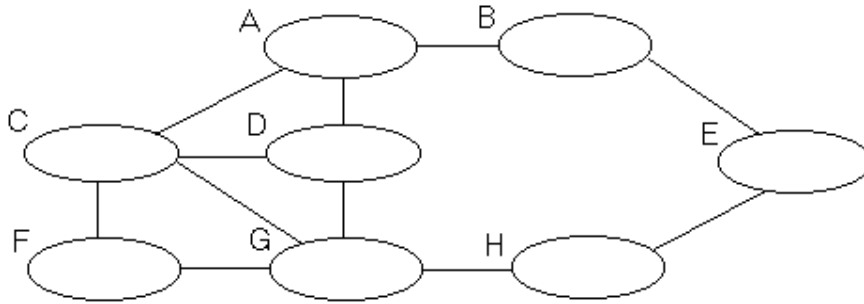# TRIGONOMETRY| STUDENT WORK| PROFICIENCIES

Logic puzzle

Part 1: **Solve the puzzle**. (Place the people in the correct houses)

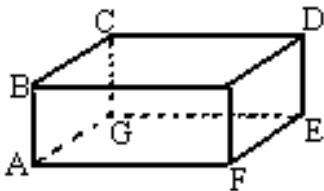**Part 2**: **Prove that your solution is the only solution**—that no other solution works. Use the reference sentences 1-10 in the body of your proof or as footnotes. The proof steps should be in good order.

1) 8 students live in the houses A B C D E F G H. Some are <u>connected</u> by phone lines (direct lines between the oval houses).
2) The 4-letter name people are not connected to each other.
3) Vera is not connected to Gabriel.
4) The 7-letter name people are not connected to each other.
5) Venus has EXACTLY two connections.
6) Paul is not connected to Tanisha.
7) The 5-letter name people are not connected to each other.
8) Nija is not in F.
9) The V-names are not connected.
10) Sean is not connected to Maria.

Proficiency problem

You wish to find the volume of a building. The base is a parallelogram and the sides are vertical. The roof is also a parallelogram parallel to the base.

You may not climb the building nor throw anything on it or at it.

You have with you:

a yardstick
tent pegs
tuna sandwiches
a scientific calculator
a backpack
a roll of electric tape
scissors
a sextant
a machete
a level

graph paper and colored pencils
a camera (Polaroid) and film
trig tables
      an axe
a thermos of tea
      a hammer
 a box of straws
 a flashlight with batteries
 2 compasses (1 of each kind)
 a ball of twine

Find the volume efficiently (minimize time and energy).
- Draw appropriate pictures and label everything.
- State the formulas to be used and show how to solve them.
- Show what you will measure and how.

06/16

1) First I will find the area of the base.
   To do that, I will measure the angle GAF with
   the sextant.

   To measure ∢ GAF I will align the sextant with   (horizontal)
   segment AF. (i.e. 90° in front AB 0° parallel AF) just ·behind the wall

   Looking through the straw I will deter-
   mine the angle. After that, I will measure with
   my yard stick segments AG and A F.

   Once I have those measures I will put
   them in the equation. Area. It would
   look like this.   (distance of)
                                   →(sin∢)(distance of AG)
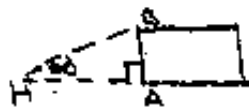   A= b h

   The result is the area of the base
   parallelogram AFEG.

2) I will determine the height of the
   building.
      First I will stand next to corner A
   and measure a line that extends from $\overline{AF}$,
   B and Where
   H   F. The end of that line is H.

      From H, I will use my sextant to de-
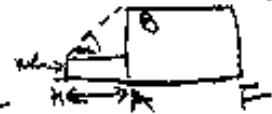   termine the ∢ BHA.

