Mkoba wa WanaAstronomia Vijana

The Young Astronomer's Briefcase

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Malengo
Goals

- **Kuelewa umuhimu wa kuangalia mazingira kwa umakini**
- Understand the importance of careful observations
- **Kuelewa jinsi ya kutumia vifaa kwa njia ya wanafunzi wenyewe kutengeneza vifaa**
- Understand the use of various instruments through the student's construction of the instruments

Mkoba wa WanaAstronomia Wachanga

The Young Astronomer's Briefcase

- **Vifaa vyote vilivyotengenezwa vimepangwa ndani by mkoba**
- **All instruments built and organized in a box.**

Vifaa vinayohitajika kuwa kwenye mkoba

Components of the kit

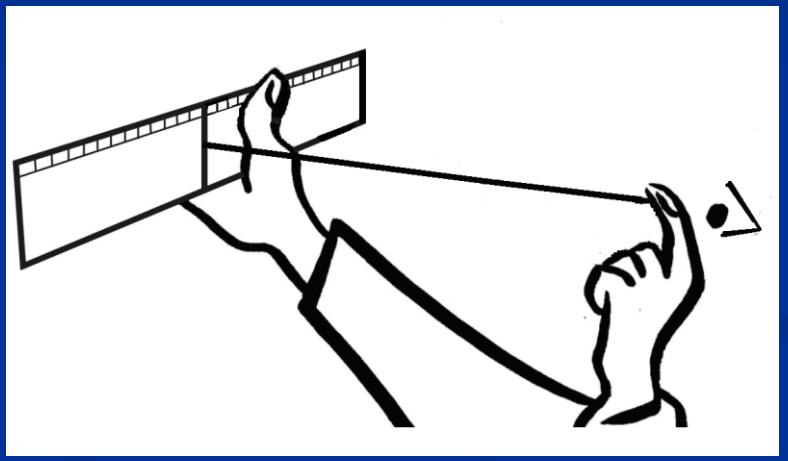
- -1) "Rula ya kupima pembe"
- -2) Roboduara sahili
- -3) Kifaa sahili cha kupima pembe mlalo
- -4) Tufebapa
- -5) Ramani ya Mwezi
- -6) Spektroskopi
- -7) Bonyeza ya Ikweta
- -8) Tochi ya mwanga mwekundu
- -9) Kitafuta dira
- -10) Saa ya mkononi
- -11) Vifaa vingine kama karatasi, penseli, kamera n.k.

- "Ruler to measure angles"
- Simplified quadrant
- Simple horizontal goniometer
- Planisphere
- Map of the Moon
- Spectroscope
- Equatorial Sundial
- Red light flashlight
- Compass
- Wristwatch
- Paper, pencil, camera …

1) "Rula ya kupima pembe"

1) "Ruler to measure angles"

- Kupata umbalipembe kati ya nyota
- Ni rahisi kutumia kama huwezi kutumia jozi ratibu

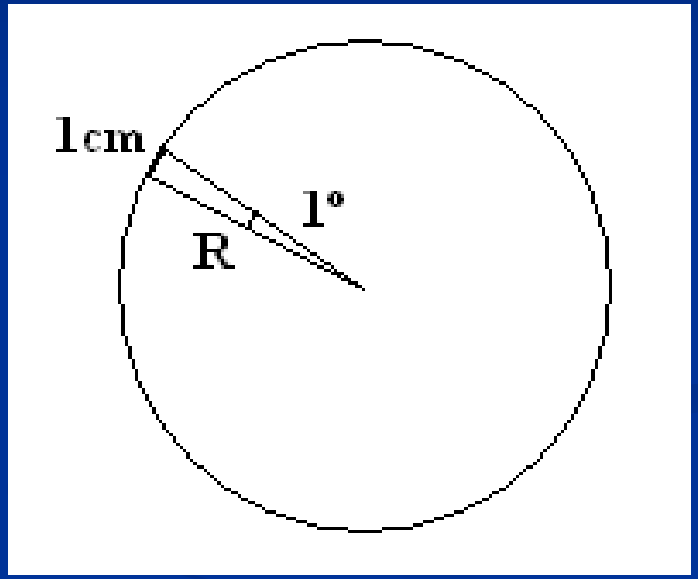


- To provide the angular distance between two stars.
- Simple to use if we do not want to use coordinates.

1) "Rula ya kupima pembe"

1) “Ruler to measure angles”

- Kuna umbali gani (nusukipenyo R) utakatotakiwa kupata chombo chenye usawia wa nyuzi digrii 1º kwa kila sentimita (1 cm).
- "What is the distance (radius R) needed to obtain a device which is equivalent to 1 º to 1 cm?”



$$\frac{2\pi R \text{ cm}}{360^\circ} = \frac{1 \text{ cm}}{1^\circ} \Rightarrow R = 180 / \pi = 57 \text{ cm}$$

1) "Rula ya kupima pembe“

1) “Ruler to measure angles”

- **Kwa ajili ya kutengeneza kifaa: Tunaweka kamba yenye urefu wa sentimita 57 kwenye rula isiyopindika**

- **To build: We set a string of length 57 cm to a non-flexible ruler**

1) "Rula ya kupima pembe“

1) “Ruler to measure angles”

- Tunaangalia kutokea mwisho wa kamba karibu ukigusa jicho (kwenye shavu chini ya jicho)
- Kamba ikinyooshwa utapata: 1cm = 1º

- We observe with the end of the string almost touching our eye (on the cheek below the eye)
- With string stretched: 1 cm = 1º

