

# Bastien and Bastienne

## WOLFGANG AMADEUS MOZART



## MATH: Mozart's Travels

### Students will

- Identify and locate cities to which Mozart traveled on a map of Europe.
- Solve rate, time, and distance problems using various means of travel from Mozart's time to the present.
- Plot points, corresponding to cities in Europe, on an x-y coordinate plane.

**Copies for Each Student:** Activity Worksheets: "Cities on a Map", "X-Y Coordinate Plan", "Mozart's Road Trips", "On Your Own", and Map of Europe

**Copies for the Teacher:** Activity Worksheets, Answer Keys

**Instructional Time:** Approximately two 45 minute class periods.

### Getting Ready

Pass out Activity Worksheets to students.

Gather calculators (if allowed) and pencils for worksheets.

This lesson includes brief stories of Mozart's life. Mozart's full biography can be found in the Language Arts and Social Studies lessons within the Classroom Materials pages:

<http://dallasopera.org/learn/teachers/materials/>

### Introduction

Mozart was a musical prodigy, which means he showed tremendous talent for reading, playing, and composing music at a very young age. When Mozart was only six years old, his father took him and his sister, also a child musician, on a tour of major European cities. The tour lasted longer than three years. Throughout his life, Mozart traveled around Europe. He travelled from his birthplace in Salzburg to Vienna, Paris, London, Milan, Prague, and other cities. He lived the last decade of his life in Vienna.

Travel in Mozart's time was typically by horse-drawn carriage. The roads were rough, and the carriages were slow. It took Mozart six days to travel by carriage from Vienna to Frankfurt, a distance of 715 kilometers, or about 444 miles. Mozart could only travel during daylight hours. Depending on the weather and the driver, a carriage could travel 60-75 miles a day. About 7 miles per hour was the typical speed of a carriage. The trips could be very uncomfortable. Once about a trip to Paris, Mozart's Mother wrote: "We were nearly choked by the wind and drowned by the rain, so that we both got soaking wet in the carriage and could scarcely breathe." Travelers were even attacked by bandits at times.

### Guided/Independent Practice

**Cities on a Map:** Ask Students to circle or highlight the following cities on the Map of Europe Worksheet: Salzburg, Vienna, Paris, London, Milan, Prague, and Berlin. Then using the letter and number guides on the

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margins, have students locate each city with two coordinates. Make sure students place the horizontal identifier first in each pair of coordinates. Rome, for example, is located in square M-10. Students should write their answers on the Cities on a Map Worksheet.

**Rate, Time and Distance:** Introduce the topic by asking about students' vacations: *"Has anyone ever traveled to San Antonio?"* Change the destination until a couple of students have been there. Then lead the conversation to cover what kind of transportation was used: *"Did you drive, take a bus, or go on an airplane?"* Going by bus would be most similar to the way Mozart traveled, because carriages, like buses, made frequent stops.

After establishing a common means of transportation, lead the discussion to *"Let's talk about a trip by car. Do your parents drive fast or slow on the highway?"* [Answers will vary. The idea is just to get students remembering the long drives.] *"If your parents drive the speed limit, how fast would they be driving?"* [70 mph] *"Suppose we were taking a trip to San Antonio to see the Alamo and enjoy the Riverwalk. We could drive that fast, but what if we stop for gas or a flat tire or to eat lunch? What if the highway patrol stops us for speeding? Would that slow us down, make our trip longer?"* [Answers will vary, but you might hear some funny stories about travel delays.] *"Because we can't go super-fast the whole way to San Antonio, let's use 55 miles per hour as our average speed. Now, San Antonio is about 280 miles away from Dallas. How long will it take us to get there?"* [If your students aren't familiar with the basic equation, let them struggle with this for a minute. Write on the board whatever formulas or strategies that students suggest. Now is the time to introduce the basic equation: **rate x time = distance.**

**Solving Problems:** The problems on the accompanying Rate, Time, and Distance are in two formats. The first set, on the "Mozart's Road Trips" Worksheet, is guided practice and includes biographical details of Mozart's life as part of the problem set-up. These problems are open-ended and are meant to be solved as a group with the instructor leading the discussion, so that students learn the basic solution strategies. Take some time with this. The things kids will remember from the Mozart notes (*"She got her head cut off? Gross!"* *"Mozart wrote an opera when he was our age?"*) may help them remember the math lesson. The second set of problems, on the "On Your Own Worksheet", is independent practice. These problems have multiple choice answers and are meant to be solved by students working independently. Combine the two exercises for assessment purposes: the guided practice for participation, and the independent practice for mastery.

