

Lost Treasure!!!

A trigonometry group project

Introduction

A team of explorers finds a treasure map from 1747 with these directions to the treasure:

*From the tallest palm tree (P), sight the highest hill (H).
 Drop your eyes vertically until you sight the base of the hill.
 Turn 40 degrees clockwise from that line and walk 70 paces to the big red rock (R).
 From there walk 50 paces back to the sight line between the palm tree and the hill.
 Dig there (X).*

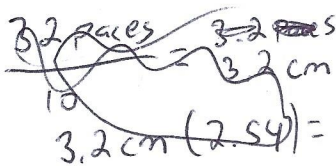
The trouble is that after so long, the palm tree no longer exists. So, the team contacts you to decipher the map and give them a plan for finding the lost treasure. Determine a plan to locate the position of the lost palm tree and write out an explanation of your procedure for the explorers.

Directions

OK! Let's begin. On the next page you will find a mostly blank map to use. Do the following work on that page.

- Start at the red rock R. Draw a circle centered around R with an appropriate radius. Use the following conversion factor to determine the radius:
 10 paces = 1 centimeter, so 70 paces = 7 cm.
- Now find the point along the circle that has 40 degrees be the angle between the lines of sights to the hill H and the rock R. Mark this place P with a palm tree demonstrating your artistic merit.

Next you are going to use trigonometry to determine the two distances you should walk towards the hill from the palm. On your drawing, draw a second circle around R representing 50 paces. You will notice that this circle crosses the PH line of sight at two spots. These are the predicted locations of the treasure! Now it's a 50/50 chance on finding the treasure your first try! Use the laws of triangles to solve for the two distances to the treasure points. You should get answers in the units of paces.



$$\begin{aligned} \text{distance to } P_1 &= \cancel{31.82} \text{ } 32 \text{ paces } (3) = 96' \\ \text{distance to } P_2 &= 43 \text{ paces } (3) = 129' \\ 70(3) &= 210 \\ 50(3) &= 150 \end{aligned}$$

The first distance from the palm along the line of sight to the hill is 96 ft. From this first spot, walk an additional 129 ft towards the hill to find the second spot to dig.

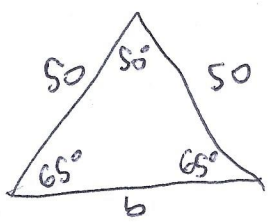
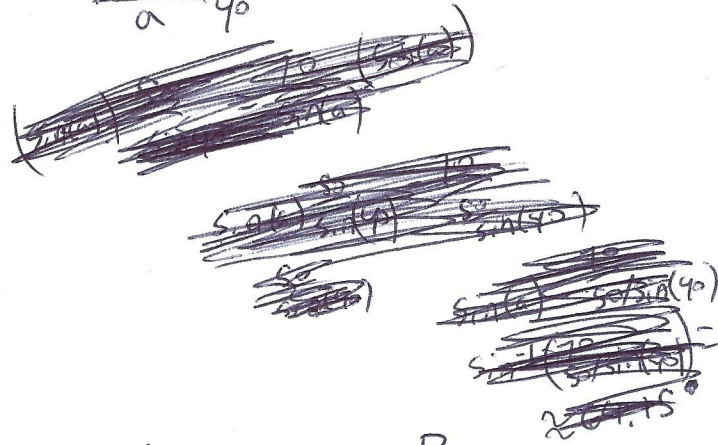
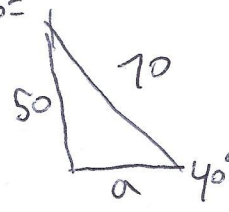
Move on to page 3 for detailing the plan.

