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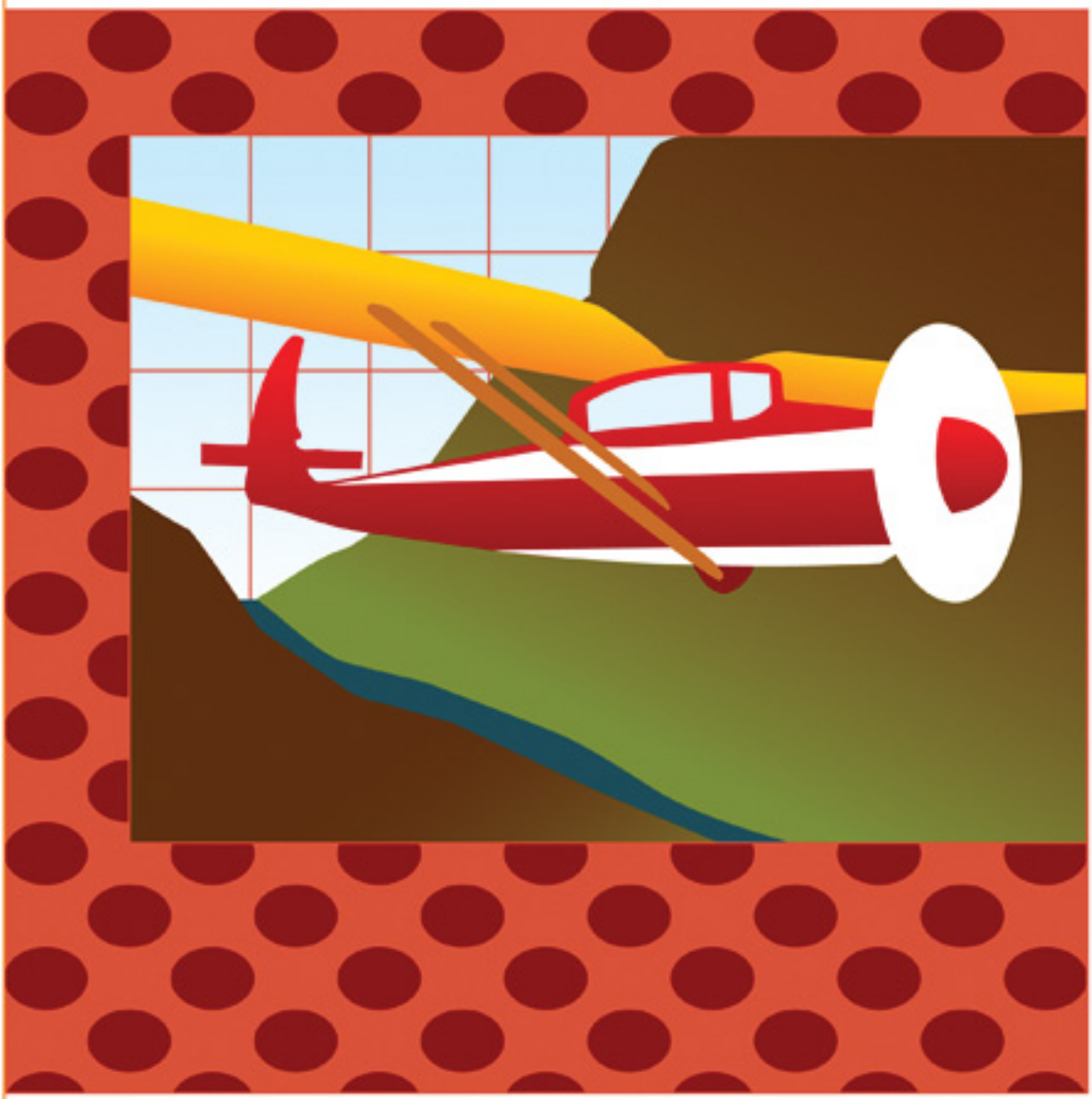
FLIGHT



A Simulation of a Cross-continent Air Race that Develops Map-reading and Decision-making Skills

Learn Through Experience

FLIGHT

A simulation of a cross-continent air race that develops map-reading and decision-making skills

JAY REESE, the author of FLIGHT, has his M.Ed. from the University of Oregon and has taught in the Parkrose School District, Portland, Oregon, Bethel School District, Eugene, Oregon, and the University of Oregon, Eugene, Oregon. Jay also wrote HOMESTEAD and MERCHANT for Interact.

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FLIGHT

In this simulation student teams fly small planes in an air race across an imaginary continent. Students plan their strategies, figure out specific flight plans, react to the vagaries of fate, make new decisions, and record what happens to them. As they participate, they specifically experience the following:

Knowledge

- What map symbols mean
- What a distance scale means
- The purpose of latitude and longitude
- The hazards of flying light planes

Skills

- Reading maps
- Figuring distances and direction
- Reading latitude and longitude
- Cooperating in order to make group decisions
- Writing diary entries

Attitudes

- Appreciation of the skills needed in navigating an airplane
- Respect for light airplane crews flying in hazardous weather

PURPOSE

OVERVIEW

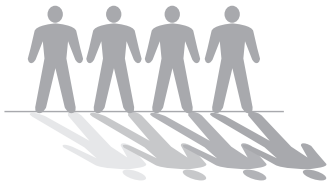
FLIGHT begins with a PRE-TEST which demonstrates the map-reading skills of your students. Students then form flight teams of three persons: Pilot, Co-pilot, and Navigator. You may spend up to three days to review essential map reading skills to ensure student success: legend, latitude and longitude, and scale. Students then discuss the ANDORANIA MAP, review job descriptions, and study the **Rules** of the simulation.

The race begins and continues until one team completes the course (approximately five days are necessary). Each team files for your approval a daily FLIGHT PLAN. Once it is approved, the Pilot draws a FATE CARD and the team completes the action indicated. The team members draw the plotted course on their small maps in their Student Guides and move their team marker on the large classroom map. The day ends with the writing of the diary entry describing the day's happenings.

FLIGHT concludes when one team successfully completes the flight from Karuz to Morgan Town. Once you declare the winner, administer the POST-TEST, and conduct an oral evaluation of the simulation, encouraging students to discuss what they learned.

1. **Before you begin:** Read all materials in this Teacher Guide and in the Student Guide.

2. **Grouping students:** Either by chance or by dictation place your students into flight teams of three members each. If your class size is not exactly divisible by three, allow one team to have two members or one team to have four members.
   a. **Chance:** Make three small lettered slips for each team (three A's, three B's, three C's, etc.). Students draw slips to determine their flight team.
   b. **Dictation:** Assign students to teams, balancing personalities, gender, and/or ability levels.
   c. **Option:** You may require that students rotate their role responsibilities beginning on Day 3 to allow each student the opportunity to experience each role.



3. **Preparing your classroom:** Make a display copy of the MAP OF ANDORANIA and project it onto a large sheet of butcher paper in order to make a bulletin board-size map. Consider having students help you with this task several days in advance; doing so will create interest. Copy the FATE CARDS, cut apart and place in an envelope for use later.

You may elect to laminate the FATE CARDS to prolong their usefulness.

4. **Duplication:** Duplicate the following in the number indicated in *Italics*:
   - DIARY ENTRY — *four per flight team*
   - FATE CARDS — *one set (cut apart)*
   - FLIGHT PLAN — *five per flight team*
   - FLIGHT TEAMS ROSTER — *one*
   - MAP OF ANDORANIA — *display copy*
   - PRE/POST-TEST — *two class sets*
   - WINNERS CERTIFICATE — *three or more as needed*

5. **Other materials**
   - Envelope — *one (for FATE CARDS)*
   - Hat or basket — *one (optional)*
   - Paper — *class set*
   - Pencils — *class set*
   - Pushpins (various colors)* — *one per flight team*
   - Ruler — *class set*
   - Scrap paper — *enough for students*

*You may devise another type of marker for each team.

6. **Team markers:** Obtain colored pushpins or thumbtacks. A second option is to have students make small, colored airplanes from poster board—one color for each team. Pin these markers on the large classroom map. Flight team pilots move their team markers to show their progress across Andorania.

These by no means cover all types of maps available. You may obtain three-dimensional maps from the U.S. Army Topographic Command, Washington, D.C.

7. **Resource maps:** Obtain for display during the simulation as many of the following maps as possible. Your school librarian, geographical organizations, travel agencies, or government offices are excellent sources.
   a. Elevation maps (Lowlands, highlands, and mountains are given in different colors.)
   b. Contour maps (Contour lines show elevations.)
   c. Three-dimensional maps (Molded relief maps printed on plastic sheets)
   d. Photo maps (Images obtained from the air or space)
   e. Statistical maps
   f. Weather maps
   g. Road maps

8. **Evaluating the PRE/POST-TEST:** Questions 1, 2, and 3 deal with *scale*, questions 4 through 14 deal with *legend*, and questions 15 through 18 deal with *latitude* and *longitude*. The remaining questions are general questions about the race itself.