The sextant ⌐ ⌐⌐⌐ must be vertical and parallel to $\overline{HA}$. Once I have looked through the straw and determined the angle I will put the #'s in the following formula:

$$\overline{BA} = \overline{HA} \tan \measuredangle + my\ height$$

(Height of building) (distance of way line)

3) Once I know both the height of the building and the area of the base, I will multiply them in order to attain the volume.

$$V = A\ H\ \longrightarrow\ \left(\text{distance } \overline{HA} \text{ times } \tan \measuredangle \text{ plus my height}\right)$$

$$\left(\text{distance } \overline{AF} \text{ times}\right)\left(\text{distance } \overline{AG} \text{ sin}\alpha\right)$$

1. Vera - 4 letters
2. Venus - 5
3. Gabriel - 7
4. Paul - 4
5. Tanisha - 7
6. Nija - 4
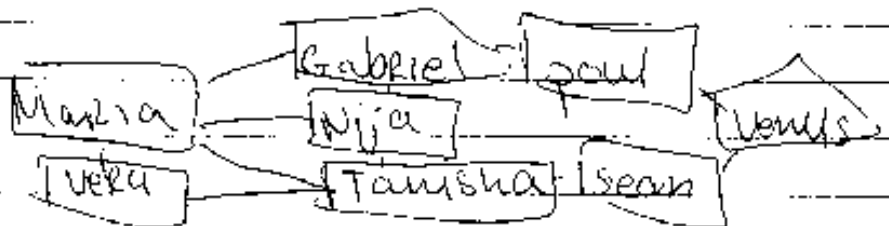7. Sean - 4
8. Maria - 5

Vera, Paul, Nija, Sean were not connected

Gabriel, Tanisha are not connected

Venus maria are not connected

Sean is not connected to maria

Nija is not in "F"

If the four-letter names are not connected to eachother then the only space the can be placed without being connected is F, D, H, and B.
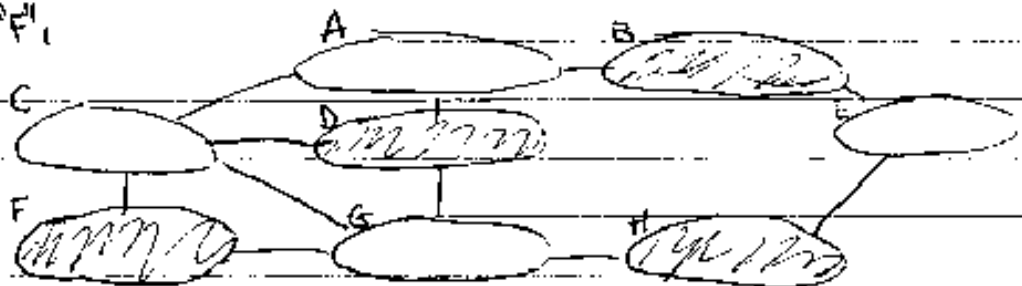
If you put a four letter name in "C" you would have to place the other three four-letter names in B,H, and C, because C is connected to F, A, D, & G. Which is leaving three names and three houses. That won't work because the three houses are connected.

If you put a four letter name in "G" it would leave three spaces too because "G" is connected to F, C, D, H, . Which leaves you A, B, E. As you can see those are connected too. So that doesn't work.

But if you place a four-letter word in "F" that leaves A, D, H, B, E. Because they are not connected and C, and G are connected so there are no four-letter names in G or G. Now if you place a four-letter

name in "A" that means you can't place no four letter names in D, or B which leave two names, and two places H, and E. That wouldn't work because the two four letter names would be connected. So no four letter name can be placed in "A". So now we have limited are houses down to ~~four~~ five (now) F, D, H, B, E. New E is connected to B, and H which means the four letter names would end up being connected so no four -letter names can be placed in "E". Which leaves three four letter names, and three space. Well what do you know they are not connected D, B, H aren't connected to eachother and aren't connected to "F".
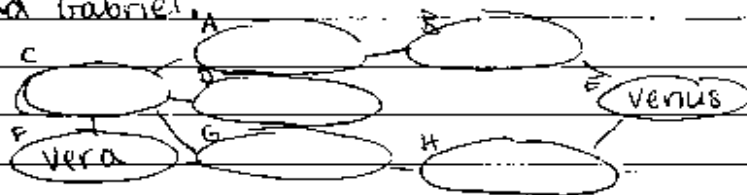

