

GPS Community Survey Project

Mountain Ridge Middle School

Team 84: Deb Fox-Gliessman, Ellie Foust, Beth Peters, Karen Sprafke
February 21, 2010

Essential Question	<p>What is a community? How is Highlands Ranch a community? How is Team 84 (8-Fource-in-Motion) a community?</p> <p>How do we use geography to study a community?</p> <p>How do we use data and information to draw conclusions? How do we know data and information are accurate, relevant and significant?</p>
Information Resources	GIS software and/or Google Maps, GPS units, student-gathered data and information
Objective	<p>To create a “picture” of the Highlands Ranch community, collect information about the community at various locations along a route between Mountain Ridge Middle School and Dad Clark Park.</p> <p>This is a complete unit comprised of 4 separate lessons or tasks. This unit can be completed by an individual class or by an interdisciplinary group of students.</p>
<p>Task #1:</p> <p>Surface Background Knowledge about Longitude and Latitude</p> <p>Work on group cooperation skills</p>	<p><u>Activity - Create a Human World Map</u> Students will create a world map using GPS coordinates for major locations around the world. This is a fun activity to get students to: (1) renew their knowledge of longitude and latitude, hemispheres, and key points on the Earth’s surface, and (2) work effectively in groups.</p> <p><i>Management: This activity is a little chaotic but fun! Expect noise and confusion.</i></p> <p><u>Location</u></p> <ul style="list-style-type: none"> - Large open space (cafeteria, gym, outdoor space) - Space should be free of furniture and other obstacles <p><u>Materials</u></p> <ul style="list-style-type: none"> - World maps (1 for each team) that shows longitude and latitude - Location cards (half with place names, half with the corresponding coordinates) <p><u>Preparation</u></p> <ul style="list-style-type: none"> - Create a list of locations (<i>see Sample 1 below</i>) - Create 2 location cards for each location on the list (one with the location name, one with the corresponding longitude and latitude) <p><u>Instructions</u></p> <ul style="list-style-type: none"> - Divide students into groups of 3 or 4 - Use one group of students to stand at the anchor coordinates for your human map:

	<ul style="list-style-type: none"> ○ North Pole (0, +90) and ○ South Pole (0, -90) - Ask the remaining groups to identify one member as the Navigator, one member as the Place Name and one member as the Coordinates. - Have the class regroup by job assignment. - Provide all Navigators with a world map - Provide all Place Name members with a Place Name Card - Provide all Coordinates members with a Coordinates Card - Place your student “anchors” at their locations and orient the rest of the students to the quadrants on their human map – N, S, E, and W hemispheres. - Challenge each team to find their place in the world. Place Name members and Coordinates members (each possibly from different teams) will find each other with the help of their Navigators who will use their maps to help their team mates find their appropriate place on the human map. <p><u>Reflection (class discussion and journal entries)</u></p> <p>Discuss with students their observations about the activity.</p> <ul style="list-style-type: none"> - Did they understand longitude and latitude? - Did they recognize their location in relationship to other locations? - In what ways did their group work well together? - In what ways did their group work with other groups? - How could the group have been even more effective in working together?
<p>Task #2:</p> <p>Introduction to GPS technology, map reading, observation and data collection</p> <p>Work on group cooperation skills</p>	<p><u>Activity - GPS Challenge</u></p> <p>Students will use Longitude and Latitude coordinates and GPS units to navigate to specific locations on the school campus where they will practice the collection of observations and data. This is a fun outdoor activity to get students to: (1) learn the use of maps and GPS units, (2) practice observation and data collection skills, and (3) work effectively in groups.</p> <p><i>Management: Students will be walking around in groups and adult supervision will need to be placed strategically around the campus to guide students and answer questions. A signal may be needed (whistle, horn, etc.) to call students in.</i></p> <p><u>Location</u></p> <ul style="list-style-type: none"> - Outdoors - Note that buildings can obstruct GPS satellite communication so coordinates for this activity should take students away from building walls. <p><u>Materials</u></p> <ul style="list-style-type: none"> - GPS units (1 for each team) set to show decimal degrees for longitude and latitude - Set of instructions for student groups that provides a map and GPS coordinates as well as observation and data collection guidelines for each location (<i>See Sample 2 below</i>) <p><u>Preparation</u></p> <ul style="list-style-type: none"> - Create a list of locations by Longitude and Latitude coordinates (10-12 locations total). Use a GPS unit (recommended), GIS system or Google Earth to identify the coordinates. - Create a map of the area containing the locations - Create a worksheet guiding students in the collection of observations and data - Highlight a different set of 5 or 6 coordinates for each group (to keep