1.	F	11.	F	21.	T
2.	T	12.	T	22.	F
3.	F	13.	T	23.	T
4.	T	14.	T	24.	T
5.	T	15.	T	25.	F
6.	F	16.	T		
7.	T	17.	T		
8.	T	18.	F		
9.	T	19.	T		
10.	F	20.	T		

9. **Using the PRE/POST-TEST:** Student performance on the Pre-test will determine how you prepare for the first race day of the simulation.
   a. If student answers on the PRE-TEST indicate that the students have very little background knowledge of map legends, latitude and longitude, and scale, cover these map skills more thoroughly using your own resources. You may need to spend three or four days on each lesson.
   b. If student answers on the PRE-TEST indicate some basic knowledge of map legends, latitude and longitude, and scale, use the FLIGHT lessons to review and reinforce map skills knowledge.
   c. If student answers on the PRE-TEST indicate mastery of map legends, latitude and longitude, and scale by the class, you may elect to begin the race immediately.

10. This simulation is designed for students with a preliminary knowledge of how to read maps. The map lessons in Days 2, 3, and 4 are primarily a review.

11. FLIGHT is designed for use by flexible, creative teachers who desire a participatory classroom. You may modify, add or delete materials to fit the needs and interests of your students or to satisfy your own requirements. Consider the following suggestions to modify FLIGHT:
   a. Require that students compute their distances each day in both miles and kilometers.
   b. Add additional FATE CARDS for other situations. (You may encourage creative students to write new FATE CARDS for a second FLIGHT race.)
   c. Conduct a return race across the Andorania continent. Require a stopover so that the race covers more of the map. For example: Race from Morgan Town to South Stor, with a mandatory stopover at Dellor.
   d. Conduct an air race over a map of a real area of the world.

If your students cannot read maps, plan some in-depth lessons for your students prior to beginning the actual simulation. The review lessons taught on Days 2, 3 and 4 include too much material for students to assimilate in one lesson if they have no previous knowledge of how to work with maps.

To convert miles to kilometers, multiply the number of miles times 1.60934.

To convert kilometers to miles, multiply the number of kilometers times 0.62137.

UNIT TIME CHART

FLIGHT

Pre-Flight Preparations | Race

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
PRE/POST TEST FLIGHT TEAMS ROSTER Student Guide: **Introduction** Introduce simulation Organize flight teams	Student Guide: **Map Legends** Review map legend symbols **Map Symbol Bingo**	Student Guide: **Latitude and Longitude** Review latitude and longitude **Where Is It?**	Student Guide: **Scale of Distance** Review scale of a map Make individual scales for race Discuss geographic features of Andorania map	**Race Day 1** Student Guide: **Pre-Flight Preparation** Student Guide: **Rules of the Race** Student Guide: **Sample Flight Plan** Introduce FLIGHT PLANS Announce departure and destination cities Announce weather conditions Teams file FLIGHT PLANS

Race Days | Finish

DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
Race Day 2 Pilots draw FATE CARDS Teams move markers on class map Co-pilots write DIARY ENTRIES for previous day Announce weather conditions Teams file FLIGHT PLANS	**Race Day 3** Pilots draw FATE CARDS Teams move markers on class map Co-pilots write DIARY ENTRIES for previous day Announce weather conditions Teams file FLIGHT PLANS	**Race Day 4** Pilots draw FATE CARDS Teams move markers on class map Co-pilots write DIARY ENTRIES for previous day Announce weather conditions Teams file FLIGHT PLANS	**Race Day 5** Pilots draw FATE CARDS Teams move markers on class map Co-pilots write DIARY ENTRIES for previous day Announce weather conditions DIARY ENTRIES for Bonus Round (optional)	PRE/POST TEST WINNERS CERTIFICATES Announce Bonus Round distances Teams move markers on class map Announce the winning team Student debriefing

DAY 1

Objectives

- PRE/POST-TEST determines entry knowledge of students.
- Introduce simulation.
- Establish flight teams.

Materials

- PRE/POST-TEST — *class set*
- FLIGHT TEAMS ROSTER — *one*
- Student Guides — *class set*
- Flight Team selection papers* — *three per team (optional)*
- Large map of Andorania — *one (for classroom display)*
- Push pins — *one per team (a different color for each flight team)*

*See Setup Directions # 2 **Grouping students** for additional recommendations.

Procedure

1. Distribute the PRE/POST-TEST and have students complete it. Collect and correct later.

2. Distribute the Student Guides and have students read the **Introduction**.

3. Briefly discuss the simulation.

4. Place students into flight teams using whichever method you selected. Record the names of team members for your own reference on the FLIGHT TEAMS ROSTER.

DAY 2

Objectives

- Review facts about basic map symbols and map legends.
- Review Andorania map symbols.
- Reinforce legend knowledge with **Map Symbol Bingo**.

Materials

- Student Guides — *class set*
- Hat or basket — *one (optional)*
- Large map of Andorania — *one (for classroom display)*
- Map Symbols selection papers* — *one of each*
- Paper — *class set*
- Pencils — *class set*
- Ruler — *class set*
- Scrap paper — *enough for students*

*Prior to class write on separate slips of paper the names of the features represented on the **Map Legends** in the Student Guide on page 3.

Procedure

1. Distribute the Student Guides and direct students to page 3, **Map Legends**. Read the information as a class, individually or in flight teams.

TEACHING TIP

Briefly discuss the map symbols with the students, emphasizing the symbols that appear on the Andorania map.

2. To reinforce student understanding of the Andorania Map legend, play **Map Symbol Bingo**.
   Directions
   a. Distribute or have students take out paper, pencils and rulers.
   b. Have students rule a bingo-type grid made up of nine squares on their sheets of paper.
   c. Students randomly draw replicas of the map symbols from the **Map Legends** page in their Student Guides. They must fill each of the nine squares. (There are no *FREE* spaces.)
   d. Collect the papers and distribute them so that each student receives a paper prepared by another student.
   e. One at a time select Map Symbols selection papers from the hat or basket.
   f. Call out what the symbol represents. Do not describe the symbol itself.
   g. Students tear bits of scrap paper to cover the symbols called out.
   h. The first student to cover three map symbols in a row wins.

TEACHING TIP

Showing a variety of maps is especially helpful if you plan to run the race a second time using a different map.

3. Display and discuss some of the resource maps obtained according to the Setup Directions #7.

4. Collect the Student Guides.

DAY 3

Objectives

- Review facts about latitude and longitude.
- Learn how to find coordinates on a map.
- Play **Where is it?**

Materials

- Student Guides — *class set*
- Large map of Andorania — *one (for classroom display)*

Procedure

1. Distribute the Student Guides and direct students to page 5, **Latitude and Longitude**. Read the information as a class, individually, or in flight teams.

2. Briefly discuss latitude and longitude with the students, answering questions and ensuring understanding.

3. To reinforce the ability of students to accurately determine the latitude and longitude of specific locations, play a game of **Where Is It?** (see directions on page 10.)

4. After finishing **Where Is It?**, collect the Student Guides.

Latitude and longitude may be difficult for some students to understand. It will help if students have access to a globe, to help them locate the Equator and the Prime Meridian.

WHERE IS IT?

Directions

a. Use the **Andorania Map** in the Student Guide.
b. Divide the class so the flight teams are sitting together.
c. Read the names of cities on the Andorania Map. Ask students to locate the cities named to the nearest latitude and longitude.
d. Ask the flight teams sequentially.
   — If the first flight team locates the city correctly, it gets a point, good for extra miles on the first day's flight.
   — If the first flight team answers incorrectly, it receives no penalty but the second flight team gets the chance to locate the same city.
   — Address the next city to the third flight team.
   — Continue through several rounds of questions and answers, allowing map reading experiences for all flight teams.
e. Read the cities as listed. You may decide to limit the amount of time you allow the flight team members to arrive at their answer.
f. Keep track of correct answers and reward teams for being able to accurately determine latitude and longitude.
   — Each correct answer earns a flight team ten extra miles (or 16 km) on the first day of the race.

TEACHING TIP

For example, if a flight team earns 3 points, it can travel an extra 30 miles (or 48 extra kilometers) over the 450 miles allowed.

City	Correct latitude and longitude
1. Dellor	*50° N and 154° W*
2. Gobiton	*31° N and 159° W*
3. Karuz	*21° N and 171° W*
4. Tam	*28° N and 158° W*
5. Rayjan	*41° N and 155° W*
6. Malgo	*46° N and 170° W*
7. Atkins	*50° N and 164° W*
8. Old Town	*34° N and 164° W*
9. Borkin	*40° N and 169° W*
10. Lake Town	*43° N and 165° W*
11. South Stor	*31° N and 155° W*
12. Fitz	*30° N and 156° W*
13. Melbro	*43° N and 155° W*
14. Anstel	*50° N and 155° W*
15. Port Gobi	*30° N and 164° W*

DAY 4

Objectives

- Review facts about the scale of a map.
- Make a scale and use it to find distances on a map.
- Study map of Andorania.

Materials

- Student Guides — *class set*
- Paper — *class set*
- Pencil — *class set*
- Ruler — *class set*

Procedure

1. Distribute the Student Guides and direct students to page 6, **Scale of Distance**. Read the information as a class, individually or in flight teams.

2. Briefly discuss scale with the students, answering questions and ensuring understanding. Have students use their rulers to determine distances on the map. Do this informally.

3. To reinforce the ability of students to accurately determine scale, have each flight team prepare one or more moveable scales as described in the Student Guide.
   a. Distribute or have students take out paper, pencils, and rulers.
   b. Offer assistance as needed. Encourage students to measure accurately.
   c. Advise students to keep their moveable scales for future use.

4. As time permits, study and discuss the important geographic features on the Andorania map. Since students already know the cities, discuss the mountains and have students locate the various mountain passes. Also make certain students know where the deserts, rivers, and forests are located.

5. Collect the Student Guides.

You may take more time teaching about scale on a map. Students may make their own map of their neighborhood or their route to school (by bus, car, bicycle, or foot) or may trace a map of their city and list places of interest. Place these student-created maps on the bulletin board.

Race Day 1

Objectives

- Introduce flight team **Pre-Flight Preparation**
- Introduce **Rules of the Race**
- Learn how to complete a FLIGHT PLAN

Materials

- Student Guides — *class set*
- FLIGHT PLANS — *one per flight team*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Distribute the Student Guides and direct students to page 2, **Pre-Flight Preparation**. Read the information as a class, individually, or in flight teams.

2. Discuss the flight team role responsibilities with the students. Make certain each person on the team knows what to do. If you have not already assigned roles within the flight teams, allow time for students to assign jobs.

3. Assign or allow teams to select a team color that corresponds to a colored pushpin. Place the pushpins near the legend on the large classroom Andorania Map.

4. Direct students to page 2, **Rules of the Race**. Read the information as a class, individually, or in flight teams. Discuss the Rules of the Race with the students answering questions and ensuring understanding.

PRE-FLIGHT PREPARATION

Each team member has a specific job and is responsible for his or her own job. You also work as a team, helping one another complete all the jobs each round.

Pilot The Pilot is in charge, and is the chief decision-maker. The pilot receives the completed Flight Plans from the Navigator, checks them to make certain they are complete, and files them with the teacher. The pilot draws the Fate Cards. The pilot also checks that the diary entry is complete and full of interesting details.

Co-pilot The Co-pilot keeps track of what happens and writes the diary entry. The co-pilot also completes the tasks of the Pilot or the Navigator if either is absent or out of the room when a decision has to be made.

Navigator The Navigator reads the map, recommends the best route, fills out the Flight Plan, and hands it to the Pilot. The Navigator leads any discussion about the route.

RULES OF THE RACE

1

Your teacher may assess a penalty for an inaccurate Flight Plan and return it to be completed again.

4

Teams cannot go more than the maximum distance, even if a city is only a short distance farther.

8

You lose distance because you must travel at a higher altitude.

1. The Navigator of each flight team fills out an accurate Flight Plan each round.
2. No student may move any team's marker on the large classroom map without the teacher's approval.
3. The destination for each round must be a city. Do not plan to land your plane anywhere else.
4. The maximum distance for each round is 450 miles (724 kilometers).
5. If a Fate Card indicates weather, mechanical, or some other problem, you must land at a city within the given number of miles. If you can find no city, you must make a forced landing, suffer a one-day flight penalty, and return to your last city of departure before continuing the race.
6. The Co-pilot prepares a diary entry at the end of each round.
7. All mountains are presumed to be over 10,000 feet (3,048 meters) high, unless you go through a pass (5,000 feet).
8. If your airplane must cross over mountains (except passes), you may not travel more than 500 miles (805 kilometers) during that round. You may cross passes at a regular altitude.
9. If a Fate Card indicates problems at a certain city or place, the problems affect only the team drawing the Fate Card.

5. Distribute the FLIGHT PLANS to the flight team Navigators. Direct students to the **Sample Flight Plan** on page 8 of their Student Guides and review how students will complete their FLIGHT PLANS.
   a. Emphasize that accuracy is essential.
   b. Emphasize that the Andorania maps in their Student Guides are the basis for accuracy. Recommend that they not compute distances using the enlarged classroom map.
   c. Remind the flight team Pilots that they must check the accuracy of the FLIGHT PLANS before handing them in.

SAMPLE FLIGHT PLAN

Date: 11 / 17 / **Team Color**: Blue

Team Name: JoJiMar

- City of departure this round: Stelli
- City of destination this round: Mestor
- Day's total flight distance: 450 miles
- Direction: NE
- Major cities flying over or near: Venn
- Day's weather forecast: fair and warm
- Maximum elevation for today: 2,000 feet
  (1,500-2,000 feet is normal; mountain passes are 5,000 feet.)
- Major land areas to cross: Rayjan River
  (Include rivers, mountains, deserts, forests, swamps, coastlines.)
- Parallels (latitude lines) to cross: 40° N
- Meridians (longitude lines) to cross: 155° W

6. Announce the beginning of the race:

   "The race is now ready to begin.

   "All airplanes depart from Karuz, Boracai. This is your departure city.

   "The race will end at Morgan Town, Morgania. This is your final destination.

   "Weather today is fair and warm. No bad weather is expected, though a possibility of bad weather exists.

   "Flight teams will now fill out their first FLIGHT PLANS. Pilots hand them in when they are finished."

7. As FLIGHT PLANS are handed in, check them for accuracy.
   a. Allow the students a 25-mile leeway in figuring their distances for this first flight plan.
   b. Return any that are inaccurate.

8. Refer to the **Air Miles Charts** (on page 36) to confirm that the students have correctly computed distances.

9. Collect the Student Guides.

Consider assessing a 50-mile penalty every time a FLIGHT PLAN must be redone in order to motivate students to check their work carefully.

*The **Air Miles Charts** includes distances between most cities and towns to which students teams might travel on any given Race Day. Distances of less than 200 miles or more than 600 miles are not computed.*

RACE DAY 2

Objectives

- Students participate in the air race.
- Students learn how to complete a DIARY ENTRY.

Materials

- Student Guides — *class set*
- DIARY ENTRY — *one per flight team*
- FATE CARDS — *one set*
- FLIGHT PLANS — *one per flight team*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Distribute the Student Guides. Have the Pilot of each flight team draw a FATE CARD using one of the following procedures:
   - Allow Pilots to draw alphabetically based on team names.
   - Allow Pilots to draw randomly.
   - Reward exemplary work in this or other academic work as an incentive to allow Pilots to draw first.
   - Reward positive behaviors as incentives to allow flight teams to draw first.

2. Flight teams adjust their flight plans for Race Day 1 according to the information on their FATE CARDS. Flight team Pilots move their pushpins on the large classroom Andorania Map.

3. Each flight team member draws the team's flight path on the Andorania Map in his or her Student Guide. Answer any student questions.

4. Draw students' attention to page 8 of the Student Guide. Review with the students your expectations for the quality of Diary Entries students will produce. Distribute the DIARY ENTRY forms.

5. Co-pilots write DIARY ENTRIES for Race Day 1. Have other flight team members check the entry for correct spelling and grammar.

SAMPLE DIARY ENTRY

Date: November 17
Team Name: JoJiMar
Team Members: John, Jim and Mary
Team Color: Blue

Today we had planned to fly from Stelli to Mestor. We expected to have a peaceful flight over the beautiful Rayjan River. Everything started out fine. The engine sounded right. The weather was satisfactory with only a few high clouds in the sky. Our visibility was outstanding. We could see for many miles.

Then suddenly our luck changed. Our plane's compass began wavering crazily. We started worrying about being able to know exactly where we were, when we looked down and saw the city of Venn not far away. We landed at their airport and turned our plane over to a mechanic. By evening the compass was repaired.

We went into town for a solid meal. We ate at the Atlantis restaurant. Our main course was a fish called the Stor. It has a fat body, and a delicious taste quite a bit like a trout. We stayed the night in the Rayjan View Hotel, which overlooks the Rayjan River. The river was so close to our room that we could hear it gurgling in the lonely darkness as we drifted off to sleep. We took the happy river sounds as a good luck symbol for tomorrow's flight.

6. Announce the weather conditions for Race Day 2:

   "There are strong headwinds today.
   No airplane may go more than 450 miles
   (724 kilometers) maximum."

7. Teams fill out and file FLIGHT PLANS for Race Day 2.

8. Check the FLIGHT PLANS for accuracy.

9. Collect the Student Guides.

*Refer to the **Air Miles Charts** to confirm that the students have correctly computed distances.*

RACE DAY 3

Objectives

- Students participate in the air race.

Materials

- Student Guides — *class set*
- DIARY ENTRY — *one per flight team*
- FATE CARDS — *one set*
- FLIGHT PLANS — *one per flight team*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Distribute the Student Guides. Have the Pilot of each flight team draw a FATE CARD using your preferred procedure.

2. Flight teams adjust their flight plans for Race Day 2 according to the information on their FATE CARDS. Flight team Pilots move their pushpins on the large classroom Andorania Map.

3. Each flight team member draws the team's flight path on the Andorania Map in his or her Student Guide. Answer any student questions.

4. Co-pilots write DIARY ENTRIES for Race Day 2. Have other flight team members check the entry for correct spelling and grammar.

5. Option: Announce that team members will switch roles for the next leg of the race.
   - The Pilot will be the Navigator.
   - The Navigator will be the Co-pilot.
   - The Co-pilot will be the Pilot.

6. Announce the weather conditions for Race Day 3:

   "Patches of early morning fog today. Unsettled conditions mean possible storms later."

7. Teams fill out and file FLIGHT PLANS for Race Day 3.

8. Check the FLIGHT PLANS for accuracy.

9. Collect the Student Guides.

*Refer to the **Air Miles Charts** to confirm that the students have correctly computed distances.*

You may continue distributing and collecting the Student Guides for the next day or two then put them aside. Your students may need to continue to refer to the Job Descriptions, Rules and/or the model Flight Plans and Diary Entries.

RACE DAY 4

Objectives

- Students participate in the air race.

Materials

- Student Guides — *class set*
- DIARY ENTRY — *one per flight team*
- FATE CARDS — *one set*
- FLIGHT PLANS — *one per flight team*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Have the Pilot of each flight team draw a FATE CARD using your preferred procedure.

2. Flight teams adjust their flight plans for Race Day 3 according to the information on their FATE CARDS. Flight team Pilots move their pushpins on the large classroom Andorania Map.

3. Each flight team member draws the team's flight path on the Andorania Map in his or her Student Guide. Answer any student questions.

4. Co-pilots write DIARY ENTRIES for Race Day 3. Have other flight team members check the entry for correct spelling and grammar.

5. Option: Announce that team members will switch roles for the next leg of the race.
   - The Pilot will be the Navigator.
   - The Navigator will be the Co-pilot.
   - The Co-pilot will be the Pilot.

6. Announce the weather conditions for Race Day 4:

   "There are strong tailwinds today. Maximum distance is increased to 675 miles (1086 kilometers)."

7. Teams fill out and file FLIGHT PLANS for Race Day 4.

8. Check the FLIGHT PLANS for accuracy.

RACE DAY 5

Objectives

- Students participate in the air race.

Materials

- Student Guides — *class set*
- DIARY ENTRY — *one per flight team*
- FATE CARDS — *one set*
- FLIGHT PLANS — *one per flight team*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Have the Pilot of each flight team draw a FATE CARD using your preferred procedure.

2. Flight teams adjust their flight plans for Race Day 4 according to the information on their FATE CARDS. Flight team Pilots move their pushpins on the large classroom Andorania Map.

3. Each flight team member draws the team's flight path on the Andorania Map in his or her Student Guide. Answer any student questions.

4. Co-pilots write DIARY ENTRIES for Race Day 4. Have other flight team members check the entry for correct spelling and grammar.

5. If a flight team reaches Morgan Town, declare that team the winner of the race. If no flight team reaches the destination city by the end of Race Day 4 (or if more than one flight team reaches the destination city) the Bonus Round will determine the winner.

6. **Bonus Round Procedures**
   a. Flight teams turn in their DIARY ENTRIES for Race Days 1-4.
   b. Read the entries before the next class and award extra mileage for the Bonus Round.
   c. Award bonus distances for the Bonus Round as follows:

SCORING FOR DIARY ENTRIES

500 miles (805 km)	for DIARY ENTRIES that are complete for each day and show more imagination than the sample in the Student Guide.
400 miles (644 km)	for DIARY ENTRIES that are complete for each day and show about the same amount of imagination as the example in the Student Guide.
300 miles (483 km)	for DIARY ENTRIES that are complete but rather dull—perhaps just a rehash of the information on the daily FLIGHT PLAN.
200 miles (322 km)	for DIARY ENTRIES that are partially complete.
100 miles (161 km)	for DIARY ENTRIES that are incomplete, but turned in.
No bonus miles	for DIARY ENTRIES not turned in.

Day 10

Objectives

- Bonus Round miles announced.
- Winning flight team announced.
- Students evaluate the simulation.
- Students take the POSTTEST.

Materials

- WINNERS CERTIFICATE — *three or more*
- PRE/POST-TEST — *class set*
- Large map of Andorania — *one (for classroom display)*
- Pencils — *class set*
- Pushpins (various colors) — *one per flight team*

Procedure

1. Announce the Bonus Round distances for each flight team.

2. Flight team Pilots move their colored pushpins on the large classroom Andorania Map.

3. Announce the winners of the race and award WINNERS CERTIFICATES to each member of the winning team(s).

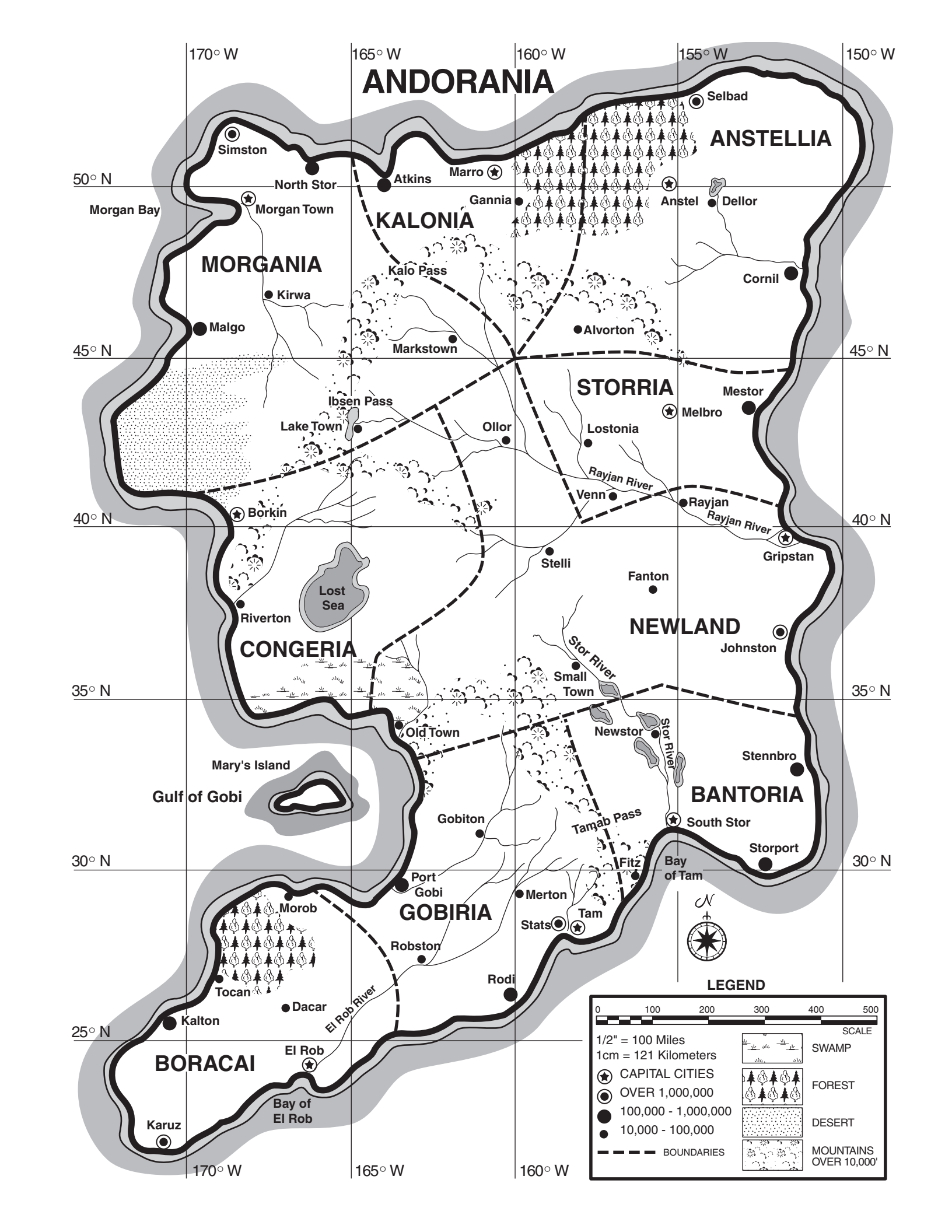
4. Distribute the PRE/POST TEST and have students complete.

5. Debrief the simulation by asking students what they have learned. During this portion of the discussion, include the following important points:
   a. Map symbols
   b. Latitude and longitude
   c. Scale

6. Debrief students' attitudes and evaluate flight teams' race strategies. During this portion of the discussion, include these important points:
   a. Did you feel as though you were in a race?
   b. Did you and other team members agree on what to do?
   c. If you did not always agree, how did you settle your differences?
   d. If you were doing the same race again, how would you change your route?

7. Debrief students' attitudes about the simulation itself. During this portion of the discussion, include the following important points:
   a. Did this simulation give you a better understanding of an airplane race?
   b. Did the FATE CARDS help or hinder you? How would you change them?
   c. What are the simulation's strongest points?
   d. What are the simulation's weakest points?
   e. Do you recommend that other students participate in this simulation? If *No*, why not? If *Yes*, why?
   f. How would you improve the simulation?

8. ***Optional Activity***: If your schedule allows, offer students the opportunity for a return race.
   a. Involve a different part of the map, or require stopovers at specific cities. For example: Race from Morgan Town, MR to South Stor, BA, with a required stop-over (overnight) at Dellor, AN.
   b. Use one of your resource maps for a second race.


ANDORANIA
ANSTELLIA
KALONIA
MORGANIA
STORRIA
NEWLAND
CONGERIA
BANTORIA
GOBIRIA
BORACAI
Selbad
Simston
Atkins
Marro
North Stor
Morgan Bay
Morgan Town
Gannia
Anstel
Dellor
Kalo Pass
Cornil
Kirwa
Malgo
Alvorton
Markstown
Mestor
Melbro
Ibsen Pass
Lake Town
Ollor
Lostonia
Rayjan River
Venn
Rayjan
Borkin
Gripstan
Stelli
Fanton
Lost Sea
Riverton
Johnston
Stor River
Small Town
Old Town
Newstor
Mary's Island
Gulf of Gobi
Stennbro
Gobiton
Tamab Pass
South Stor
Storport
Fitz
Bay of Tam
Port Gobi
Merton
Tam
Stats
Morob
Robston
Rodi
Tocan
Dacar
Kalton
El Rob River
El Rob
Bay of El Rob
Karuz
170° W
165° W
160° W
155° W
150° W
50° N
45° N
40° N
35° N
30° N
25° N
LEGEND
0 100 200 300 400 500
SCALE
1/2" = 100 Miles
1cm = 121 Kilometers
CAPITAL CITIES
OVER 1,000,000
100,000 - 1,000,000
10,000 - 100,000
BOUNDARIES
SWAMP
FOREST
DESERT
MOUNTAINS OVER 10,000'

FATE CARDS (blanks)

FLIGHT

FATE CARDS

FLIGHT

Fog delays your takeoff and cuts down the maximum distance for the round to 250 miles (415 kilometers).	Gas leak forces you to set down 200 miles (330 kilometers) from takeoff or to return to your departure city for repairs. You must wait until the next round.
Your radio malfunctions. You must land at the city nearest to your departure city. Repairs delay you until the next round	At 200 miles (330 kilometers) out, your compass began wavering and needed repair. You must land at the nearest city and wait the balance of the round for repairs.
Fog closes the destination airport. You must find an alternate city, within the distance requirements.	No gas at one stop. You must delay one round for a new supply.
At 100 miles (170 kilometers) out, a storm came up. You must find an airfield within 50 miles (80 kilometers) or you must return to your departure city and wait until the next round.	After you had gone 50 miles (80 kilometers), you encountered a severe sleet storm. You had to land within 50 miles for repairs, which ends your flight this round.

FATE CARDS

FLIGHT

No problems today. You had a safe trip.	You arrived safely at your destination.
You arrived safely at your destination.	You arrived safely at your destination.
You arrived safely at your destination.	A turbulent high wind forces you to fly at an elevation below 10,000 feet (3,048 meters). If you had planned to go over mountains (except passes) this round, you must turn back or try to go around them. If there are no mountains in today's round, land safely at destination. Remember that mountain passes are all more than 10,000 feet in elevation.
You had sunny skies today. You landed 30 minutes ahead of schedule.	Your navigator suddenly comes down with the flu. You must land at the city nearest the halfway point. This ends today's round.

FATE CARDS

FLIGHT

Dust storms over desert. If you plan to fly over the desert this round, turn back and land at nearest city before the desert, or go around. If there are no deserts in today's flight, you have a safe trip.	Your landing gear buckled as you landed at your destination. You lose half a day making repairs (You can only go half of the maximum next round.)
A light drizzle keeps you worried all day, but you land at your destination safely.	NEWLAND grounds all airplanes today for a safety check. If your city of departure was in NEWLAND, you cannot fly this round. Otherwise, you have a safe trip.
All airplanes within 100 miles (170 kilometers) of the Lost Sea are asked to search for survivors of a shipwrecked boat. If you are within that distance of the Lost Sea today, you must land at Riverton. Otherwise, you have a safe trip.	This is the tornado season. If you are crossing the area of the map between 40°-45° N and 155°-160° W, you are grounded for this round. Otherwise, you have a safe trip.
This is the tornado season. If you are crossing the area of the map between 40°-45° N and 155°-160° W, you are grounded for this round. Otherwise, you have a safe trip.	Ice on your wings forces you to go only half-way and land at a city nearest your halfway point. This ends today's round.

FATE CARDS

FLIGHT

Soon after takeoff, a stowaway is found in your plane. He produces a weapon and forces you to fly toward Alvorton. If you cannot reach Alvorton this round, you must fly your maximum distance in that direction and land at the nearest city to drop off the hijacker.	Heavy rains fall in lowland areas of Andorania. No flying over marshlands or forests this round. Bypass them if you were planning to fly over them.
Strong turbulent winds move over the desert this round. No flying is allowed over the desert area. If you are not flying over the desert, you have a safe flight.	The government of Storria has grounded all private planes for the day while they search for a large illegal drug shipment. If you are departing from Storria, you may not fly this round.
Light rains this round cut down visibility in latitudes between 30°-40° N. If you are flying in that area, cut your distance in half. If not, you have a safe trip.	Borkin is heavily fogged in all morning. If you are departing from Borkin, you may fly only one-half of the maximum miles this round.
Storms are expected near the coastlines. No flying within 100 miles (170 kilometers) of coastal areas this round. Change your course if you have to.	Large storm front hits the mountain area from Lake Town north to Kalo Pass. No travel across these mountains this round. Bypass them if you were planning to fly over them.

FATE CARDS

FLIGHT

Heavy rains have caused the Rayjan River to flood. These floodwaters have closed the airports at Ollor, Lostonia, Venn, Rayjan, and Gripstan. If you were to depart from one of these airfields, you are grounded until tomorrow. If you planned to land at one of these airfields, you must find an alternate destination.	Your plane's co-pilot suddenly starts vomiting. You must land at the nearest city for medical help. If your navigator can pitch a coin into a wastebasket from 15' on the first try, the medicine miraculously cures the illness and you fly on to your destination with strong tail winds. If the toss misses, you are grounded until the next round.
The airfield at Port Gobi is closed to all incoming and outgoing flights this round because hijackers are holding a plane on the main runway. If you are departing from Port Gobi, you cannot take off this round. If you have Port Gobi as your destination, you must find an alternate city.	A large crow flies into your propeller, denting if. You must land at the nearest city and get it repaired. You are delayed until the next round.
An uneventful flight. You landed safely.	An uneventful flight. You landed safely.
An uneventful flight. You landed safely.	Halfway out, your airplane was hit by lightning during a severe storm. You had to set down immediately. If there is not a city within 50 miles (80 kilometers) of your Fight Plan's halfway point, you must make an emergency landing in a field. In such a case repairs will delay you a day.

PRE/POST-TEST

FLIGHT

Name: _____

Directions: Write T (True) or F (False) in the provided space.

____ 1. A scale on a map shows weight.

____ 2. A scale might be given in kilometers.

____ 3. All maps have the same scale (you can use one scale on other maps).

____ 4. A map symbol for forests is 

____ 5. 0° latitude is the Equator.

____ 6. A pass is the highest point in the mountains.

____ 7. When elevation is given in color, green usually means lowlands.

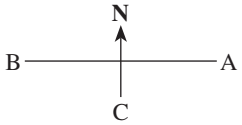
____ 8. A star  on a map usually means a capital city.

____ 9. A map symbol for a boundary is

____ 10. A compass rose is a flower.

____ 11. A map's legend is the part that shows latitude and longitude.

____ 12. Usually the top of the map is north.



____ 13. In this diagram, east is point A.

____ 14. In the diagram in number 13, point B is west.

____ 15. Latitude lines are also called parallels.

____ 16. Longitude lines are also called meridians.

____ 17. A map symbol for mountains is 

____ 18. The Prime Meridian is located at 20° E.

____ 19. Airplane pilots have to file flight plans, as a rule.

____ 20. Flight plans show estimated elevation and destination.

____ 21. The destination is the city or airport where the airplane will land.

____ 22. A navigator of an airplane repairs the motor.

____ 23. Elevation means how high a person or place is above sea level.

____ 24. Fog might present a problem to airplane flights.

____ 25. A tail wind would slow an airplane's speed in the air.

FLIGHT TEAMS ROSTER

FLIGHT

TEAM 1	Members _____ Team Name _____ Team Color _____
TEAM 2	Members _____ Team Name _____ Team Color _____
TEAM 3	Members _____ Team Name _____ Team Color _____
TEAM 4	Members _____ Team Name _____ Team Color _____
TEAM 5	Members _____ Team Name _____ Team Color _____
TEAM 6	Members _____ Team Name _____ Team Color _____
TEAM 7	Members _____ Team Name _____ Team Color _____
TEAM 8	Members _____ Team Name _____ Team Color _____
TEAM 9	Members _____ Team Name _____ Team Color _____
TEAM 10	Members _____ Team Name _____ Team Color _____
TEAM 11	Members _____ Team Name _____ Team Color _____
TEAM 12	Members _____ Team Name _____ Team Color _____

FLIGHT PLAN

Date:_____ **Team Color:** _____

Team Name: _____

- City of departure this round: _____
- City of destination this round: _____
- Day's total flight distance: _____
- Direction: _____
- Major cities flying over or near: _____
- Day's weather forecast: _____
- Maximum elevation for today: _____
  (1,500-2,000 feet is normal; mountain passes are 5,000 feet.) _____
- Major land areas to cross: _____
  (Include rivers, mountains, deserts, forests, swamps, coastlines.) _____
- Parallels (latitude lines) to cross: _____
- Meridians (longitude lines) to cross: _____

FLIGHT PLAN

Date:_____ **Team Color:** _____

Team Name: _____

- City of departure this round: _____
- City of destination this round: _____
- Day's total flight distance: _____
- Direction: _____
- Major cities flying over or near: _____
- Day's weather forecast: _____
- Maximum elevation for today: _____
  (1,500-2,000 feet is normal; mountain passes are 5,000 feet.) _____
- Major land areas to cross: _____
  (Include rivers, mountains, deserts, forests, swamps, coastlines.) _____
- Parallels (latitude lines) to cross: _____
- Meridians (longitude lines) to cross: _____

FLIGHT

FLIGHT PLAN

DIARY ENTRY

FLIGHT

Date: _____ Team Name: _____ Team Color: _____

Directions

1. Use your Flight Plan as a guide for your trip.
2. Write in complete sentences.
3. Diary Entries that completely describe the day's flight and that include interesting and imaginative details will earn bonus miles at the end of the race.

AIR-MILES CHART

FLIGHT

	Alvorton	Anstel	Atkins	Borkin	Cornil	Dacar	Dellor	El Rob	Fanton	Fitz	Gannia	Gobiton	Gripstan	Johnston	Kalton	Karuz	Kirwa	Lake Town	Lostonia	Malgo	Markstown	Marro	Mary's Island	Melbro
Alvorton		300	425		400		325		475		275		525				575	450	200		225	325		225
Anstel	300		500		275														475		475	300		400
Atkins	425	500									250						300	425		400	300	200		
Borkin																	400	275		325	500		500	
Cornil	400	275											475						475			550		325
Dacar												450			200	325							375	
Dellor	325																		475		525	400		375
El Rob												500			275	300							475	
Fanton	475									525		525	250	250					275		575			
Fitz									525			275		500									550	
Gannia	275		250														475	500			275			450
Gobiton						450		500	525	275														
Gripstan	525				475				250										400					
Johnston									250	500									475					450
Kalton								275								200							475	
Karuz						325		300							200									
Kirwa	575		300	400							475							300			350	450		
Lake Town	450		425	275							500						300		425	350	250	525		575
Lostonia	200	475			475		475		275				400	475				425			300	525		
Malgo			400	325														350			475			
Markstown	225	475	300	500			525		575		275						350	250	300	475		300		400
Marro	325	300	200		550		400										450	525	525		300			525
Mary's Island				500		375		475		550					475									
Melbro	225	400			325		375				450			450				575			400	550		
Merton						475		475	600	200														
Mestor	350	425			250		375		375		550		250	400					300					
Morgan Town			250	550							475							450		250	450	450		
Morob						200		300				375			325	475							200	
Newstor									275	250		375	425	275					525				600	575
North Stor											375						250	475		350	400	325		
Old Town				475		550			525	500		250						550						
Ollor	225	525	500	500					375		425		525				500	375				475		300
Port Gobi						300		350		425					475								200	
Rayjan	350	550			450		550							275					200		500			
Riverton																	550	375		500			350	
Robston						250		275		400		250			475	575							325	
Rodi						400		375		300		300											475	
Selbad	450				350						375											375		550
Simston			275								550						300	575		350	550	475		
Small Town	600								200	375		350	450	375				575	400				500	575
South Stor									400			350	550	375								600		
Stats						500		500				225											450	
Stelli	400								200			525	425	450				400	200		425	600		325
Stennbro									400	350			425	250										
Storport									525			525	575	400										
Tam						550		550				250											500	
Tocan								225				550				300							350	
Venn	300	575			500		550				550		325	375				475			400			200

AIR-MILES CHART

FLIGHT

	Merton	Mestor	Morgan Town	Morob	Newstor	North Stor	Old Town	Ollor	Port Gobi	Rayjan	Riverton	Robston	Rodi	Selbad	Simston	Small Town	South Stor	Stats	Stelli	Stenbro	Stor Port	Tam	Tocan	Venn
Alvorton		350				550		225		350				450					400					300
Anstel		425						525		550														575
Atkins			250					500							275									
Borkin			550				475	500																
Cornil		250								450				350										500
Dacar	475						550		300			250	400					500				550		
Dellor		375								550														550
El Rob	475			300					350			275	375					500				550	225	
Fanton	600	375			275		525	375								200	400		200	400	525			
Fitz	200				250		500		425			400	300			375				350				
Gannia		550	475			375		425						375	550									550
Gobiton				375	375		250					250	300			350	350	225	525		525	250	550	
Gripstan		250			425			525								450	550		425	425	575			325
Johnston		400			275					275						375	375		450	250	400			375
Kalton				325					475			475												
Karuz				475								575											300	
Kirwa						250		500			550				300									
Lake Town			450			475	525	275			375				575	575			400					475
Lostonia		300			525					200						400			200					
Malgo			250			350					500				350									
Markstown		550	450			400				500					550				425					400
Marro			450			325		425			525			375	475									600
Mary's Island					600				200		350	325	475			500	600	450	600			500	350	
Melbro					575			300						550		575			325					200
Merton				425	375		375					200				425	300			550	450			
Mestor								425		200				550		550			450					275
Morgan Town																								
Morob	425						375		200			275	425					475				525	200	
Newstor							450		525	425			525					375	375	250	300	375		425
North Stor																								
Old Town	375			375				550	275		350	425	525			325	525	450	400			475	550	550
Ollor		550					550			325	550					425			200					200
Port Gobi				200	525		275				575		375			550	500					300	375	
Rayjan		200			425			325								350	575		250	525				
Riverton				525			350	550	575															
Robston	200			275			425									600	500	250				275	375	
Rodi				425	525		525		375							600	425						525	
Selbad		550																						
Simston																								
Small Town	425	550					325	425	500	350		600	600				325	450	200	425	475	450		300
South Stor	300						525		500	575		500	425			325		275	525	225		250		575
Stats				475	375		450		275			250				450	275			500	375			
Stelli		450			375		400	200		250	550					200	525							
Stennbro	550				250					525						425	225	500				475		575
Storport	450				300								500			475		375				350		
Tam				525	375		475		300			275				450	250			475	350			
Tocan				200			550		375			375	525											
Venn		275			425		550	200								300	525							

WINNER'S CERTIFICATE

FLIGHT

Congratulations!

The winning team of

_____

_____

_____

demonstrated mastery of map skills
and won the race across Andorania in

FLIGHT

Teacher _____ Date _____

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To help illustrate to others the experiential activities involved and to promote the use of simulations, we like to get photographs and videos 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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Age of Student: _____ (print)

Parent or Guardian: _____ (print)

Signature: _____ Date: _____

Address:

_____

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_____

_____

Phone: _____

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10200 Jefferson Blvd.
Culver City, CA 90232-0802
310-839-2436

FLIGHT

STUDENT GUIDE

INTRODUCTION

Welcome to FLIGHT. During this simulation you and your classmates will pretend you are airplane pilots and crew in a race across an imaginary continent called Andorania. Before the race begins, you will complete a Pretest to demonstrate how much you know about reading maps. Then, depending upon what map reading skills you and your classmates know, your teacher will review map symbols, the scale of distance, and latitude and longitude.

After you complete your map review, you and your classmates will form teams with three members each. Each person on the team has a job. You might be the Pilot, the Co-pilot, or the Navigator. Your teacher will notify you of your departure city and destination city. All teams have similar airplanes; your airplane cannot fly farther, higher or faster than the airplane of any other team.

During each round of the race your team will decide what route you will follow to reach your destination, then file your Flight Plan. After your teacher approves your Flight Plan, your team pilot draws a Fate Card which tells whether your airplane has a successful trip or if something happens to complicate your trip. You might fly all of the way without any problems, or the weather may suddenly change, or something may go wrong in your aircraft. Your team may have to make quick decisions. Your problem may be so serious that you will be forced to land at the nearest airport. Following each day's flight your Navigator writes a daily diary entry that tells what happened to your team and how your team reacted to the events.

Your team files a flight plan, draws a Fate Card, moves your airplane marker on the large classroom map, and writes a diary entry for every day of flight during the race. The first team to reach its destination city is the winner. If no team reaches its destination city by the end of the fourth round, then a Bonus Round is held. The quality of your diary entries determines your Bonus Round distance. The team that has flown the longest distance at the end of the Bonus Round is the winner.

During your exciting FLIGHT race you will practice map skills as you plan and carry out your racing strategy. Good luck!

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Interact
Learn Through Experience

PRE-FLIGHT PREPARATION

Each team member has a specific job and is responsible for his or her own job. You also work as a team, helping one another complete all the jobs each round.

Pilot The Pilot is in charge, and is the chief decision-maker. The pilot receives the completed Flight Plans from the Navigator, checks them to make certain they are complete, and files them with the teacher. The pilot draws the Fate Cards. The pilot also checks that the diary entry is complete and full of interesting details.

Co-pilot The Co-pilot keeps track of what happens and writes the diary entry. The co-pilot also completes the tasks of the Pilot or the Navigator if either is absent or out of the room when a decision has to be made.

Navigator The Navigator reads the map, recommends the best route, fills out the Flight Plan, and hands it to the Pilot. The Navigator leads any discussion about the route.

RULES OF THE RACE

LEARNING TIP

1

Your teacher may assess a penalty for an inaccurate Flight Plan and return it to be completed again.

1. The Navigator of each flight team fills out an accurate Flight Plan each round.

2. No student may move any team's marker on the large classroom map without the teacher's approval.

3. The destination for each round must be a city. Do not plan to land your plane anywhere else.

4

Teams cannot go more than the maximum distance, even if a city is only a short distance farther.

4. The maximum distance for each round is 450 miles (724 kilometers).

5. If a Fate Card indicates weather, mechanical, or some other problem, you must land at a city within the given number of miles. If you can find no city, you must make a forced landing, suffer a one-day flight penalty, and return to your last city of departure before continuing the race.

6. The Co-pilot prepares a diary entry at the end of each round.

7. All mountains are presumed to be over 10,000 feet (3,048 meters) high, unless you go through a pass (5,000 feet).

8

You lose distance because you must travel at a higher altitude.

8. If your airplane must cross over mountains (except passes), you may not travel more than 500 miles (805 kilometers) during that round. You may cross passes at a regular altitude.

9. If a Fate Card indicates problems at a certain city or place, the problems affect only the team drawing the Fate Card.

MAP LEGENDS

Maps represent the world or part of it. You probably are acquainted with road maps, weather maps, or political maps.

A map's *legend* is the portion of the map that tells what all of the symbols and colors on the map mean. Become familiar with the following common symbols used on maps:

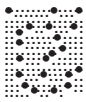
A star usually designates the **Capital City** of a nation or state.

A circle usually designates the location of a **City**. Maps use different city symbols to show the city's population.

Usually, the larger the size of the city, the larger the circle.

This is one symbol that stands for **Mountains**. Some maps use colors.

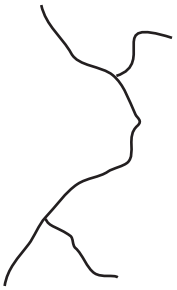
Lines of dots and dashes, in different combinations and lengths, designate **Boundaries** between nations, cities, counties, or other areas.



Irregular clusters of dots show sand or **Desert**s. Some maps also use color.

Miniature trees show **Forests**.

This symbol shows a marsh or **Swamp**.



An irregular line can be either a **Road** or a **River**. The legend shows which is which. Sometimes, rivers are blue and roads are red or black. If the legend doesn't tell, examine the lines carefully. If they end at a coastline or a lake, they are usually rivers. If they connect cities, they are usually roads.

This symbol stands for an **Airport**.

This is one symbol for a **Canal**.

This symbol along a river shows a **Dam**.

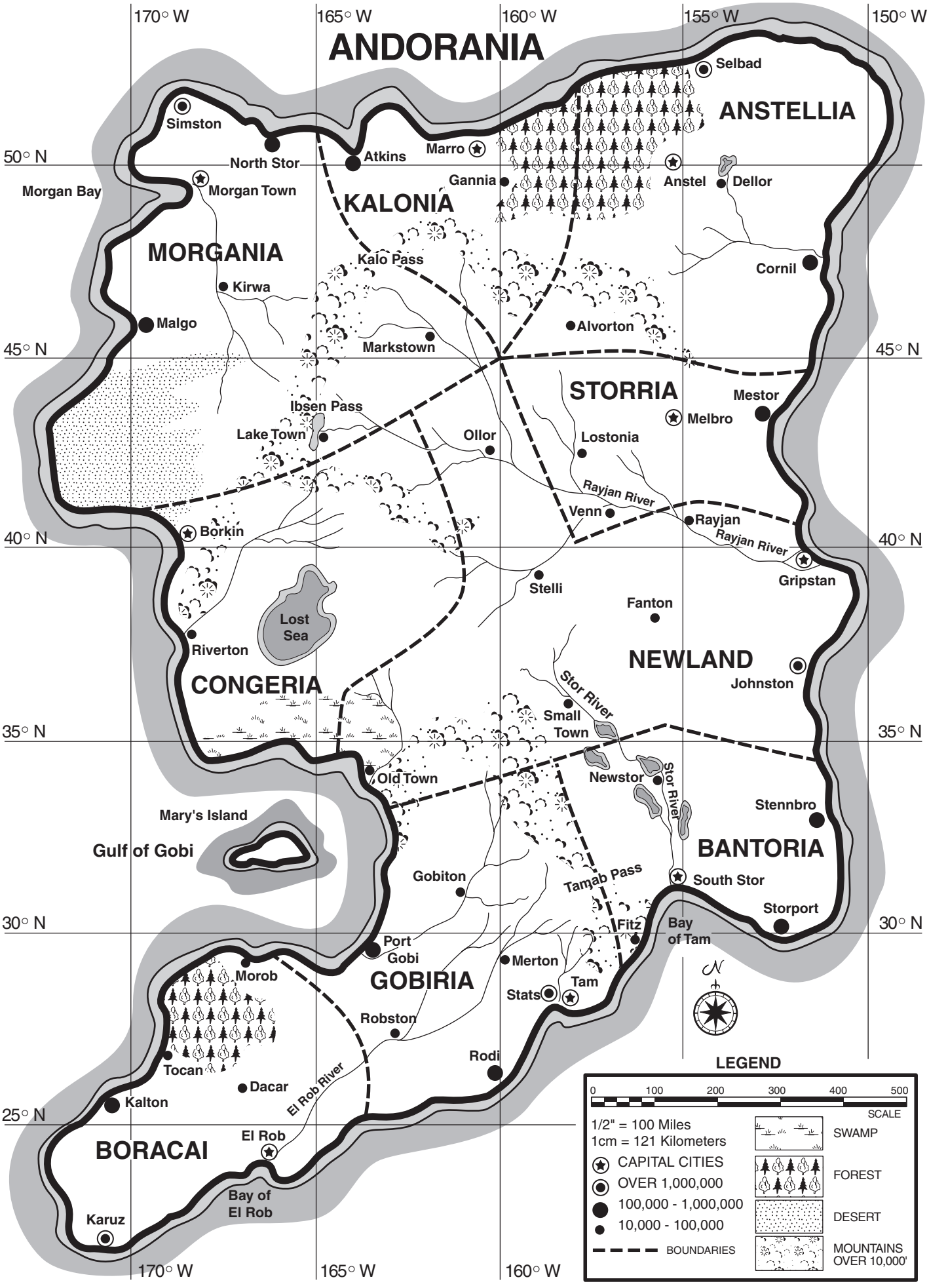
A **Compass Rose** points north on a map. The major points on a compass rose are N (North), E (East), S (South) and W (West). Usually North is at the top of a map and South is at the bottom. East is to the right of North and West is to the left. The secondary points are NE (Northeast), SE (Southeast), SW (Southwest) and NW (Northwest). South is opposite North on a compass rose.

Many people (and most airplane pilots) describe directions on a compass rose using degrees. (North is 360°, East is 90°, South is 180°, and West is 270°.)

Magnetic North is a few degrees away from True North, and only causes a problem when you use a compass to find direction. In this simulation, we use True North.

This is the symbol given for a **Bridge** or **Overpass**.

