

Teqûpâ shadow marking



V3



*Teach us to number
our days*

Tehillim 90:12



How?

Basically, we set up a sundial experiment!



Summer Solstice

Equinoxes

4

BOARD

SUN

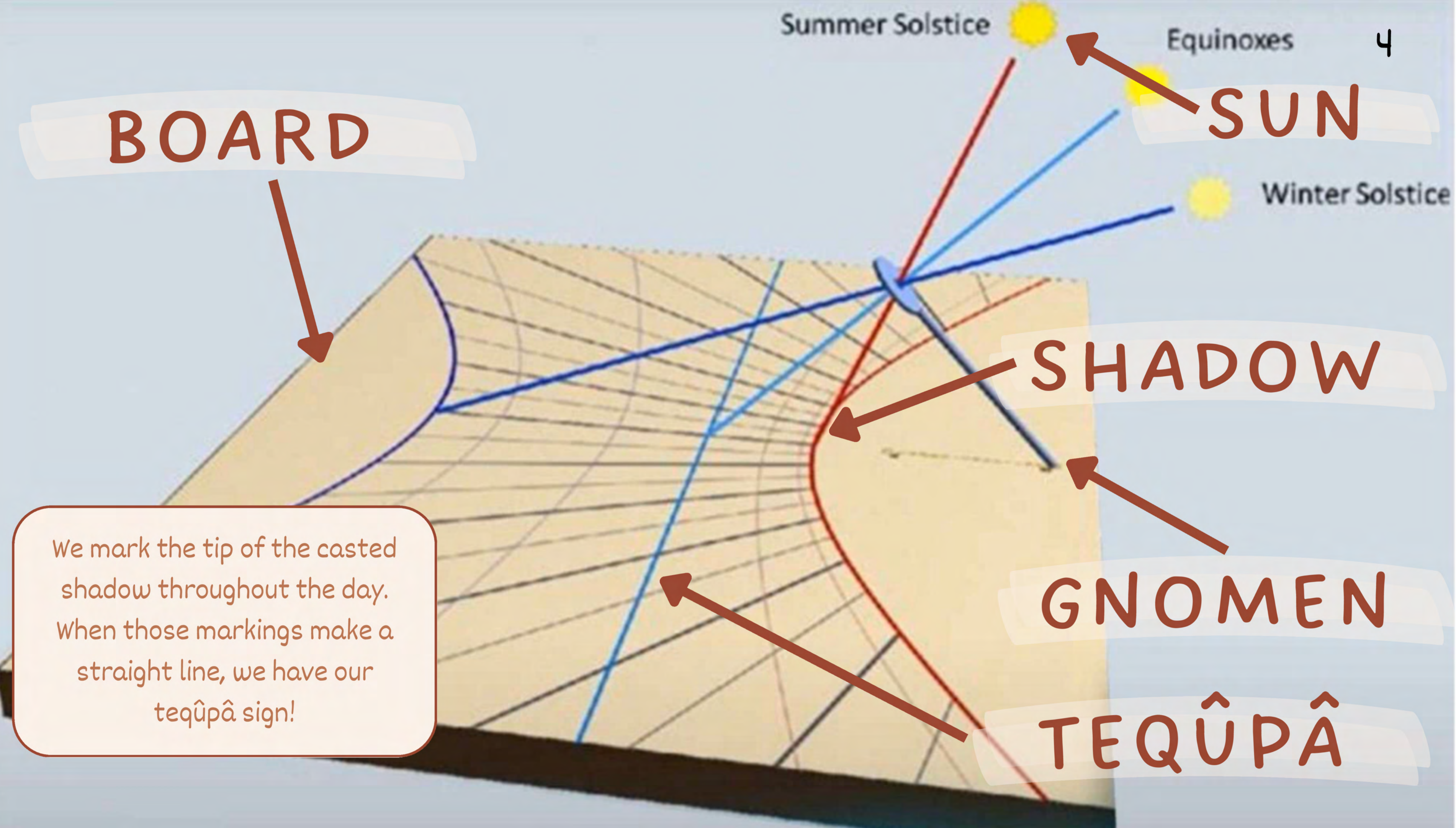
Winter Solstice

SHADOW

GNOMEN

TEQÛPÂ

We mark the tip of the casted shadow throughout the day. When those markings make a straight line, we have our teqûpâ sign!



BASIC QUESTIONS



When...

What...

Where...

How...

...to mark the shadow



WHEN TO MARK

*Start practicing today.
Literally as soon as possible!*

It's better to practice before the teqûpâ (equinox). Everyone lives in different areas, and you will learn a lot more from practicing.

So it's important to test your specific area to see what works best for you.

Teqûpâ



When to track:

- Track once a week leading up to the teqûpâ so you can test your setup.
- At least 1 day of full tracking the week before, again for practice.
- Week of teqûpâ: at a minimum 3 days. Day before teqûpâ, day of teqûpâ, day after teqûpâ. This will help us compare the curves the day before and after to confirm the straight line.

WHERE TO TRACK

Where to set up and track:

- Put your shadow marking setup on a flat surface.
- Find an area free from casted shadows (trees, buildings, etc. all cast large shadows).
- This area should be free from interruption as well (people, animals, lawn mowers, etc.).



WHERE TO TRACK



WHERE TO TRACK



WHERE TO TRACK

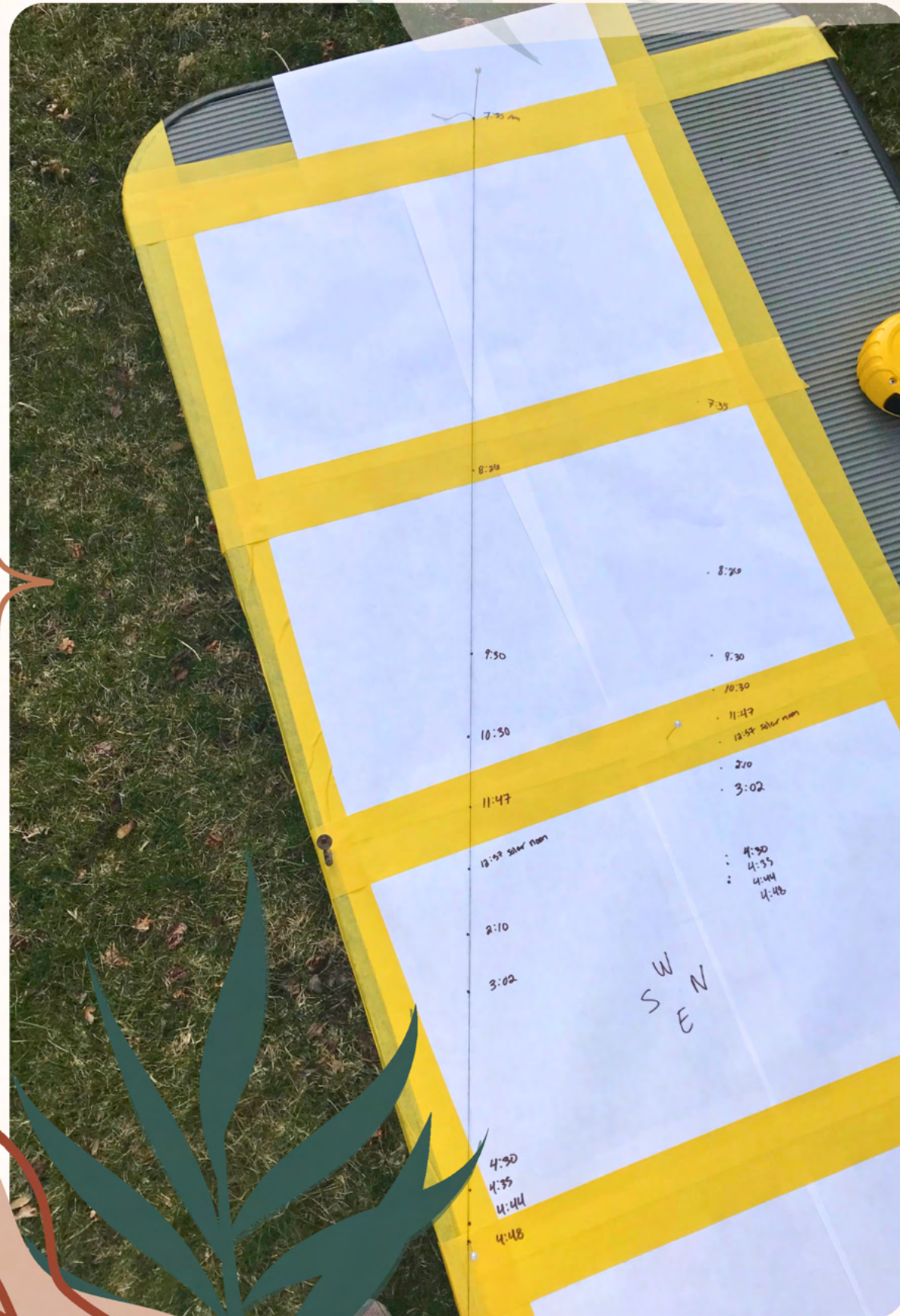
Your set up must stay in the same spot, unmoved for the entire tracking day.

You can move your set up **AFTER** collecting data between marking days.

Unless you want to mark multiple days on the same board to compare. Then keep the set up unmoved all marking days.