	<p>groups from following each other instead of navigating for themselves)</p> <ul style="list-style-type: none"> - Set up GPS units for each student group <ul style="list-style-type: none"> o Set units to decimal degrees for Longitude and Latitude o Charge batteries <p><u>Instructions</u></p> <ul style="list-style-type: none"> - Divide students into groups of 3 or 4 - Distribute GPS units, one to each group - Provide students with an orientation to the GPS unit operation. Student instruction sheet can include illustrations of the basic screens from the GPS unit (<i>See Sample 2 below</i>) - Distribute instruction sheets to student groups and explain the requirements (navigation, data collection, observations) - Establish a procedure (time, whistle, other signal) for groups to return to “base” - If groups finish well before the other groups, ask them to select and find another 2 locations from the list <p><u>Reflection (class discussion and journal entries)</u></p> <p>Discuss with students their observations about the activity.</p> <ul style="list-style-type: none"> - Did they understand longitude and latitude and how to use the GPS unit to navigate to a specific location? <ul style="list-style-type: none"> o Students should notice that moving north, south, east or west has a specific impact on their longitude and latitude - Did they recognize their location in relationship to other locations? <ul style="list-style-type: none"> o Students should be able to articulate whether they are moving toward or away from the Equator or Prime Meridian - In what ways did their group work well together? - In what ways did their group work with other groups? - How could the group have been even more effective in working together?
<p>Task #3:</p> <p>Community Survey – Data Collection</p> <p>Work on group cooperation skills</p>	<p><u>Activity - GPS Community Survey</u></p> <p>The purpose of this activity is to explore the characteristics of a community.</p> <p>Students will use Longitude and Latitude coordinates and GPS units to navigate to specific locations in the community where they will practice the collection of observations and data. All group routes end at the same location (a community park) where they will eat lunch and engage in team-building activities. This is a fun outdoor activity to get students to: (1) learn the use of maps and GPS units, (2) practice observation and data collection skills, and (3) work effectively in groups.</p> <p><i>Management: This needs to be handled as a field trip with permission slips, chaperones, sack lunches, proper attire (outdoors, walking, weather-appropriate), etc.</i></p> <p><u>Location</u></p> <ul style="list-style-type: none"> - Outdoors - Note that buildings can obstruct GPS satellite communication so coordinates for this activity should take students away from building walls. <p><u>Materials</u></p> <ul style="list-style-type: none"> - GPS units (1 for each team) set to show decimal degrees for longitude and latitude - Set of GPS coordinates for each group. Do not give students a map of the route(s) to the destination.

- Information on what data / observations need to be collected along the route
- Job descriptions / responsibilities for group members. (*See Sample 3 below*).
- A digital camera for each group
- Group route maps for chaperones so they can guide students if they get off track (*See Sample 4 below*)

Preparation

- Brainstorm with students or create on your own a list of characteristics that might describe a community (common history, geographic and other physical features of a location, plant life, housing, business / industry, community buildings, churches, etc.)
- Create a list of locations by Longitude and Latitude coordinates (10-12 locations total). Use a GPS unit (recommended), GIS system or Google Earth to identify the coordinates.
- Create a map of the area containing the locations
- Create a guide or set of instructions for students in the collection of observations and data related to community characteristics or other learning objectives
- Set up digital cameras
 - o Charge batteries
 - o Ensure there is enough memory remaining on disk
- Set up GPS units for each student group
 - o Set units to decimal degrees for Longitude and Latitude
 - o Charge batteries

Instructions

- Divide students into groups (up to 10 per group)
- Distribute GPS units and digital cameras, one to each group
- Assign chaperones to groups and provide chaperones with a route map for their assigned group
- Distribute instructions to students
 - o GPS coordinates for their route
 - o Job responsibilities
 - o Data collection and observation instructions
- Establish a procedure for arrival at the destination (how to check in, what to do, etc.)
- When groups arrive at the destination, use the opportunity to debrief and engage in team-building activities (*See Sample 5*)

Reflection (class discussion and journal entries)

Discuss with students their observations about the activity.