Zozezi 1: Kupima umbalipembe kati ya nyota mbili au nukta mbili

Activity 1: To measure the angular distance between two stars or two points

2) Roboduara sahili

2) Simplified quadrant

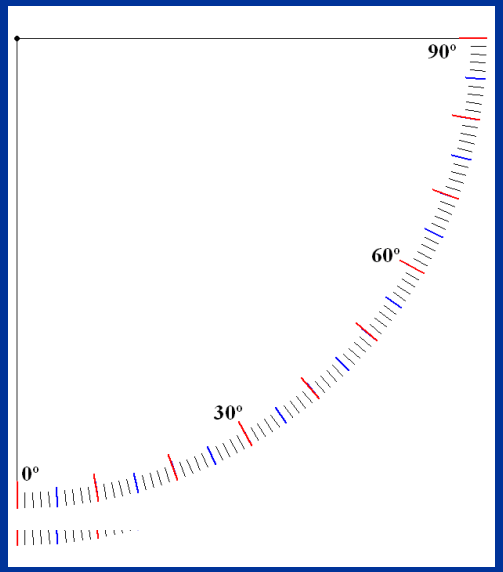
- Kutafuta kimo cha nyota
- Fanyeni kwa vikundi vya wanafunzi wawili: mmoja akiwa anagalia kwenye kionea na mwingine akisoma kipimo

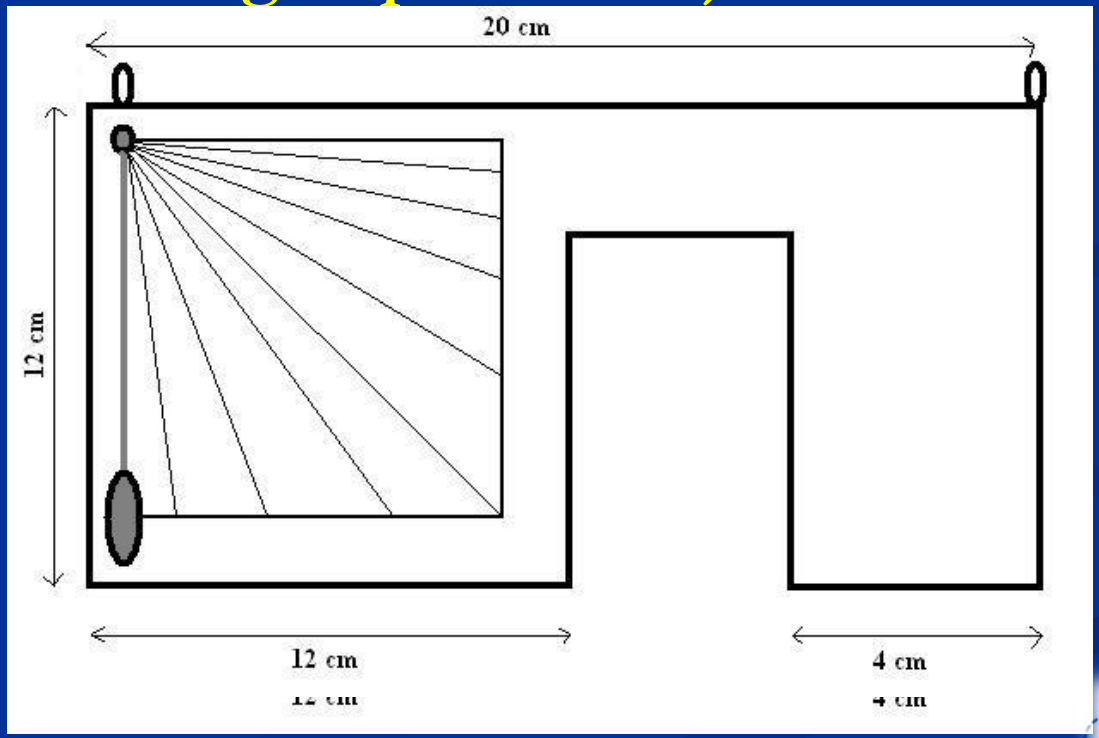
- To find the altitude of the stars.
- Work in groups of two students: one looking through the viewfinder and the other making the readings.

2) Roboduara sahili (muundo wa bunduki)

2) Simplified quadrant (gun type)

- Vipande vya kadibodi (kiasi 12 x 20 cm)
- Kulabu mbili mviringo upande wa juu



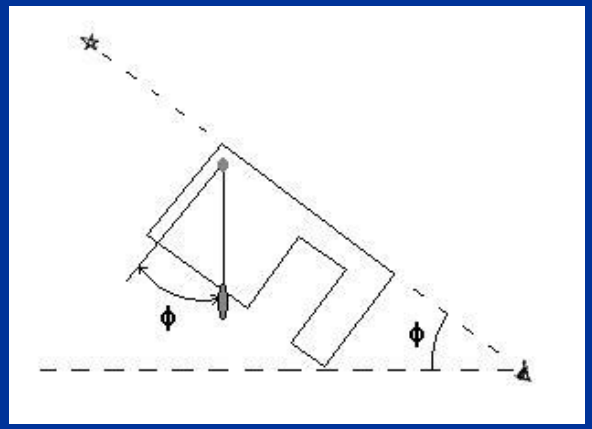


- Rectangular piece of cardboard (approx. 12 x 20 cm).
- Two round hooks on the upper side.

2) Roboduara sahili (muundo wa bunduki)

2) Simplified quadrant (gun type)

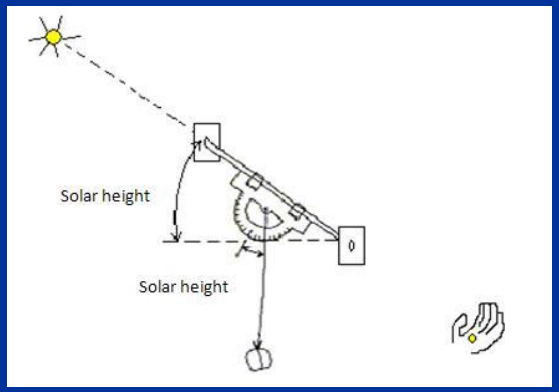
- **Ukiangalia kitu kupitia kulabu mbili, kamba itaonesha kimo chake juu ya upeo**
- If you see the object through the two hooks, the string indicates the altitude above the horizon.