**From Map to Grid:** Introduce students to the x-y coordinate plane, perhaps as follows: *"Mathematicians often use a diagram called a grid, which is like a map. Many different kinds of information can be shown on a grid. You may have seen a business's profits shown on a grid like this"* (show students an example). *A grid that has been divided into four parts by a horizontal number line and a vertical number line is sometimes called an x-y coordinate plane. A plane is any flat, or 2-dimensional, surface. The labels x and y refer to the horizontal line (the x-axis) and the vertical line (the y-axis). The location of any point in the grid, or plane, can be identified by a pair of numbers called the coordinates of the point. The point where the x-axis crosses the y-axis is called the origin, and its coordinates are (0,0)."*

On the map of Europe, we identified the location of each city with a letter (from the horizontal scale) and a number (from the vertical scale). For example, Rome is located in area M-10 of the map. When we locate points on a grid, we also use a horizontal scale (x-axis) and a vertical scale (y-axis). In the *ordered pair* of coordinates, the x number is written first; the y number is written second. For example, the location of Munich on the X-Y Coordinate Plane should be identified as (18,10). The first number tells the horizontal distance from the *origin* (the center point). The second number tells the vertical distance from the origin.

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Elementary students usually have not been introduced to negative numbers. For this exercise, only the first quadrant (where  $x$  and  $y$  are both positive) is used. Have the students write the coordinates for all the cities shown beside the city name on the X-Y Coordinate Plane Worksheet.

## Evaluation

1. "Cities on a Map"
  - a. For the exercise in which students circle or highlight various cities on the map of Europe, using a conventional 50-100 point scale, grade student maps with the percentage of cities identified correctly.
  - b. For the exercise in which students identify the map coordinates of various cities on the Cities on a Map, using a conventional 50-100 point scale, grade student maps with the percentage of cities identified correctly.
2. Solving Problems: "Mozart's Road Trips" and "On Your Own"
  - a. The problems on "Mozart's Road Trips" are to be worked as a group with the instructor leading the class through them. Students are sure to get the correct answer, but evaluate the process: Did the student fill in the charts properly? Did the student participate in the discussion (e.g., read aloud, make comments, and ask questions)?
  - b. The problems on "On Your Own" are to be worked on by students individually with minimal or no help from the instructor.
  - c. Evaluate these exercises together, 12 problems, using a conventional 50-100 point scale with the percentage of correct answers.
3. From Map to Grid

For the exercise, in which students identify the  $x$ - $y$  coordinates of various cities on the X-Y Coordinate Plane, using a conventional 50-100 point scale, grade student maps with the percentage of cities identified correctly.

## TEKS

### Math

#### 3<sup>rd</sup> Grade

##### 111.5 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

##### 111.5 b. 4 A,B Number and operations

The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve problems with efficiency and accuracy. The student is expected to: (A) solve with fluency one-step and two-step problems involving addition and subtraction within 1,000 using strategies based on place value, properties of operations, and the relationship between addition and subtraction; (B) round to the nearest 10 or 100 or use compatible numbers to estimate solutions to addition and subtraction problems;

#### 4<sup>th</sup> Grade

##### 111.6 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

##### 111.6 b. 4 H Number and operations

The student applies mathematical process standards to develop and use strategies and methods for whole number computations in order to solve problems with efficiency and accuracy. The student is expected to: (H) solve with fluency one- and two-step problems involving multiplication and division, including interpreting remainders.