What materials



What you need:

- Board (foam board, light-colored wood, plastic signage, etc.)
- Gnomon (an object that will cast a shadow)
- Fine-tip pencil to mark the shadow
- Tiny push pins to mark the tip of the shadow
- Camera/phone to take pictures
- Fine piece of thread

GNOMON TIPS*

Gnomon:

- Use a sharpened pencil
- Toothpick
- Sewing needle
- Screw
- 1.5" is a good size and may prevent ghosting
- Needs to be stable and not move during the entire tracking day



pencil



toothpick



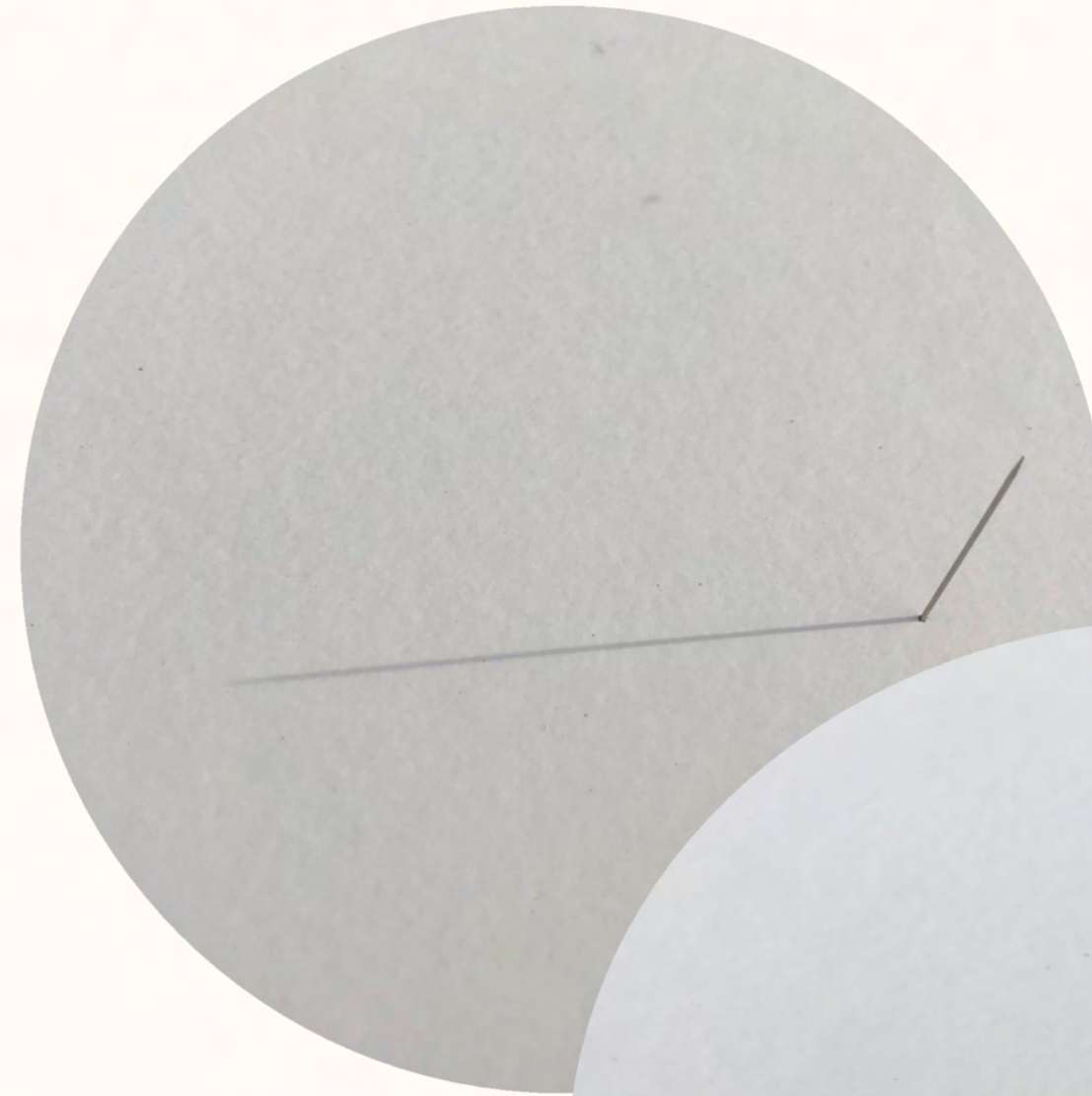
screw

GHOSTING OUT

You may notice “ghosting out” early in the morning and late in the evening.

This means the tip of the shadow disappears slightly. And it is difficult to see where the exact tip is.

This may also happen with taller gnomons because the shadow is much longer.



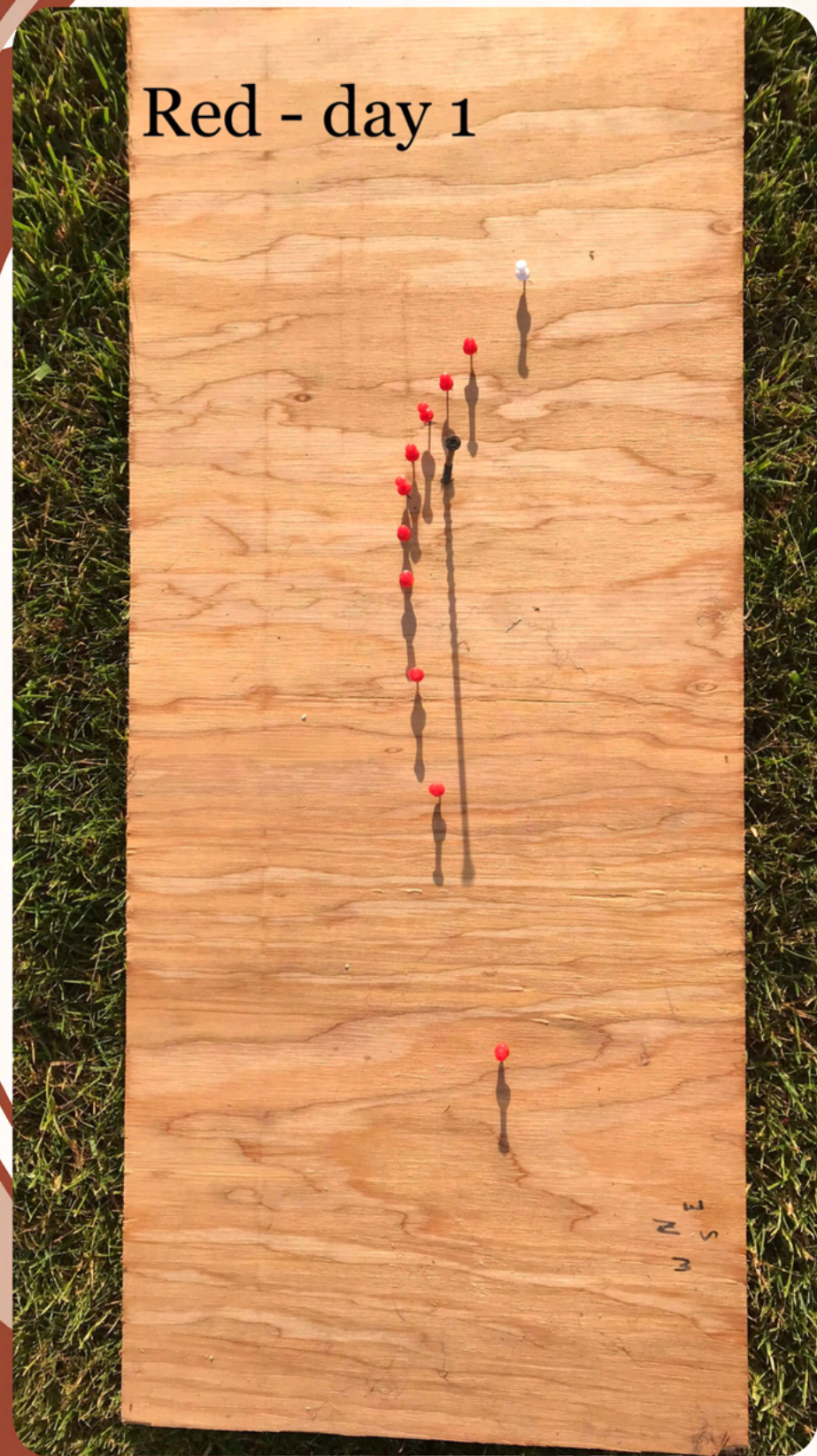
How to track



How to track:

- Run your board East to West, gnomon pointing North
- Minimum 10 hours of tracking each day
- Start as early as you can as soon as the sun is creating a shadow on your board
- Get as late in the day as you can before your board is covered in shadows

How to track



How to track:

- Get as early as you can in the morning
- Mark solar noon
- Get as late in the day as you can before your board is covered in shadows
- Track once/hour in between
- Note down the times that you track for each pin

DATA COLLECTION

- Date of marking
- Location (state, province, etc.)
- Time zone name or UTC
- Total shadow markings
- First marking time
- Last marking time
- Solar noon time for your location
- Height of gnomon
- Length from 1st marking to last
- Mark North, East, West, South on picture or on your board
- Initials
- Pictures (next 2 pages)
- Send to team leader