2) Roboduara sahili (muundo wa bunduki)

2) Simplified quadrant (gun type)

- **Mrija uliokingwa kwa kipande cha kadibodi mbele ya kulabu inakupa njia nzuri ya kupima kimo cha Jua kwa kuweka taswira ya Jua juu ya kadibodi nyeupe**
- A straw with a carton located across the hooks is an excellent viewfinder for measuring the altitude of the Sun by projecting the image onto a piece of white cardboard.



TAHADHARI:

KAMWE USIANGALIE JUA MOJA KWA MOJA

ATTENTION: NEVER LOOK DIRECTLY AT THE SUN!

Zoezi 2: Kutafuta kimo cha Jua, nyota au nukta fulani katika ukumbi

Activity 2: To find the altitude of the Sun, a star or a point in the corridor

3) Kifaa sahili cha kupima pembe mlalo

3) Simple horizontal goniometer

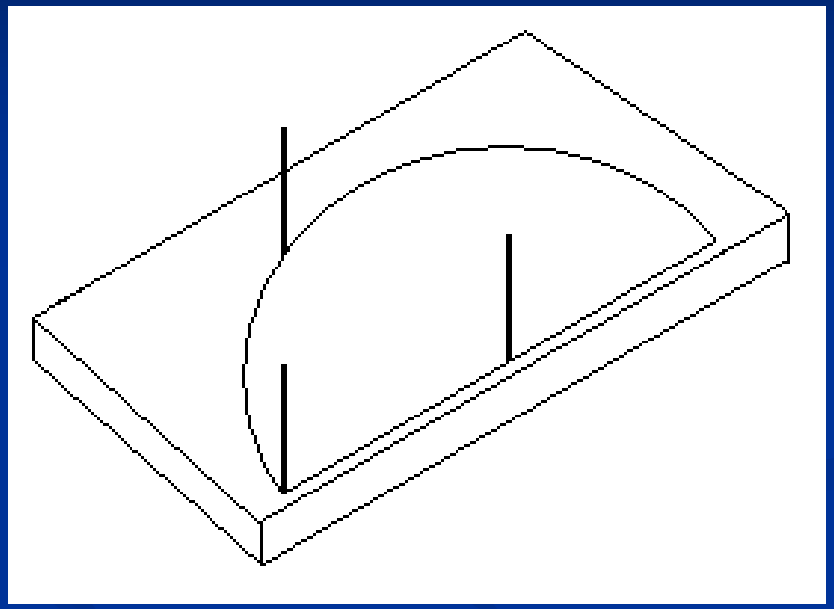
- Kutafuta pembekaskazi (azimuth) ya nyota
- Utahitaji kutumia kitafuta dira kwa kuonanisha kifaa kielekee Kasakazini-Kusini

- To determine the azimuth of the stars.
- You need to use a compass to align the instrument in the North-South direction.

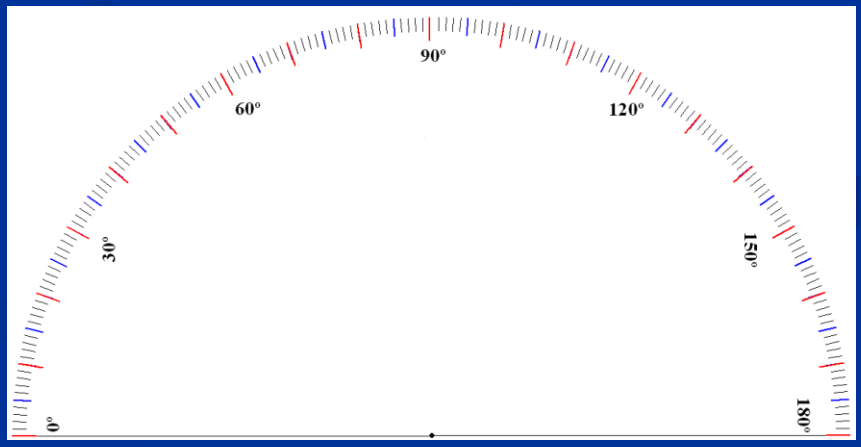
3) Kifaa sahili cha kupima pembe mlalo

3) Simple horizontal goniometer

- Kadibodi 12 x 20 cm
- Kwa kutumia sindano ndefu 3 unaweza kupata mielekeo miwili
- Soma kiasi cha pembe kati ya mielekeo hiyo miwili



- Cardboard 12x20 cm.
- Using 3 "needles" you can set two directions.
- Read the angle between them.



3) Kifaa sahili cha kupima pembe mlalo

3) Simple horizontal goniometer

- Kupima pembekaskazi (azimuth) ya nyota, elekeza mstari msingi wa nusuduara uelekee Kaskazini-Kusini
- Pembekaskazi (azimuth) ni kipimo cha pembe utakayopata kati ya mstari Kaskazini-Kusini wa chombo na ule uanoelekea kwenye nyota (kupitia kati ya duara)

- To measure the azimuth of a star, place the origin of the semicircle in the North-South direction.
- Azimuth is the angle from the North-South line through the centre of the circle and the direction of the star.