- Did they understand longitude and latitude and how to use the GPS unit to navigate to a specific location?
 - o Students should notice that moving north, south, east or west has a specific impact on their longitude and latitude
 - o Students should be able to use this knowledge to navigate around obstacles when a straight line route is not possible
- Did they recognize their location in relationship to other locations?
 - o Students should be able to compare existing location and desired location to determine bearing in order to reach the desired location
- In what ways did their group work well together?
- In what ways did their group work with other groups?

	<ul style="list-style-type: none"> - How could the group have been even more effective in working together? - How have these activities helped them to understand the meaning of “community?” - How have these activities help them to build community on Team 84?
<p>Task #4:</p> <p>Community Survey Map</p> <p>Work on data evaluation skills</p>	<p><u>Activity - GPS Community Survey</u></p> <p>The purpose of this activity is to explore the characteristics of a community.</p> <p>Students will use Longitude and Latitude coordinates and ArcGIS to create a community map of observations and data collected on their walking field trip. The map will include linked photos and descriptions prepared by students from observations collected by each group. Students will then be able to make general observations about the characteristics of their community.</p> <p><i>Management: Students will need an orientation lesson on the use of ArcGIS in order to accomplish this task. If students will not be using GIS software, this activity can be created on a large map of the community using typed descriptions and copies of the pictures taken by the groups or can be created by teachers using information generated by the students.</i></p> <p><u>Location</u></p> <ul style="list-style-type: none"> - Computer lab and classroom <p><u>Materials</u></p> <ul style="list-style-type: none"> - Pictures and written observations by location (Longitude and Latitude) - Computers with ArcGIS to generate map electronically or the following items to create a hand-made product of the same information: <ul style="list-style-type: none"> o Large map of the area o Hardcopies of the pictures taken by student groups with Longitude and Latitude indicated on each one o Observations made by student groups with Longitude and Latitude indicated on each one - List of community characteristics brainstormed in Task #3 above <p><u>Preparation</u></p> <ul style="list-style-type: none"> - Place pictures in folders by group on the computer <ul style="list-style-type: none"> o Use naming conventions to identify the pictures by location to make it easier to attach pictures to the correct location on the map - Orient students to the use of ArcGIS if that will be used to generate an electronic map <p><u>Instructions</u></p> <ul style="list-style-type: none"> - If using ArcGIS, have each student generate a map of their route <ul style="list-style-type: none"> o Include longitude and latitude points o Attach one or more pictures to the location along with observation notes o Save map to student folder on computer / server to share with class o <i>Question: Can these maps be merged onto a single map with all of the information and links or can students add information simultaneously to a single map?</i> - If making a paper product <ul style="list-style-type: none"> o Display the enlarged map on the wall o Assign one or more locations to each student o Each student places a hardcopy of one or more pictures on the wall

	<p>and uses string to indicate the location on the map where the pictures were taken.</p> <ul style="list-style-type: none"> ○ Next to the picture(s) the student displays a typed copy of the observations made about that location - Ask students to examine the final product. <p><u>Reflection (class discussion and journal entries)</u></p> <p>Discuss with students their observations about the community.</p> <ul style="list-style-type: none"> - What characteristics to they see that describe their community? - How do these characteristics unify the community? Divide it? - How do these characteristics relate to their lives specifically? <p>Discuss with students their observations about the activity.</p> <ul style="list-style-type: none"> - Do they understand longitude and latitude and how to use the GPS to gather meaningful information about a location? - Do they understand how to compile and evaluate the information that they collected? - In what ways did their group work well together to collect accurate and meaningful information? - In what ways did their group work with other groups to collect accurate and meaningful information? - How could the group have been even more effective in working together to collect accurate and meaningful information? - How have these activities helped them to understand the meaning of “community?” - How have these activities help them to build community on Team 84?
Assessment	<p>Evaluate student journals to determine understanding of the reflection questions at the end of each task. Student should demonstrate knowledge and understanding of the idea of community, the use of GPS technology, and the evaluation of data and information using critical thinking skills.</p>
Enrichment	<p>This unit provides a wealth of differentiation and choice as students are able to take on different roles requiring a variety of skills. Each student is able to use existing skills and is challenged to develop new skills.</p> <p>This unit focuses on a broad concept (community) but focuses students on their own community (both where they live and within their school), making the lesson personal and meaningful.</p> <p>The experiences in this unit will transfer to other lessons and activities related to technology, science, social studies, language arts, math, and service learning and will help students make the connections between themselves, their community, and the world.</p>

