



MANUAL

Prepared by:

Utah Council of Land Surveyors



UTAH TRIG – STAR CONTEST

Prepared by the Utah Council of Land Surveyors (UCLS)
2010-2011



"It has been a pleasure working with you on behalf of our students. I look forward to work with you next year. I hope to increase the number of students that get involved with TRIGSTAR."
"Thank you again,"

Jamie Bateman
Mathematics Dept. Chair
Syracuse High School

*Contact the State UCLS Coordinator Brad
Mortensen At bmortensen@classoc.com*

Introduction:

Trig Star is an annual competition that recognizes the best students of trigonometry from high schools throughout Utah. The goals of Trig Star are:

- To promote excellence in the mastery of trigonometry in high school.
- To honor high school students who have demonstrated their superior skill among classmates at the local and statewide level.
- To acquaint high school students with the use and practical applications of trigonometry in the surveying profession.
- To build an awareness of surveying as a profession among mathematically skilled high school students, career guidance counselors, and high school math teachers.

Trig Star is an extra-curricular activity held each year in high schools across the state of Utah. The competition is a timed exercise in solving trigonometry problems that incorporate the use of right triangle formulas, and the laws of sines and cosines. Contestants have up to one hour to complete the exam, and the student who achieves the highest score in the shortest amount of time wins. The first, second, and third place winners receive cash prizes of \$200, \$100, and \$50 respectively along with award certificates.

From the winners at each high school, state level winners are determined. The first, second, and third place winners in Utah receive cash prizes of \$300, \$200, and \$100 respectively along with award certificates. The Utah winner will compete against other states' winners by taking the national exam. The teacher sponsoring the state winner will receive a cash prize of \$300.

Trig Star is co-sponsored by the National Society of Professional Surveyors (NSPS) and the Utah Council of Land Surveyors (UCLS).

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The following topics listed on this page are sections of this manual. They are arranged in an order that will help guide you through the process of setting up and running a Trig Star Program for your chapter. Each topic is covered in more detail in this manual on its own page.

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"Thank you so much for all of your help with this competition. The kids were really excited about their prize money and to also be recognized was a cool thing for them. I look forward to working with you again."

"Thanks so much!"

**Ashley Martin
Math Department
CHS ROCKS!!!!**

Suggested Schedule / Checklist:

(Timing will vary depending on each school's schedule)

- November Contact the High School Math Department regarding the Trig Star Program.
Arrange for a meeting with the teachers to review the details of the program.
Encourage them to start a Trig Star Program at their school.
- December If possible, find an additional sponsor to cover expenses and prize money.
(Local prizes and the prize amounts are optional)
Send in the sponsorship application (page 7) form to NSPS and send a copy to
The State Coordinator.
Maintain contact with the school to answer questions and keep their interest.
- January Make arrangements with the math department for the classroom presentation.
Send a flyer to the school announcing the Trig Star Program, location and date.
Gather materials and ideas for the presentation.
Compile, organize and rehearse your presentation.
- February Give the classroom presentation to all interested students.
Tell them about the upcoming Trig Star exam.
Make arrangements with the math department for the date and time of the exam.
Contact the local newspaper.
- March Administer the Trig Star Exam
Announce the winner(s).
Schedule a time to return to the school to formally present the plaque and award money.
Arrange for a representative from the local newspaper to be there to take pictures.
Give the newspaper a written explanation of the program.
Give the teacher a copy of the Teacher Evaluation Form.
- April Submit copies of the first, second and third place winners' exams along with copies of each
student's test cover sheet, the contest report (page 13) and teacher evaluation form (page 14) to
the UCLS Trig Star Coordinator.

Suggestions on Sponsoring Trig Star

As the surveyor working with a local high school you will be considered the “local sponsor”. Your local Chapter and/or a local Surveying/Engineering company are excellent choices to help offset expenses and to offer attractive prizes to the students that participate in the contest.

The awards don't need to be extravagant. This year the UCLS Board has decided to sponsor the local prizes for 20 High Schools as follows: The first, second, and third place winners receive cash prizes of \$200, \$100, and \$50 respectively along with award certificates.