Zoezi 3: Kutafuta pembekaskazi ya nyota au umbalipembe kati ya nyota mbili au nukta mbili za mbali darasani

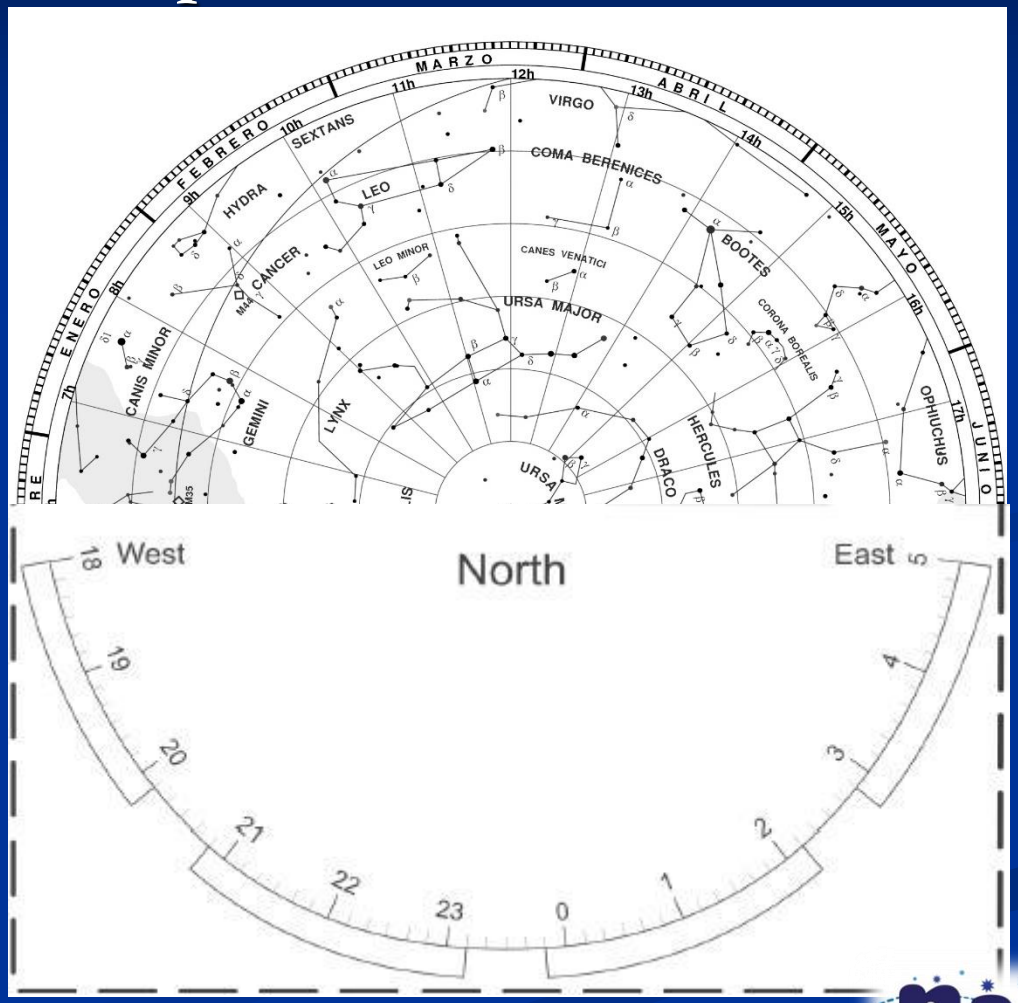
Activity 3: To determine the azimuth of a star or the angular distance between two stars or two points in the classroom

4) Tufebapa

4) Planisphere

- **Kujifunza makundinyota yanayoonekana kutoka latitudo yako na tarehe na muda utakapoziangalia.**

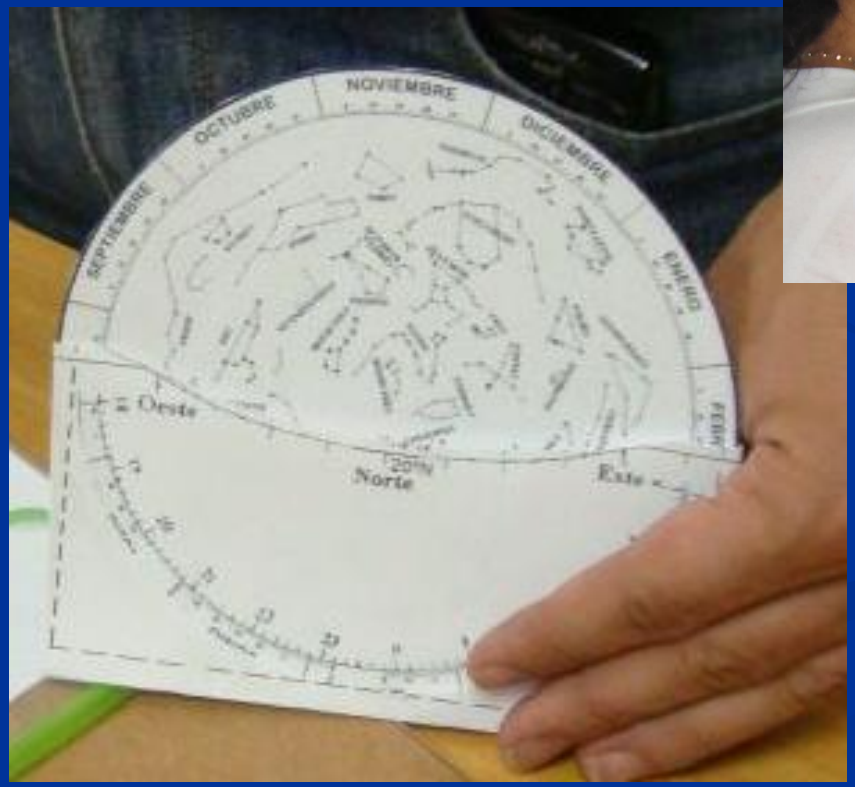
- To learn what constellations are visible at your latitude, knowing the date and time of the observation.



