PRE-CALCULUS Disaster Mission Relief Rubric

TEAM MEMBERS _____ TEAM # _____ PERIOD _/_

CRITERIA		POINTS	EARNED		VALUE
Accuracy in Polar Coordinates	**12** Air Traffic Controller gave accurate coordinates for all four missions, submits worksheet	**9** Air Traffic Controller gave accurate coordinates for three missions and/or does not submit worksheet	**6** Air Traffic Controller gave accurate coordinates for two missions	**0** Air Traffic Controller gave accurate coordinates for one or zero missions	
Accuracy in the Mathematics for First Mission	**6** The answer and all of the supporting work are correct, includes units of measure	**5** The answer and all of the supporting work are correct, units of measure are missing	**4** The answer is not correct due to error(s) in work	**0** The answer is not correct and/or work is not shown	
Accuracy in the Mathematics for Second Mission	**6** The answer and all of the supporting work are correct, includes units of measure	**5** The answer and all of the supporting work are correct, units of measure are missing	**4** The answer is not correct due to error(s) in work	**0** The answer is not correct and/or work is not shown	
Accuracy in the Mathematics for Third Mission	**6** The answer and all of the supporting work are correct, includes units of measure	**5** The answer and all of the supporting work are correct, units of measure are missing	**4** The answer is not correct due to error(s) in work	**0** The answer is not correct and/or work is not shown	
Accuracy in the Mathematics for Fourth Mission	**6** The answer and all of the supporting work are correct, includes units of measure	**5** The answer and all of the supporting work are correct, units of measure are missing	**4** The answer is not correct due to error(s) in work	**0** The answer is not correct and/or work is not shown	
Organization	**6** Work is organized and neat	**4** Work is not neat	**2** Work is not legible	**0** No work is submitted	
Collaboration/ Group Communication	**3** The group communicated clearly			**0** The group did not communicate clearly	

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/ 45

Mission: Disaster Relief

Purpose: All students will apply their knowledge of Polar Coordinates and other topics they have learned this year to solve real world crises.

Technology Used: The students will use the iPod Touch to navigate (virtual compass) and communicate (FaceTime) *Please note that the Air Traffic Controllers will be in a different location than the Pilots. In addition, so that the Air Traffic Controllers can see their planes moving, we will have Video Conferencing set up.

Supplies Needed: iPod Touches, Video Conferencing Materials, and Map for the Air Traffic Controller

Roles:

- Air Traffic Controller: The air traffic controller will communicate where each team needs to navigate to and the Mission (word problem) that the team has to complete before moving on.
- Co-Pilots: The pilots will listen to the direction of the Air Traffic Controller, complete the missions that they are given, and report to the Air Traffic Controller (word problem solution).

Expectations:

- Students will have pencils, calculators, and formula note cards with them.

- Air Traffic Controllers will report to G-720; Co-Pilots to the Auxiliary Gym.

- Air Traffic Controllers and Co-pilots must agree on the solution before moving to the next mission. The team must submit one set of solutions at the end of the period.

Notes:

- 3 students per team
  - 1 Air Traffic Controller
  - 2 Co-Pilots
- Each team starts on a different mission so that it is moving independently of other teams.
- This process will be best completed in an open space like the gymnasium.

Scenario: You are working for the American Red Cross. It is the responsibility of the Air Traffic Controller to redirect the pilots to avoid storms, other planes, and more. It is the responsibility of the pilots to complete the missions that they are given.

Mission 1:

- A major earthquake just occurred in Arkansas and you need to determine the magnitude of the earthquake on the Richter scale to determine the area that is affected and the amount of supplies that you will need.
  - The magnitude, R, on the Richter scale of an earthquake of intensity I is given by $R = \log (I/I_0)$. The intensity of the earthquake is 1,000,000 I_0. Use the given formula to find the magnitude on the Richter scale.

Mission 2:

- A tsunami warning is issued for Santa Catalina, California. Ocean swells are approximately 10 feet high from crest to trough, with wavelengths of 250 feet.
  - Find an equation that models these swells before you drown.   :)

Mission 3:

- A cruise liner has left port off the coast of Key West, Florida and traveled 25 miles on a bearing of N 42° W when it started to experience engine difficulties. A second cruise liner was at another port in Cape Coral 150 miles due north of the port of the first liner.
  - What bearing should the second cruise liner travel in order to rescue the people from the troubled liner and how far does it need to travel?