Sponsorship funds may also be needed to offset related Trig Star event costs, such as:

- Copying handouts for the presentation to the students
- Copying the Trig Star exams
- Copying the certificates of participation
- Engraving the winner's plaque

During your planning for a Trig Star event if you have any questions, feel free to contact the Trig Star Coordinator or the UCLS State Office.



Contacting Your Local High School

Making first contact with the Math Department Chairperson is often the most difficult task when trying to start a Trig Star Program. Here are some tips:

- Do you know any teacher, guidance counselor or administrator at your local high school that could introduce you to a math teacher?
- Do any of your children, grandchildren, nieces, nephews, etc., attend a nearby high school where you would be willing to visit to present the Trig Star program/test?
- Are any of your neighbors or friends at church or social groups, teachers or school employees that may be able to steer you in the right direction toward the trigonometry teacher?
- Ask them to give you the name and phone number (or e-mail address) of that teacher. Then ...
- Make the contact, preferably with the math department chair. Introduce yourself and tell the teacher that you would like to present a program to students explaining how the surveying profession utilizes trigonometry. Explain about the program and offer to send some information along with sample problems.
- Schedule a date with the teacher to give a presentation. You may find it helpful to have a colleague or coworker assist you, especially if you have equipment and/or materials to bring to the school. Setup a date and time when the exam will be given. Sometimes this can be given on the same day as the presentation, but usually another day works out better.



TRIG-STAR

A High School Trigonometry Skill Awards Program

Administered by the NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS
A member organization of the American Congress on Surveying and Mapping

★★SPONSORSHIP APPLICATION★★

A local sponsor is needed for each participating High School. Only one TRIG-STAR will be allowed per high school per year. The local sponsor must apply to NSPS on this application form and list the name of the High School where the contest will be held. A contest packet containing contest instructions, a test packet, an award plaque (if ordered), and a sample news release will be forwarded by NSPS to the local sponsor. The local sponsor will be responsible for making all the local arrangements. The winner will be eligible to compete in the NSPS National Trig-Star Contest and contest information will be supplied with the contest packet.

High School Name (REQUIRED)

City and State (REQUIRED)

Local Sponsor

Mailing Address

Phone Number () _____

Fax Number () _____

Plaques can be purchased for \$8.00 each
Makes checks payable to NSPS TRIG-STAR

Quantity _____ **Enclosed is \$** _____ **or pay by**

Visa /MC # _____ **Expiration Date** ____/____

Name on Card _____ **Signature** _____

Send To: TRIG-STAR, 6 Montgomery Village Avenue, Suite #403, Gaithersburg, MD 20879
Phone: 240-632-9716 ext. 103 or 105 Fax: 240-632-1321 E-mail: tmilburn@acsm.net
www.acsm.net

★★★SPONSOR TRIG-STAR IN YOUR HIGH SCHOOL★★★

Presentation Suggestions

One of the most important parts of your presentation will be to discuss the Trig Star Program with the students. Give the date and time of when the exam will be given. The other objective is to discuss the Surveying and Mapping profession. Tell them briefly, what a Land Surveyor does, how trigonometry is utilized in our work, the variety of the business, history of the profession and the type of individual suited for this line of work.

There are several presentation formats that can be followed. The variations depend not only on your personal speaking style, but also on high school factors, such as the size of the group, the amount of time allowed and the room configuration. For example small groups allow for a more detailed demonstration of equipment and explanation of Survey Plats or Maps. Questions are more common in small groups and personal connections are easier to make.

On the other hand, larger groups will allow you to reach more students and you may feel that you have made more efficient use of your time. The more visual aids the better the presentation. Many possible visual aids can be found in the resources section of this manual and on-line.

The video "Surveying, A Career Without Boundaries" shows surveyors at work using the latest equipment both in and out of the office. A copy can be purchased from the State Office. Examples of Plats and Maps are always interesting to students, especially if it shows an area they are familiar with. A big hit is an aerial photo, which includes their school in part of the photo. Setting up equipment and allowing students some hands on experience has always provided positive feedback from teachers and students.

Don't forget, if you can engage the students in doing some sample calculations they will feel more involved. For example set up the total station in the classroom and couple of prisms. Then measure the distances and angle between the lines. Sketch out the measurements and ask the students to solve for the unknown distance. If they seem unsure on how to approach the problem help them determine that they must use the law of cosines and fill out the equation on the board.