4) Tufebapa

4) Planisphere

- Unakili kwa fotokopy makundinyota kwenye karatasi nyeupe

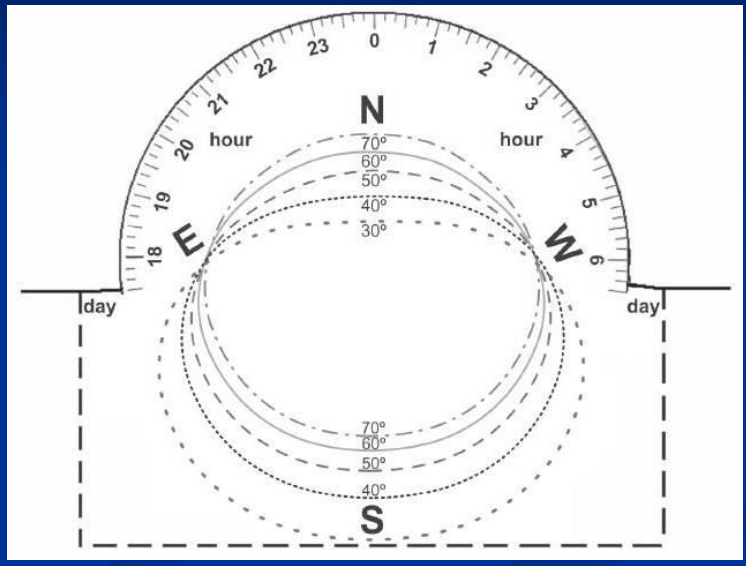


Constellations disc photocopied onto white paper.

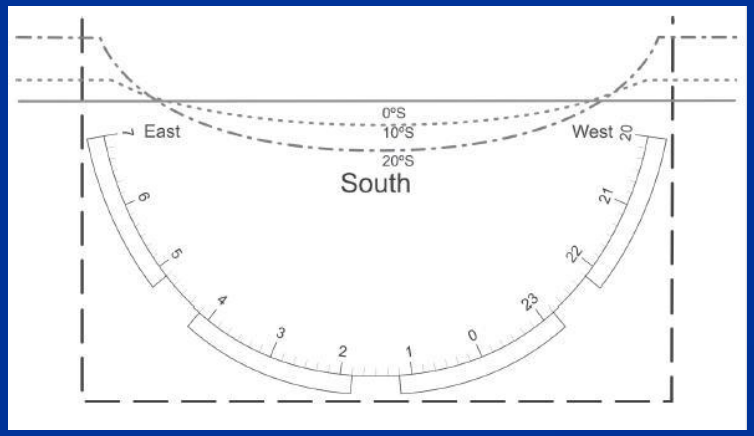
4) Tufebapa

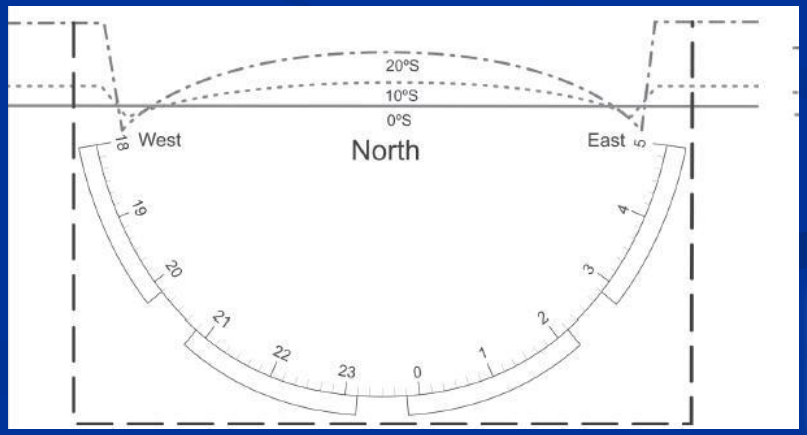
4) Planisphere

- **Ndani ya mfuko ambao umekatwa eneo kutegemeana na latitudo yako**



Inside a pocket whose cut-out area depends on the local latitude.