Mission 4:

- A flash flood in Piscataquis County, Maine has destroyed a path in one period long of a sine curve. Your mission is to deliver food and drinking water to the shelter.
  - A safety shelter is about 5 miles North and 9 miles East of the path of destruction.   If the safety shelter had been hit, how would the function have changed?

Mission 5:

- Colossus is a 180-foot tall Ferris wheel located at Six Flags St. Louis in Eureka, Missouri. It is 165-foot wide, weighs 180 short tons, and has a maximum capacity of 320 people. Colossus is currently the largest Ferris wheel at a theme park in the United States. On June 17, 2009, there was a power outage at Six Flags St. Louis and as a result, several park guests had to be manually released from the rides. The Colossus Ferris Wheel was the most difficult for the park employees to release riders from, because, with no power, the wheel had to be manually cranked to get the passengers to the ground. It took the rescue team about 75 minutes before the final passenger was released from Colossus after the power went out.
  - What was the linear speed in feet per minute that the team had to crank the wheel?

Mission 6:

- There is a forest fire in Oregon. A forest ranger sights the fire directly to the south. A second ranger, 7 miles east of the first ranger, also sights the fire. The bearing from the second ranger to the fire is S 28° W.
  - You will need to tell the first ranger how far to the nearest tenth of a mile he is to the fire so he can respond accordingly.

Mission 7:

- An avalanche hit Park City in Utah. Your mission is to land the plane and help unload supplies at a Red Cross safety location.
  - You are 800 feet in the air and you need to land the plane. The plane must meet the earth at an angle of 10 degrees. How far will you travel before you land safely?

- A hurricane hit oilrigs situated on a platform off a 1500 yard long sandy beach on the shore of Louisiana. The local governments need your help transporting workers to fix the minor problems on the rigs.
  - The angle made from the platform with one end of the beach is 87° and with the other end is 52°. Find the distance, to the nearest tenth of a yard, from each end of the beach. From which end of the beach should the workers leave?
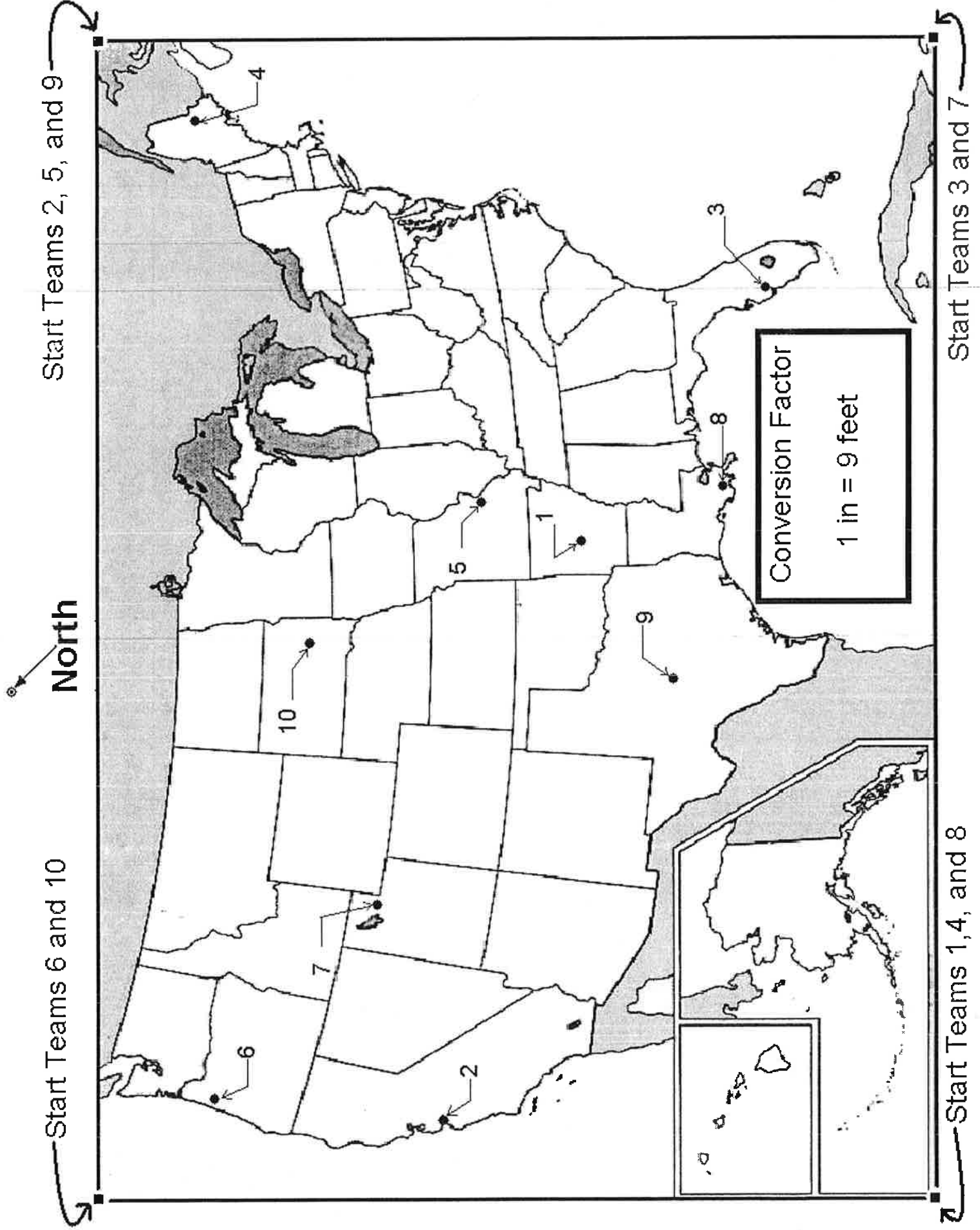
Mission 9:

- A wildfire is ablaze in Texas and is spreading rapidly. Your mission is to help pour water on the edge of the fire to prevent it from spreading.
  - When the blaze initially began, the local police who are 100 yards away said that the angle of elevation was 10° from the ground to the top of the flame. One minute later, the angle of elevation was 25°. How much higher did those flames become during that minute? If you need to fly 95 yards above the flames to be safe, what is the airplane's height from the ground?

Mission 10:

- There is a forest fire in South Dakota. A forest ranger sights the fire directly to the south. A second ranger, 7 miles east of the first ranger, also sights the fire. The bearing from the second ranger to the fire is S 28° W.
  - You will need to tell the first ranger how far to the nearest tenth of a mile he is to the fire so he can respond accordingly.

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North

Start Teams 2, 5, and 9

Start Teams 3 and 7

Start Teams 6 and 10

Start Teams 1, 4, and 8

Conversion Factor

1 in = 9 feet

AIR TRAFFIC CONTROLLER NOTES

1. Find your team number at one of the corners of the map. This tells your co-pilot where to begin.

2. **Look at the bottom table and direct your co-pilots to your first mission (your team #) using the appropriate angle and distance in feet and inches. This takes your team to the site of your first mission. Tell the co-pilot this first direction immediately!**

3. You will need to make a total of **3** calculations.

4. From your **first** mission, draw a segment to N. Draw another segment from your first mission to the next consecutive mission number. If you are team #10, you will go from #10 to #1 for your next mission. Ex: if you are team #5, #5 is your first mission. Draw a segment to north and another segment from #5 to #6.

5. Starting from the segment you drew to "N", measure the angle formed with the mission segment. When moving **clockwise from** the north segment **to** the mission segment, if the angle is less than 180°, use its measurement. If the angle is greater than 180°, measure the counterclockwise angle and subtract your measurement from 360°.

6. Measure the segment from your starting point to your next mission, to the nearest 1/8".

7. Convert the length from inches to decimal inches. Ex: For 7 1/8 inches 1/8 inch = .125 inch, therefore 7 1/8 inches = 7.125 inches.