F, D, H, B

The people with seven letters in their names were not connected neither were the people with five letters in their names. So it's 2 people with seven

letters in their name Taussha, and Gabriel.
And there are two people with five letters
in their names. (Venus, Herla) The spots that are left
open are C, A, G, F, Now I have to set it
up in a way the seven letter names don't
connect, and the five letter names don't connect.
    Since the V-letter names don't connect
there is but so many place only one
place Venus can go without being
connected to Vera that is in E. Now
vera can't be placed in B, or H, so that
leaves her D, and F. Now "D" is connected
to A, G, and C. Since vera is not connected
to Gabriel she has to be place in the
"F" spot because out of A, G, and C
Gabriel has to be placed and he would
have ended up connecting with vera. So
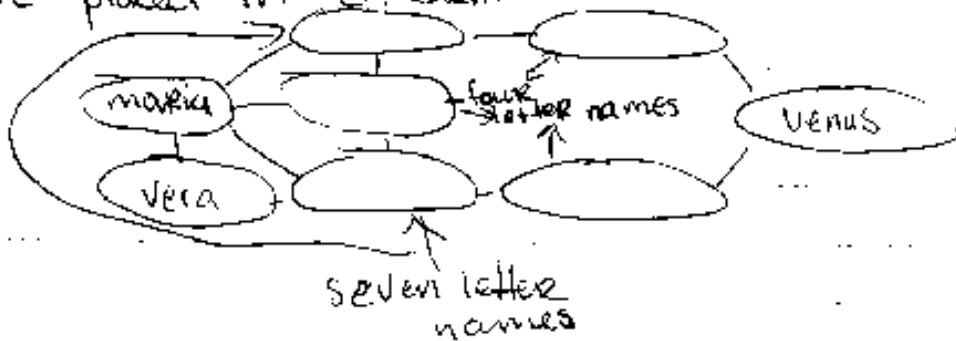now vera is disconnected from venus,
and Gabriel.

    If the five letter names can't connect
that means maria has to be placed
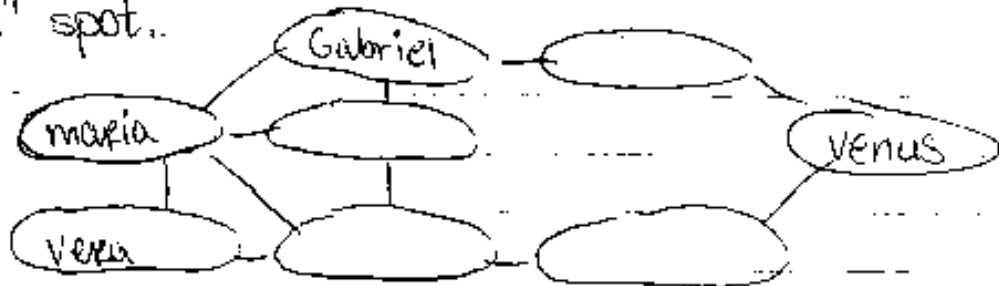in "C". Because if you place her in

and have exactly two connections
that is E. Because "A" has three
connection (C, D, B). "G" Has four connections
(C, F, D, H) "C" Has four connections (F, G, D, A)
F, D, B, H are only for four letter names.
o And "E" is the only house left with exactly
two connection.