Zoezi 4: Zungusha diski hadi ilingane na tarehe na muda wa kuangalia anga

Activity 4: Rotate the disk until it matches the date and time of observation

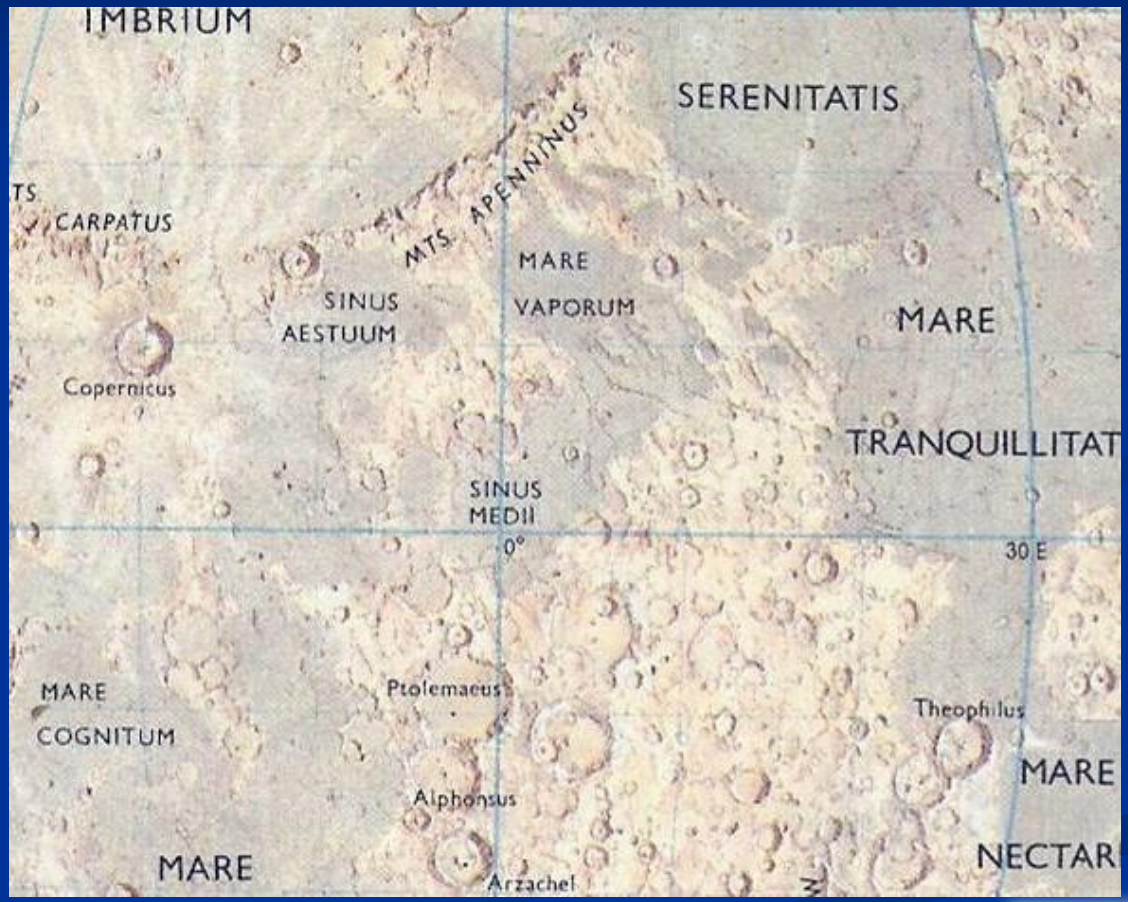
Kutumia tufebapa darasani au wakati wa kuangalia anga

To use the planisphere in the classroom or in observation sessions

5) Ramani ya Mwezi

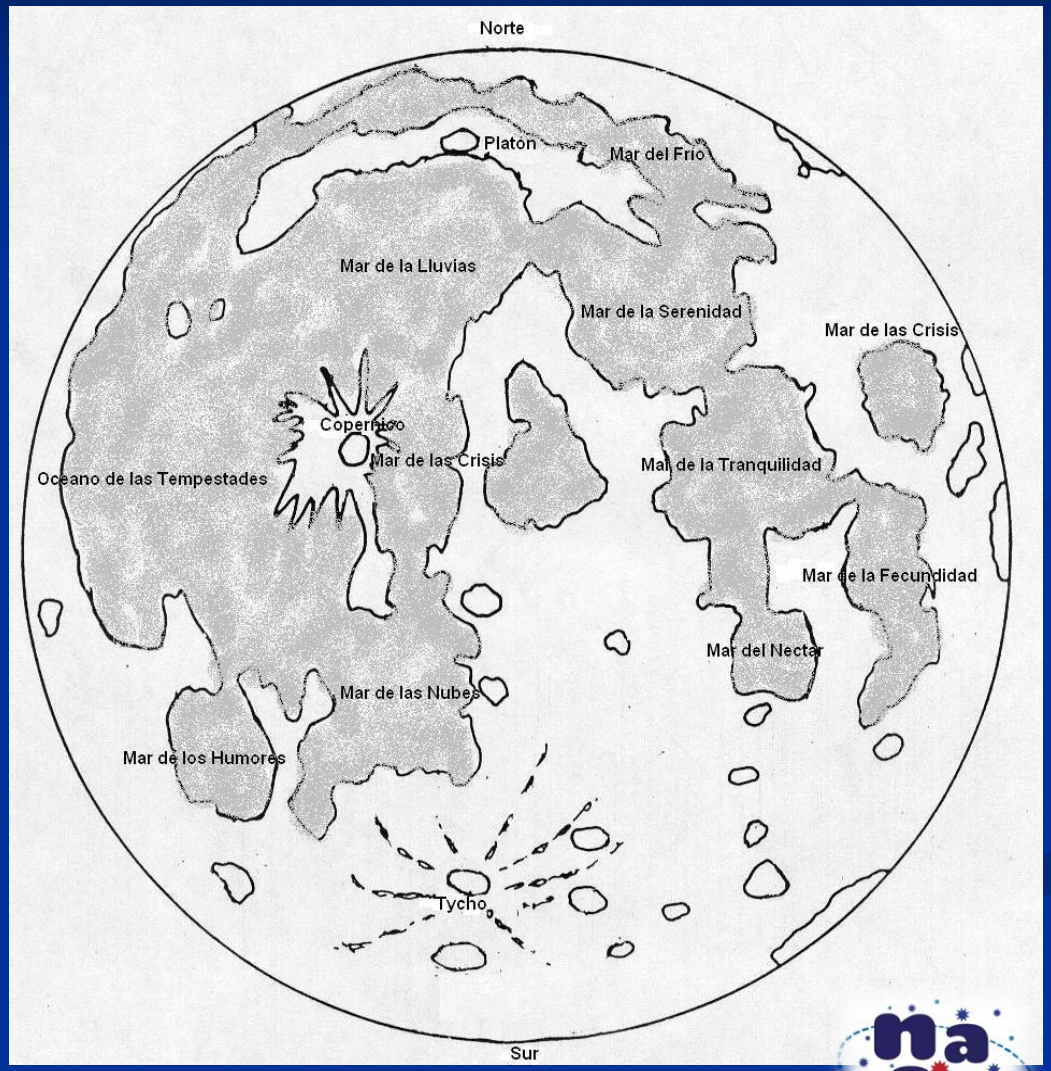
5) Moon map

- **Kutambua sehemu za bahari (maria), na mashimo na miinuko Mwezini**
- **To locate seas (maria), craters and ridges.**



Zoezi 5: Anza kwa kutafuta maria

Activity 5: Start by identifying the maria



Zoezi 5: Endelea kwa kupata mashimo na maumbo mengine

Activity 5: Continue to identify craters and other features

6) Spektroskopi

6) Spectroscope

- **Kuonesha taswirangi za mwanga wa Jua**
- To display the spectrum of sunlight

6) Spektroskopi

6) Spectroscope

- Paka rangi nyeusi sehemu za ndani ya boksi
- Kata upande mmoja wa ganda la boksi kuweza kuangalia taswirange ndani ya boksi
- Bandika kipande cha CD ndani ya boksi kwa upande wa chini (upande wa CD uliorekodiwa ukielekezwa juu)

- Paint the inside the box black.
- Cut a flap to look at the spectrum within the box.
- Paste a piece of CD on the bottom inside the box (with the recorded area facing up).