8. Multiply by the conversion factor of 9. Ex: 7.125 inches X 9 feet/inch = 64.125 feet

9. Convert to feet and inches. Ex: For 64.125 feet .125 feet X 12 inch/feet = 1.5 inches, therefore 64.125 feet = 64 feet 1.5 inches

10. Relay the angle and the length in feet and inches to your team.

11. Repeat the process but this time begin with the number of your last mission and move to the mission with the next consecutive number.

12. After you determine all of your movements (to complete four missions), you may then help your team solve the crises.

TRIG MISSION RELIEF PROJECT

TEAM _____

Use a Conversion Factor of 1 in. = 9 ft.

Initial	to	Final	Angle	Distance on map	Distance in Feet	Distance in Feet & Inches
Start to team# _____						
	to	_____				
	to	_____				
	to	_____				

Gp/Corner	to	Start	Angle	Distance on map	Distance in Feet	Distance in Feet & Inches
1/SW	to	1	33°	6 in	54 ft	54 ft
2/NE	to	2	334°	$9\,^1/_8$ in	82.125 ft	82 ft 2 in
3/SE	to	3	339°	$2\,^3/_8$ in	21.375 ft	21 ft 5 in
4/SW	to	4	28°	$10\,^1/_2$ in	94.5 ft	94 ft 6 in
5/NE	to	5	313°	$4\,^7/_8$ in	43.875 ft	43 ft 11 in
6/NW	to	6	59°	$1\,^1/_4$ in	11.25 ft	11 ft 3 in
7/SE	to	7	338°	$8\,^1/_4$ in	74.25 ft	74 ft 3 in
8/SW	to	8	44°	6 in	54 ft	54 ft
9/NE	to	9	311°	$6\,^7/_8$ in	61.875 ft	61 ft 11 in
10/NW	to	10	30°	$4\,^3/_4$ in	42.75 ft	42 ft 9 in

How to use the Technology

General:
- The students will need to be on the internet. To log on, they will open **Safari** and use their school computer log-in.
- Please note that the internet may drop while the students are working. They will simply have to go back to safari and log in again!

FaceTime:
- **Air Traffic Controllers ONLY**
  - Click on Face Time icon.
  - Click on Contacts on the bottom, and find your contact (the HHS IPod number you are assigned to call).
  - Click on the number of iPod you are to call
  - Click Home.
- **Pilots ONLY**
  - Click Accept.
- If you lose connection, go to htsdstudent+(the iPod # you are on)@gmail.com.
  Password is Talbots1

QR Code Scanner:
- Open the **Bakodo** app or another Scan app and hold it steady overtop of the QR code. Make sure to line up the corners of the code with the **Red Corners** on the screen.
- You must hold the iPod steady and it may not work if there is a shadow or glare.
- Click on go to URL

Gyro Compass:
- When you first open the app, a sample of "Star Walk" will appear. Face the "NORTH" sign on the wall of the gym, hold the iPod vertically in your hands, and swipe the screen until you see the "N" arrow. Line it up with the North spot and then click done.
- The red hand is now your **polar axis** and the imaginary line from the **pole to north** will create the angle.
- Place the iPod on the floor and turn it until you find the desired angle. The angle measurement is given in the tool bar at the top to the right of "Heading".
- *When you turn to the right, the angle measure increases from 0°. If you turn to the left, the angle measure is decreasing from 360°.*
- Eyeball a spot on the wall that marks that angle. Using the distance that the ATF gave you, use the TapeMeasure app (directions are below) and walk toward that spot.

Tape Measure:
- Open TapeMeasure.
- Each student must calibrate TapeMeasure (it goes from your height.) Check that the Unit is in Foot/Inch. Click Calibrate. Target in the crosshair, a point on the ground 9 ft. 10 in. (See the area in the gym designated for this.) Click Select. Do this 3 times. Click Save, then done.
- Click on Distance. Pointing in the direction of the angle your ATF gave to you, target the crosshair on a point on the floor of the given distance. Walk to that spot. If measured correctly, you should be at the barcode of your mission.

PRE-CALCULUS Disaster Mission Relief
Co-Pilot Worksheet

TEAM MEMBERS _____

TEAM NUMBER _____ PD _____

Mission _____ to Mission _____

Mission _____ to Mission _____

ANSWER:

Mission _____ to Mission _____

ANSWER:

Mission _____ to Mission _____

ANSWER:

ANSWER: