

# MATH

## Can Take You Places

## LESSON 21

### “A Scheduling Dilemma”

by Rhonda Bailey

**CONCEPT AREA** Problem Solving

**GRADE LEVEL** 4-6

**TIME ALLOTMENT** 60 minutes

**LESSON OVERVIEW** Students will investigate a real-life problem situation involving an Amtrak Train.

**LESSON ACTIVITIES OVERVIEW** Groups of students will work together on a train-scheduling problem in which the Amtrak Train agent has only 3 seats available to sell, but has 4 passengers who need reservations to 4 different destinations. The students will use the Amtrak Route Map, Seat Map and Train Schedule to come up with a solution that will allow all 4 passengers to get to their destinations.

**LEARNING OBJECTIVES** Students will be able to:

- Use the four-step problem-solving model to solve a real-life application problem
- Use an appropriate problem-solving strategy to solve the problem
- Write a solution to the problem situation, justifying why their solution is reasonable

Students must use correct labels and units throughout the problem-solving process, which includes the solution.

**STANDARDS (TEKS)** From the Texas Essential Knowledge and Skills for Math for grades 4-6:

Grade 4

4.1A, B, C, D

Grade 5

5.1A, B, C, D

Grade 6

6.11A, B, C, D

**MEDIA COMPONENTS** Video: *Math Can Take You Places #004 “Problem Solving”*  
Internet:

For Amtrak scheduling information: <http://www.amtrak.com/>

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- MATERIALS**
- Amtrak Seat Map (optional)
  - Amtrak Route Map (optional)
  - Amtrak Train schedule
  - Color tiles to represent the 4 passengers
  - “A Scheduling Dilemma” student activity sheet system

- PREP FOR TEACHERS**
- Arrange students in groups of 3 or 4 and distribute sets of materials to each group.
  - Each student should have his or her own activity sheet.

**Note:**

If your class includes students who are acquiring English as a second language (ESL), you may also need to brainstorm problem-solving strategies or offer a list of possible strategies for students to refer to while completing the activities.

**INTRODUCTORY  
ACTIVITY: SETTING  
THE STAGE**

1. Discuss with students how it might be possible to sell two train tickets for the same seat on a train.
2. Ask students to look at the Amtrak Route Map and Train schedule. Ask students to discuss how they might use the Route Map and Train schedule when planning to ride the train.
3. Make sure that students understand they must use the four-step problem-solving process. It may be necessary to review this process.
  - a. Understanding the problem
  - b. Making a plan
  - c. Carrying out the plan
  - d. Evaluating the solution for reasonableness

**LEARNING  
ACTIVITIES**

Students will work with their group to complete the “Scheduling Dilemma” activity sheet.

**CULMINATING  
ACTIVITY**

1. Students will present their scheduling solution to the class.
2. Student groups must show evidence of the problem-solving process in finding their solutions.

**CROSS-  
CURRICULAR  
EXTENSIONS**

Social Studies

Have students plan a train trip using the Amtrak Route Map. Students will compile a journal about the interesting places they visited during their train trip. Let students use the Internet to find photographs of the places they visited and incorporate the photos into their stories.

English Language Arts

Have students write a narrative describing a trip they would like to take on the Amtrak train, detailing why they have selected the particular train route and describing some of the destinations they will visit along the way.

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**REAL-WORLD CONNECTIONS** Students can investigate other situations that might involve scheduling dilemmas, such as scheduling employees to work in a store that is open from 9 a.m. to 9 p.m.

Have students talk about situations where putting objects in a specific order would be important (locker combinations or class schedules) versus situations where the specific order does not matter (putting coins into a vending machine).

**ASSESSMENT** Students will complete an individual assessment and show evidence of proficiency using the following criteria:

1. Students use the four-step problem-solving model to solve an application problem.
2. Students use an appropriate problem-solving strategy to solve the problem.
3. Students write a solution to the problem situation, which includes the correct use of labels and units, justifying why their solutions are reasonable.