Fig 4

if you put her in "G" the seven-letter (that, won't work) names will connect. So Sence ~~G, D, B, A~~ ~~are taken up by four-letter names~~ ~~B taken up by Venus~~ there are only three spots A, C, G. And ~~if~~ maria can't be placed in A, or G she has to be placed in "C". ~~system.~~

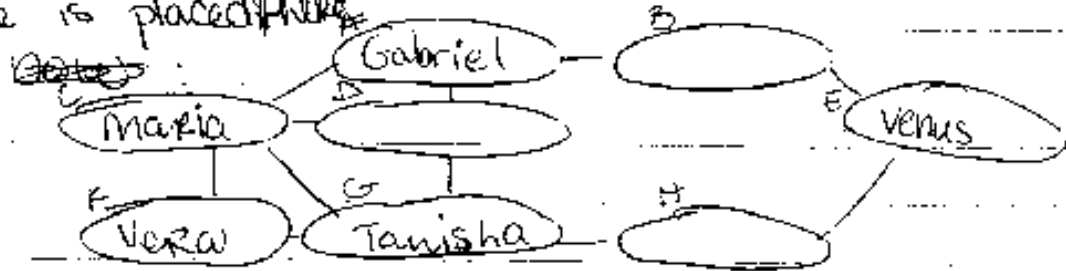
four-letter names

maria

Vera

Venus

seven letter names

Sence Gabriel wasn't connected to vera he had to be placed in the "A" spot. Because there are only two spots left "A" and "G". "G" is connected to vera so .... Gabriel has to be placed in the "A" spot..
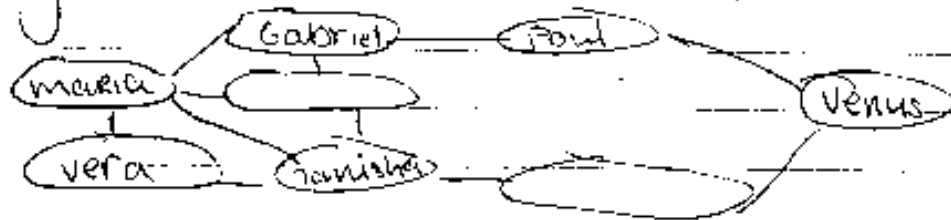

Gabriel

maria

Venus

Vera

~~First~~ Now there is only one spot left which leaves "G". ~~Sence~~ Tanisha

_____ is the only one left that where
She is placed~~there~~.
~~Bela~~

is the only one left that where
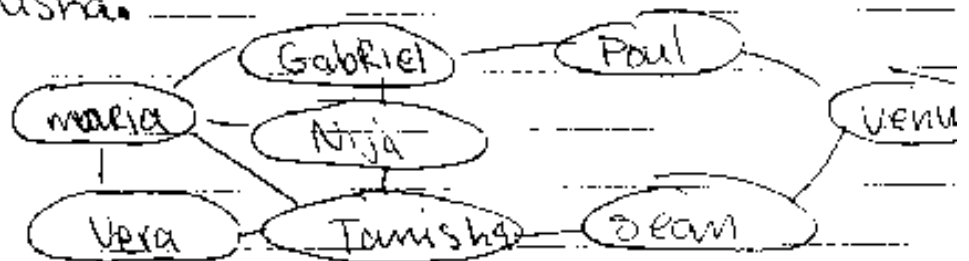She is placed there.

Now I have to fill in the four
letter names.

If Paul is not connected to tanisha
he has to be placed in the "B" spot
because, if you place him in either
"D", or "H" it will connect to "G"
where Tanisha a is placed. So the
only place Paul can be placed without
being connected to Tanisha is "B".

The last two people who names
need to be filled in are Nija, and
Sean. Now we already know Nija can't
be in the "F" spot. For one, she wasn't
aloud in that spot in the first place
and for two it's already taken. And Sean isn't.

connected to maria so he had to be placed in "H" because if you place him in "D" it is connected to "C" where maria was placed at so in order for sean to be disconnected from maria, he would have to be placed in the "H" spot. Which put Nija in the "D" spot because she was the only one out of the four letter named people who was left and the only person who could be connected to Maria, Gabriel, and Tanisha.

→ None of the 4-letter named people are connected
→ Vera, and Gabriel aren't connected
None of the 7-letter name people were connected
Venus had exactly two connection
Paul is not connected to Tanisha
The five letter name people weren't connected
Nija wasn't in "F"
The U-names are not connected
Sean is not connected to Vera