Zozezi 6: Funga boksi sehemu ndogo ukiwa wazi upande wa pili wa pale unapoangalia

Activity 6: Close the box leaving only a slit open in the area opposite the viewer.

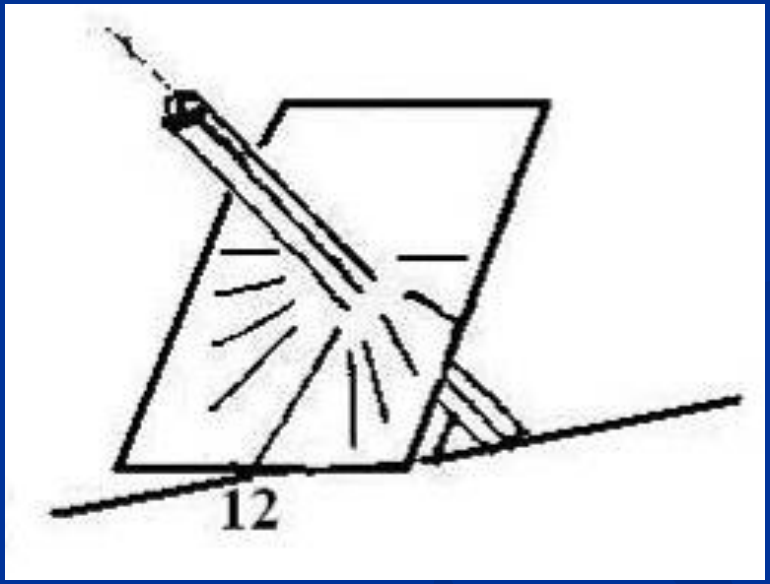
- Kutumia spektroskopi kwa ajili ya Jua au taa za darasani
- Picha ya taswirangi ya Jua

- To use the spectroscope with the Sun or the lights of the classroom.
- Photograph of the solar spectrum.

7) Bonyeza ya Ikweta (Equatorial Sundial)

7) Equatorial sundial

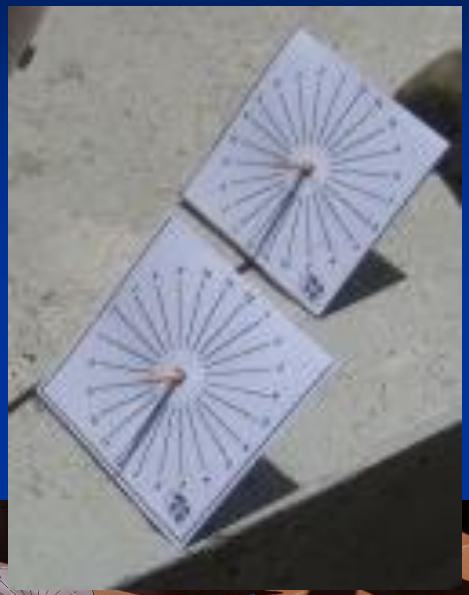
- Kupata muda
- Utahitaji kutumia kitafuta dira kuelekeza kifaa hiki Kaskazini-Kusini
- Angalia warsha ya Upeo na Bonyeza (Horizon and Sudials)

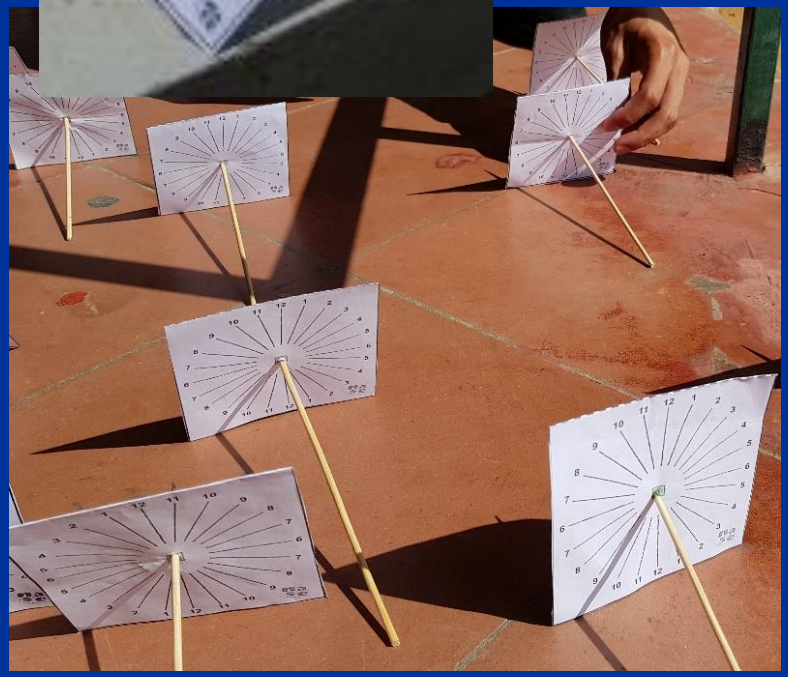


- To determine the time.
- You need to use a compass to align the instrument in the North-South direction.
- Workshop Horizon and Sundials.

Zoezi 7: Kutumia bonyeza kwa kufanya marekibisho

Activity 7: To use the sundial with the corrections





Muda wa Jua + Jumla ya rekebisho = muda wa saa ya mkononi

Solar Time + Total Adjustment = wristwatch time

Rekebisho Jumla

- **Rekebisho la longitudo**
- **Rekebisho la muda wa majira joto/baridi**
- **Rekebisho la Mlinganyo wa Muda (Equation of Time)**

Total Adjustment:

- Longitude Adjustment
- Summer/winter Adjustment
- ET Adjustment

8) Tochi ya mwanga mwekundu

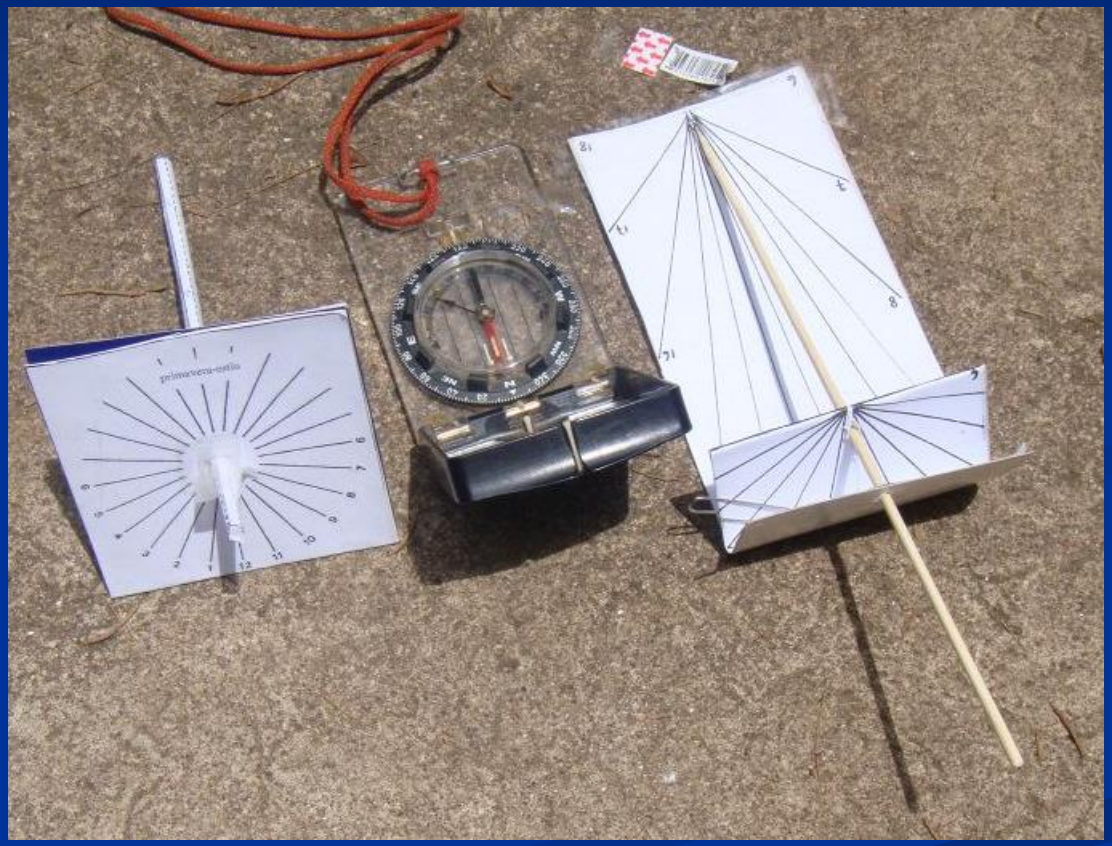
- Kumulika na kusoma ramani kabla ya kuangalia anga yenyewe wakati wa usiku
- Mwanga wa kawaida unaharibu maangalio
- Unaweza kubandika plastiki nyekundu mbele ya kioo cha tochi ya kawaida au kioo cha simu ya mkononi

- Illuminate and study your maps before looking at real night sky.
- Light can disrupt observations.
- You can attach red “cellophane” to your torch (or mobile phone) with adhesive tape.

9) Kitafuta Dira

9) Compass

- **Kuoanisha mielekeo ya vifaa mbali mbali**



- To align using different tools

10) Saa ya mkononi na vingine

10) Wristwatch and...

- Vifaa vingine
  - daftari
  - penseli au kalamu
  - kamera
  - ....
- Everything else...
  - notebook
  - Pencil or pen
  - camera
  - ...

Mahitimisho

- Ni vizuri wanafunzi wenyewe watengeneze vifaa vyao na kuvitumia kutoka kwenye mkoba uliopangwa vizuri
- Kutokana na mazoezi, wanafunzi:
  - wataongeza ushupavu wa kufanya vipimo vyao
  - watachukua jukumu la kutengeneza vifaa vyao
  - wataongeza ubunifu wao na ustadi wa kutumia mikono
  - kuelewa umuhimu wa kuchukua data kwa utartibu wake
  - kuwezesha elewa ya vifaa vya umaridadi zaidi
  - kutambua umuhimu wa vipimo vinavyofanywa kwa macho pekee, hapo zamani na sasa

- Is appropriate that students make their own instruments and use them in their organized briefcase
- With this activity, students:
  - gain confidence in their measurements
  - take responsibility for their own instruments
  - develop their creativity and manual skills
  - understand the importance of systematic data collection
  - facilitate their understanding of more sophisticated instruments
  - recognize the importance of observation with the unaided eye, both in history and today.

Asanteni sana kwa uskikivu wenu

Thank you very much for your attention!