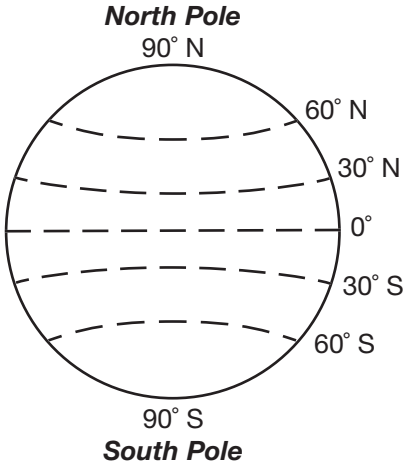
This symbol is for a **Railroad**.



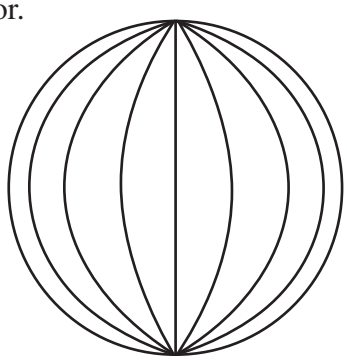
LATITUDE AND LONGITUDE

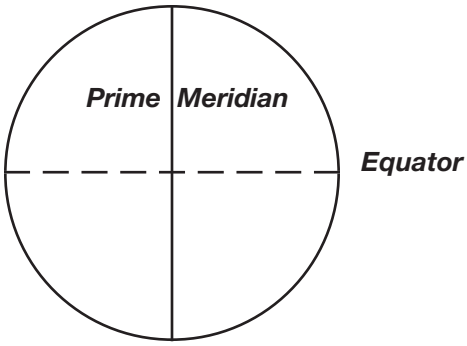
Cartographers draw latitude and longitude lines on maps to enable them to pinpoint specific locations on the earth.

Latitudes (also called parallels) are the lines drawn parallel to the equator on a globe or map. The equator is the line halfway between the North and South Poles. It is 0°. The North Pole is 90°N. The South Pole is 90°S. All parallels north of the equator include the designation N and those south include the designation S. For instance 45°N is the parallel halfway between the equator and the North Pole. (Of course, there is also a parallel that is 45°S.)

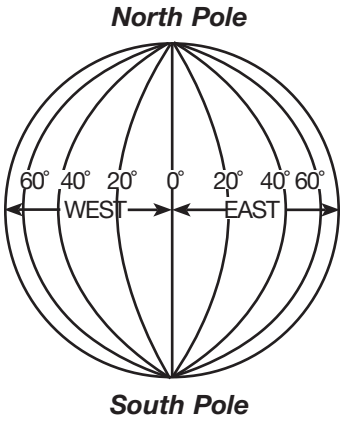


Longitudes (also called meridians) are north-south lines on a globe or map. They are not parallel because they meet at the North and South Poles. They are farthest apart at the equator.





Just as the equator is 0° latitude, there is also a 0° longitude line, called the Prime Meridian or the Greenwich Meridian.

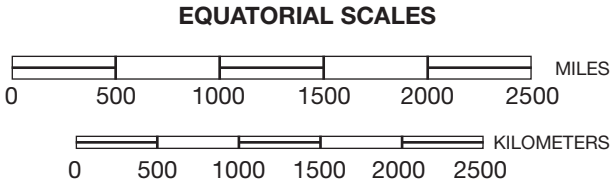


All other meridians are east or west of the Prime Meridian, except for 180°, which is halfway around the earth. There is, for example, a meridian 160°E and also one 160°W.

It is possible to find any place on the globe if you know its latitude and longitude. For instance, the tip of the island of Niihau in Hawaii is near 22°N, 159°W. On the Andorania map the city of Atkins is located at 50°N, 164°W.

SCALE OF DISTANCE

Almost every map includes a scale of distance, given in kilometers and/or miles. A scale may look like this:

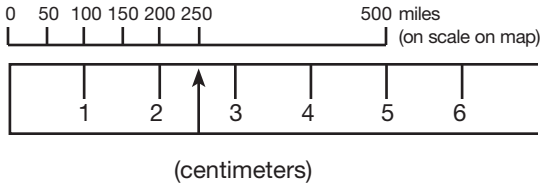


This scale can be used anywhere on the map that goes with it. However, it will not necessarily work with any other map, since every map has its own scale of distance.

How to Use a Scale

1. How can you use the map scale to find the distance between two cities on a map? One way is to use a ruler to measure the distance between the two cities.

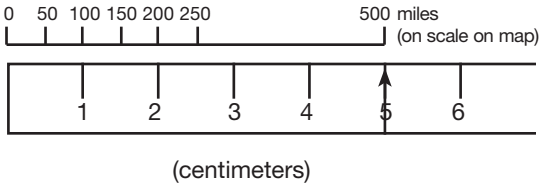
   For example, two cities on a map measure 2.5 centimeters from each other. Measure 2.5 centimeters on the scale for that map.



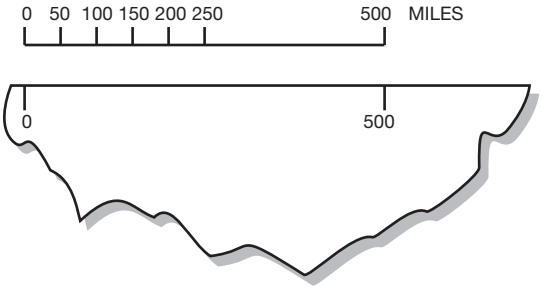
2. How can you find a certain distance from a specific point on the map? (This is what you will be doing during FLIGHT.)

   For example, how can you find a location 500 kilometers from the city of Small Town on the Andorania map?

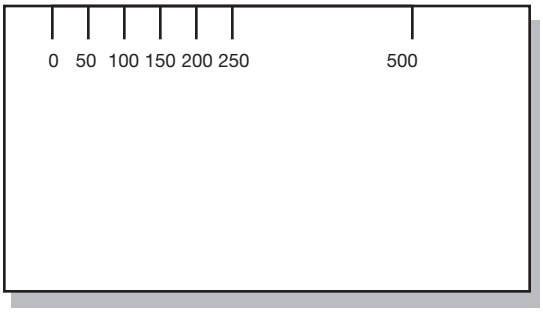
Method 1: Use a ruler to measure 500 miles on the scale, then use that same distance to measure on the map.



Method 2: Using the scale, mark the 500 miles on a piece of paper then place the paper on the map to find the 500-miles range.



Method 3: Copy the scale markings on a piece of paper or thin cardboard. This creates a moveable scale to use over and over again, anywhere on the map. (You can make such a scale any width.)



DIARY ENTRY EXPECTATIONS

Your daily Diary Entry is important to the success of your flight team. The more complete, rich and detailed your diary entry, the better score you will receive. Points earned for Diary Entries will boost your flight team's total miles traveled and may help you to win the race!

BONUS SCORING FOR DIARY ENTRIES

500 miles (805 km)	for DIARY ENTRIES that are complete for each day and show more imagination than the sample in the Student Guide.
400 miles (644 km)	for DIARY ENTRIES that are complete for each day and show about the same amount of imagination as the example in the Student Guide.
300 miles (483 km)	for DIARY ENTRIES that are complete but rather dull—perhaps just a rehash of the information on the daily FLIGHT PLAN.
200 miles (322 km)	for DIARY ENTRIES that are partially complete.
100 miles (161 km)	for DIARY ENTRIES that are incomplete, but turned in.
No bonus miles	for DIARY ENTRIES not turned in.

SAMPLE FLIGHT PLAN

Date: 11 / 17 / **Team Color:** Blue

Team Name: JoJiMar

- City of departure this round: Stelli
- City of destination this round: Mestor
- Day's total flight distance: 450 miles
- Direction: NE
- Major cities flying over or near: Venn
- Day's weather forecast: fair and warm
- Maximum elevation for today: 2,000 feet
  (1,500-2,000 feet is normal; mountain passes are 5,000 feet.)
- Major land areas to cross: Rayjan River
  (Include rivers, mountains, deserts, forests, swamps, coastlines.)
- Parallels (latitude lines) to cross: 40° N
- Meridians (longitude lines) to cross: 155° W

SAMPLE DIARY ENTRY

Date: November 17
Team Name: JoJiMar
Team Members: John, Jim and Mary
Team Color: Blue

Today we had planned to fly from Stelli to Mestor. We expected to have a peaceful flight over the beautiful Rayjan River. Everything started out fine. The engine sounded right. The weather was satisfactory with only a few high clouds in the sky. Our visibility was outstanding. We could see for many miles.

Then suddenly our luck changed. Our plane's compass began wavering crazily. We started worrying about being able to know exactly where we were, when we looked down and saw the city of Venn not far away. We landed at their airport and turned our plane over to a mechanic. By evening the compass was repaired.

We went into town for a solid meal. We ate at the Atlantis restaurant. Our main course was a fish called the Stor. It has a fat body, and a delicious taste quite a bit like a trout. We stayed the night in the Rayjan View Hotel, which overlooks the Rayjan River. The river was so close to our room that we could hear it gurgling in the lonely darkness as we drifted off to sleep. We took the happy river sounds as a good luck symbol for tomorrow's flight.