$$180 - \sin^{-1}\left(\frac{70 \sin 40}{50}\right) = 115.85^\circ$$

$$180 - 115.85 - 40 = 24.145$$

$$a = \frac{50 \sin(24.145)}{\sin(40)}$$

$$a = 31.82$$

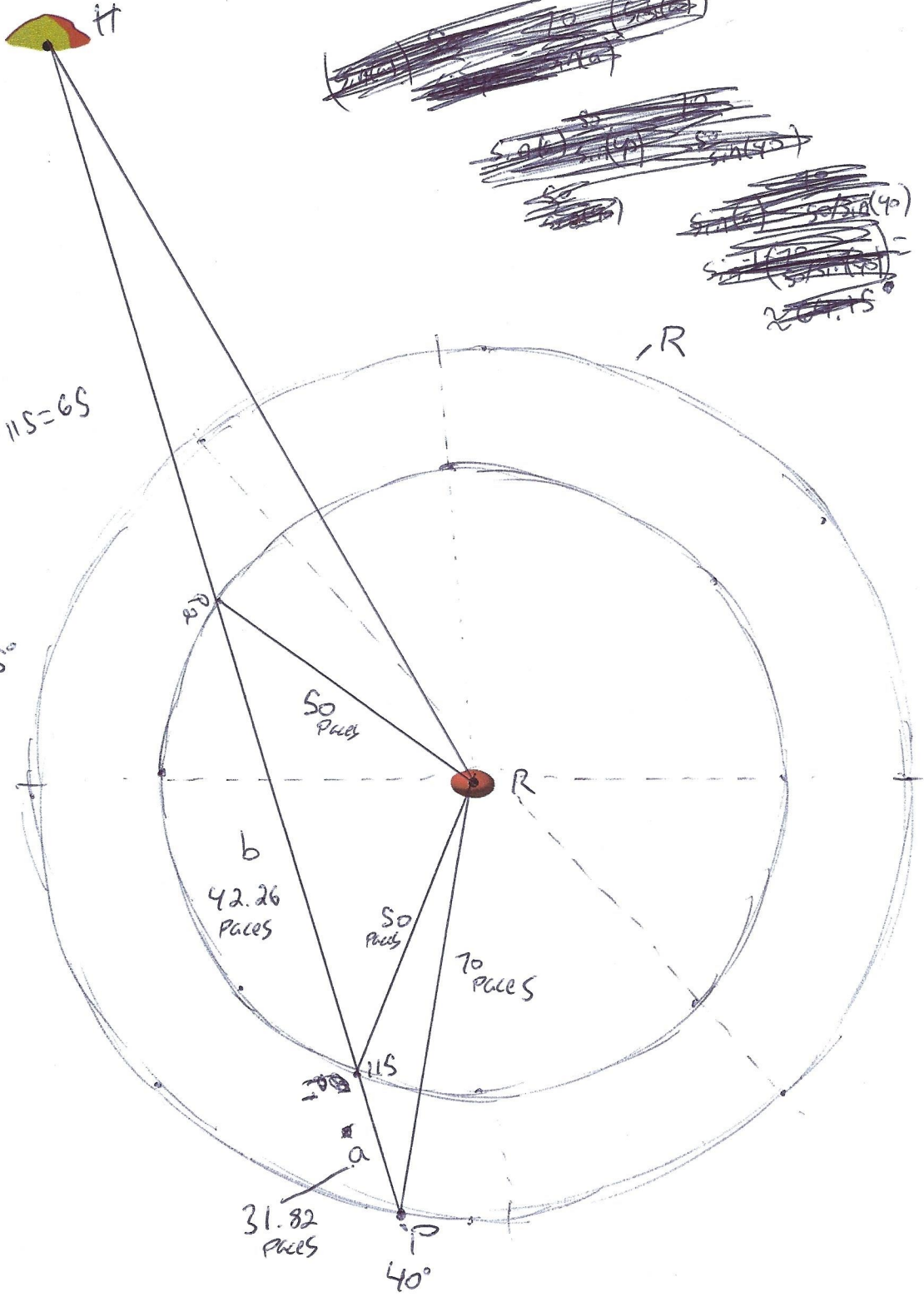


$$180 - 115 = 65$$

$$\sin^{-1}\left(\frac{50 \sin 65}{50}\right) = 65^\circ$$

$$180 - 65 - 65 = 50$$

$$b = \frac{50 \sin 50}{\sin 65} = 42.26$$



Now, you are going to detail your plan for finding the treasure so you can tell your team on site exactly what to do. The only equipment they have to work with is a tape measure, lots of rope, a sharp knife, shovels, and a protractor. You all decide that a pace will be approximated by 3 feet, so make sure to convert your numbers to feet so they can accurately measure!

Find the red rock, measure out 210 feet of rope and cut it. Anchor one end of the rope to the middle of the red rock. Start walking away from the red rock until rope is taught. Keep this radial distance following the circumference until the rope is 40° with the large hill. Next, walk 96 feet toward the big hill. Dig here. If no treasure is found, walk an additional 129 feet and then dig there. Treasure should be there if not at first location.

Reflection

Discuss the things you have learned in your trigonometry class and how they may apply to the real world. Can you make the argument that trigonometry is a useful tool? What kinds of things have you learned that can be useful in your particular career path? Please be specific and give multiple examples to back up your statements. **Your reflection needs to be typed - not hand written - and included with your submission. Length may vary, but should be long enough to answer the questions with meaningful responses.**

Math 1060 is a Quantitative Literacy General Education course. Scan or save a copy of your finished report to upload to your SLCC e-Portfolio so that it can be found under this category. You will **NOT** receive a grade for the assignment if it is not uploaded to your e-Portfolio. Instructions for the e-Portfolio are posted on the Canvas site for this course.

See additional page.