Survivor - The Australian Outback

The following group project is to be worked on by *no more than four* students. You may use any materials you think may be useful in solving the problems but *you may not* ask anyone for help other than the people you have chosen to work together. This means you may not ask a tutor or any person other than those in your immediate group for help.

You are to type a letter of response to the problem presented backing up your conclusions with mathematical reasoning, formulas, and solutions. Your grade will depend on how well you communicate your response as well as the accuracy of the conclusions. This project will be scored on the checklist that is attached.

Please sign and date here to indicate that you have read and agree to abide by the above mentioned stipulations.

_____ _____
Student Name #1 Date

_____ _____
Student Name #2 Date

_____ _____
Student Name #3 Date

_____ _____
Student Name #4 Date

Survivor - The Australian Outback

Ogakor Tribe
Somewhere in the Australian Outback
February 8, 2001

MAT 151 Algebra Advisors
Chandler-Gilbert Community College
2626 E. Pecos Rd.
Chandler, AZ 85225

Dear Algebra Advisors:

Imagine that in October of 2000, you and fifteen other strangers are stranded, hundreds of miles from anywhere, in the Australian Outback.

Dry, arid, open land is criss-crossed with deep rock canyons, thundering waterfalls, and enormous eucalyptus forests. This is your new home for seven weeks. The only other inhabitants are kangaroos, emus, wild pigs and horses, crocodiles, large goannas (lizards), and exotic bird life. It seems almost mystical, but you are now part of a bold challenge where only one of you will win the ultimate prize of one million dollars.

You will build shelter, catch food, and establish a new society. You must work together as a team to succeed but ultimately you are competitors. Each day you will compete in challenges of strategy, guile, and wits to win small luxuries and to preserve your chance for the ultimate cash prize. These challenges are referred to as "immunity challenges".

You will then form the infamous Tribal Council, where you will openly debate the group dynamics of the previous days. The council ends with a secret ballot in which each of you votes one of your fellow tribemates out. The person with the most votes against him/her must leave immediately and is eliminated from the contest.

Over the weeks, one by one, more are eliminated until only two remain. In order to choose the final winner, a unique Tribal Council is called. This final council (consisting of the last seven eliminated contestants) will stand in judgment of the remaining two. You will endure weeks of surviving the elements and outlasting the other tribemates, but it all comes down to one - the ultimate Survivor - winner of $1,000,000.

Imagine that you have been out here for weeks now and have not yet won an immunity challenge. You know how serious of a problem that can be. You have lived without fire and have had to vote two members out of the tribe. The next challenge is upcoming, and, as a highly esteemed algebra advisor, your tribemates look to you for help in this Survivor Challenge!

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Here is the situation. The creators of this show have really created a doozy of a challenge for the tribes here in the Australian Outback. Being in need of supplies (matches, cooking gear, toilet paper, free pizza delivery, and extra blankets), the producers of the show have devised a particularly interesting challenge. You and your team need to give a helicopter pilot directions for delivering a crate of goodies at exactly high noon on Friday, March 9 at the designated target (see included map). The pilot will do exactly as you say and if you have accurately computed the distances, times, velocities, etc., you and your tribe will benefit from the contents of the crate. If not, you will have to endure another week lacking these key survival supplies. If both teams accurately describe the way to get the crate dropped on the target, the tie-breaker will go to the tribe that gets the delivery to occur closest to noon on the 9th.

Attached are some documents that you will find useful. Document 1 is the map of where the helicopter is located and where the drop target is located. Be sure to carefully examine the scale used for this map.

Document 2 include the specifications for the helicopter used in this challenge. You may not need to use all of the data, but you will certainly find some of it useful.

Here are some final requirements. The area where the drop zone has been created is in the middle of dense, forested area of the outback. The forest consists of, among other plant varieties, the eucalyptus tree which is one of the tallest trees in the world. This eucalyptus forest will prevent the helicopter pilot from landing on the target. You will have to plan on dropping the crate from the helicopter. But do not be concerned…we guarantee that the contents of the crate will be unharmed if the crate's speed at impact is 300 feet per second or less (we have placed the target over a soft bed of peat moss to help absorb the impact). Be sure to clearly indicate the altitude at which the helicopter should hover when the crate is dropped!

Finally, you can have the pilot leave the heliport anytime after 8:00 a.m. on Thursday. So, you should have your response to the pilot by _____.

Sincerely,

Ogakor Tribe

Notes from your enterprising and resourceful professor:

- Be very specific in your descriptions. The pilot will do exactly as you say! Read the letter carefully and make sure that you have provided all of the necessary information!
- Remember that the height off the ground, in feet, of a free-falling object is given by

$$h(t) = -16t^2 + v_0 t + h_0$$

where v_0 is the initial velocity and h is the height from which the object is dropped.

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Writing Project Evaluation/Checklist

Gateway checklist - these items must be present in order for the paper to be evaluated

Yes	No	Expected Features
		1. Does this work meet the expectations for the presentation of technical work?
		2. Is the work all computer generated?
		3. Is there symbolic, numerical, and graphical support included in the work?
		4. Is the answer stated in a few complete sentences that stand on their own? That is, is the summary satisfactory?
		5. Is there a description of the solution(s)?
		6. Is the noise (i.e. grammatical, punctuation, spelling, etc. errors) level low enough to not cause communication problems?
		7. Is the project free of major errors?
		8. Is acknowledgment given where it is due, if appropriate?
		9. Is there an attached page describing the contributions of the team members?