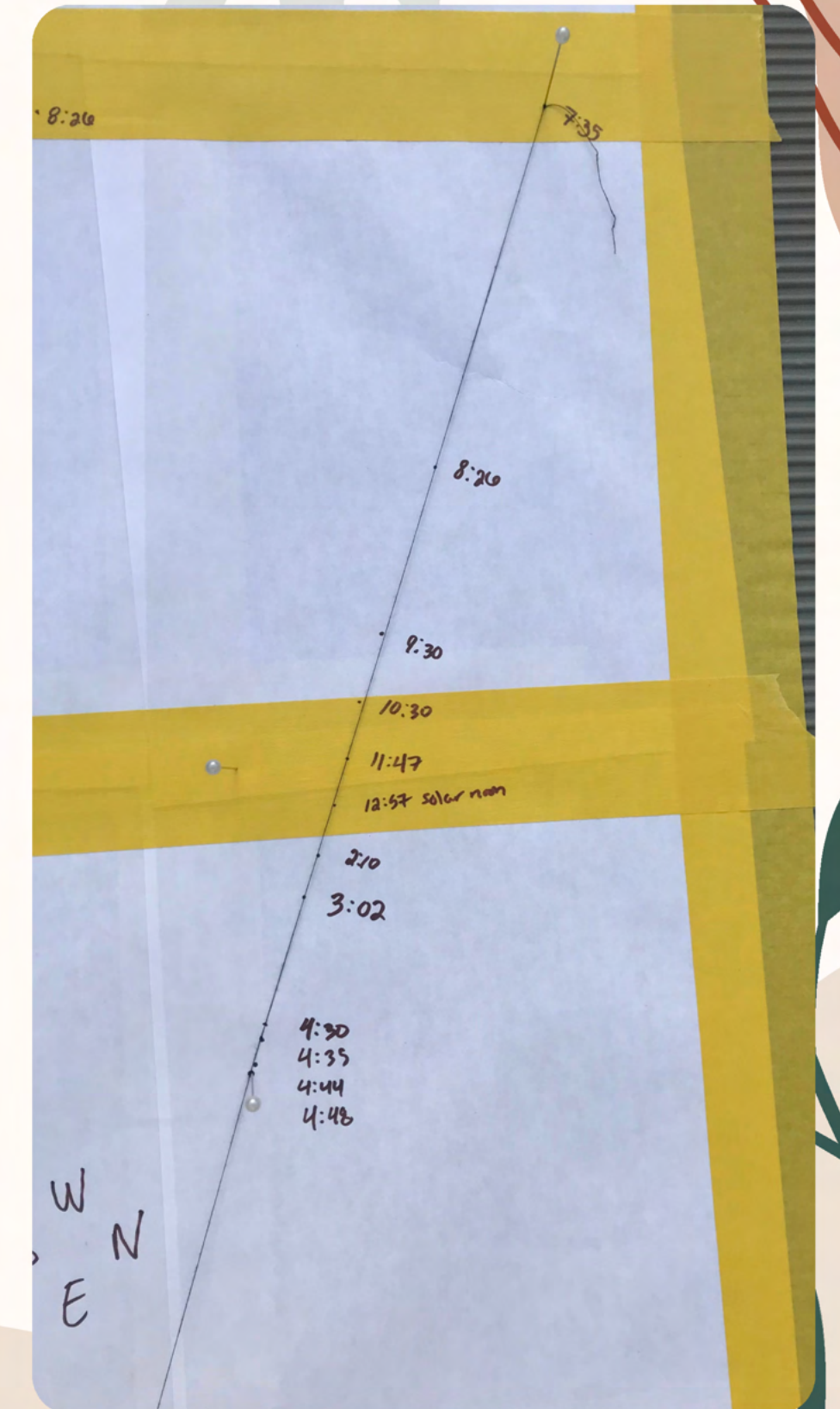
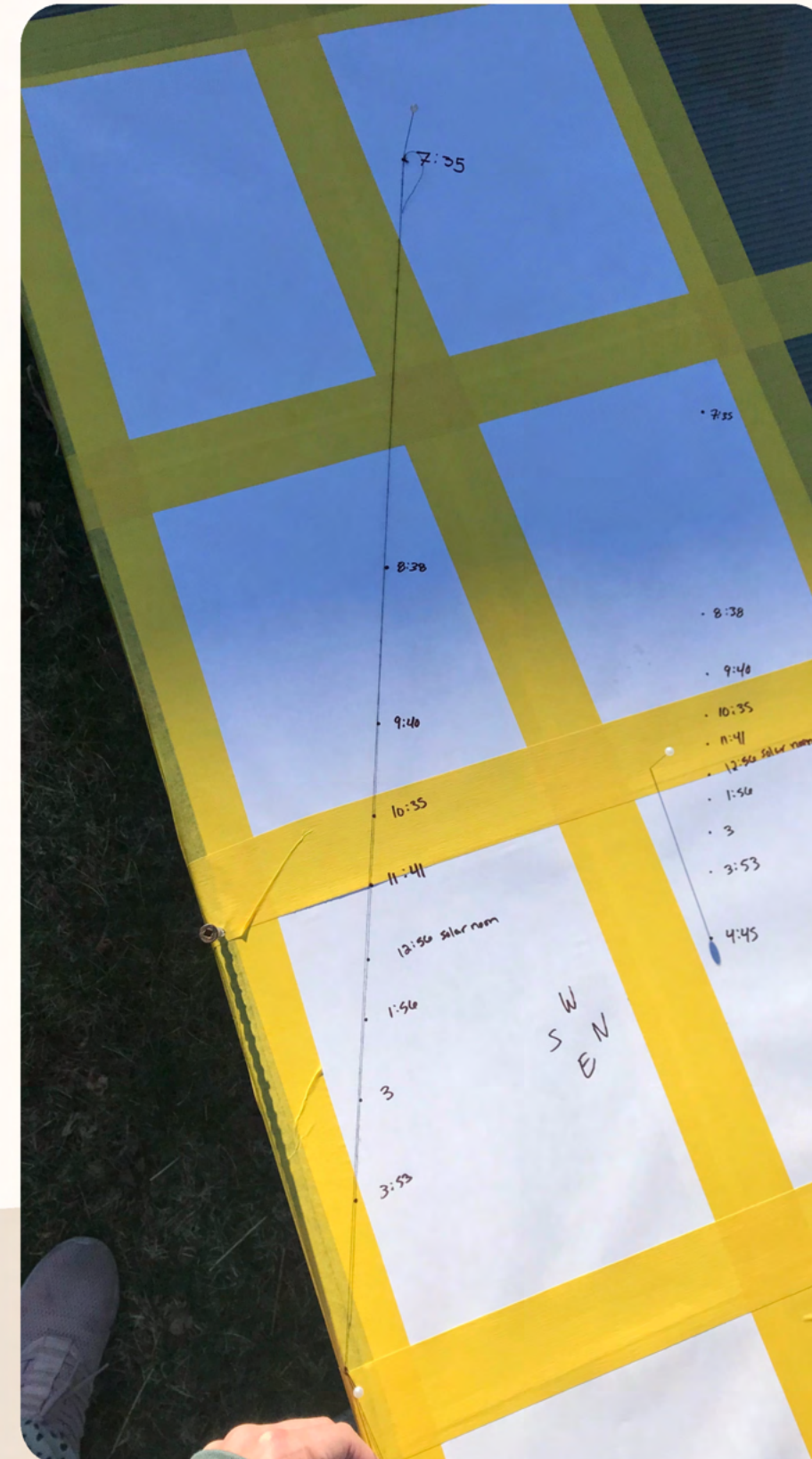
Marking the shadow data collection

Date of marking	
Location	
Time zone name / UTC time zone	
Total markings	
1st marking time	
Last marking time	
Solar noon time	
Height of gnomon	
Length from 1st to last marking	
Mark N, E, S, W on picture	
Take 4 pictures: all data, 1st marking, solar noon, last marking	Place data collection sheet on board to include with your "all data" picture.
Initials	

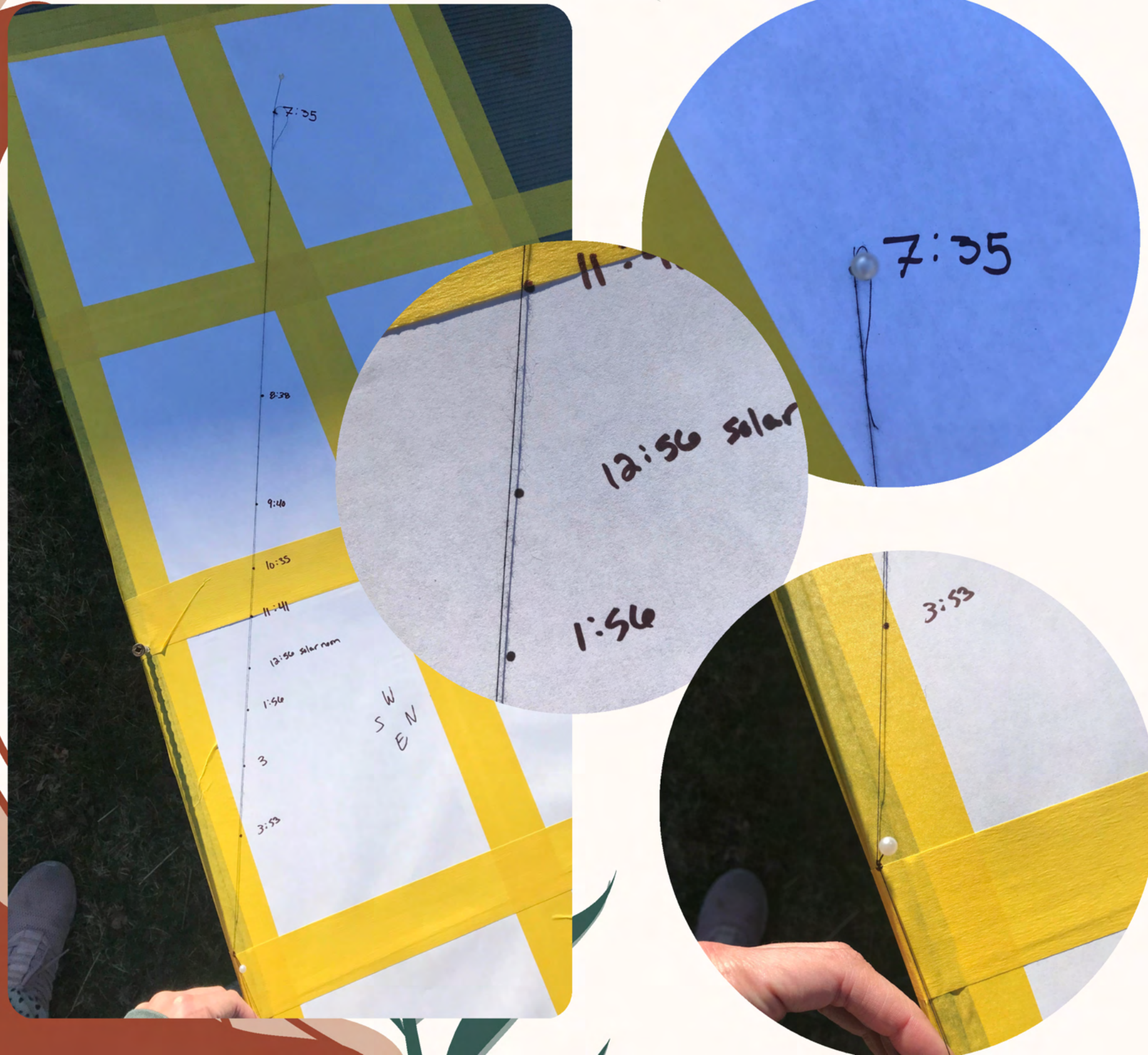
DATA COLLECTION

How to take pictures and report data:

- Take a fine piece of thread
- Connect the thread to the 1st data point (wrap around pin)
- Pull the thread and connect to the last data point (wrap around pin)
- Do not connect it or wrap it around any of the in between points - ignore those



How to take pics



4 pictures total:

- 1 picture of the entire board with your data information (so we can see all data points)
- 1 picture of a close up of the 1st marking
- 1 picture of a close up of solar noon marking
- 1 picture of a close up of last marking



What I've learned

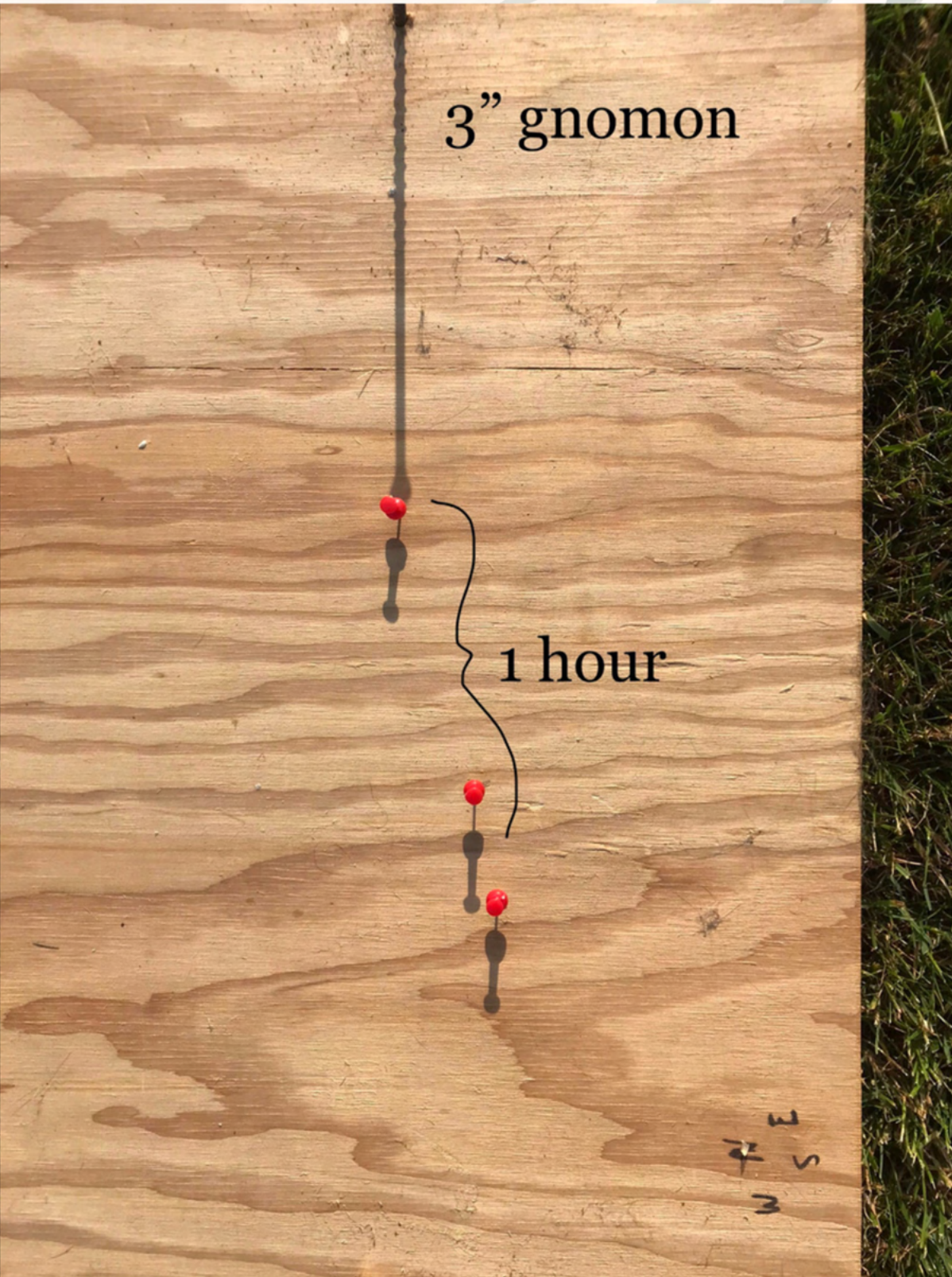
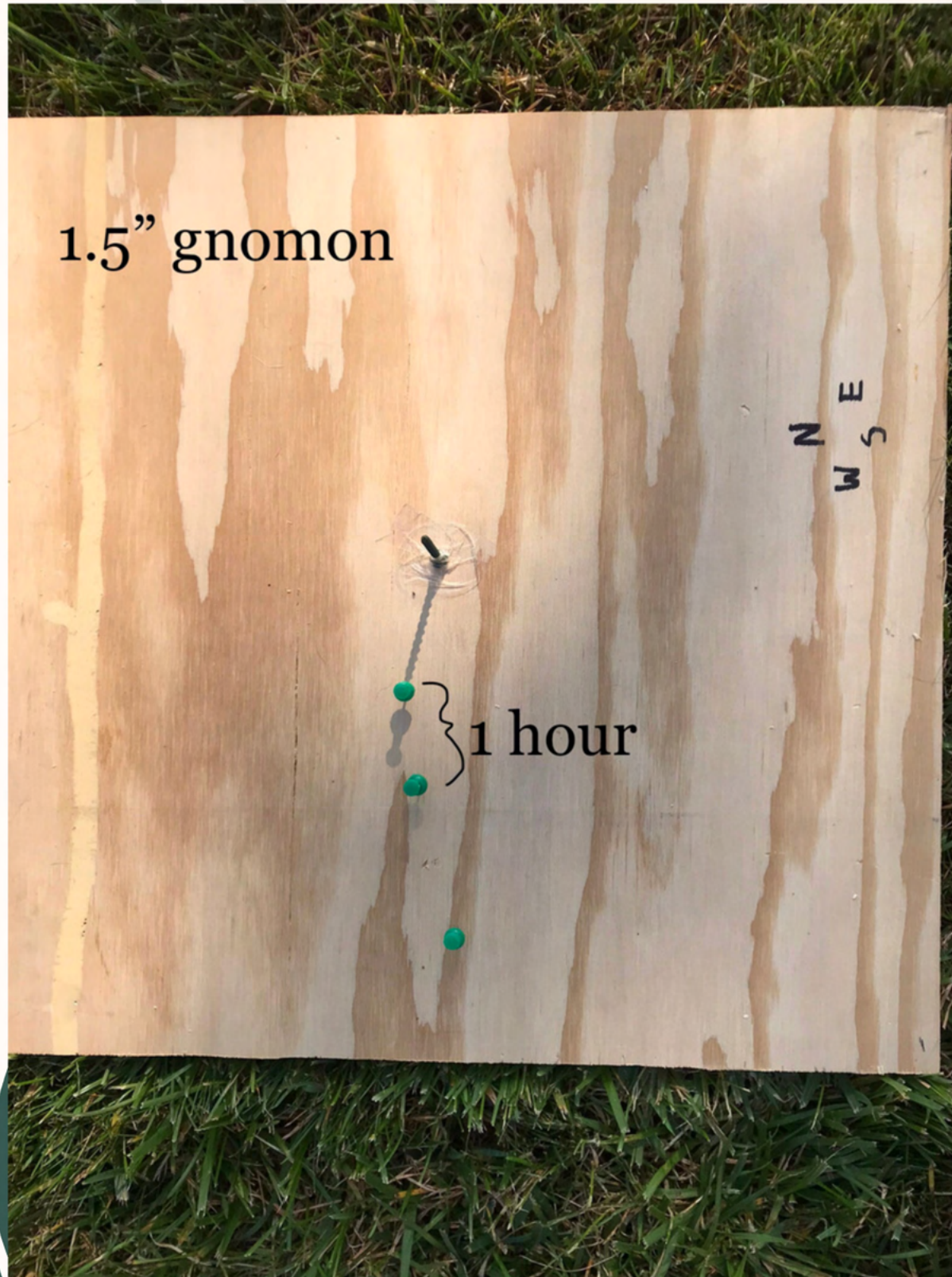


My first set up:

- Set up two boards - different lengths in board and gnomon
- Testing different areas for cast shadows
- Pointy tip gnomon provides a more accurate mark
- Larger gnomons may ghost out early am and late pm

ADDITIONAL TIPS

16x16 board



48x15.5 board



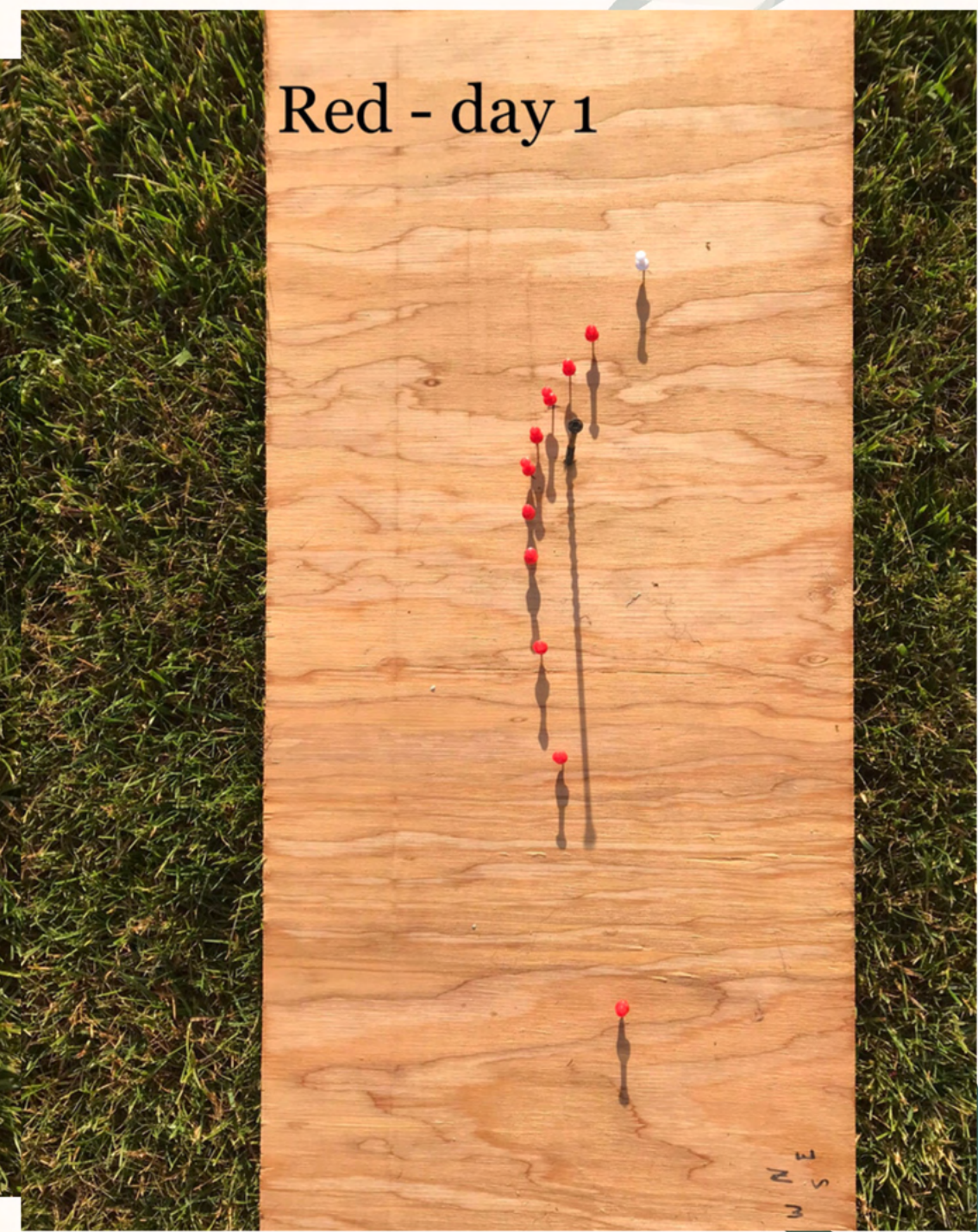
Taller gnomons require a longer board

ADDITIONAL TIPS

16x16 board



Red - day 1



48x15.5 board



Taller gnomons provides a more pronounced curve

ADDITIONAL TIPS

- The shadow will be longest when the sun is rising and setting
- The shadow will be very close to the gnomon when the sun is directly above it

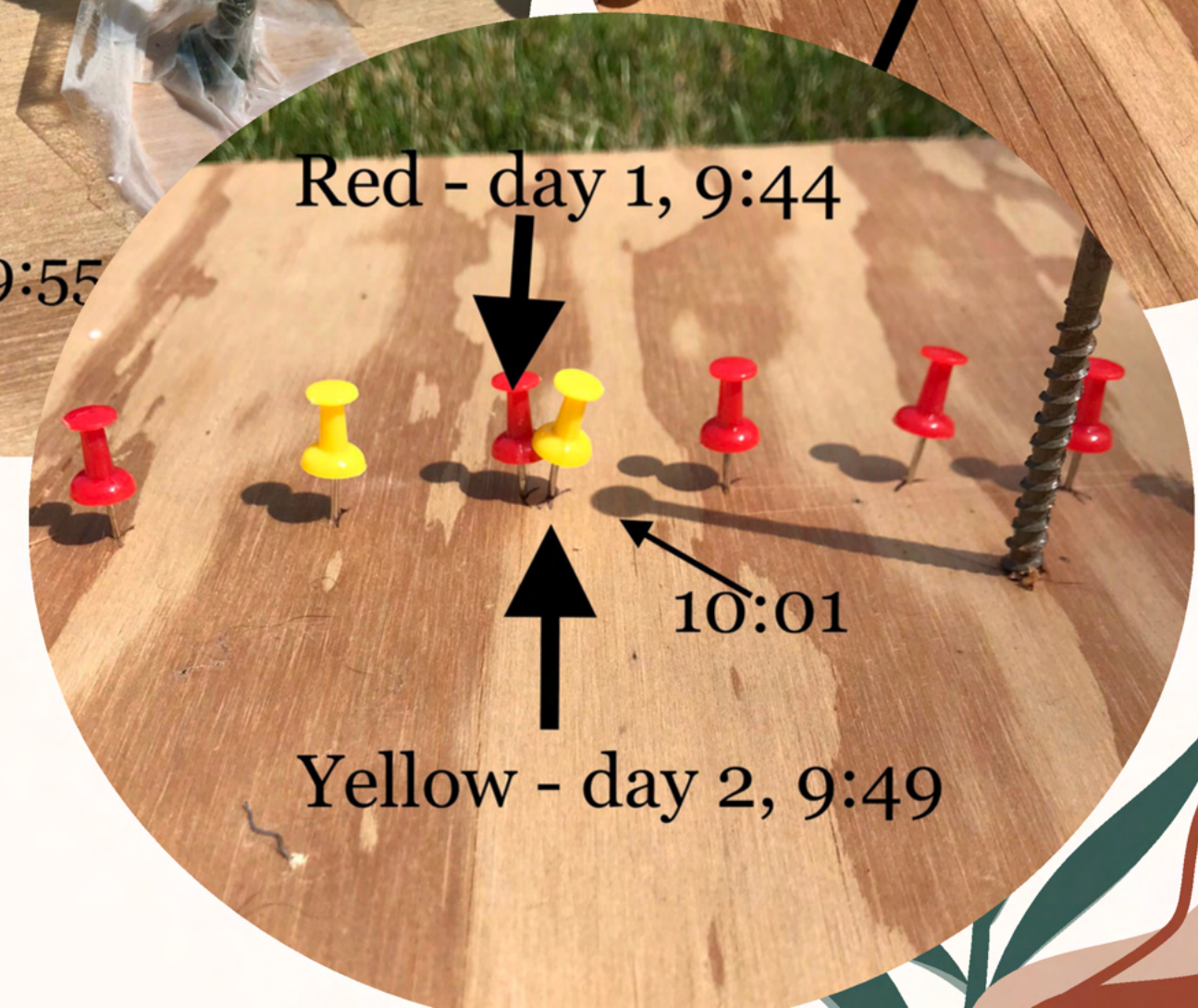
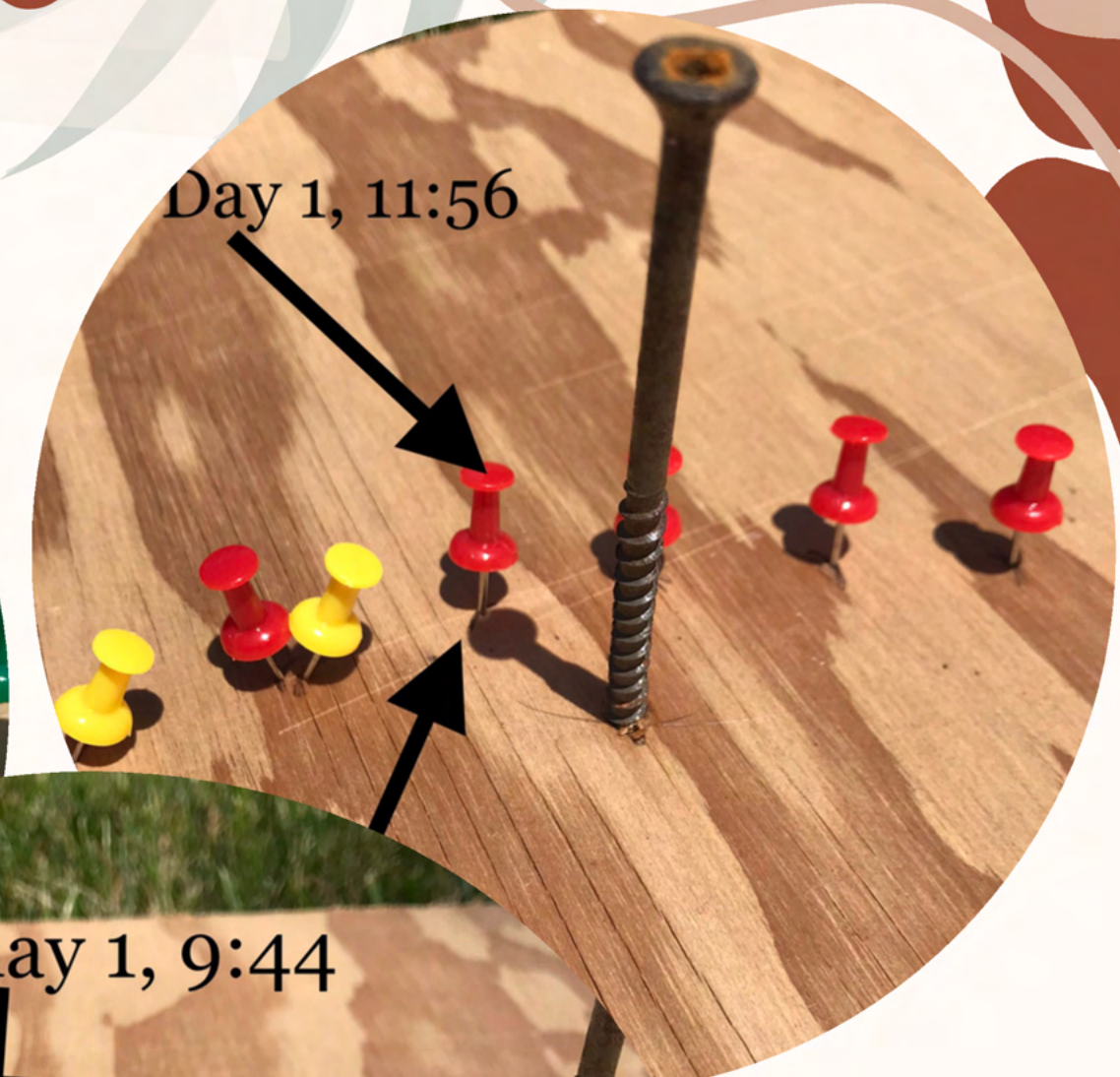
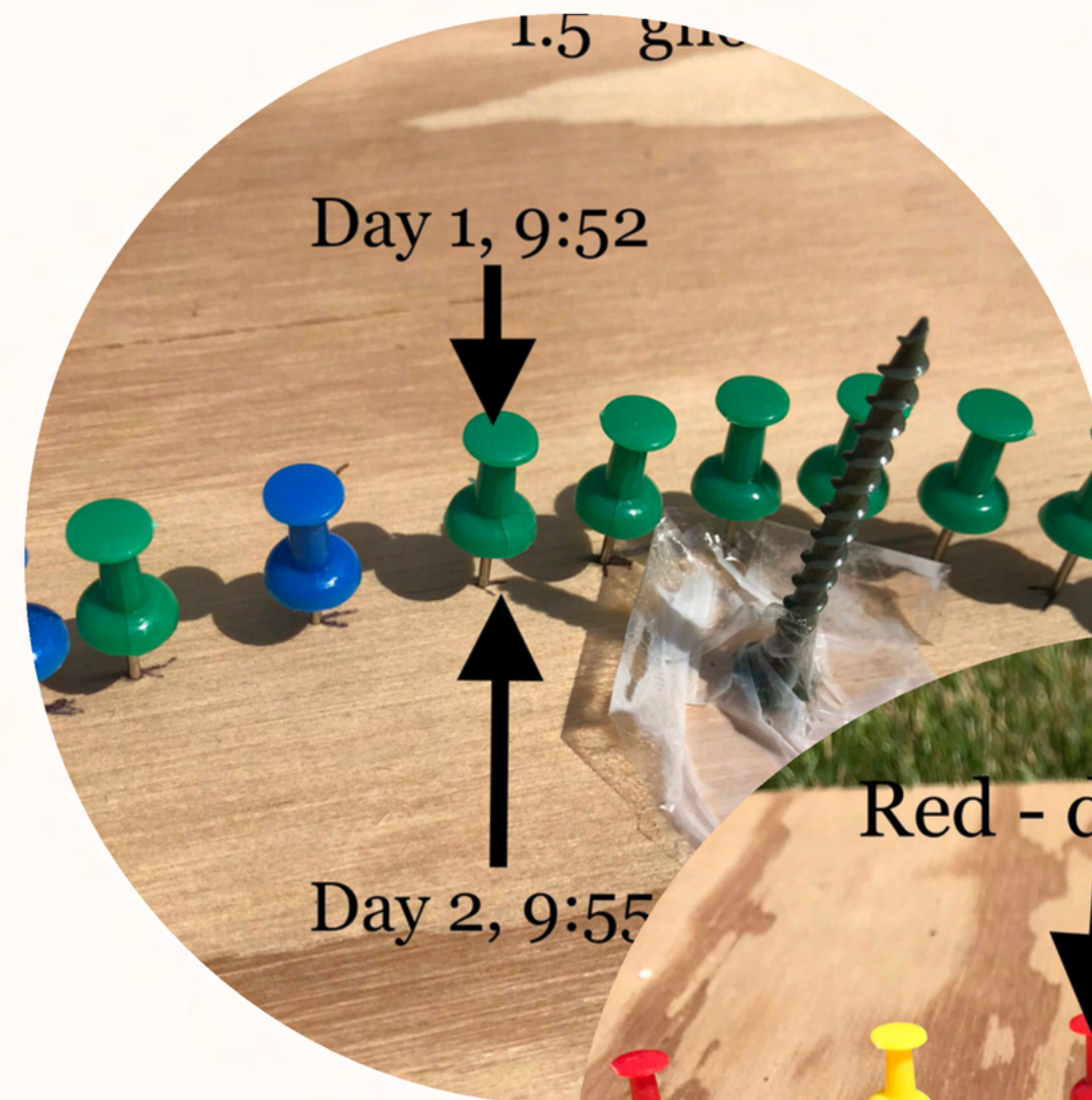


ADDITIONAL TIPS

Shadow tips are very close to each other day to day.

Mark each day starting with a clean slate.

Otherwise your push pins will start to get crowded.



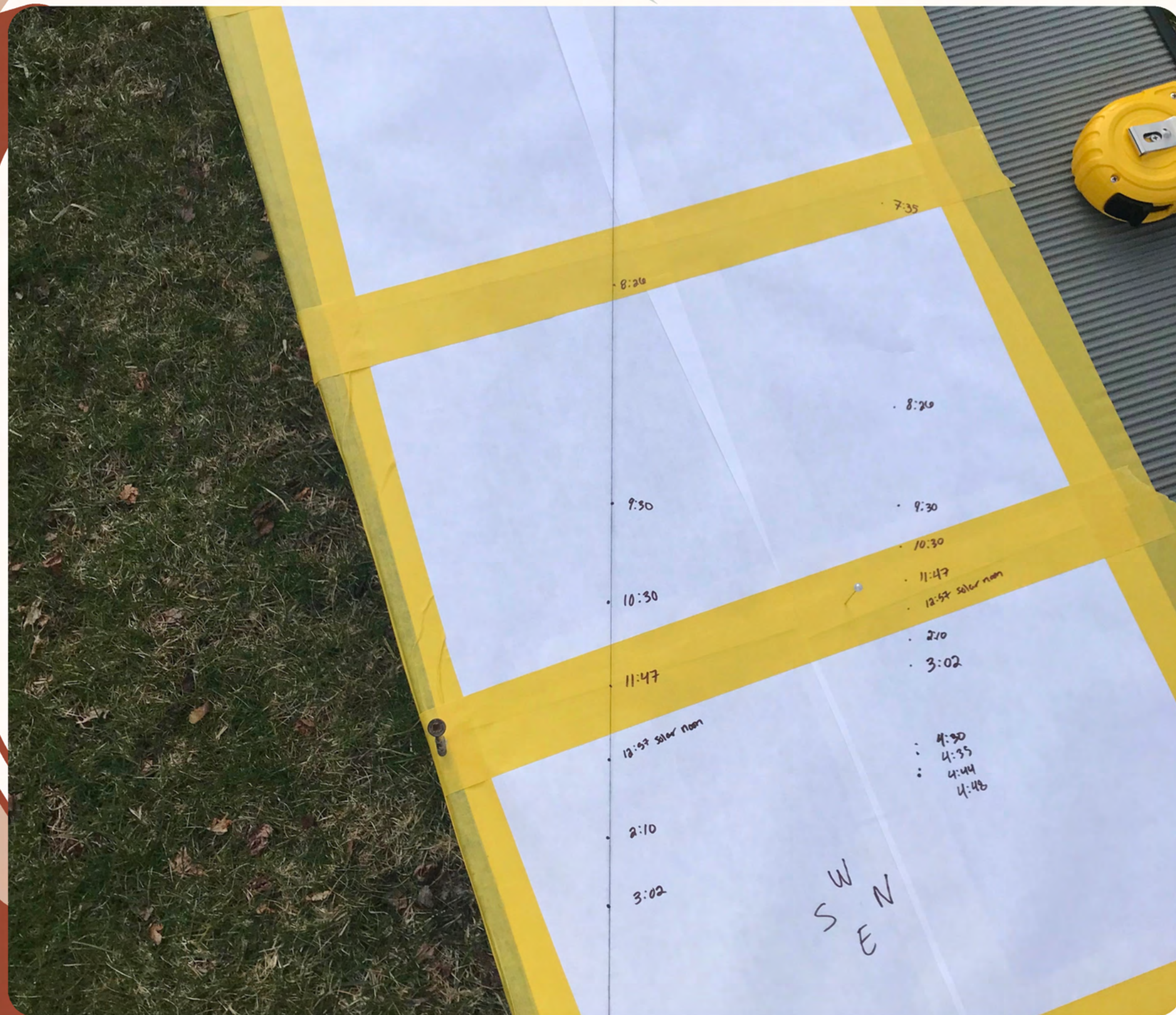
ADDITIONAL TIPS

Be mindful of how you secure your gnomon as well.

Markings around noon will be much closer to your gnomon the shorter it is.



What I've learned



My second set up:

- Dog grooming table with paper taped down
- Rounded top of the screw and corsage pin for gnomon ✨
- Two set ups on the same board - larger and smaller gnomon

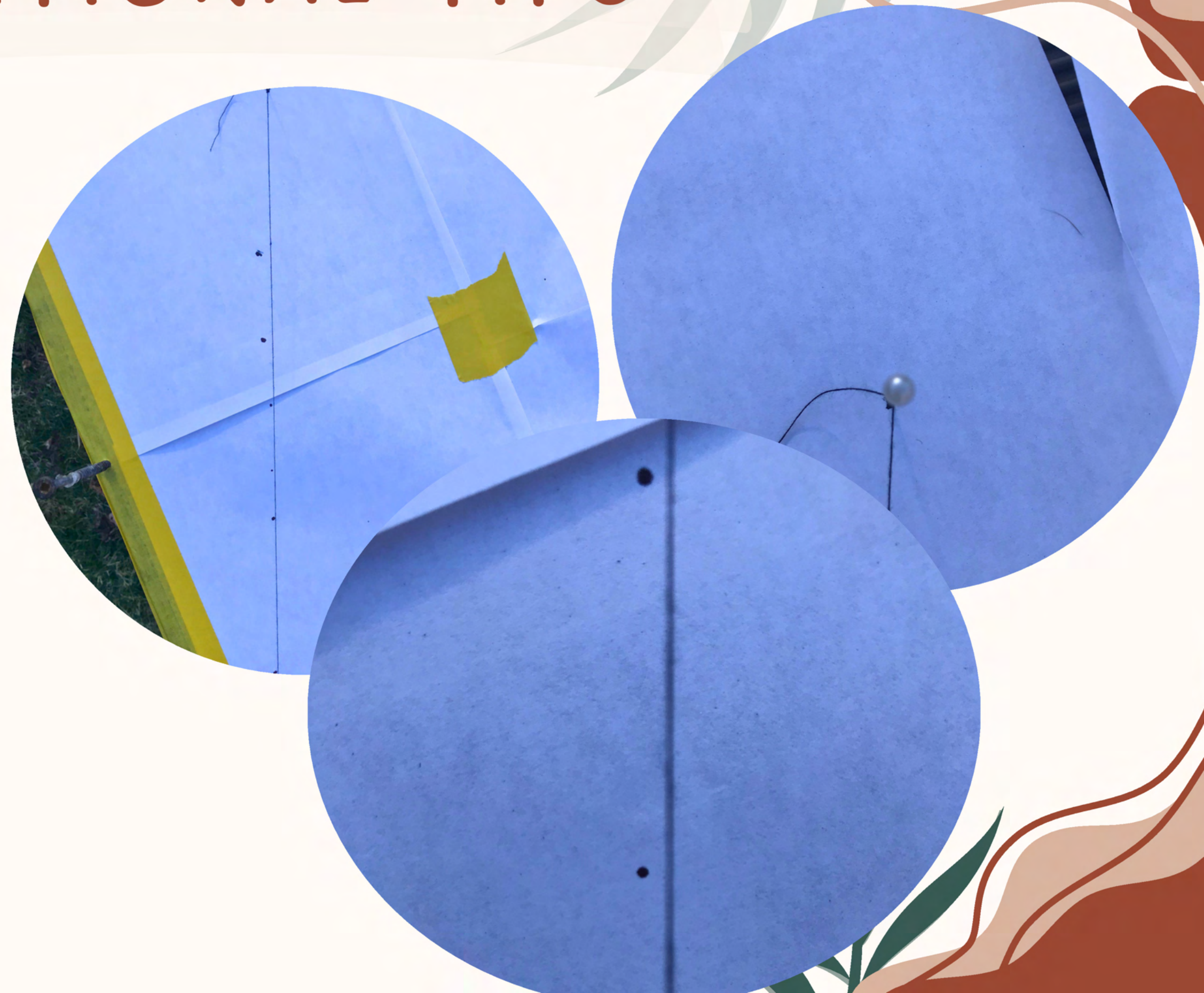
ADDITIONAL TIPS

Taping paper down isn't the most accurate way to mark.

Wind will go under the paper and move it.

You will also press the paper down when you mark.

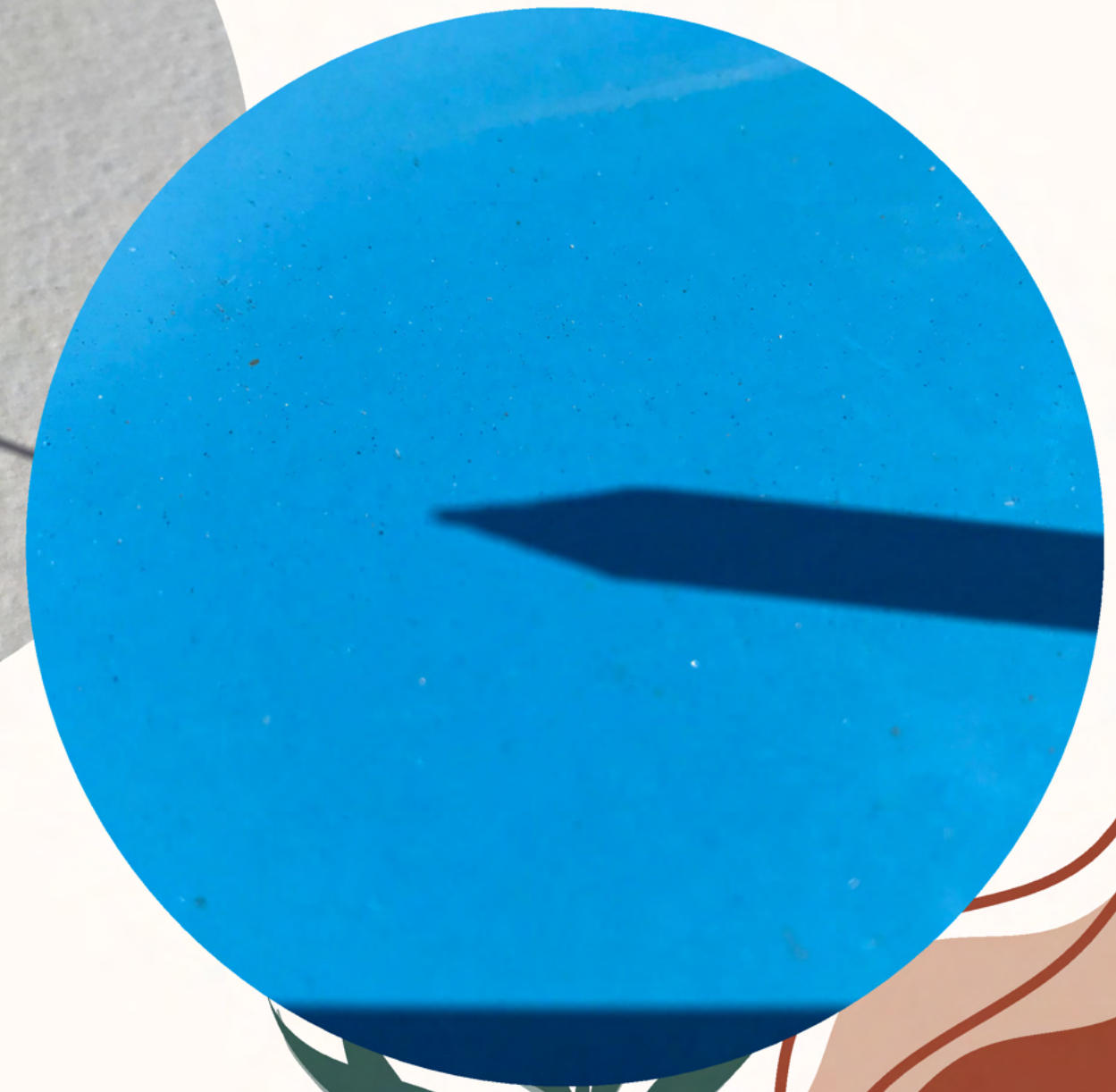
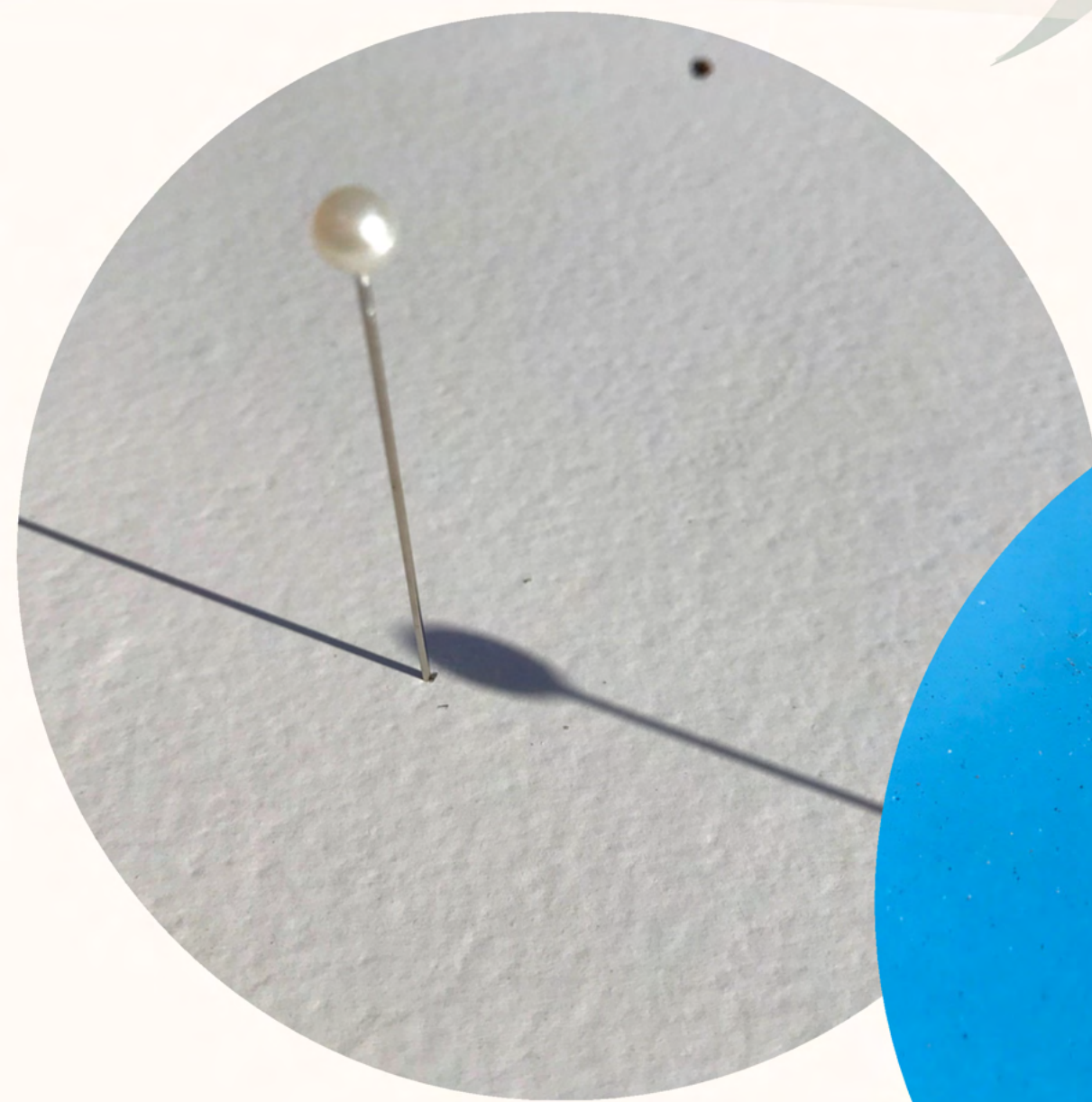
And we need a setup that does not move.