##### 111.6 b. 8 A,C Geometry and measurement

The student applies mathematical process standards to select appropriate customary and metric units, strategies, and tools to solve problems involving measurement. The student is expected to: (A) identify relative sizes of

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measurement units within the customary and metric systems; (C) solve problems that deal with measurements of length, intervals of time, liquid volumes, mass, and money using addition, subtraction, multiplication, or division as appropriate.

### 5<sup>th</sup> Grade

#### 111.7 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

#### 111.7 b. 2 C Number and operations.

The student applies mathematical process standards to represent, compare, and order positive rational numbers and understand relationships as related to place value. The student is expected to: (C) round decimals to tenths or hundredths.

#### 111.7 b. 3 A Number and operations.

The student applies mathematical process standards to develop and use strategies and methods for positive rational number computations in order to solve problems with efficiency and accuracy. The student is expected to: (A) estimate to determine solutions to mathematical and real-world problems involving addition, subtraction, multiplication, or division;

#### 111.7 b 8 A,B,C Geometry and measurement.

The student applies mathematical process standards to identify locations on a coordinate plane. The student is expected to: (A) describe the key attributes of the coordinate plane, including perpendicular number lines (axes) where the intersection (origin) of the two lines coincides with zero on each number line and the given point (O, O); the x-coordinate, the first number in an ordered pair, indicates movement parallel to the x-axis starting at the origin; and the y-coordinate, the second number, indicates movement parallel to the y-axis starting at the origin; (B) describe the process for graphing ordered pairs of numbers in the first quadrant of the coordinate plane; and (C) graph in the first quadrant of the coordinate plane ordered pairs of numbers arising from mathematical and real-world problems, including those generated by number patterns or found in an input-output table

### 6<sup>th</sup> Grade

#### 111.26 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

#### 111.26 b. 3 D,E Number and operations

The student applies mathematical process standards to represent addition, subtraction, multiplication, and division while solving problems and justifying solutions. The student is expected to: (D) add, subtract, multiply, and divide integers fluently; and (E) multiply and divide positive rational numbers fluently.

### 7<sup>th</sup> Grade

#### 111.27 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

#### 111.27 b. 3 A,B Number and operations.

The student applies mathematical process standards to add, subtract, multiply, and divide while solving problems and justifying solutions. The student is expected to: (A) add, subtract, multiply, and divide rational numbers fluently; and (B) apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers.

#### 111.27 b. 4 A Proportionality.

The student applies mathematical process standards to represent and solve problems involving proportional relationships. The student is expected to: (A) represent constant rates of change in mathematical and real-world problems given pictorial, tabular, verbal, numeric, graphical, and algebraic representations, including  $d=rt$ ;

### 8<sup>th</sup> Grade

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111.28 b. 1 A Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to: (A) apply mathematics to problems arising in everyday life, society, and the workplace;

111.28 b. 4 B Proportionality.

The student applies mathematical process standards to explain proportional and non-proportional relationships involving slope. The student is expected to: (B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship; and

**Correlates:** Language Arts

**Gardner's Intelligences:** Verbal-Linguistic, Logical/Mathematical

**Blooms Taxonomy:** Apply, Analyze, Evaluate, Create

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Warrack, John and West, Ewan, *The Oxford Dictionary of Opera*, Oxford University Press, 1992.

**Online Resources:**

Boener, Steve. "Chronology." The Mozart Project: The life, times, and music of Wolfgang Amadeus Mozart. 2011.

<http://www.mozartproject.org/compositions/index.html>.

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Name: \_\_\_\_\_ Date: \_\_\_\_\_

*Bastien and Bastienne*

**Cities on a Map**

Write the map coordinates for each city, as shown.

*Example: Amsterdam (J, 4)*

1. Salzburg ( \_\_, \_\_ )

2. Munich ( \_\_, \_\_ )

3. Vienna ( \_\_, \_\_ )

4. London ( \_\_, \_\_ )

5. Paris ( \_\_, \_\_ )

6. Milan ( \_\_, \_\_ )

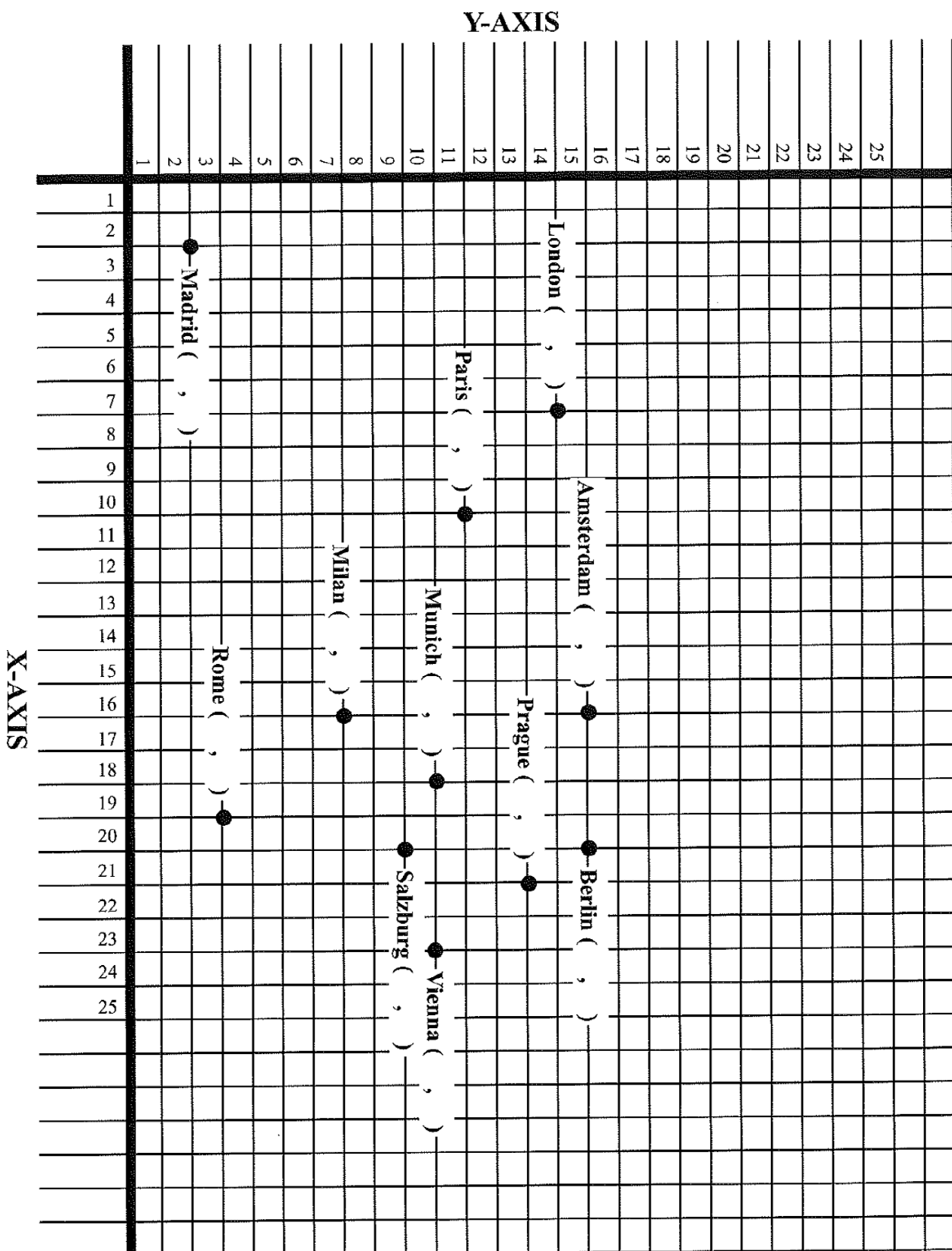
7. Prague ( \_\_, \_\_ )

8. Berlin ( \_\_, \_\_ )

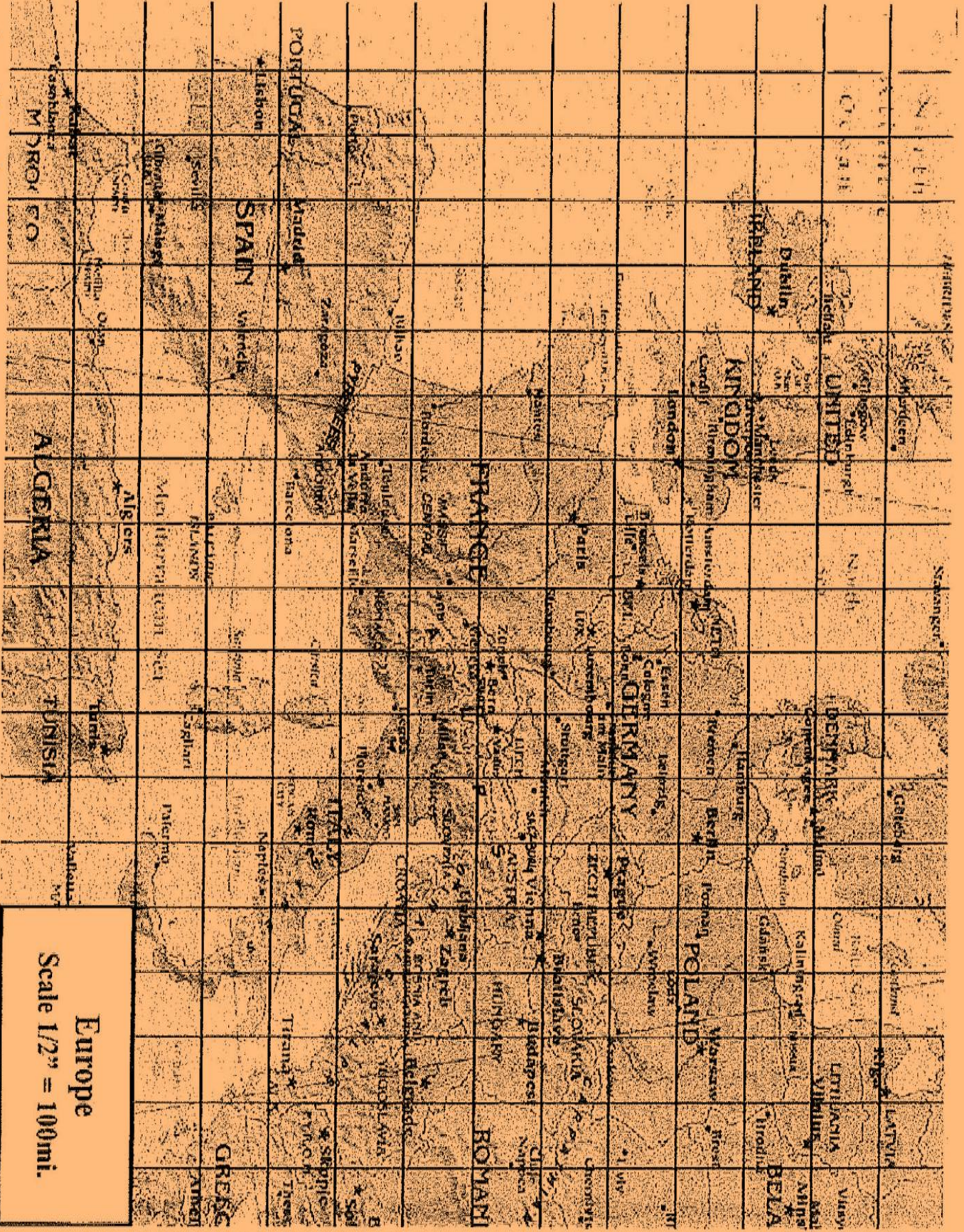
9. Rome ( \_\_, \_\_ )

10. Madrid ( \_\_, \_\_ )

# X-Y Coordinate Plane



A B C D E F G H I J K L M N O P Q R S



14 13 12 11 10 9 8 7 6 5 4 3 2 1



## *Bastien and Bastienne*

# Mozart's Road Trips: Rate, Time and Distance

The problems in this lesson all involve **rate**, **time**, and **distance**. The **rate** is how fast you go. The **time** is how long the trip takes. The **distance** is how far you travel. The basic equation used to solve road trip problems is:

**rate x time = distance**

When you work on these problems, use the chart to help you set up your solution strategy. Keep some scratch paper handy, or write on the back if you need more space.

1. Mozart was born in Salzburg. He learned to play the piano and violin by the age of six. His father claimed that little Wolfgang composed a concerto at the age of four! One of the first journeys he made was to Vienna, which was then the capitol of the Holy Roman Empire (present day Germany and Austria). The trip was part of a longer tour with his father and sister. Mozart met Empress Maria Theresa and the royal family. He asked one of the Empress's daughters to marry him, but she turned him down. The little girl's name was Marie Antoinette. (A future queen of France, she was beheaded during the French Revolution.)

Mozart and his family left Salzburg in a horse drawn carriage. The carriage could move at a speed of about 7 miles per hour. Over a period of three days, Mozart traveled in the carriage for 26 hours before he reached Vienna. How far did he travel?

Rate	Time	Distance

To solve this problem, remember **rate x time = distance**. Start by filling in what you know about the situation in the chart above. Do you know the rate (speed of travel)? If so, fill it in. Do you know the time (how long the journey took)? If so, fill it in. Do you know the distance? No, in this problem, you have to figure out the distance. Now multiply to find your answer.

2. If you drove from Salzburg to Vienna today, you could probably travel 60 miles per hour. About how

long would it take you to drive from Salzburg to Vienna?

Rate	Time	Distance

To solve this problem, start by filling in what you know about the situation. Do you know the rate? If so fill it in the chart above. Do you know the time? No in this problem, you have to figure out the time. Do you know the distance? Yes, you do, from working problem #1.

When you know the rate and the distance, how to you find the time? Remember **rate x time = distance**. Therefore, **distance / rate = time** ("the distance divided by the rate equals the time"). Divide to find your answer.

3. On that first tour as a child, in 1764-65, Mozart also traveled to Paris and then from Paris to London. In London, where the Mozarts stayed for fifteen months, he performed for King George III. This was the king that the American colonists rebelled against in the American Revolution; he was also insane. While Mozart was in London, a scientific study was made of his musical ability - to make sure Mozart's talent was the real thing and not just a parlor trick. The Roayl Society (a scientific group) published the study, which declared that nine-year-old Wolfgang had "almost supernatural talents."

Mozart left Paris on April 10, 1764, travelling by carriage, as usual, then by boat across the English Channel, then by carriage again to London. He arrived two-weeks later. The distance from Paris to London, by a good land and sea route today, is about 250 miles. About how many miles per day did Mozart travel?

Rate	Time	Distance

The rate in this problem is not in miles per hour, but **miles per day**. Start by filling what you already know about the situation. Do you know the rate, time or the distance? Fill in those numbers.

Solution strategy: If you know the **rate and time**, solve for the **distance** by multiplying. If you know the **distance and rate** solve for the **time** by dividing. If you know the **distance and time** solve for the **rate** by dividing. **HINT:** The **time** in this problem is “two-weeks”. How many **days** are in two weeks?

4. If you want to travel from Paris to London today, you can fly on Air France airlines. The flight takes about 1 hour and 15 minutes (1. hours or 1.25 hours). The direct, straight-line distance for this flight is about 190 miles. How fast does the airplane move?

Rate	Time	Distance

Do you know the rate, time or the distance? Fill in this numbers.

Solution strategy: If you know the **rate and time**, solve for the **distance** by multiplying. If you know the **distance and rate** solve for the **time** by dividing. If you know the **distance and time** solve for the **rate** by dividing.

5. Mozart traveled to Italy in 1770, again by carriage. In Milan, he was asked to compose an opera. Wolfgang was only fourteen years old, but he wrote an opera called *Mithradates, King of Pontus*. Mozart wrote the music to a script, or libretto, based on a play by the famous French dramatist, Jean Racine. The opera is set in the years of ancient Rome, 63 BCE. Mithradates has to fight the Romans to save his kingdom. Mithradates also has to fight his own son, who has fallen in love with his third bride-to-be, Aspasia. (Operas, as you will see in *Don Giovanni*, are full of passionate struggles!) Because Mozart was so young, many people thought his opera would be a flop. But *Mithradates* was a big hit, even though it was over six hour long! Mozart stayed in Italy for about two years, learning many different musical styles. Later in his life, he wrote his greatest operas in the Italian style he had learned in Milan.

Mozart’s trip from Salzburg to Milan, a distance of about 340 miles, took 5 days. How many miles per day did his carriage travel?

Rate	Time	Distance

The rate in this problem is not in **miles per hour**, but **miles per day**. Start by filling what you already know about the situation. Do you know the rate, time or the distance? Fill in those numbers.

Solution strategy: If you know the **rate and time**, solve for the **distance** by multiplying. If you know the **distance and rate** solve for the **time** by dividing. If you know the **distance and time** solve for the **rate** by dividing.

6. You can travel today from Salzburg to Milan by bus. Including all the stops, the trip takes about 13 hours. If the bus travels at 26 miles per hour, how far is the road trip today from Salzburg to Milan? (A European bus can, of course, travel much faster, but remember the stops slow down the average speed.)

Rate	Time	Distance

Start by filling what you already know about the situation. Do you know the rate, time or the distance? Fill in those numbers.

Solution strategy: If you know the **rate and time**, solve for the **distance** by multiplying. If you know the **distance and rate** solve for the **time** by dividing. If you know the **distance and time** solve for the **rate** by dividing.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Bastien and Bastienne

### On Your Own: Rate, Time and Distance Problems

The problems in this lesson all involve rate, time, and distance. The rate is how fast you go. The time is how long the trip takes. The distance is how far you travel. The basic equation used to solve road trip problems is:

$$\text{rate} \times \text{time} = \text{distance}$$

When you work on these problems, use the chart to help you set up your solution strategy. Keep some scratch paper handy, or write on the back if you need more space.

Circle the best answer to each problem.

1. On a trip from Dallas to San Antonio, Mario and his family drove for 4 hours. His father is a good driver, and he was able to drive the speed limit the whole way without stopping. The speed limit is 70 miles per hour. About how many miles did Mario's family drive?

- a. 350 miles
- b. 17 miles
- c. 280 miles
- d. 28.0 miles

Rate	Time	Distance

2. Melinda and her mother were driving from Dallas to Chicago, Illinois, to visit Melinda's aunt. On the first day they drove from Dallas to Oklahoma City, a distance of about 204 miles. When they stopped for the night, they had been driving for 4 hours. How fast did they drive?

- a. 51 miles per hour
- b. 15 miles per hour
- c. 60 miles per hour
- d. 50.4 miles per hour

Rate	Time	Distance

3. On the second day of their trip, Melinda and her mother drove from Oklahoma City to Kansas City. They drove about 4 hours at 55 miles per hour, stopped for lunch for 1 hour, and then drove 65 miles per hour for the last 132 miles into Kansas City. Altogether how long did it take them to go from Oklahoma City to Kansas City?

- a. About 5 hours
- b. About 12 hours
- c. About 7 hours
- d. About 11.5 hours

Rate	Time	Distance

Mozart left Paris on April 10, 1764, travelling by carriage, as usual, then by boat across the English Channel, then by carriage again to London. He arrived two-weeks later. The distance from Paris to London, by a good land and sea route today, is about 250 miles. About how many miles per day did Mozart travel?

Rate	Time	Distance

4. On the third day of their trip, leaving Kansas City, Melinda's mother said, "Let's drive all the way to Chicago today. We can take sandwiches in the car and only stop to get gas and use the restroom. The speed limit is 70 miles per hour. If we can keep our speed at least 60 miles per hour, we can probably get to Aunt Rose's by suppertime. That's if we drive straight through for almost 8 hours and 15 minutes." Which expression shows the best estimate of the distance,  $d$ , from Kansas City to Chicago?

- a.  $d = 70 \times 8.15$
- b.  $d = 60 \times 8.25$
- c.  $8.25 \times d = 60$
- d.  $8.15 \times d = 70$

Rate	Time	Distance

5. David and Tyrell have been friends since they were little kids. David lives in Dallas, and Tyrell lives in Atlanta, Georgia. The boys are now 18 years old. They have had their driver's licenses for a year, and both have good driving records. Their parents rewarded them with a road trip to New Orleans for Mardi Gras Festival. David leaves home at 6 a.m., driving 50 miles per hour in his truck to New Orleans, which is 507 miles from Dallas. Tyrell leaves home at 8 a.m., driving 55 miles per hour in his car to New Orleans, which is 488 miles from Atlanta. Which one will arrive first to New Orleans, and that is the best estimate of the time he will arrive?

- a. Tyrell will arrive first, at about 4 p.m.
- b. David will arrive first, at about 4 p.m.
- c. Tyrell will arrive first, at about 5 p.m.
- d. David will arrive first, at about 5 p.m.

Rate	Time	Distance

6. Alice traveled by air from Dallas to Washington, D.C. The Flight she took left Dallas at 7 a.m. She arrived in Washington 2 hour and 45 minutes later (2.75 hours). The speed of the plane was about 434 miles per hour. What is the best estimate of the number of miles she traveled?

- a. 1913 miles
- b. 1063 miles
- c. 1085 miles
- d. 1193 miles

Rate	Time	Distance

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## ANSWER KEY

### Cities on a Map

1. Salzburg (20, 9)
2. Munich (18, 10)
3. Vienna (23, 10)
4. London (7, 14)
5. Paris (10, 11)
6. Milan (16, 7)
7. Prague (21, 13)
8. Berlin (20, 15)
9. Rome (19, 3)
10. Madrid (2, 2)

## ANSWER KEY

### Mozart's Road Trips: Rate, Time and Distance

- |                    |              |                  |
|--------------------|--------------|------------------|
| 1. Rate: 7 mph     | Time: 26 h   | Distance: 182 mi |
| 2. Rate: 60 mph    | Time: 3.03 h | Distance: 182 mi |
| 3. Rate: 17.85 mpd | Time: 14 d   | Distance: 250 mi |
| 4. Rate: 15 2mph   | Time: 1.25 h | Distance: 190 mi |
| 5. Rate: 68 mpd    | Time: 5 d    | Distance: 340 mi |
| 6. Rate: 26 mph    | Time: 13 h   | Distance: 338 mi |

## ANSWER KEY

### On Your Own: Rate, Time and Distance Problems

- |  |                                 |                                  |                                     |
|--|---------------------------------|----------------------------------|-------------------------------------|
| 1. C, 280 mi                                   | Rate: 70 mph                    | Time: 4 h                        | Distance: 280 mi                    |
| 2. A, 51 mph                                   | Rate: 51 mph                    | Time: 4 h                        | Distance: 204 mi                    |
| 3. C, About 7 hrs ( $2.03h + 4h + 1h$ )        | Rate: 65 mph                    | Time: 2.03 h                     | Distance: 132 mi                    |
| 4. B, $d = 60\text{mph} \times 8.25\text{h}$   | Rate: 60 mph                    | Time: 8.25 h                     | Distance: $d$                       |
| 5. B, David will arrive first, at about 4 p.m. | Rate:<br>D: 50 mph<br>T: 55 mph | Time:<br>D: 10.14 h<br>T: 8.87 h | Distance:<br>D: 507 mi<br>T: 488 mi |
| 6. D, 1193 mi                                  | Rate: 434 mph                   | Time: 2.75 h                     | Distance: 1193.5 mi                 |