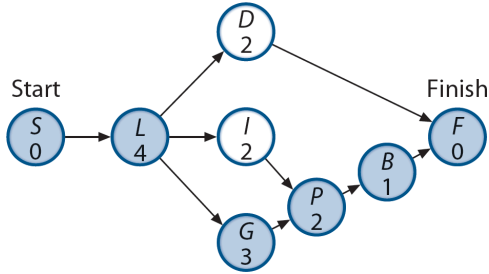
- a. The total network calling cost is \$17.65. (El costo total del sistema de llamadas es \$17.65.)

b. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 2, Investigation 2, Applications Task 1 (p. 443)

- a. Tasks D , I , and G can be worked on at the same time as can D and P or D and B . (Se puede hacer las tareas D , I , y G al mismo tiempo que D y P o D y B .)

b.



- c–e. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 2, Investigation 2, Applications Task 8 (p. 446)

- a. The EFT is 17 days. (El EFT son 17 días.)
- b. There are two critical paths. That is, there are two paths from S to F that have the maximum length of 17 days. (Hay dos caminos críticos. Es decir, hay dos caminos de S a F que tienen la longitud máxima de 17 días.)
- c. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 2, Investigation 2, Extensions Task 21 (p. 451)

Students should be encouraged to carefully describe their method for determining the EFT. Devising and describing step-by-step solution procedures or algorithms is an important part of solving many types of problems in mathematics—particularly in discrete mathematics. Sometimes this process of solving problems is called *algorithmic problem solving*. It is an important theme that should be highlighted throughout the curriculum. (Los estudiantes deben ser animados a describir con cuidado su método de determinar el EFT. Concibiendo y describiendo procedimientos de la solución o algoritmos paso a paso es una parte importante de resolver muchos tipos de problemas en las matemáticas—particularmente en las matemáticas discreto. A veces este proceso de resolver problemas se llama *algorithmic problem solving*. Es un tema importante que debe ser destacado a través del currículo.)

- a. i. A : 3 units of time (unidades de tiempo)
 ii. C : 12 units of time (unidades de tiempo)
 iii. To be completed by the student. (Para ser completado por el estudiante.)
- b–d. To be completed by the student. (Para ser completado por el estudiante.)

Lesson 2, Investigation 2, Review Task 25 (p. 452)

- a. $x = 52^\circ$; $y = 76^\circ$
- b. $x = \sqrt{72} = 6\sqrt{2}$; $y = 45^\circ$
- c. $x = 4$; $y = \sqrt{84} = 2\sqrt{21}$
- d. To be completed by the student. (Para ser completado por el estudiante.)