ADDITIONAL TIPS

Pointy tipped gnomons work better than a rounded tip.

The rounded tip - even with the corsage point from the needle - is difficult to mark the actual tip accurately.



Quick summary



Location:

- Must be unmoved and free from cast shadows.

Materials:

- Flat, lightly colored surface with a pointy tipped gnomon - 1.5" to prevent ghosting.

When:

- Practice asap. Mark at least 3 days: day before, day of, and day after Teqûpâ. 10 hours of tracking minimum. But at least as early and late as possible plus solar noon.

Data summary

Location:

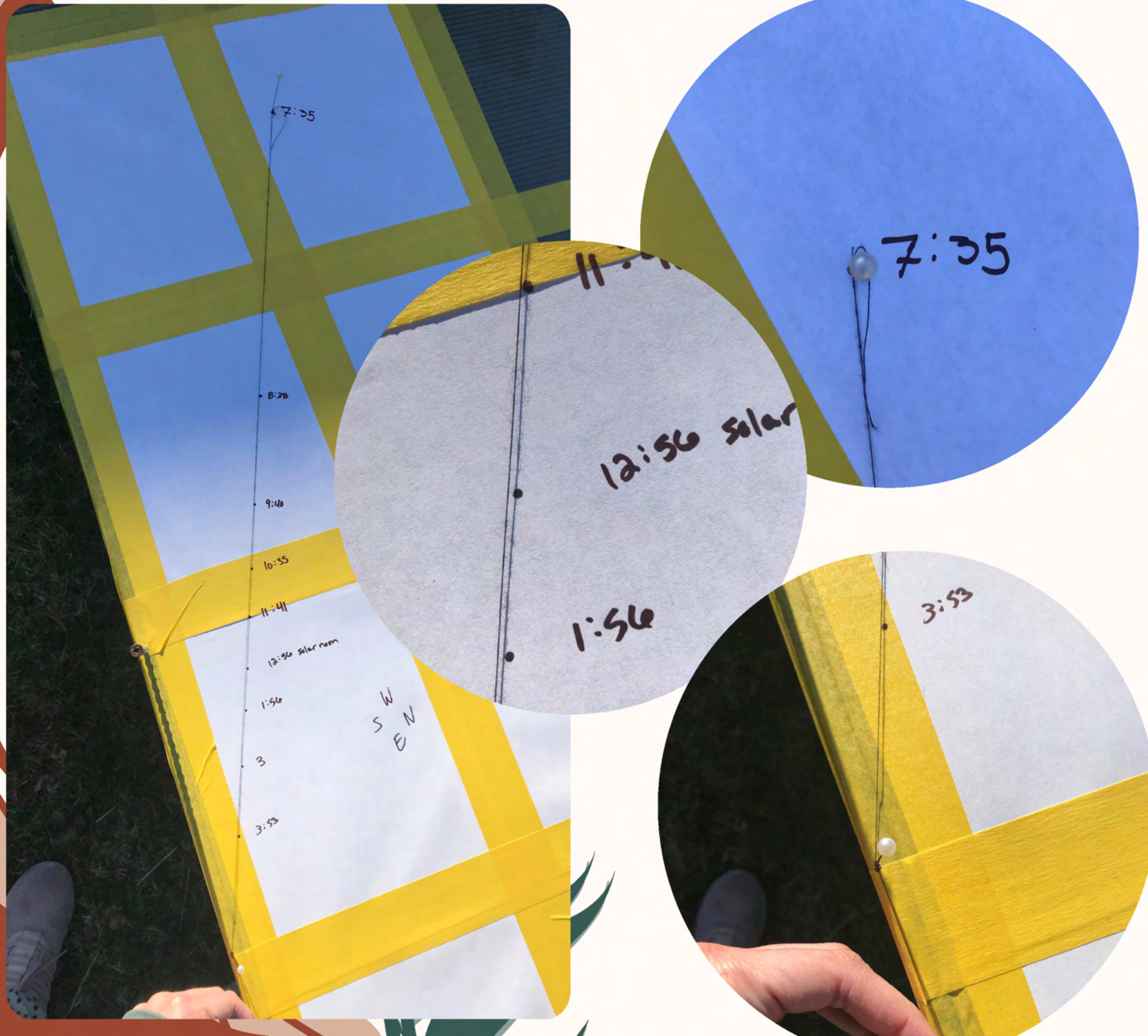
- Date of marking, your location, time zone, mark North, West, South, East on picture.

Details:

- Total markings, 1st and last marking time, solar noon time, length from 1st to last marking, height on gnomon.

Pictures:

- 4 pics total: entire marking, close up of: 1st, solar noon, and last marking.

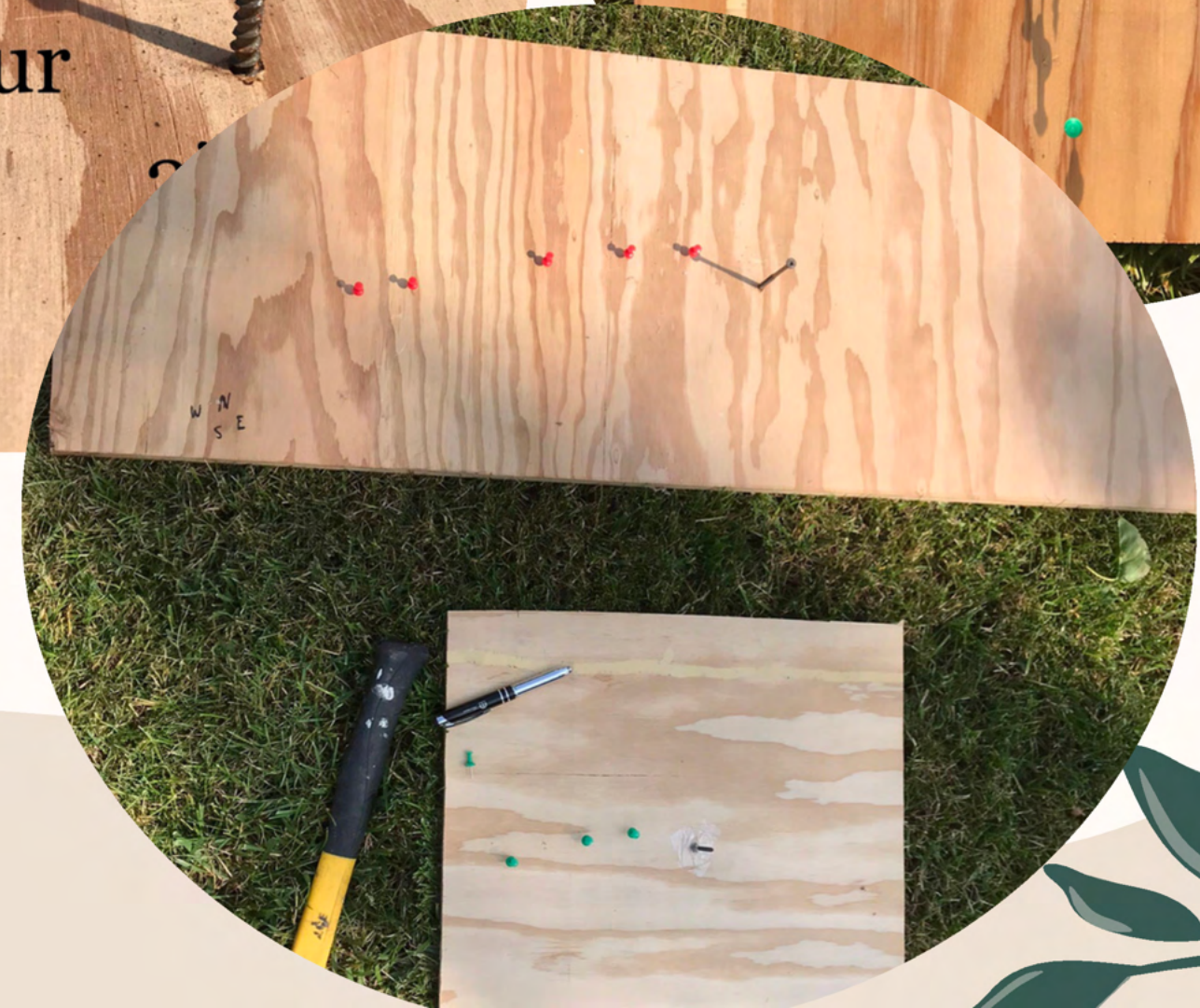


HAVE FUN!

This is such a wonderful and fun project!

Very fun, low effort. But massive impact!

We do this so we can number our days and honor אָרְבֵּי מוֹעֲדִים Moedim on His time.



Resources

Visit the following website link for all resources

bit.ly/tequfah

You will find:

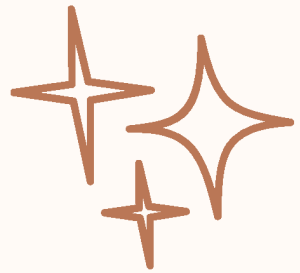
- Quick overview of מועדים Moedim
- Simple explanation of Tequfah
- Shadow marking PDFs and videos
- Instructions cheat sheet printable
- Data collection sheet printable
- UTC and time zone names
- Solar noon calculator

Marking the shadow data collection

Date of marking	
Location	
Time zone name / UTC time zone	
Total markings	
1st marking time	
Last marking time	
Solar noon time	
Height of gnomon	
Length from 1st to last marking	
Mark N, E, S, W on picture	
Take 4 pictures: all data, 1st marking, solar noon, last marking	Place data collection sheet on board include with your "all data" picture.
Initials	

Resources

for more in-depth studies, visit
studythecalendar.com





Questions?

email



questions@studythecalendar.com