The student will	<ul style="list-style-type: none"> - Work in groups effectively - Investigate the history, geography and social nature of the communities in which they live and learn - Build skills in new technology (GPS, GIS, digital photography) - Use specific and effective word choice to record observations - Use critical thinking skills to objectively evaluate information in order to understand the characteristics of communities in general and their communities specifically (e.g., accuracy, relevance, significance)
Management	<p>This unit requires significant teacher / adult management as students explore what it takes to work successfully in small groups. The teacher needs to float and offer assistance as needed. Some of the management is dependent upon technological knowledge and expectation.</p>
Standards – Colorado Grade Level Expectations	<p><u>Reading, Writing and Communication</u> 8th Grade - Research and Reasoning: Individual research projects begin with information obtained from a variety of sources, and is organized, documented, and presented using logical procedures</p> <p><u>Mathematics</u> 8th Grade - Data Analysis, Statistics and Probability: Visual displays and summary statistics of two-variable data condense the information in data sets into usable knowledge</p> <p><u>Science</u> 8th Grade – Life Science: Human activities can deliberately or inadvertently alter ecosystems and their resiliency</p> <p><u>Social Studies</u> 8th Grade – Geography: Use geographic tools to analyze patterns in human and physical systems; Conflict and cooperation occur over space and resources</p> <p><u>Physical Education</u> 7th - 12th Grade – Emotional and Social Wellness: Demonstrate respect for individual differences in physical activity settings; Demonstrate collaboration, cooperation, and leadership skills; Demonstrate responsible behavior in group settings; Develop strategies to communicate ideas and feelings; Demonstrate inclusiveness in and out of classroom settings</p> <p><u>Technology</u> NETS for All Grade Levels - Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others; Students demonstrate a sound understanding of technology concepts, systems, and operations; Students apply digital tools to gather, evaluate, and use information.</p>

Sample 1 - Human Map Western Hemisphere

Place	Latitude	Longitude
1. Accra, Ghana	N 5°32	W 0°08
2. Anchorage, AK	N 61°12	W 149°53
3. Augusta, ME	N 44°19	W 69°44
4. Barcelona, Spain	N 41°23	E 2°10
5. Cancun, Mexico	N 21°14	W 87°11
6. Charlotte, NC	N 35°13	W 80°50
7. Copenhagen, Denmark	N 55°45	E 12°26
8. Dublin, Ireland	N 53°25	W 6°15
9. Ecuador	N 0°18	W 78°20
10. Fargo, ND	N 46°52	W 96°47
11. Frankfurt, Germany	N 50°06	E 8°40
12. Gettysburg, PA	N 37°28	W 78°57
13. Havana, Cuba	N 23°12	W 82°23
14. Hershey, PA	N 40°16	W 76°38
15. Highlands Ranch, CO	N 39°31	W 104°57
16. Iceland	N 64°55	W 18°49
17. Kona, Hawaii	N 19°35	W 155°57
18. London, England	N 51°30	W 0°07
19. Madrid, Spain	N 40°24	W 3°41
20. Marrakech, Morocco	N 31°37	W 8°00
21. Memphis, TN	N 35°08	W 90°03
22. Mexico City, Mexico	N 19°24	W 99°07
23. Monrovia, Liberia	N 6°14	W 10°53
24. New York, New York	N 40°45	W 73°58
25. North Pole	N 90°00	W 90°00
26. Ottawa, Ontario	N 45°25	W 75°41
27. Panama Canal	N 9°00	W 79°36
28. Paris, France	N 48°45	E 2°12
29. Philadelphia, PA	N 39°57	W 75°09
30. San Francisco, CA	N 37°45	W 122°26
31. Scammon Bay, AK	N 61°50	W 165°35
32. Washington, DC	N 39°05	W 77°17
33. West Fargo, ND	N 46°52	W 96°53
34. West Keys, FL	N 24°33	W 81°46

N 0°00 / W 0°00 (1 student)

Equator

N 0°00/ W 0°00 to W 170°00 (17 students)

N 0°00/ W 0°00 to E 20°00 (2 students)

Prime Meridian

N 0°00 to N 90°00/ W 0°00 (9 students)

Sample 2 - **8-FOURCE-IN-MOTION GPS CHALLENGE**

Mountain Vista High School / Mountain Ridge Middle School

Highlands Ranch, CO

N 39° 31.332' Latitude W 104° 57.810' Longitude



Work as a team to use your GPS unit and what you know about longitude and latitude to find the following locations (highlighted below). Place each location on the map above (use 1, 2, 3 etc. to show the location). Then answer the related questions on the back of this sheet. Happy trails!