Your final score will be calculated based on your performance on these features:

Very Good	Good	Poor	
			Clear summary of the problem to be solved • Introductory paragraph lays the background for the problem situation and its solution • Shows why the question(s) to be addressed are important
			Precise and well-organized explanation of how the answer was found including • assumptions • algebraic (symbolic) support • graphical support • numerical support

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Very Good	Good	Poor	Features
			Solve the problem(s) that were originally asked so that there are no obvious errors in the solution. Shows familiarity with the mathematical concepts and their appropriate use.
			Use of graph mechanics including • labeled axes with units • labeled axis divisions • descriptive title • clear and descriptive legend • data points shown
			Concluding paragraph summarizes the purpose of the project and the outcome. Briefly closes the letter by stating any limitations or suggestions for improvement.
			Style and readability demonstrates a quality of imagination and rigor that results in a distinctive project. The project shows a personal exploration.

Comments on quality of submitted work and how any problems might be resolved

Final Score:_____

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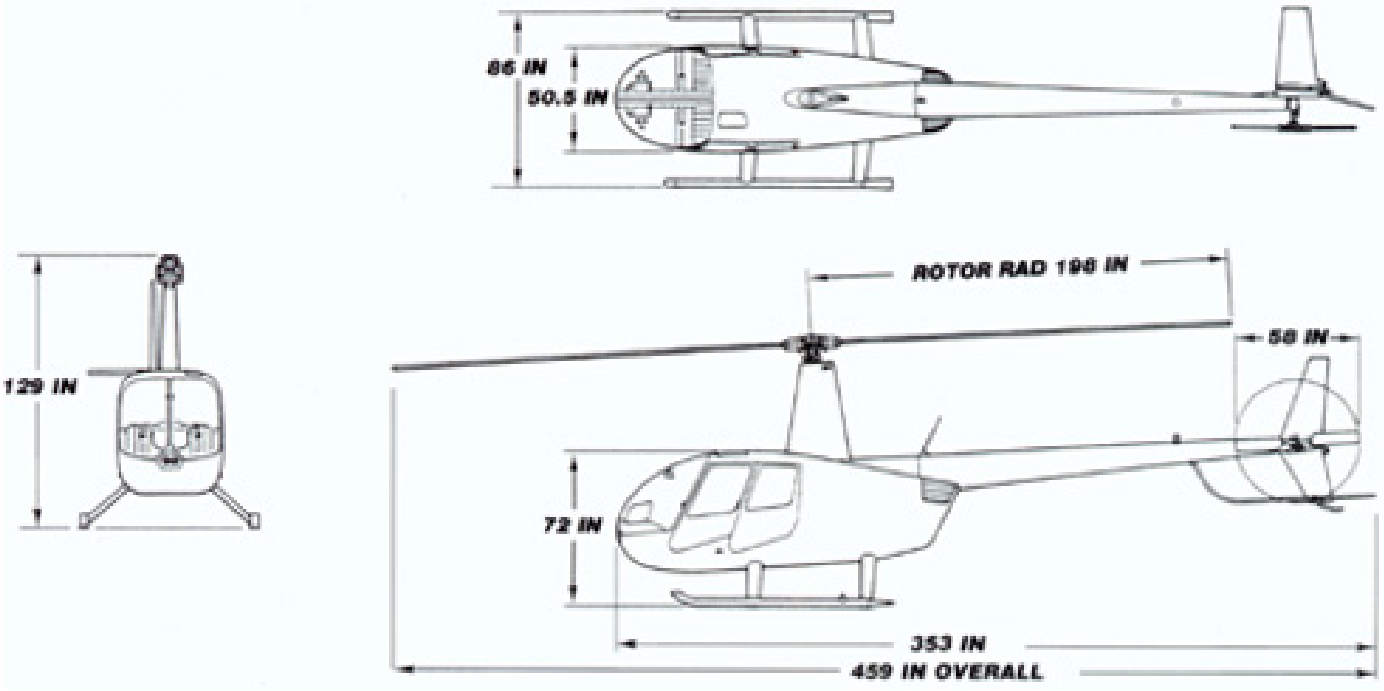
Document 2 - Helicopter Specifications



Weights

Gross Weight……2,400 lb
Empty Weight Equipped (incl oil & avionics)…1,424 lb
Standard Fuel (30.6 gal)…….. 184 lb
Auxiliary Fuel (18.3 gal)…….. 110 lb
Passengers and Baggage w/standard fuel……..792 lb

Performance

Cruise Speed……..130 mph (113 Kph)
Maximum Range (no reserve)…Approx 400 miles
Hover Ceiling IGE @ 2400 lb……..6,400 feet
Hover Ceiling OGE @ 2200 lb…….5,100 feet
Rate-of-Climb……over 1,000 FPM
Maximum Operating Altitude……14,000 feet

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Document 1 - Map

Note: 1 inch = 30 miles