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THE GREAT EQUATION RACE

A Journey Around the World Combining Teamwork, Problem Solving, and Algebra

The Great Equation Race

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About the author

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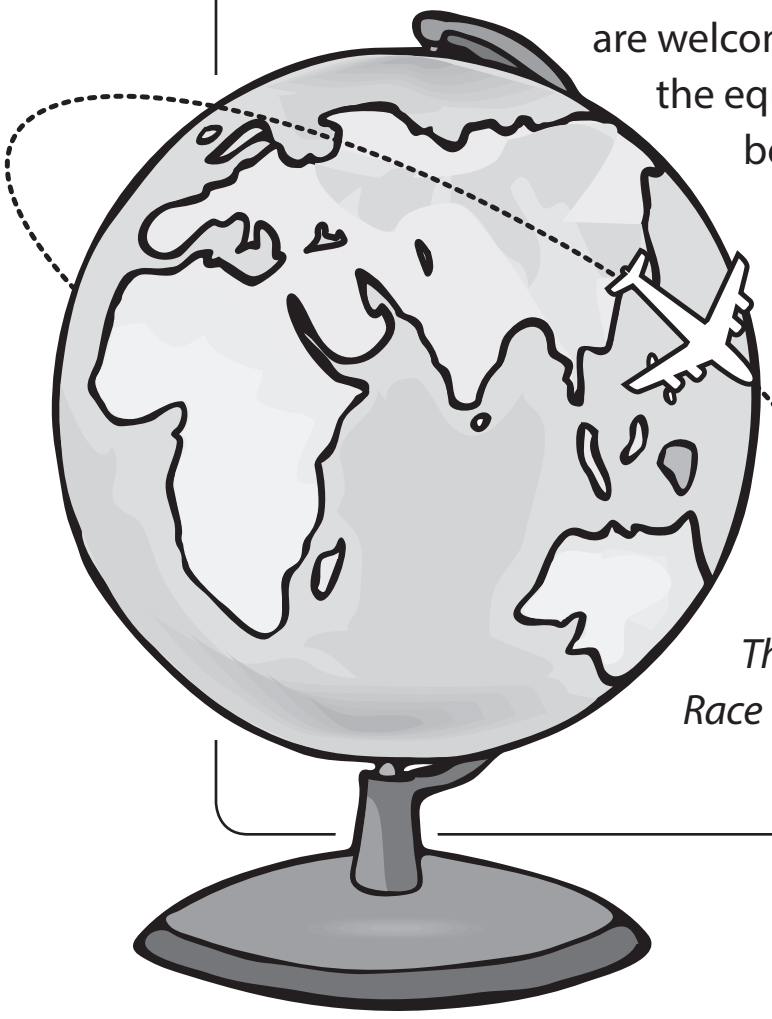
10200 Jefferson Blvd • P.O. Box 802 Culver City, CA 90232
Phone: (800) 421-4246 • www.teachinteract.com
ISBN# 978-1-56004-369-0

Welcome to *The Great Equation Race*!

The Great Equation Race is a fun, interactive unit that will motivate middle school students to solve equations as they travel in a race around the world. During this interdisciplinary five day unit students will solve equations, earn mileage, measure and track their course on a map, and research facts about different cities around the world all in a quest for the finish line. All learning levels are welcome in this race as the equations used can be differentiated to challenge each student. Teachers will love watching all students achieve success. Get ready because *The Great Equation Race* is about to begin!



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Reproducibles

Purpose and Overview

Welcome to *The Great Equation Race*!

The Great Equation Race is an interactive mathematics unit for students in grades 5–9 who have had instruction and practice solving linear equations. In the unit, teams of students are given the challenge of completing a journey to five different cities around the world. The teams are faced with a daily challenge: each student must solve his/her own equations on problem cards in order to earn a plane ticket. These plane tickets enable the students to travel to their Destination City and each day move one step closer to completing the race. As they travel, students must keep track of the cities and countries they visit, chart the mileage they have traveled using a map and scale, research facts about each destination, and mark the path of their journey on a team map. This is a race in which all can participate and have their achievements recognized. At the finish line, students receive a travel postcard, which they can decorate to create a bulletin board commemorating their race.

Because of the wide age range of students who can participate in this simulation, the unit has been created with three different levels of equations. Level One comprises one-step problems without negative numbers. This level is perfect for students who are new to equations or face learning challenges. Level Two focuses on one-step equations with negative numbers and provides teachers with a smooth transition from Level One. Level Three is for more advanced students, or students in higher grades. These problems are multi-step equations with negative numbers incorporated into them. There are also Challenge Cards to provide advanced/more-experienced students with additional challenges. *The Great Equation Race* is not designed to teach the steps necessary in solving linear equations, but was created to reinforce the skills already taught. In the unit, students are given many different opportunities to demonstrate their proficiency in solving both simple and complex equations.

What Do Students Learn?

The Great Equation Race was designed to incorporate standards from the National Council of Teachers of Mathematics. In today's mathematics classroom, students are encouraged to express their thinking and knowledge through problem solving and verbal expression. Our students must be able to demonstrate what they have learned and apply this knowledge in daily work, both independently and collectively with peers.

The Great Equation Race provides teachers and students with a fun, interactive way to achieve all of these goals. The math content and skills in the unit encompass standards from Numbers and Operations, Functions and Algebra, Problem Solving and Communication. On page 25 of the teacher's guide, you will find the standards from the National Council of Teachers of Mathematics. These standards describe what students will learn and how they will demonstrate that knowledge.

Knowledge

In this unit, students will demonstrate:

- An ability to identify different types of equations
- Prior mathematical knowledge
- The use of an atlas and map
- Proficiency in researching facts and figures about different cities
- The ability to chart distances and mileage traveled using a map and scale
- The location and names of different cities and countries around the world
- Organizational skills
- An ability to identify the steps required in solving linear equations and the use of those steps
- Mathematical thinking through verbal communication
- Time management

Skills

- Apply prior knowledge in identifying and solving linear equations
- Follow written and oral instructions
- Organize completed work
- Record and plot travel information
- Use a map and scale to determine distances traveled

- Research facts and figures about different destination cities
- Organize time to facilitate task completion
- Listen to the opinions and explanations of others
- Maintain focus and work independently
- Maintain focus and work as a team
- Explain the steps used in solving linear equations

Attitudes

- Develop an understanding of the importance of teamwork
- Appreciate and respect different learning styles
- Value each individual's contribution toward a common goal
- Respect each person's thoughts and opinions
- Appreciate the importance of communication
- Value the learning process
- Enjoy and have fun with mathematics

Learning Styles

Students learn in different ways, and *The Great Equation Race* affords them the opportunity to demonstrate how they learn best while still challenging each individual to grow in new ways. Students are encouraged and required to work as a team. This teamwork encourages communication, allowing students to demonstrate their knowledge and build confidence. Students who excel in verbal communication will enjoy this aspect of the race, while students who are challenged in this area will have a chance to stretch and grow. Move time has been incorporated into this unit, taking into account that many students learn best when their bodies are in motion. Students walk around the room to collect materials, examine maps, turn in completed work, and receive plane tickets. Creative skills are used to design passport stamps and postcards. While there is a lot of focus on the ability to complete individual problem cards successfully, student teams must also work together to solve any interpersonal conflicts peacefully and efficiently. Students can also use each other as a resource, incorporating a peer-teaching aspect to *The Great Equation Race*.

Teaching tip

In teaching this unit, I did both. One time, I chose the pairs because I wanted to encourage community and to see different students work together. I also chose to match up teams who were at different skill levels to promote a peer-teaching aspect. Another time, I allowed students to select their own pairs. Both ways were equally successful.

Teaching tip
If letter grading is a practice at your school, you may wish to count the completed cards as a classwork/quiz grade.

Student Travel Teams

During *The Great Equation Race*, students travel with a teammate. These travel teams of two remain the same throughout the race. You can choose the teams, or allow students to pair themselves up. Students do not compete against each other, so you can pair up students who are at different skill levels without creating a conflict (for example, one student gets frustrated because he/she can or can't solve the equations at the same rate as his/her partner). While it is ideal for students to work in pairs, due to class numbers, it may be necessary to include groups of three. This can work, but may require additional observation to ensure that each student completes his/her own work.

How long is this race?

The Great Equation Race is designed to last seven class days. Teachers are welcome to extend the race by adding their own Daily Destination Cities and by incorporating other levels of problem cards.

How will learning by assessed?

There are several different ways to assess learning in *The Great Equation Race*. One way is through student problem cards. Students are assigned problem cards daily. These cards are completed, corrected by a peer, and kept until the end of the race. At the end of the race, they can be reviewed and assigned a letter grade or rubric score. This manual includes a Teacher Final Evaluation Form.

Another assessment method is through teacher observation. The teacher works as an observer and facilitator during *The Great Equation Race*. Once the initial question/answer period has ended, you should have plenty of time to walk around and observe your students as they work. To aid in this observation process, this manual includes a Teacher Observation Form.

Students will complete daily self-assessments during the race. These assessments not only focus on one's ability to solve equations, but also require students to examine their focus and cooperation. They provide teachers with an inside view into the mind of learners.

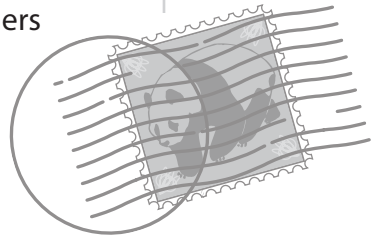
After completing the race, the teacher completes a Final Evaluation, the form that is included in this manual.

Why use *The Great Equation Race*?

The Great Equation Race engages students in the world of solving equations in a motivating, interactive environment. Often, the mathematics classroom can only involve paper and pencil—a class that revolves around worksheets, tests, and quizzes. *The Great Equation Race* provides necessary practice while at the same time incorporating students in a game—a race in which all students can achieve and win. Students are required to communicate with

each other while discussing problem-solving methods and solutions, and the race around the world will motivate students to work in a focused, efficient manner, which will then aid their team in crossing the finish line.

Teacher and Student Benefits



Using *The Great Equation Race* in the classroom provides both teachers and students with many different benefits. For teachers, the unit is easy to use, and once students have learned the Travel Rules and Guidelines, they will be able to work independently. This allows teachers time to observe and assess how students work with others, how they work independently (i.e., ability to focus and time management), and the mathematical strengths and weaknesses of each student. To facilitate teacher preparation, all of the problem cards have already been created, and there are several different levels from which to choose. Teachers will also find Practice Problems to select from for Day One, and answer keys have been provided for all of the problem cards.
Students will find *The Great Equation Race* fun and interactive. It's something different, and it breaks away from traditional methods of teaching equations that involve worksheets or problems from a textbook. While both of those methods are useful, *The Great Equation Race* makes math intriguing and shows students that they can learn in new ways. Because of the number of problem cards and challenge cards, students will receive a lot of practice time. Students will also complete self-evaluations that encourage them to look inward and think about their own learning.

Differentiation

There are several different ways to differentiate instruction while teaching *The Great Equation Race*. The first is through the use of the problem cards. You can choose any of three different options when selecting problem cards for students. Level One contains one-step problems without negative numbers. This level could be used with students new to solving equations, in combination with other levels, or in the upper grades as a review of past skills learned. Level Two problem cards have one-step equations with negative numbers. This level provides a natural transition from Level One, or could be used in combination with Level Three. Level Three problem cards involve solving multi-step equations with negative numbers. Some of these problems use the Distributive Property, and require students to combine like terms. This level would be a nice addition to a Pre-Algebra or Algebra I class. Students working with Level Three cards will have already demonstrated proficiency in solving one-step equations. In one class, a teacher may choose to use all of one level, require students to work through all three levels, or designate which students will be working on different cards of different levels. Because each student completes his/her own card, the level selection can be left to the discretion of the instructor. On the first day of the race, students will complete practice problems, which help you to determine appropriate problem cards for each student.

Teaching tip

One year, I used this with a group of students who had challenges with focus and behavior. I found that the teams were focused, required minimal redirection, and expressed a desire to want to move forward during each class. Even my most reluctant learners expressed that they "loved" the race and many wanted to know if we could play it again.

Challenge Cards are for advanced instruction and would fit perfectly in an eighth or ninth grade algebra class. The equations contain negative numbers, fractions, and decimals. These Challenge Cards can be incorporated into the daily problem cards or used at student request.

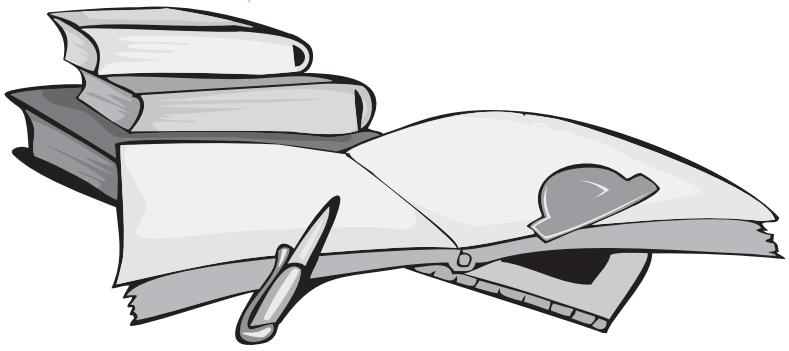
Another way to differentiate instruction is with the number of problem cards assigned. Although the Daily Directions say that a student will complete one card per class, you may choose to assign more than one. In the upper grades, Level One problems may be used as a review and if students have already demonstrated proficiency with the one-step equations, then you may want to assign more than one card per class. You could also choose to assign additional problems as homework.

Motivation

The biggest motivation in *The Great Equation Race* is the desire students will have to cross the finish line. Each day, students will want to solve equations and complete their required teamwork so that they can receive a plane ticket and travel to the next destination in the race. While each student works independently, you will find your students encouraging each other to complete his/her problem cards so that the team can move forward. Because students want to cross the finish line, behavior issues are easily eliminated or cease to exist at all.

Flexibility

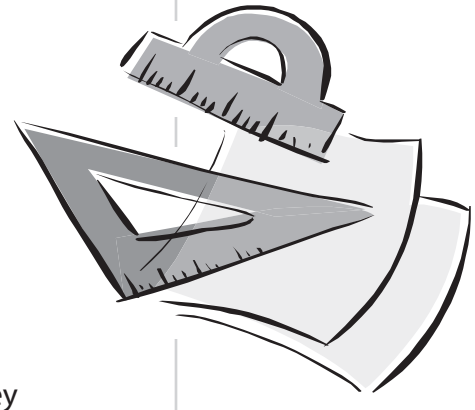
What makes *The Great Equation Race* so flexible is that you can choose the equations that the students will solve. This feature already exists in the design of the program. While you could create different problem cards, it is not necessary because you have many different levels of problem cards from which to choose. This allows students the flexibility of working at a level that they find challenging personally, and students who are on different levels can work side by side on the same team.



Components

The Great Equation Race includes a Teacher's Guide which offers everything needed to run a great race.

Components include:



- Daily Directions
- Student Guidebooks
- The Mission Overview
- Travel Rules and Guidelines
- Practice Problems and Answer Key
- Problem Cards and Answer Key
- Day Six Problem Cards (Student Take Home) and Answer Key
- Challenge Cards and Answer Key
- Plane Tickets
- Bonus Vouchers
- World Map
- Travel Postcards
- Teacher Observation Form
- Teacher Final Evaluation Form

**There are a few additional items required—and a suggestion to cut down on duplication expenses. See the next section.

Getting Started/Preparation/ Setup Directions

Before beginning *The Great Equation Race*, read through all of the materials and become familiar with the Travel Rules and Guidelines.

Decisions To Make

1. **Which Problem Cards will students use?**

   This is one of the biggest questions to address, and you can go about it in two different ways. The first is to decide ahead of time; this option lends itself to having the whole class use the same level. The second is to use the Practice Problems on Day One to assess student proficiency and then choose from there. If you plan to do this, students might end up working on several different levels of cards.

   Here is a breakdown of the different levels of Problem Cards:

- **Level One**—Contains one-step equations without negative numbers. This is an ideal set of cards for beginning students or for students in the younger grades. This set could also be used for remediation or for students who face learning challenges.
- **Level Two**—Contains one-step equations with negative numbers. These cards progress from Level One and could be used for either advanced students or for students who have demonstrated proficiency at one step equations, but need an additional challenge. These cards could also be used as Challenge Cards for students working on Level One.
- **Level Three**—These are for more advanced students or for students in Pre-Algebra or Algebra I classes who have finished the beginning equations and need to move on to more challenging work. At this level, the equations have multiple steps and also include negative numbers.
- **Challenge Cards**—These cards are designed to be used in addition to the other levels, and are intended for students either in advanced/upper grades (8^{th} and 9^{th}) or who need an additional challenge. These equations have multiple steps, and contain fractions, decimals, and negative numbers. These cards could also be used as homework in the upper grades or for extra credit points.

2. How should I group my students?

There are two different ways to think about grouping students. One way is to decide ahead of time and create teams that you think will work well together. Remember that the teams will be working together the entire time. Another option is to allow students to self-select, then the partner that they choose is up to them. This puts more responsibility on the students to cooperate and focus, since they "picked" their own teammate.

3. How should I organize the materials in the classroom?

I recommend having one location for all of the needed materials. A table in the front or back of the room works well. On it, you can put a box to keep all of the student folders, a tray for rulers, pencils, stars, extra copies of maps, books for student research, and several atlases. This helps students to be responsible for their materials, and builds independence and confidence. Each day when students begin class, they can go to this table/area and get all of their materials. At the end of class, they can be responsible for cleaning up and making sure that all of their materials are organized and left in the right spot. If you teach multiple classes, clearly label a different box for each class. This will avoid students misplacing their folders.

4. Which Practice Problems should I use?

On Day One, students will complete the Practice Problems as an assessment tool. You will need to decide which problems you would like to use. You can choose some of them, or all of them. Your choice will depend on the grade/level of the students. For example, a beginning student would only complete Option One Practice Problems, while an advanced student might be required to complete all three sets of Practice Problems.

Additional Materials Required

- Paper
- Pens/pencils
- Colored pencils/markers/crayons
- Rules
- Stars for student maps
- A few reference books about each country or city that the students visit. They will use these books to find facts about each Daily Destination city.
- Four or five atlases
- Folders—one per team to help students organize and keep track of materials

- A notebook or pieces of paper stapled together for each student. Students will use the problem cards, but will need to copy down each problem in his/her notebook to solve.

Reproducibles

Bright Idea

The first time I taught *The Great Equation Race*, I copied each day's problem cards and handed them out. The problem I found was that students wrote on them so I had a lot of copying to do if I was teaching this in multiple classes at the same time. The second time I taught it, I laminated the cards and made the students copy the problems in their notebooks. This way, they didn't write on the cards and it was so much less paper.

Make copies of the following forms prior to beginning the simulation. Keep in mind that these numbers represent teaching to one class. If you are teaching this unit in multiple classes, as may be the case in middle school, plan accordingly.

- Guidebooks (one per student)
- Travel Rules and Guidelines (one per student)
- Mission Overview (one per student; the same copies can be used in multiple classes)
- Teacher Observation Form (make as many copies as needed according to class size)
- Final Teacher Evaluation Form (you will need one per student for final assessment)
- Plane Tickets (one per student; the same copies can be used in multiple classes)
- Bonus Travel Vouchers (ten copies—keep in mind that not all students will request Challenge Cards)
- World Maps (one per team)
- Day Six Problem Cards (Student Take Home)

Note: Problem Cards are not reproducible. Students use a problem card to copy each problem down in a notebook to solve. After copying, be sure to tell students to leave enough room to solve each problem. See Daily Directions for more specific details.