1. N 39° 31.360' Latitude / W 104° 57.766 Longitude
2. N 39° 31.357' Latitude / W 104° 57.736 Longitude
3. N 39° 31.307' Latitude / W 104° 57.723 Longitude
4. N 39° 31.165' Latitude / W 104° 57.862 Longitude
5. N 39° 31.049' Latitude / W 104° 57.933 Longitude
6. N 39° 31.311' Latitude / W 104° 57.791 Longitude
7. N 39° 31.374' Latitude / W 104° 57.824 Longitude
8. N 39° 31.320' Latitude / W 104° 57.867 Longitude
9. N 39° 31.260' Latitude / W 104° 57.844 Longitude
10. N 39° 31.231' Latitude / W 104° 57.778 Longitude
11. N 39° 31.095' Latitude / W 104° 57.779 Longitude
12. N 39° 31.161' Latitude / W 104° 58.000 Longitude

When you are done, return to the location shown at the top of the map.

Team Members (first and last names):

1. _____ 2. _____ 3. _____

Location	Coordinates	Heading to get here from last location (circle one)	What is at this location?	What heading will you take to get your next location? Will the coordinates go up or down?
Start	N W	This is your starting location. It is where you are standing right now.		
First: Location ____	N W	N W S E WNW ESE WSW ENE		
Second: Location ____	N W	N W S E WNW ESE WSW ENE		
Third: Location ____	N W	N W S E WNW ESE WSW ENE		
Fourth: Location ____	N W	N W S E WNW ESE WSW ENE		
Fifth: Location ____	N W	N W S E WNW ESE WSW ENE		
Sixth: Location ____	N W	N W S E WNW ESE WSW ENE		



Waiting for Satellites



GPS has signal



Different levels of accuracy



What direction are you heading?

Walking Fieldtrip Job Responsibilities

Within each group, students will rotate through these roles. Roles should change at each location so that each student has the opportunity to perform each role at least once during the walk. The number of students performing any job at one time will depend on the size of the group.

Each student must have a journal and something to write with and will be writing down information based on the job responsibilities.

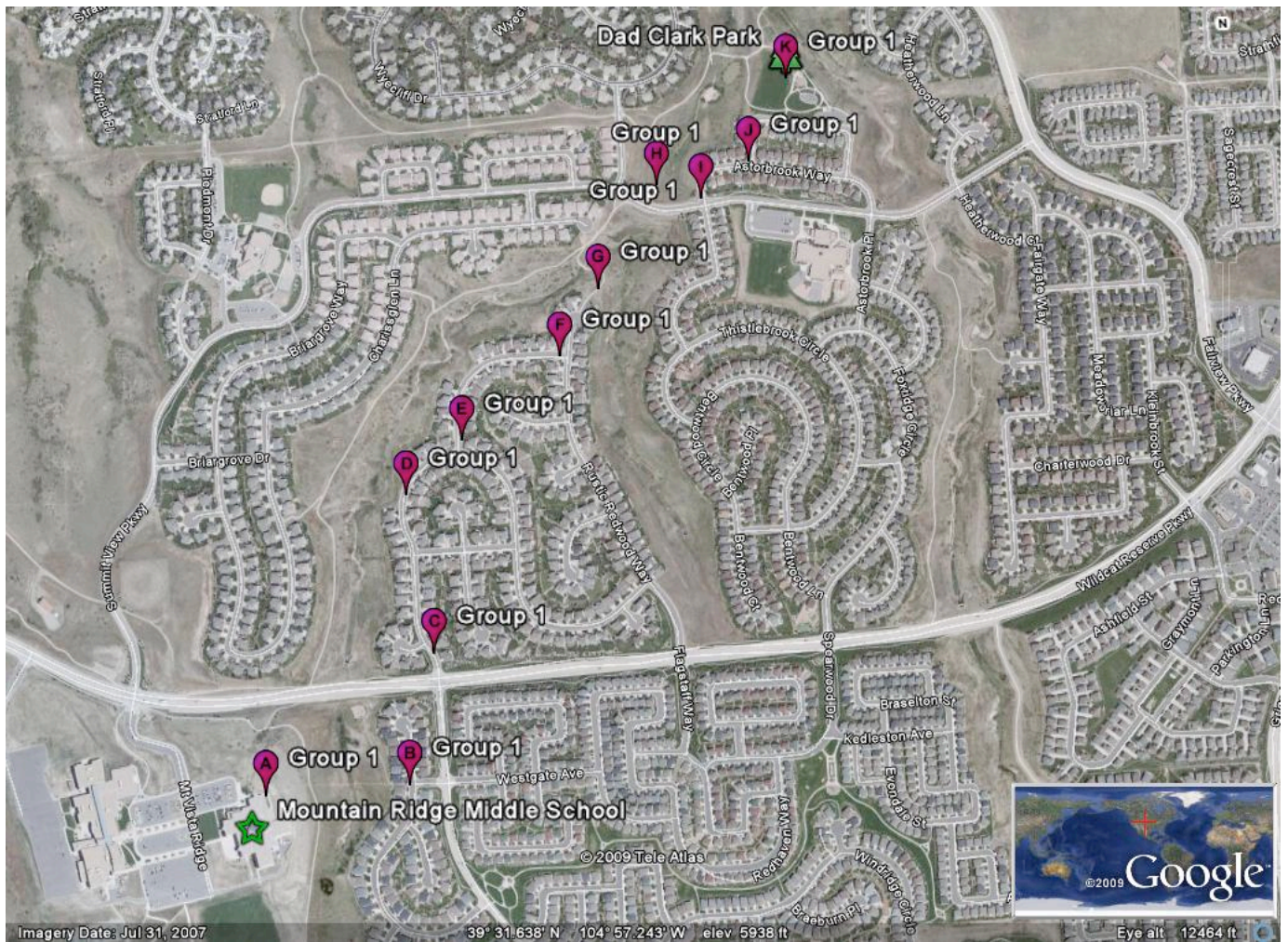
Jobs and Responsibilities:

- **2 GPS gurus** – You are holding the GPS units and telling the group the direction we are going. Materials needed: GPS units
- **1 GPS checker** – You are checking with the GPS gurus and the coordinate keeper to make sure you are going in the right direction. Materials needed: brain
- **2 coordinate keepers**- You will hold the coordinates and work with the GPS gurus and checkers to move in the right direction. Materials needed: coordinate sheet
- **1 photographer**- At each coordinate, you will be taking pictures of street names, names of parks, recreation sites, plants and anything else that describes our Highlands Ranch community. Materials needed: camera
- **2-3 spotters** – You are helping the photographer locate interesting things to take pictures of and writing down a detailed description of each of the pictures taken. (ie: at coordinate __ Picture one is a possible noxious weed. Picture two is a street sign, Summit View.) Materials needed: eyes, clipboard and paper
- **2 I notice, I wonder**- You are observing at each coordinate and coming up with one thing you notice about the area around the coordinate, and one thing you wonder about the area. Try to focus on community😊. Materials needed: reflection journal

After each coordinate, you will switch jobs. Make sure you do each job at least once!

Sample 4 – Chaperone route map

(A map is provided to the chaperone for each student group)



TEAM 84: 8-Fource in Motion

Your task is to choose as many of the options from the list below to define and unify our team. Remember, we are all about community! When we're back at school, we'll share our ideas and choose the best to use throughout the year.

ALL TEAM MEMBERS MUST INCLUDE THE GROUP'S IDEAS IN THEIR REFLECTION JOURNALS. Use the materials provided to create your final product.

1. That's the way we became the Brady Bunch: Make up a team THEME SONG. Write your lyrics in your reflection journals.
2. Secret Handshake: When we meet in the hall, we need a greeting. Devise a HANDSHAKE that we can all use. It can be as simple or complex as you choose! Write and/or sketch in your journals.
3. Have it your way: Create a MOTTO or SLOGAN that we could paint above the doors to our pod. Write in your journals.
4. Logo Madness: Get artistic and create a LOGO (symbol) to represent the Team formerly known as 84. Sketch in your journals.
5. Wearable Art: Design the front and back of a team T-SHIRT. What would it say? Colors? Graphic? Write and/or sketch in your journals.
6. We Are 84: Make a CHEER for our team. Practice...you may want to write down the words and actions in your journals. Be ready to perform!
7. We the People...Create a team CONSTITUTION. What rights and responsibilities should be guaranteed to the members of this amazing team? Write in your journals.
8. Vogue Pose: Create an individual or group pose that we can all learn. Write and/or sketch in your journals.
9. Team Mascot: Who are we? Create a mascot for Team 84. Sketch in your journals and tell why it's the best thing to represent us.
10. Your Choice: Create some other way to define or represent our team. Describe your ideas and plans in your journals.