Also important discuss with the students what they need to prepare for in order to take the Exam, such as working with units expressed in decimals and in degrees, minutes and seconds (answers are required to be to the nearest hundredth and nearest second of an angle). A discussion of rounding of numbers should be covered. Often students will round off intermediate solutions and use these values in remaining calculations while working toward the final answer. This usually results in the final answer being close, but not to the precision required for the final answer.

It should be pointed out to the students that they may use a reference book during the exam if they so desire. Also, students will need to use a calculator capable of trig functions, however the use of calculators with coordinate geometry and/or triangle solution programs will not be allowed. If students have any of these programs loaded in their calculators they should be removed before the exam.

Giving the Exam

The number of students taking the exam will determine if you need any help, two people can cover about 15 to 20 students.

- 1 Secure a Stop Watch for timing the contestants.
- 2 Obtain the help of additional proctors as needed.
- 3 Remind the teachers and students that all calculators need to be deprogrammed before the exam begins.
- 4 Seat all contestants and pass out the test while instructing the contestants NOT to open the test materials until told to do so.
- 5 Have the contestants fill in the questions on the test cover sheet, request that they print the information clearly. If possible ask the teacher for a copy of a attendance sheet.
- 6 Read aloud the instructions given on the test cover sheet.
- 7 Instruct the contestants to raise one hand if they have a question during the exam and to raise both hands when they have finished.
- 8 Instruct the contestants that finish early to sit quietly until all others have completed the test or until the end of the hour. Plan ahead with the High School teacher as to their preference on this matter.
- 9 Instruct the contestants to open the test materials and begin
- 10 Start the Stop Watch
- 11 As the contestants turn in their tests, record their time to the nearest second (if possible) on the test cover sheet. The students are not allowed to “rework” any problems after they have turned in their tests.
- 12 After 60 minutes, collect all tests that have not been turned in and record a time of 60 minutes on them.



Scoring the Exam

Check and score the exams after all the tests have been turned in you can do this at the school, home or office. It is best not to score the test while there are still students working on the problems.

Point values for each problem are shown on the exam. Points for each answer must be awarded as all or nothing. In other words, no partial credit is allowed for answers that are almost correct. The rounding of the answers must be exact to the number of places specified. If linear answers are specified to be to the nearest hundredth and angular answers are specified to be to the nearest second then answers must be exactly to that value, otherwise that answer is completely wrong and no credit given for that answer.

The student with the highest score and fastest time is the winner. Both the time and the high score are reported to the Trig Star Coordinator to determine the State Winner and Runner-up.

Students naturally want to know how they did on the exam, even if they didn't come out on top. Obviously (for the security of the exam) you cannot give copies of the exams back to the students, however you could give them their scores.

Do not give an answer sheet or copies of the students' tests to the teacher until the state winner has been determine for the year. Discuss the scoring policy and offer to go over the test with the students.



Honor the High School Trig Star

Have a Trig Star Plaque engraved with the winning student's name, High School name, year of the award and the sponsor's name. Some Chapters purchase plaques from a local trophy shop and try to match the school's colors others order the plaque from NSPS.

Another nice touch is to prepare certificates of participation for all the contestants. A blank certificate form in Word format is included.

Plan on returning to the High School for an Award presentation. The presentation can be made during the winner's class, or if the school has an awards ceremony you may find this to be a good time to honor the student. Make sure to take pictures, digital if possible, you should bring someone along to help with the photography.

Award the plaque and prize to the winner and give honorable mention recognition to those students that also had outstanding scores or solutions. Distribute any certificates that have been prepared.



Forms and Reports to complete:

- 1 Copy the **Contest Report** form in this manual. Complete the form and send a copy to the State Trig Star Coordinator.
- 2 Copy the **Teacher Evaluation** form in this manual. Give a copy of this form to the math teacher. If necessary provide the teacher with a self-addressed stamped envelope and have the teacher send you the completed evaluation form. Forward a copy to the State Trig Star Coordinator.