Unit Time Chart

Day 1–Day 2

Day 1

Directions/Setup

- Read the **Mission Overview**
- Assign/choose student travel teams
- Distribute materials
  - Pocket folder
  - Guidebooks—one per person
  - World Map—one per team
  - Ruler
  - Pens/pencils
  - Page of star stickers
- Distribute and read through the **Travel Rules and Guidelines**
- Have students fill out guidebook information
- Write practice problems on the board or on an overhead transparency
- Students complete Practice Problems in their guidebooks
- Collect folders of material

Day 2

Travel Begins

- Students get into their travel teams and gather folders of materials
- Read **Travel Rules and Guidelines**
- Read about the **Daily Destination City**
- Travel teams research Daily Destination City and Country and mark the location on their map
- Students then work to use a map and scale to determine the mileage traveled from their current destination to a new destination. (Technology could be integrated here as students research their Daily Destination City.)
- Students work together to find five facts about the Daily Destination City/Country. (Technology integration works here as well.)
- Each student records this information in his/her guidebook
- Students receive Problem Cards
- Travel Teams solve equations, check work with partner, and correct errors
- After finishing, students show their work to the teacher and receive plane tickets
- Each student then uses his/her passport and designs/creates a special stamp to represent their destination city
- Students chart their course on their map, and place a star on their destination city
- Lastly, students complete the **Day Two Self-Evaluation**

Day 3–Day 5

Travel Continues

- Students get into their travel teams and gather folders of materials
- Review **Travel Rules and Guidelines**
- Read about the **Daily Destination City**
- Travel Teams research Daily Destination City and Country and mark the location on their map
- Students then use a map and scale to determine the mileage traveled from their current destination to the new destination. (Technology could be integrated here for research.)
- Students work to find the five facts about the Daily Destination City/Country. (Technology could be integrated here as well.)
- Each student records this information in his/her guidebook
- Next, students receive Problem Cards
- Travel teams solve equations, check work with partner, and correct errors
- After finishing, students show work to the teacher and receive plane tickets
- Each student then takes his/her passport and designs/creates a special stamp to represent their city
- Students chart their course on their map, and place a star on their destination city
- Last, students complete the Daily Self-Evaluation

Day 6–Day 7

Day 6

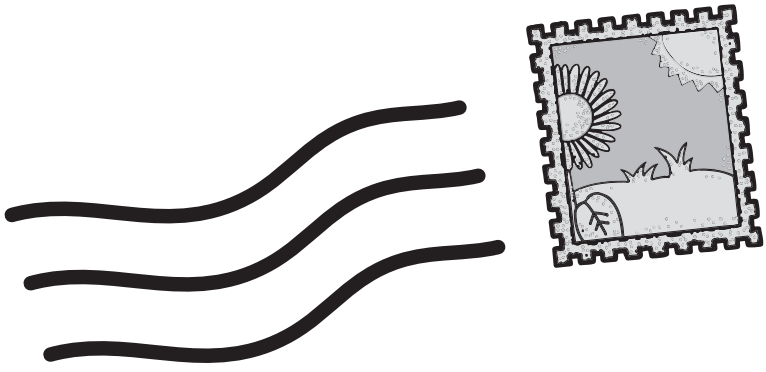
Last Travel Day

- Students get into their travel teams and gather folders of materials
- Review **Travel Rules and Guidelines**
- Read about the **Daily Destination City**
- Travel teams research the Daily Destination City and Country and mark the location on their map
- Students then use a map and scale to determine the mileage traveled from their current destination to a new destination. (Technology could be integrated here for research.)
- Students work to find the five facts about the Daily Destination City/Country. (Technology could be integrated here as well.)
- Each student records this information in his/her guidebook
- Next, students receive Problem Cards
- Travel teams solve equations, check work with partner, and correct errors
- After finishing, students show work to the teacher and receive plane tickets
- Each student then uses his/her passport to design/create a special stamp to represent the Daily Destination City
- Students chart their course on their map, and place a star on their destination city
- Lastly, students complete the **Day Six Self-Evaluation**. Before leaving class, students receive their last Problem Card, which will be due at the beginning of Day Seven and earns them a return ticket to New York City and the finish line

Day 7

Wrap-Up and Completion

- Students get into their travel teams and gather folders of materials
- Teachers collect Day Six Problem Card and distribute plane tickets
- Students are given 15 minutes to finish any incomplete work, chart their course on their map, and place a star on New York City
- Students receive a list of all of the materials that should be in their folders
- Students receive the **Final Self-Evaluation** to complete
- After finishing, students each receive a travel postcard to design and decorate
- Students create a class display of their travel postcards
- The teacher collects all folders for final evaluation



Daily Directions
Day One


Whole class

Materials

- Pocket Folder—one per team
- Guidebooks—one per person
- World maps—one per team
- Notebook for solving problem card equations
- Colored pencils/markers/crayons
- Rulers
- Paper, pens, pencils
- Star stickers
- Abridged Handout of Travel Guidelines—one per person

Directions

1. Before handing out any materials or assigning teams, read the following **Mission Overview** aloud to the students.

Mission Overview


Read or say

Welcome to *The Great Equation Race*! You are about to go on an exciting adventure race in which you will travel with a partner to five cities around the world. Given that this is math class, your ability to solve equations will determine your ability to successfully complete this race. This is not a competition; it is a race where everyone who participates and reaches his or her daily goals will win.

Your race will begin and end in New York City. What happens during the race is up to you. You will be traveling with a teammate. You and your teammate will each have your own equations to solve, but will be responsible for helping each other to complete daily team tasks. On a daily basis, your team will solve equations, work together to determine the amount of mileage you have traveled, research information about different places around the world, and earn plane tickets for travel. You will have to keep track of all of this information. At the end of the trip, <u>all</u> work will be collected for a **Final Evaluation**.

Your team will receive a handout that will outline all of the race rules and guidelines. Good luck! Your Great Equation Race is about to begin!

Daily Directions

Day One

Pairs

Teaching tip

It will help students work together if you allow students to move their desks either side by side or front to front.

Bright Idea

I found that it was helpful to write the list of materials on the board.

Teaching tip

Allow time for the students to ask questions.

Teaching tip

Walk around and observe students as they work. If a student is having a difficult time solving a particular problem or if a student does not seem challenged by the level of practice problems chosen, make a note of it. This will help when selecting Problem Cards for the students. If a student is unable to solve one of the practice problems, have him/her circle the number of the problem.

Teaching tip

Check each student's Practice Problems before the next class. Use student work to select a level of Problem Cards for each student. Make a note in each Guidebook; this will make it easier to hand out the appropriate Problem Card during the next class.

1. Assign student teams and have partners sit next to each other.
2. Once students are in their teams, distribute the following materials.
   - Pocket folder
   - Notebooks for solving equations
   - Colored pencils/markers/crayons
   - Guidebooks
   - World map
   - Ruler
   - Page of star stickers
3. Allow students a few minutes to look through the materials, and make sure that every team has all of the required materials.
4. Instruct students to write both teammates' names on all of their materials. Next, have students fill in Page One of the Guidebook.
5. Distribute the abridged **Travel Rules and Guidelines**. Read through the **Travel Rules and Guidelines** with the students.
6. Instruct students to open their **Guidebooks** to page four. Tell students that their first task on this trip is to complete some practice problems in the Practice Problems Workspace (page 4 of the Guidebook). Explain that these problems will assess their ability to solve equations right now. Teachers may choose to assess students on one level or on several. Practice Problems can be found on page 42.
7. Write the practice problems on the board. Instruct the students to copy these problems into the work area on page four and solve them.
8. Have students swap guidebooks with their partners. Review the answers to the problems. Allow time for students to ask questions and go over solutions on the board.
9. Finally, have students put all of their materials in their pocket folder. Collect the folders and congratulate the students for completing their first task.
10. Tell the students that they will begin travel on *The Great Equation Race* tomorrow!

Daily Directions
Day Two

1. Move students into travel teams and distribute the materials.

Materials

- Pocket folders
- Notebooks for solving equations
- Colored pencils/markers/crayons
- Guidebooks
- World map
- Ruler
- Page of star stickers

2. Have atlases and research books on New York City available for student use.
3. Use the handout to review the **Travel Rules and Guidelines.** Allow time for the students to ask questions.
4. Read about the **Daily Destination City.**

Daily Destination City

Welcome to New York City! Many years ago, immigrants traveled from all over the world in search of a better life in America. They began their journey in other lands and the Statue of Liberty greeted them as they arrived in New York City. You will begin your race at the Statue of Liberty. Once you have earned a plane ticket, take a ferry to the mainland and a taxi ride to John F. Kennedy Airport. Next, board a plane headed for London.

5. Refer students to the handout of the **Travel Rules and Guidelines**, and have them get to work.

Pairs

Teaching tip
This will be the most challenging day, as students learn the travel guidelines and rules of the race. Review how to use a scale to measure mileage on a map. Use the review problems and choose an example similar to the ones on which the students will be working. Go over the example on the board or on an overhead projector.

Read or say

Teaching tip
Observe students as they work. The teacher's section includes an Observation Rubric. Encourage students to solve their problems and to use their Student Itinerary. You can either walk around to pass out Problem Cards or have the students come to you to get them once they have completed their map work. Students will also show you their completed work in order to get their plane tickets.

Daily Directions
Day Three


Pairs

1. Move students into travel teams and distribute materials.

Materials

- Pocket folders
- Notebooks for solving equations
- Colored pencils/markers/crayons
- Guidebooks
- World map
- Ruler
- Page of star stickers

Teaching tip

If all of the students received a plane ticket on Day Two, be sure to congratulate them on their achievement. If some did and some did not, remind students that they must complete their Day Two work and receive a plane ticket before moving on to Day Three work. Allow time for the students to ask questions.