**STUDENT HANDOUTS** “A Scheduling Dilemma” student activity sheet  
Wrap-Up Question

**“A Scheduling Dilemma”**  
**Activity Sheet**

Schedule for Amtrak Train 2158		
Departure Time	Train Station Abbreviations	Departure City
9:00 AM	WAS	WASHINGTON, DISTRICT OF COLUMBIA
9:35 AM	BAL	BALTIMORE (PENN STATION), MARYLAND
10:17 AM	WIL	WILMINGTON, DELAWARE
10:38 AM	PHL	PHILADELPHIA (30TH ST), PENNSYLVANIA
11:31 AM	NWK	NEWARK (PENN STATION), NEW JERSEY
12:03 PM	NYP	NEW YORK (PENN STATION), NEW YORK
2:54 PM	PVD	PROVIDENCE, RHODE ISLAND
3:18 PM	RTE	ROUTE 128, WESTWOOD, MASSACHUSETTS
3:27 PM	BBY	BOSTON (BACK BAY), MASSACHUSETTS
3:33 PM	BOS	BOSTON (SOUTH STATION), MASSACHUSETTS

Train 2158 is completely full, except for three seats. There is a large group traveling from Washington, DC to Boston (South Station), Massachusetts.

The seats that are still available are: 2A, 4B, 5D.

The following passengers want to travel:

Passenger Number	From	To
1	WAS Washington, DC	NWK Newark (Penn Station), NJ
2	PHL Philadelphia (30 <sup>th</sup> St.), PA	PVD Providence, RI
3	NYP New York (Penn Station), NY	BOS Boston (South Station), MA
4	BAL Baltimore (Penn Station), MD	BBY Boston (Back Bay), MA

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You must determine the best seat assignment for the next four passengers that call for reservations. Work with your group to solve this scheduling dilemma. Use the problem-solving process to find your solution.

- Understanding the problem
- Creating a plan
- Solving the problem
- Checking the reasonableness of your solution

## Wrap Up Questions

1. How did your group determine which information was important to solve this problem? Was there any information that you decided was not important?
2. Describe an alternate problem-solving strategy that your group could have used to solve this problem.
3. Is there more than one solution to this problem? How do you know?
4. Describe how the problem would change if 5 passengers had to share 4 seats.

### Página de Actividad

Horario para el Tren Amtrak 2158		
Hora de Salida	Abreviaciones de las Estaciones de Tren	Ciudad de Salida
9:00AM	WAS	WASHINGTON, DISTRITO OF COLUMBIA
9:35AM	BAL	BALTIMORE (ESTACIÓN PENN), MARYLAND
10:17AM	WIL	WILMINGTON, DELAWARE
10:38AM	PHL	PHILADELPHIA (CALLE 30), PENNSYLVANIA
11:31AM	NWK	NEWARK (ESTACIÓN PENN), NEW JERSEY
12:03PM	NYP	NEW YORK (ESTACIÓN PENN), NEW YORK
2:54PM	PVD	PROVIDENCE, RHODE ISLAND
3:18PM	RTE	RUTA 128, WESTWOOD, MASSACHUSETTS
3:27PM	BBY	BOSTON (BACK BAY), MASSACHUSETTS
3:33PM	BOS	BOSTON ((ESTACIÓN SUR), MASSACHUSETTS

El tren 2158 está completamente lleno, excepto por tres asientos. Hay un grupo grande que viaja desde Washington, DC a Boston (Estación Sur), Massachusetts.

Los asientos que están disponibles son: 2A , 4B , 5D.

Los siguientes pasajeros quieren viajar:

Número del Pasajero	Desde	A
1	WAS Washington, DC	NWK, Newark (Estación Penn) , NJ
2	PHL Philadelphia (Calle 30), PA	PVD Providence, RI
3	NYP New York (Estación Penn), NY	BOS, Boston (Estación Sur), MA
4	BAL Baltimore (Estación Penn), MD	BBY Boston (Back Bay), MA

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### Te Lleva a Muchos Lugares

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### “Un Dilema del Horario”

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Debes decidir y asignar los mejores asientos a los cuatro pasajeros siguientes que llamen por reservaciones. Trabaja con tu grupo para resolver este dilema del horario. Para encontrar la solución, usa el proceso para resolver problemas.

- Entender el problema
- Crear un plan
- Solucionar el problema
- Revisar para ver si la solución es razonable



### Preguntas para Resumir

1. ¿Cómo decidió tu grupo cuál era la información importante para resolver el problema? ¿Hubo alguna información que ustedes decidieron que no era importante?
2. Describe si hubo una segunda estrategia de solución del problema que tu grupo podría haber usado para resolver este problema.
3. ¿Hay más de una solución a este problema? ¿Cómo lo sabes?
4. Describe cómo el problema cambiaría si cinco pasajeros tuvieran que compartir 4 asientos.