 **TRIG-STAR** 

Contest Report

Trigonometry Teacher's Name _____

High School Name _____

Mailing Address _____

City _____ State _____ Zip _____

School Phone () _____

Sponsor's Name _____

Mailing Address _____

City _____ State _____ Zip _____

Sponsor's Phone () _____ Fax () _____

Date of Contest ____/____/____ Winner's Time _____ Winner's Score _____

Number of Contestants _____

Winner's Name/Graduation Year _____

Name of Parents/Guardians _____

Mailing Address _____

City _____ State _____ Zip _____

Home Phone () _____ Work Phone () _____

Comments

Send this form along with copies of the first and second place students' tests plus copies of the test cover sheets to the State Trig Star Coordinator.

Send a copy of this report to: TRIG-STAR, 6 Montgomery Village Avenue, Suite #403, Gaithersburg, MD 20879

TRIG-STAR

Teacher Evaluation Form

While the Trig Star event is still fresh in your memory, please fill out this evaluation form. Your comments will help us improve future programs.

1. What did you think of the Surveying presentation?

2. Did you get positive feedback from the students about the presentation? Yes No
(Circle one)

If yes, what did they like about the presentation?

If not, please summarize their criticism.

3. What did you think of the exam?

4. Did you get positive feedback from the students about the exam? Yes No
(Circle one)

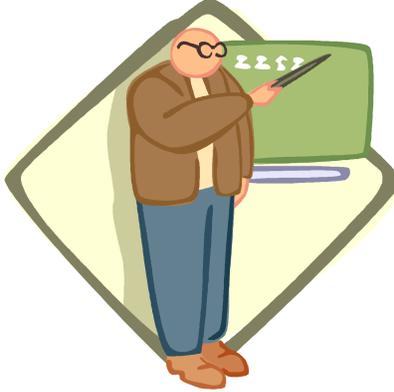
If yes, what did they like about the exam?

If not, please summarize their criticism.

5. Do you feel the students were prepared for the exam? Yes No
(Circle one)

6. What suggestions would you make to improve future Trig Star programs?

Trig Star Presentation Example



- Introduction, thank the students and teacher for allowing you to visit the class.
 - Discuss the Trig Star Program and the upcoming exam
 - Go over the awards at all levels of the competition
 - Review the historical background of surveying. (As time permits)
 - Biblical Reference to moving a neighbor's landmark (Jeremiah ch. 19 verse 14)
 - Early development of surveying techniques by Egyptians. (Poster of Pyramids)
 - Boundary stones have been found that are over 3000 years old.
 - Reestablish boundaries after flooding of the Nile River.
 - Refer to Mount Rushmore Picture
 - George Washington surveyed the Great Dismal Swamp.
 - Graduated from William and Mary
 - Abraham Lincoln surveyed and divided land north of Springfield, IL.
 - He was self-taught
 - Thomas Jefferson was the father of the Public Land Survey System.
 - Give a brief history of the Public Land Survey System.
 - Was a County Surveyor
 - Mount Everest is named after George Everest, British Surveyor General of India.
- Note: The items above are listed for general use. You can and are encouraged to develop your own historical fact data base especially local references.
- Video
 - Show the video "Surveying a Career without Boundaries"
 - (See the Resources web page for more information on this video.)
 - Questions and Answers

Discuss how you got involved in surveying.
Show examples of the types of unique projects you have worked on.
The use of modern surveying equipment and techniques such as CAD, GPS,
Aerial Photogrammetry, etc.

Education requirements, Colleges that offer Degrees in Surveying/Geomatics.
State requirements for practicing land surveying.

- Survey equipment demonstration
Measure the distances and angle between two prisms.
Allow each student to look through the telescope on the total station.
Sketch the measurements on the board in the classroom.
Using the Law of Cosines, have the students compute unknown distance.
Discuss the use of linear surveying units (feet and decimals, not inches and fractions)
Discuss the use of angular surveying units (degrees, minutes and seconds)
- Wrap up
Give date and time for the Exam
Remind students they will need to be able to work with:
Angles in the form of Degrees, Minutes and Seconds
Not to round off intermediate answers, only the final answer.
Review basic Geometry such as
Summation of angles in a triangle
Summation of angles in a multi-sided figure
Summation of angles making up a straight line
Principal of the shortest distance between a point and a line
Review basic Trigonometry such as the Right Triangle formulas and the Law of Sines and Cosines
- Thank students for their attention.