2. Have several atlases and research books on London available for student use.
3. Direct student attention to the **Travel Rules and Guidelines Handout.**
4. Read about the **Daily Destination City.**

Daily Destination City


Read or say

Congratulations on your safe arrival. Welcome to London! London is a historical, artistic city. While here, you will be visiting many different sites. One of the first places to see is Buckingham Palace, where you will witness the Changing of the Guard. After Buckingham Palace, you will visit The Globe Theater, where many of William Shakespeare's plays were performed. Make sure to do a little shopping, and before leaving be sure to get a glimpse of the Clock Tower and listen for Big Ben striking on the hour. Once you have received your plane ticket, start brushing up on your Italian because you and your teammate are off to Florence.

Teaching tip

Students should be confident with the procedures and guidelines, and things should be running smoothly. If there is still a team or two having difficulty, spend a few moments working to get them on track. Once you've taken care of this, you should be able to do a lot of observing.

5. Remind students to complete their **Guidebooks** and **Maps**. Also remind students that there are **Challenge Cards** available for those who either finish early or are looking for an additional challenge.
6. Pass out Problem Cards. Students should begin working immediately.

Daily Directions
Day Four


Pairs

1. Move students into travel teams and distribute materials.

Materials

- Pocket folders
- Notebooks for solving equations
- Colored pencils/markers/crayons
- Guidebooks
- World map
- Ruler
- Page of star stickers


Teaching tip
A great day to observe student work. Encourage progress and remind students to stay on task. There are only a few racing days left before *The Great Equation Race* comes to its finish.

2. Have atlases and books on Italy available for student use.
3. Use the handout to review the **Travel Rules and Guidelines**. Allow time for students to ask questions.
4. Read about the **Daily Destination City.**

Daily Destination City

Congratulations on another day of racing. Welcome to Florence! Florence is a beautiful city full of history and art. The great Michelangelo created some of his famous masterpieces here. One of your stops will be to see his famous sculpture of David, and some of his other unfinished pieces. You will also want to visit some of the large cathedrals in the city—they are filled with breathtaking art and sculptures. Before leaving this glorious city, be sure to enjoy some delicious gelato and maybe a cappuccino. After receiving your plane ticket, take the train to the airport and board a plane headed for Cape Town.


Read or say

5. Remind students to complete their **Guidebooks** and **Maps**. Also, remind students that there are **Challenge Cards** available for those who either finish early or are looking for an additional challenge.
6. Pass out Problem Cards. Students should begin working immediately.

Daily Directions
Day Five


Pairs

1. Move students into travel teams and distribute materials.

Materials

- Pocket folders
- Notebooks for solving equations
- Colored pencils/markers/crayons
- Guidebooks
- World map
- Ruler
- Page of star stickers

Teaching tip

A great day to observe student work. Encourage progress and remind students to stay on task.

2. Have atlases and books on South Africa available for student use.
3. Use the handout to review the **Travel Rules and Guidelines**. Allow time for students to ask questions.
4. Read about the **Daily Destination City.**


Read or say

Daily Destination City

You are more than halfway through *The Great Equation Race,* and teams are still going strong. Welcome to Cape Town! This is an incredible city full of culture and wildlife. First, you will be visiting the White Elephant Safari Lodge and Bush Camp. There, you will be assigned a guide and go on a safari. You will see all kinds of animals, so don't forget your camera! After a hot morning in the fresh country, cool off at Muizenberg—a beautiful white beach that runs 40 kilometers to Gordon's Bay. Finally, after earning your plane ticket, head off for Auckland.

5. Remind students to complete their **Guidebooks** and **Maps**. Also remind students that there are **Challenge Cards** available for those who finish early or are looking for an additional challenge.
6. Pass out Problem Cards. Students should begin working immediately.

Daily Directions
Day Six


Pairs

1. Move students into travel teams and distribute materials.

Materials

- Pocket folders
- Notebooks for solving equations
- Colored pencils/markers/crayons
- Guidebooks
- World map
- Ruler
- Page of star stickers


Teaching tip
This is the final day to observe student work. Be sure that you have observed every team and feel comfortable with your data on each student. You will hand out two problem cards today. Students will receive one card at the beginning of class and another at the end of class. Students will complete the last card prior to their next class. This card will earn them a return plane ticket to New York City and the finish line.

2. Have atlases and books on New Zealand available for student use.
3. Use the handout to review the **Travel Rules and Guidelines**. Allow time for students to ask questions.
4. Read about the **Daily Destination City.**


Read or say

Daily Destination City

The Great Equation Race is coming to an end, and if your team is running behind then you have limited time to catch up. It's not too late—you can regain your position in the race if you put your mind to it.

That said, welcome to Auckland! Auckland is a beautiful city and one not to be missed. One of the best ways to see Auckland is from the water. Take a ferry ride out around the city and view some of the islands that are just a boat ride away. After a lovely boat ride, you'll head off on an adventure to the Waitomo Glowworm Caves. Don't forget your headlamp and hiking boots! Before leaving Auckland, pick up your last Problem Card/Plane Ticket that will take you back to New York City. You have reached your final stretch of *The Great Equation Race*!

5. Remind students to complete their **Guidebooks** and **Maps**. Also, remind students that there are **Challenge Cards** available.
6. Pass out Problem Cards. Students should begin working immediately.

Daily Directions

Day Seven

Pairs

Bright Idea
You may want to write each of the following things on the board or overhead projector in order to help students manage their time.

The Finish Line

Congratulate all of the students for crossing the finish line of *The Great Equation Race*.

1. Students begin by meeting in their travel teams with their folders of materials. Collect the Day Six Problem Card and distribute travel postcards.
2. Tell students that they have today's class to officially complete the race. Instruct them to finish any incomplete work, be sure that all map work has been completed, and fill in the **Final Self-Evaluation** in their **Guidebook.**
3. Finally, students may design and decorate their travel postcard. The written part of the postcard should include four or five travel facts. The students can select which facts they want to include.
4. Designate an area or bulletin board for students to display their postcards when finished.
5. At the end of class, collect all student folders for a **Final Evaluation.**

National Council of Teachers of Mathematics

Principles and Standards for School Mathematics

Number and Operations Standard

- Develop and analyze algorithms for computing with fractions, decimals, and integers to develop fluency.

Algebra Standard

- Use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships.
- Recognize and generate equivalent forms for simple algebraic expressions and solve linear equations.

Problem Solving Standard

- Build new mathematical knowledge through problem solving.
- Solve problems that arise in mathematics and other contexts.
- Apply and adapt a variety of appropriate strategies to solve problems.
- Monitor and reflect on the process of mathematical problem solving.

Communication Standard

- Organize and consolidate their mathematical thinking through communication.
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- Use the language of mathematics to express mathematical ideas precisely.
- Analyze and evaluate the mathematical thinking and strategies of others.

Measurement

- Solve problems involving scale factors, using ratio and proportion.
- Understand relationships among units and convert from one unit to another within the same system.

Masters

Reproducibles

Welcome to *The Great Equation Race!* You are about to go on an exciting adventure race and travel with a partner to five cities around the world. Given that this is a math class, your ability to solve equations will determine your ability to successfully complete this race. This is not a competition; it is a race where everyone who participates and reaches his or her daily goals will win.

Your race will begin and end in New York City. What happens during the race is up to you. You will be traveling with a teammate. You and your teammate will each have your own equations to solve, but will be responsible for helping each other to complete daily team tasks. Each day, your team will solve equations, work together to determine the amount of mileage you have traveled, research information about different places around the world, and earn plane tickets for travel. You will need to keep track of all of this information. At the end of the trip, <u>all</u> work will be collected for a **Final Evaluation**.

Your team will receive a handout that will outline all of the race rules and guidelines. Good luck! Your Great Equation Race is about to begin!

Guidebook

This mission will be completed by _____ and _____.

Travel Contract

We agree to work to the best of our ability to accomplish our mission.

Signed: _____

Signed: _____

Travel Data

	Starting City	Destination City	Destination City	Date of Arrival
Day 2				
Day 3				
Day 4				
Day 5				
Day 6				

Bonus Travel

By completing Challenge Cards, I was able to travel to the following cities and countries:

1. _____
2. _____
3. _____
4. _____

Mileage Traveled

Day Two From NYC to London _____ miles

Day Three From London to Florence _____ miles

Day Four From Florence to Cape Town _____ miles

Day Five From Cape Town to Auckland _____ miles

Day Six From Auckland to NYC _____ miles

Bonus Mileage

If you traveled to any bonus destinations, please include the mileage that you traveled from your destination city to your bonus city and back.

1. _____ to _____ = _____ total miles.
2. _____ to _____ = _____ total miles.
3. _____ to _____ = _____ total miles.
4. _____ to _____ = _____ total miles.

Total miles traveled on The Great Equation Race = _____

(Be sure to include all the mileage on the previous page in your total.)

Practice Problems Workspace

Use this page for your Day One practice problems.

Fact Finders

When you arrive at each Daily Destination City, answer each of the following questions by researching facts about each location. Write the answers to each of the questions in your notebook.

Day Two—New York City

1. There are five boroughs in New York City. Name them.
2. Where would you go to see the world famous Radio City Rockettes?
3. Name two museums.
4. Name one street that borders Central Park.
5. What is one thing that you would like to see while in New York?

Day Three—London

1. Which body of water did you cross to get to London?
2. If it is 8:00 p.m. in New York City, what time is it in London?
3. What is polo?
4. Name two famous English kings or queens.
5. Name one play by William Shakespeare.

Day Four—Florence

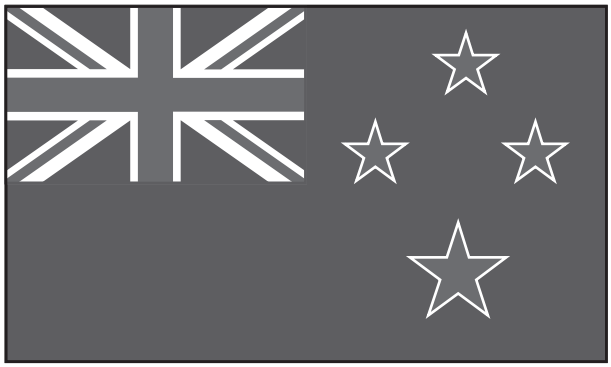
1. If it is 8:00 p.m. in New York City, what time is it in Florence?
2. How many miles is it from Florence to Rome?
3. Which city is famous for its gondolas and water canals?
4. What is one food that you would expect to eat in Florence?
5. What is one city that you might find northeast of Florence?

Day Five—Cape Town

1. Name three countries that can be found on the continent of Africa.
2. Which bodies of water surround Africa?
3. Name two other cities found in South Africa.
4. Write four important facts about Nelson Mandela.

Day Six—Auckland

1. If it is 8:00 p.m. in New York City, what time is it in Auckland?
2. On a nonstop flight, how long will it take you to travel from Auckland to New York City?
3. Name three other cities in New Zealand.
4. Name two bodies of water in/around New Zealand.
5. If you traveled northwest of Auckland, what is one city that you would expect to travel to?



Self-Evaluation

Self-Evaluation Day Two

1. I was focused today and stayed on task. _____
2. I was able to help my partner with his/her work. _____
3. I completed my problem card today. _____
4. I had to correct several problems on my problem card. _____
5. I am ready to move on to more challenging problems. _____
6. I received a plane ticket for my work today. _____

Self-Evaluation Day Three

1. I successfully completed my problem card today. _____
2. An example of a problem I knew how to solve was: _____
3. I needed help on a problem that looked like this: _____
4. I received a plane ticket for my work today. _____

Self-Evaluation Day Four

1. I was focused today and stayed on task. _____
2. I had difficulty staying on task today. _____
3. I was able to help my partner with: _____
4. I successfully completed my problem card today. _____

Self-Evaluation Day Five

1. My team has been successfully arriving at each Daily Destination City. _____
2. I have been a positive, helpful member of my team. _____
3. One type of problem that I found easy looked like this: _____
4. A type of problem that I found difficult looked like this: _____
5. My team is on track to arrive back in New York City on Day 6. _____

Self-Evaluation Day Six

1. My team has successfully arrived at all of the Daily Destination Cities. _____
2. I feel good about my work and my effort. _____
3. I will complete my last problem card and finish the race on time. _____
4. I have learned the following during the race (name at least two things):

Final Self-Evaluation

1. What was one thing that you liked about this activity?

2. What was one thing that was challenging?

3. Were you and your partner able to work successfully together? Why or why not?

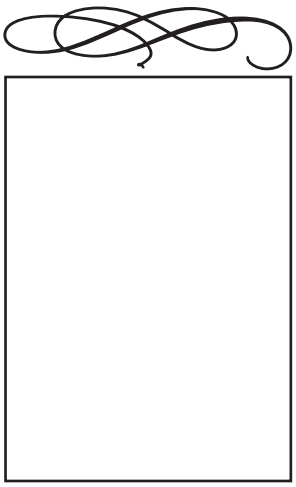
4. Were you able to arrive at every Daily Destination City on time?

5. If not, what was the biggest obstacle that you had in achieving this goal?

6. Would you like to participate in other activities like this one in the future? Why or why not?

Passport

Fill out the information and draw a picture of yourself next to your name. As you travel, draw "stamps" to represent each place that you visit in the blank space provided.



Surname

_____

Given Name

_____

Nationality

_____

Date of Birth

_____

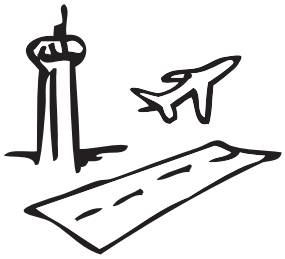
Travel Rules and Guidelines

Here is how The Great Equation Race works:

1. Each day you will travel to a new Daily Destination City. Earn your plane ticket by successfully completing Problem Cards, tracking mileage, and finding out facts about each city you visit.
2. First, locate the city on the team map and record it and its country's name in your guidebook.
3. Figure out the mileage that you traveled from your starting destination to the Daily Destination City. Record this in your guidebook.
4. Complete the Fact Finders. Each person writes his/her own answers in their notebook.
5. Receive a Problem Card.
6. Each problem from the Problem Card is copied into your notebook and solved. Each day has a heading of the day we are on, the problem written out, all work shown, and the answer labeled $x =$ _____.
7. Have your partner check your work.
8. Complete any corrections.
9. Show your completed Problem Cards and receive a Plane Ticket.
10. Complete the Guidebook and team Map. Fill in the arrival date in the guidebook.
11. On the map:
    - Using a ruler, draw a line from the team's current location to the Daily Destination City.
    - Mark the Daily Destination City with two stars to show that both team members have arrived.
12. Create/Design a stamp for your Passport. Draw it in the correct space. Be sure it represents the Daily Destination City.
13. Complete a Self-Evaluation for the day's work.
14. Keep all work in your travel folder to be handed in on the last day.

Flight Cancellations—Remember, your plane will not depart until each problem card has been successfully completed.

Bonus Travel—You can choose to complete Challenge Cards.



- Complete the card and see me for corrections.
- Receive a voucher good for travel to another city in the country your team is currently in.
- Bonus Travel is recorded on your map and in your guidebook.

Travel Rules and Guidelines

Teaching tip

Read this and distribute the abridged version. The handout offers an abbreviated version of this for quick reference.

Here is how *The Great Equation Race* works:

1. Each day there will be a new Daily Destination City, and your team's goal is to reach that city. You need to earn your plane ticket by successfully completing Problem Cards, tracking mileage, and researching information about your city or country. During the race, your team will travel to five different cities.
2. First, your team will need to locate this city on a map and record it and its country's name in your guidebook. There is one team map, but each team member must complete his/her own guidebook.
3. Once you've found the city on the map, you will figure out the mileage that you traveled from your starting destination to the Daily Destination City. Record this information in your guidebook.
4. Work together with your teammate to complete the Fact Finders. Using books and maps, you will answer the questions found in your guidebook. You may work together, but each person will record his/her own answers in their notebook.
5. After the Fact Finders have been completed, you will each receive a Problem Card. Some of the teams will be working on the same card, and some will be working on different cards. Your team success depends on BOTH of you completing your Problem Cards. If you cannot remember how to solve a particular equation, you may use your teammate as a resource.
6. Each problem from the Problem Card must be copied into your notebook and then solved. Each day your notebook should have the day's heading (for example, "Today is Day Two"), the problem written out, all the work shown, and the answer labeled as $x =$ _____.
7. After solving your Problem Card, your partner will check your work. Your goal is to complete this task smoothly. If you think your partner has made an error in correcting your work, you may check with the answer key and me.
8. Next, each teammate needs to complete any corrections.
9. Once corrections have been made, the team may show their completed problem cards and receive a Plane Ticket to the Daily Destination City.
10. After receiving your Plane Ticket, the team can complete the guidebook and map. Filling in the arrival date completes the guidebook.
    - Using a ruler, draw a line from the team's current location to the Daily Destination City.

- Mark the Daily Destination City with two stars to show that both team members have arrived.

11. Create/design a stamp for your Passport, and draw it in the correct space. The stamp should represent your Daily Destination City.
12. Finally, each team member should complete a Self-Evaluation for the day's work.
13. All work must be kept in your travel folder to be handed in on the last day.

Travel Issues and Flight Cancellations

- All flights are scheduled to leave on time. However, if one or both persons have not completed the day's work, then that person or persons will have a flight cancellation and will need to continue the unfinished work in the next travel day BEFORE moving on. **Your plane will not depart until each problem card has been successfully completed.**
- An individual may choose to complete unfinished work during his/her own time and pick up the needed plane ticket at the start of the next travel day.
- If one person completes the day's work and the other person does not, then one may board their plane without the other. There will only be one star on the map (for the person who finished) until both have received their plane tickets.

Bonus Travel

- You have the option of choosing to complete Challenge Cards.
- Challenge Cards contain difficult equations, but you will be rewarded for completing them.
- After completing a Challenge Card, see me for corrections.
- Once your work has been corrected, you may receive a travel voucher good for travel to another city in the country that your team is in. For example, if you have just arrived in Paris, France, you may choose to visit Marseilles as your bonus city.
- Bonus Travel is recorded on your map and in your guidebook.

Practice Problems

Level One

1. $x + 2 = 10$
2. $x - 4 = 9$
3. $2x = 18$
4. $\frac{x}{4} = 3$
5. $12x = 36$

Level Two

1. $x + 4 = -8$
2. $x - 8 = -18$
3. $-4x = 16$
4. $\frac{x}{6} = -1$
5. $\frac{x}{2} = -12$

Level Three

1. $8x + 1 = 17$
2. $-2x - 1 = -11$
3. $\frac{x}{4} + 4 = 6$
4. $\frac{x}{3} - 7 = -9$
5. $-9x + 4 = 40$

Problem Cards

Cut along the dashed line.

Level One

Day Two

1. $x + 10 = 24$
2. $16 + x = 36$
3. $x + 4 = 13$
4. $27 = x + 5$
5. $x + 13 = 48$
6. $14 + x = 27$
7. $45 = x + 12$
8. $28 = 9 + x$
9. $x + 14 = 50$
10. $x + 7 = 39$
11. $30 + x = 96$
12. $31 + x = 67$
13. $x + 18 = 57$
14. $x + 19 = 23$
15. $87 = 29 + x$
16. $47 = x + 33$
17. $x + 22 = 70$
18. $x + 11 = 99$
19. $90 = x + 31$
20. $x + 87 = 231$

2:1

Level Two

Day Two

1. $x + 5 = -2$
2. $x + 6 = -10$
3. $x + 7 = -18$
4. $12 + x = -40$
5. $x + 3 = -5$
6. $-12 = 14 + x$
7. $-8 = 6 + x$
8. $x + 15 = -17$
9. $-10 = x + 4$
10. $7 + x = 39$
11. $x + 18 = -9$
12. $x + 7 = -10$
13. $-44 = x + 22$
14. $x + 201 = -1$
15. $39 + x = -7$
16. $x + 28 = 4$
17. $x + 54 = 9$
18. $-88 = x + 19$
19. $x + 44 = 2$
20. $66 + x = -3$

2:2

Level Three

Day Two

1. $4x + 1 = 13$
2. $6x + 2 = 26$
3. $19 = 2x + 5$
4. $48 = 6 + 7x$
5. $3x + 9 = 27$
6. $5x + 8 = 53$
7. $22 = 3x + 7$
8. $2x + 12 = 16$
9. $8x + 8 = 72$
10. $3 + 5x = 53$
11. $40 = 6x + 4$
12. $7x + 2 = 16$
13. $13x + 5 = 44$
14. $9 + 17x = 60$
15. $4 + 9x = 40$
16. $15x + 7 = 52$
17. $55 = 15 + 20x$
18. $5x + 29 = 59$
19. $72 = 17x + 4$
20. $24x + 10 = 130$

2:3

Problem Cards

Cut along the dashed line.

Level One

Day Three

1. $x - 5 = 12$
2. $x - 6 = 18$
3. $x - 12 = 26$
4. $x - 15 = 30$
5. $x - 8 = 18$
6. $52 = x - 10$
7. $x - 9 = 18$
8. $15 = x - 17$
9. $18 = x - 13$
10. $27 = x - 19$
11. $56 = x - 32$
12. $x - 12 = 43$
13. $x - 27 = 98$
14. $81 = x - 30$
15. $65 = x - 12$
16. $x - 22 = 59$
17. $x - 33 = 47$
18. $243 = x - 111$
19. $501 = x - 123$
20. $x - 99 = 789$

3:1

Level Two

Day Three

1. $-10 = x - 4$
2. $x - 6 = -5$
3. $x - 10 = -2$
4. $x - 9 = -18$
5. $x - 7 = 15$
6. $x - 3 = -8$
7. $x - 2 = -19$
8. $x - 22 = -32$
9. $x - 25 = -15$
10. $-80 = x - 95$
11. $x - 67 = -70$
12. $3 = x - 88$
13. $-26 = x - 13$
14. $-44 = x - 40$
15. $-9 - x = -10$
16. $-9 = x - 7$
17. $-15 - x = -50$
18. $-7 = x - 200$
19. $-125 - x = -5$
20. $x - 334 = -10$

3:2

Level Three

Day Three

1. $8x + 6 = -26$
2. $-6x + 2 = -10$
3. $-4x + 7 = 35$
4. $2x + 9 = -11$
5. $5x + 8 = 28$
6. $4 + -6x = -32$
7. $-11 = 7x + 3$
8. $2 + -8x = 26$
9. $-9x + 4 = -86$
10. $24 = 2 + -11x$
11. $-8x + 6 = -50$
12. $12x + 4 = -44$
13. $-58 = 12 + 7x$
14. $-3x + 9 = -30$
15. $-5x + 8 = -42$
16. $28 = -6x + 4$
17. $60 = 11 + 7x$
18. $4 + 9x = 40$
19. $-3x + 4 = -26$
20. $-90 = -11x + 9$

3:3

Problem Cards

Cut along the dashed line.

Level One

Day Four

1. $4x = 16$
2. $10x = 20$
3. $66 = 6x$
4. $7x = 49$
5. $8 \cdot x = 32$
6. $26 = 2x$
7. $45 = 9x$
8. $10x = 220$
9. $5x = 95$
10. $480 = 6x$
11. $8x = 640$
12. $24x = 480$
13. $3x = 399$
14. $55x = 275$
15. $990 = 33x$
16. $110 = 22 \cdot x$
17. $420 = 14x$
18. $16x = 6400$
19. $31x = 217$
20. $15x = 1200$

4:1

Level Two

Day Four

1. $-3x = -12$
2. $36 = -6x$
3. $-9x = -90$
4. $-2x = 200$
5. $3x = -15$
6. $64 = -8x$
7. $-25 = -5x$
8. $-12x = 360$
9. $-400 = -2x$
10. $3x = 333$
11. $144 = -4x$
12. $-66 = -6x$
13. $-15x = 90$
14. $-90 = 30x$
15. $200 = 100 \cdot x$
16. $-990 = -9x$
17. $-700 = 14x$
18. $-12x = -1440$
19. $-9x = -720$
20. $-23x = 460$

4:2

Level Three

Day Four

1. $-4x - 2 = 10$
2. $14 = 5x - 6$
3. $11 = 2x - 1$
4. $35 = -6x - 7$
5. $-2 + 9x = 79$
6. $-4 - 8x = 60$
7. $3x - 6 = 12$
8. $30 = -7x - 5$
9. $39 = 4x - 5$
10. $33 = -3 + 3x$
11. $3x + 5x + 4 = 36$
12. $-3x + 5x + 2 = 28$
13. $8x + 2x - 5 = -25$
14. $7x - 9x + 3 = 17$
15. $6x + x - 10 = 39$
16. $x - 9x + 3 = 27$
17. $4x + 2x + 10 = -14$
18. $-3x - 2x + 1 = 16$
19. $8x + 8x + 7 = -73$
20. $x - 12x + 5 = -50$

4:3

Problem Cards

Cut along the dashed line.

Level One

Day Five

1. $\frac{x}{3} = 4$
2. $\frac{x}{6} = 10$
3. $\frac{x}{2} = 9$
4. $\frac{x}{5} = 20$
5. $\frac{x}{4} = 1$
6. $7 = \frac{x}{7}$
7. $8 = \frac{x}{3}$
8. $18 = \frac{x}{5}$
9. $19 = \frac{x}{6}$
10. $\frac{x}{7} = 26$
11. $\frac{x}{4} = 14$
12. $\frac{x}{1} = 9$
13. $\frac{x}{6} = 1$
14. $\frac{x}{10} = 12$
15. $2 = \frac{x}{13}$
16. $11 = \frac{x}{11}$
17. $21 = \frac{x}{3}$
18. $32 = \frac{x}{2}$
19. $\frac{x}{1} = 55$
20. $\frac{x}{2} = 43$

5:1

Level Two

Day Five

1. $\frac{x}{5} = -5$
2. $\frac{x}{3} = -4$
3. $\frac{x}{8} = -8$
4. $\frac{x}{7} = 10$
5. $\frac{x}{4} = -9$
6. $-9 = \frac{x}{5}$
7. $-16 = \frac{x}{4}$
8. $-20 = \frac{x}{10}$
9. $\frac{x}{12} = -4$
10. $\frac{x}{15} = 9$
11. $\frac{x}{11} = -2$
12. $\frac{8}{x} = -4$
13. $\frac{9}{x} = -3$
14. $\frac{x}{4} = -15$
15. $\frac{x}{2} = -17$
16. $\frac{x}{12} = -12$
17. $\frac{x}{1} = -9$
18. $-10 = \frac{x}{10}$
19. $-15 = \frac{x}{1}$
20. $22 = \frac{x}{4}$

5:2

Level Three

Day Five

1. $\frac{x}{2} + 2 = 12$
2. $-8 = -3x + 4$
3. $\frac{x}{5} + 3 = 15$
4. $\frac{x}{3} - 4 = 6$
5. $-2x - 2 = 12$
6. $\frac{x}{6} + 2 = 4$
7. $3x + 4 = -17$
8. $\frac{x}{2} - 4 = 4$
9. $\frac{x}{7} + 1 = 3$
10. $1 = \frac{x}{8} + 4$
11. $-2x - 4x + 3x - 2 = 10$
12. $5x - 10x + x - 3 = 29$
13. $-12x + 6x + 4 = 58$
14. $-9x + 8x - 10x + 5 = 82$
15. $-x - 2x - 3 = 3$
16. $-4x - 3x + 1 = -20$
17. $12x - 2x + 6x = 112$
18. $7x - 9x - 9x + 1 = -98$
19. $2x + 6x - 10x = 40$
20. $7x + 6x\ 4 = -93$

5:3

Take Home Problem Cards

Cut along the dashed line.

Level One

Day Six

1. $6x = 36$
2. $x + 4 = 23$
3. $x - 6 = 89$
4. $4x = 32$
5. $x + 5 = 42$
6. $x - 12 = 90$
7. $\frac{x}{2} = 12$
8. $5x = 225$
9. $x + 37 = 91$
10. $63 = x - 27$

6:1

Level Two

Day Six

1. $x - 18 = -2$
2. $x + 3 = -44$
3. $-9x = 99$
4. $-4 = x - 11$
5. $8x = -64$
6. $\frac{x}{3} = -14$
7. $7x = 49$
8. $-20 = 5 + x$
9. $-32 = x - 22$
10. $x + 56 = -231$

6:2

Level Three

Day Six

1. $2(x + 3) = 8$
2. $3(x + 4) = 24$
3. $6(x + 5) = 60$
4. $5(x + 4) = 60$
5. $7(x + 3) = 42$
6. $9(x + 4) = 117$
7. $4(x + 4) = 64$
8. $10(x + 2) = 80$
9. $11(x + 1) = 55$
10. $12(x + 4) = 84$

6:3

Challenge Cards

Cut along the dashed line.

Level One and Two—Mixed Review

Challenge

1. $x + 7 = 15$
2. $\frac{x}{4} = -2$
3. $12 = x - 4$
4. $3x = -21$
5. $x - 5 = -20$
6. $12x = 48$
7. $\frac{x}{5} = 25$
8. $\frac{x}{9} = -1$
9. $x + 2 = -4$
10. $15 = x - 10$

C: 1-2

Challenge

1. $x + 7 = 15$
2. $\frac{x}{4} = -2$
3. $12 = x - 4$
4. $3x = -21$
5. $x - 5 = -20$
6. $12x = 48$
7. $\frac{x}{5} = 25$
8. $\frac{x}{9} = -1$
9. $x + 2 = -4$
10. $15 = x - 10$

C: 1-2

Level Three—Mixed Review

Challenge

1. $\frac{1}{2}x + 2 = 8$
2. $.5x = 20$
3. $\frac{1}{3}x = 6$
4. $\frac{2}{3}x + 3 = 9$
5. $.2x + 1 = 11$
6. $\frac{1}{4}x = -3$
7. $.6x - 4 = 8$
8. $.8x = 8$
9. $\frac{2}{5}x = 20$
10. $\frac{1}{2}x - 6 = -18$

C: 3

Bonus Travel Vouchers

Bonus Travel Voucher

Good for one trip to the city of your choice.

By completing a Challenge Card,
you have gone above and beyond what is required.
Congratulations! Great work!

Bonus Travel Voucher

Good for one trip to the city of your choice.

By completing a Challenge Card,
you have gone above and beyond what is required.
Congratulations! Great work!

Bonus Travel Voucher

Good for one trip to the city of your choice.

By completing a Challenge Card,
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Congratulations! Great work!

Plane Tickets

MATHEMATICS
WORLD TRAVEL AIRLINES

Plane Ticket

Flight # 1001 Seat 21A

This one-way ticket is good for one student traveling alone.

A meal will be provided on this flight. You may board with one carry-on item.

MATHEMATICS
WORLD TRAVEL AIRLINES

Plane Ticket

Flight # 1001 Seat 21B

This one-way ticket is good for one student traveling alone.

A meal will be provided on this flight. You may board with one carry-on item.

MATHEMATICS
WORLD TRAVEL AIRLINES

Plane Ticket

Flight # 1001 Seat 22A

This one-way ticket is good for one student traveling alone.

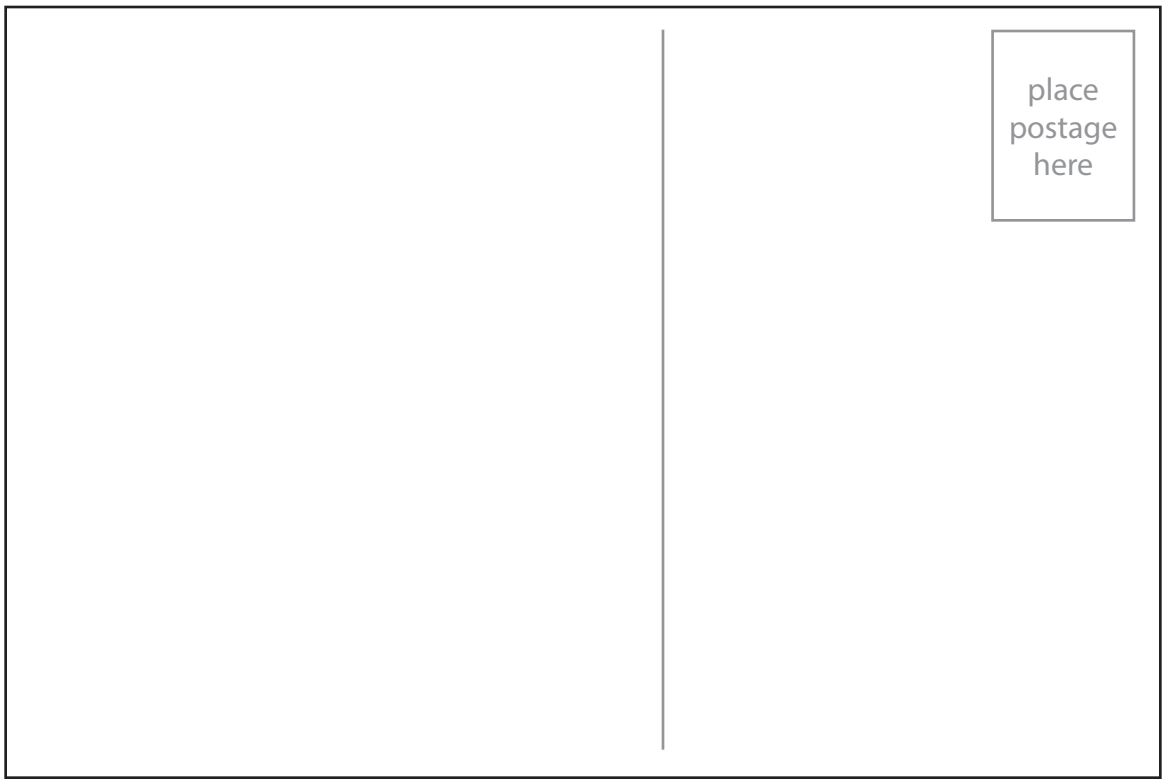
A meal will be provided on this flight. You may board with one carry-on item.

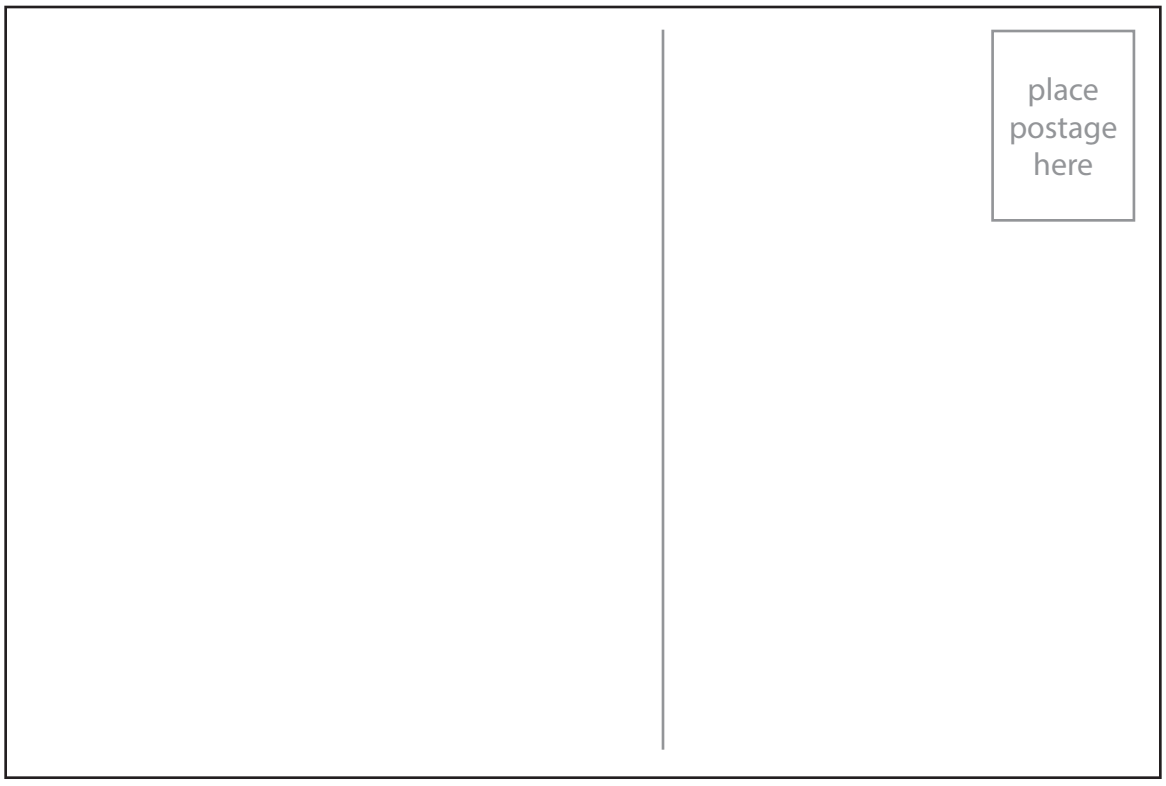
Travel Postcards: Front

Decorate this with memories from your journey.

Travel Postcards: Back

Address your postcard to a friend or family member and write about *The Great Equation Race*.





World Map

Teacher Observation Forms

Team _____

Students are focused.

Students are actively involved in solving equations.

Students are demonstrating the steps necessary to solve the equation.

Students are working together.

Students are solving conflicts effectively.

Students are talking about the race.

Comments about student _____

Comments about student _____

Team _____

Students are focused.

Students are actively involved in solving equations.

Students are demonstrating the steps necessary to solve the equation.

Students are working together.

Students are solving conflicts effectively.

Students are talking about the race.

Comments about student _____

Comments about student _____

Final Teacher Evaluation Form

Grading Rubric

4 Meets Expectations *Wow! I ran a great race!*

- Folder contents are complete. Folder contains:
  - A team map that has been marked with stars and the team path has been drawn in on the map.
  - All of the problem cards have been solved. Work is neat and answers are correctly labeled.
  - Guidebook is complete.
  - Self-Evaluations show thought and are complete.
  - Work is neat and well organized.
  - Your observation of this student was excellent—student was focused, positive, and contributed to their team.
  - This student finished the race on time.

Teaching tip
At the end of the unit, collect all of the folders. This form will assist you in grading each student's work.

3/2 Nearly There *I finished, but something was missing.*

- Folder contents are close to complete, but something is missing or incomplete.
- Folder should contain:
  - A team map that has been marked with stars and the team path has been drawn in on the map.
  - All of the problem cards have been solved. Work is neat and answers are correctly labeled.
  - Guidebook is complete.
  - Self-Evaluations show thought and are complete.
  - Work is neat and well organized.
- This student may have had trouble focusing and needed to be redirected, but your overall observation was positive.
- This student finished the race.

Teaching tip
Students can receive either a 3 or a 2 based on how much is missing. If it is a small thing like a Guidebook being incomplete, then rate them a 3. If there is equation work missing, then a 2 is more appropriate.

1	Incomplete	*I got off track and did not get back on.*

- Many items are missing from the folder.
- Students in this category did not finish the race.
- The map is incomplete.
- Guidebooks are incomplete.
- Problem cards are incomplete.
- During your observation, this student was off task and required multiple redirections. He/she did not complete their daily problem cards and was challenging to work with.

Final Teacher Evaluation Form

I. Student Folder—All contents are present

- 1 pt Team Map
- 1 pt Guidebook
- 1 pt Passport
- 1 pt Notebook

Total points _____

II. Team Map—worth 5 points

- The map is labeled correctly.
- All of the Daily Destination Cities were reached.
- Daily Destination Cities are marked with stars.
- The path of travel has been drawn on the map.

Total points _____

III. Guidebook

- 5 pts Travel Data is complete.
- 5 pts Mileage Data is complete.
- 10 pts Fact Finders are complete.
- 5 pts Self-Evaluations are complete and show thought and effort.

Total points _____

IV. Passport

- 5 pts Each Daily Destination City has been represented with a creative stamp.

Total points _____

V. Notebook

- 20 pts All of the problems have been completed.
  Work is neat and easy to read.
  All solutions have been labeled with x = ____.

Total points _____

Student Grade _____ /60

Teaching tip
This form might be used by teachers wishing to issue a letter grade/number score. It is helpful to show this form to students prior to running the race so they are aware of the grading expectations from the beginning.

Fact Finders Answer Key

New York City

1. Manhattan, Queens, Brooklyn, Staten Island, the Bronx.
2. Radio City Music Hall
3. Possible answers: Museum of Natural History, Metropolitan Museum of Art, Guggenheim Museum, Museum of Modern Art, American Indian Museum, Ground Zero Museum Workshop
4. West 110th St., West 59th St., Eighth Avenue
5. Answers will vary.

London

1. The Atlantic Ocean
2. 1:00 a.m.
3. Team sport played on horseback. Riders score by driving a small white plastic or wooden ball into the opposing team's goal using a long-handled mallet.
4. Many possible answers.
5. Possible answers: *Romeo and Juliet, A Midsummer Night's Dream, Much Ado About Nothing, Hamlet, Macbeth,* etc.

Florence

1. 2:00 a.m.
2. 140 miles
3. Venice
4. Many various answers
5. Bologna

Cape Town

1. Possible answers: Nigeria, Algeria, South Africa, Ethiopia, Egypt, etc.
2. North Atlantic Ocean, South Atlantic Ocean, Indian Ocean, Mediterranean Sea
3. Possible answers: Pretoria, Johannesburg
4. Many possible answers

Auckland

1. 9:00 a.m.
2. 20 hours and 45 minutes
3. Many possible answers
4. Tasman Sea and The Pacific Ocean
5. Helensville

Practice Problems Answer Key

Level One

1. $x = 8$
2. $x = 13$
3. $x = 9$
4. $x = 12$
5. $x = 3$

Level Two

1. $x = -12$
2. $x = -10$
3. $x = -4$
4. $x = -6$
5. $x = -24$

Level Three

1. $x = 2$
2. $x = 5$
3. $x = 8$
4. $x = -6$
5. $x = -4$

Problem Cards Answer Key

Day Two

Level One	*Level Two*	*Level Three*
1. $x = 14$	1. $x = -7$	1. $x = 3$
2. $x = 20$	2. $x = -16$	2. $x = 4$
3. $x = 9$	3. $x = -25$	3. $x = 7$
4. $x = 22$	4. $x = -52$	4. $x = 6$
5. $x = 35$	5. $x = -8$	5. $x = 6$
6. $x = 13$	6. $x = -26$	6. $x = 9$
7. $x = 33$	7. $x = -14$	7. $x = 5$
8. $x = 19$	8. $x = 32$	8. $x = 2$
9. $x = 36$	9. $x = -14$	9. $x = 8$
10. $x = 32$	10. $x = 32$	10. $x = 10$
11. $x = 66$	11. $x = -27$	11. $x = 6$
12. $x = 36$	12. $x = -17$	12. $x = 2$
13. $x = 39$	13. $x = -66$	13. $x = 3$
14. $x = 4$	14. $x = -202$	14. $x = 3$
15. $x = 58$	15. $x = -46$	15. $x = 4$
16. $x = 14$	16. $x = -24$	16. $x = 3$
17. $x = 48$	17. $x = -45$	17. $x = 2$
18. $x = 88$	18. $x = -107$	18. $x = 6$
19. $x = 59$	19. $x = -42$	19. $x = 4$
20. $x = 144$	20. $x = -69$	20. $x = 5$

Day Three

Level One	*Level Two*	*Level Three*
1. $x = 17$	1. $x = -6$	1. $x = -4$
2. $x = 24$	2. $x = 1$	2. $x = 2$
3. $x = 38$	3. $x = 8$	3. $x = -7$
4. $x = 45$	4. $x = -9$	4. $x = -10$
5. $x = 26$	5. $x = 22$	5. $x = 4$
6. $x = 62$	6. $x = -5$	6. $x = 6$
7. $x = 27$	7. $x = -17$	7. $x = -2$
8. $x = 32$	8. $x = -10$	8. $x = -3$
9. $x = 31$	9. $x = 10$	9. $x = 10$
10. $x = 46$	10. $x = 15$	10. $x = -2$
11. $x = 88$	11. $x = -3$	11. $x = 7$
12. $x = 55$	12. $x = 91$	12. $x = -4$
13. $x = 125$	13. $x = -13$	13. $x = -10$
14. $x = 111$	14. $x = -4$	14. $x = 13$
15. $x = 77$	15. $x = 1$	15. $x = 10$
16. $x = 81$	16. $x = -2$	16. $x = -4$
17. $x = 80$	17. $x = 35$	17. $x = 7$
18. $x = 354$	18. $x = 193$	18. $x = 4$
19. $x = 624$	19. $x = -120$	19. $x = 10$
20. $x = 888$	20. $x = 324$	20. $x = 9$

Day Four

Level One	*Level Two*	*Level Three*
1. $x = 4$	1. $x = 4$	1. $x = -3$
2. $x = 2$	2. $x = -6$	2. $x = 4$
3. $x = 11$	3. $x = 10$	3. $x = 6$
4. $x = 7$	4. $x = -100$	4. $x = -7$
5. $x = 4$	5. $x = -5$	5. $x = 9$
6. $x = 13$	6. $x = -8$	6. $x = -8$
7. $x = 5$	7. $x = 5$	7. $x = 6$
8. $x = 22$	8. $x = -30$	8. $x = -5$
9. $x = 19$	9. $x = 200$	9. $x = 11$
10. $x = 80$	10. $x = 111$	10. $x = 12$
11. $x = 80$	11. $x = -36$	11. $x = 4$
12. $x = 20$	12. $x = 11$	12. $x = 13$
13. $x = 133$	13. $x = -6$	13. $x = -2$
14. $x = 5$	14. $x = -3$	14. $x = -7$
15. $x = 30$	15. $x = 2$	15. $x = 7$
16. $x = 5$	16. $x = 110$	16. $x = -3$
17. $x = 30$	17. $x = -50$	17. $x = -4$
18. $x = 400$	18. $x = 120$	18. $x = -3$
19. $x = 7$	19. $x = 80$	19. $x = -5$
20. $x = 80$	20. $x = -20$	20. $x = 5$

Day Five

Level One	*Level Two*	*Level Three*
1. $x = 12$	1. $x = -25$	1. $x = 20$
2. $x = 60$	2. $x = -12$	2. $x = 4$
3. $x = 18$	3. $x = -64$	3. $x = 60$
4. $x = 100$	4. $x = 70$	4. $x = 30$
5. $x = 4$	5. $x = -36$	5. $x = -7$
6. $x = 49$	6. $x = -45$	6. $x = 12$
7. $x = 24$	7. $x = -64$	7. $x = -7$
8. $x = 90$	8. $x = -200$	8. $x = 16$
9. $x = 114$	9. $x = -48$	9. $x = 14$
10. $x = 182$	10. $x = 135$	10. $x = -24$
11. $x = 56$	11. $x = -22$	11. $x = -4$
12. $x = 9$	12. $x = -2$	12. $x = -8$
13. $x = 6$	13. $x = -3$	13. $x = -9$
14. $x = 120$	14. $x = -60$	14. $x = -7$
15. $x = 26$	15. $x = -34$	15. $x = -2$
16. $x = 121$	16. $x = -144$	16. $x = 3$
17. $x = 63$	17. $x = -9$	17. $x = 7$
18. $x = 64$	18. $x = -100$	18. $x = 9$
19. $x = 55$	19. $x = -15$	19. $x = -20$
20. $x = 86$	20. $x = 88$	20. $x = -3$

Take Home Problem Cards Answer Keys

Day Six

Level One	*Level Two*	*Level Three*
1. $x = 6$	1. $x = 16$	1. $x = 1$
2. $x = 19$	2. $x = -47$	2. $x = 4$
3. $x = 95$	3. $x = -11$	3. $x = 5$
4. $x = 8$	4. $x = 7$	4. $x = 8$
5. $x = 37$	5. $x = -8$	5. $x = 3$
6. $x = 102$	6. $x = -42$	6. $x = 9$
7. $x = 24$	7. $x = 7$	7. $x = 12$
8. $x = 45$	8. $x = -25$	8. $x = 6$
9. $x = 54$	9. $x = -10$	9. $x = 4$
10. $x = 90$	10. $x = -287$	10. $x = 3$

Challenge Cards Answer Key

Level One and Two

1. $x = 8$
2. $x = -8$
3. $x = 16$
4. $x = -7$
5. $x = -15$
6. $x = 4$
7. $x = 125$
8. $x = -9$
9. $x = -6$
10. $x = 25$

Level Three

1. $x = 12$
2. $x = 40$
3. $x = 18$
4. $x = 9$
5. $x = 50$
6. $x = -12$
7. $x = 20$
8. $x = 10$
9. $x = 50$
10. $x = -24$

Teacher Feedback Form

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Please use the release form on the following page.

Your Name: _____

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Interact Unit: _____

Comments: _____

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To Teachers:

To help illustrate to others the experiential activities involved and to promote the use of simulations, we like to get photographs of classes participating in the simulation. Please send photos of students actively engaged so we can publish them in our promotional material. Be aware that we can only use images of students for whom a release form has been submitted.

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I give permission for photographs of my child to appear in catalogs of educational materials published by Interact.

Name of Student: _____ (print)

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Signature: _____ Date: _____

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