Instructions

1. Do not open the exam envelop yourself.
2. This part of the exam consists of 7* problems located in separate exam stations.
3. You have 5 minutes to complete each problem.
4. After "out of time" is signaled, stop all actions and remain at the same station.
5. After "next station" is signaled, proceed to the next exam station and hand the exam envelope to the station's proctor.
6. Use only blue pen to mark into the answer sheets provided. Any answers written in the answer sheet at the end of timer is considered final and will be graded towards the final score.

* Number of problems will be reduced to 5 if night observation was successful

P1: Naked eye observation from real sky with panoramic 360-degrees image

Instruction: Estimate the LST (Local Sidereal Time) at the time the image was taken, rounded to nearest hour

Included:

- Panoramic 360-degrees image of the sky at night at an unknown location
- Computer screen
- Keypad to pan around the image
- Coordinates of bright stars

Name	Bayer Designation	Declination (Dec)	Right Ascension (RA)
Rigil Kentaurus	**α Cen**	–60° 50′ 02.3737″	14h 39m 36.5s
Arcturus	**α Boo**	+19° 10′ 56″	14h 15m 39.7s
Vega	**α Lyr**	+38° 47′ 01″	18h 36m 56.3s
Capella	**α Aur**	+45° 59′ 53″	05h 16m 41.4s
Altair	**α Aql**	+08° 52′ 06″	19h 50m 47.0s
Aldebaran	**α Tau**	+16° 30′ 33″	04h 35m 55.2s
Antares	**α Sco**	−26° 25′ 55″	16h 29m 24.5s
Spica	**α Vir**	−11° 09′ 41″	13h 25m 11.6s
Deneb	**α Cyg**	+45° 16′ 49″	20h 41m 25.9s
Dubhe	**α UMa**	+61° 45′ 04″	11h 03m 43.7s
Polaris	**α UMi**	+89° 15′ 51″	02h 31m 49.1s
Alpheratz	**α And**	+29° 05′ 26″	00h 08m 23.3s
Schedar	**α Cas**	+56° 32′ 14″	00h 40m 30.4s

LST of the image: _____

P2: Planet observation with real sky in panoramic 360-degrees image

Instruction: Count the number of planets visible in this image above the horizon and name the constellations they're in (with IAU designations).

Included:

- A panoramic 360-degrees image of the sky at night at an unknown location
- Computer screen
- Keypad to pan around the image

Number of Planets visible: _____

List the constellations (with IAU designations, i.e. Ursa Major or UMa):

_____

P3: Analemma on another planet

Instruction: Find the Obliquity (Axial Tilt) of the planet

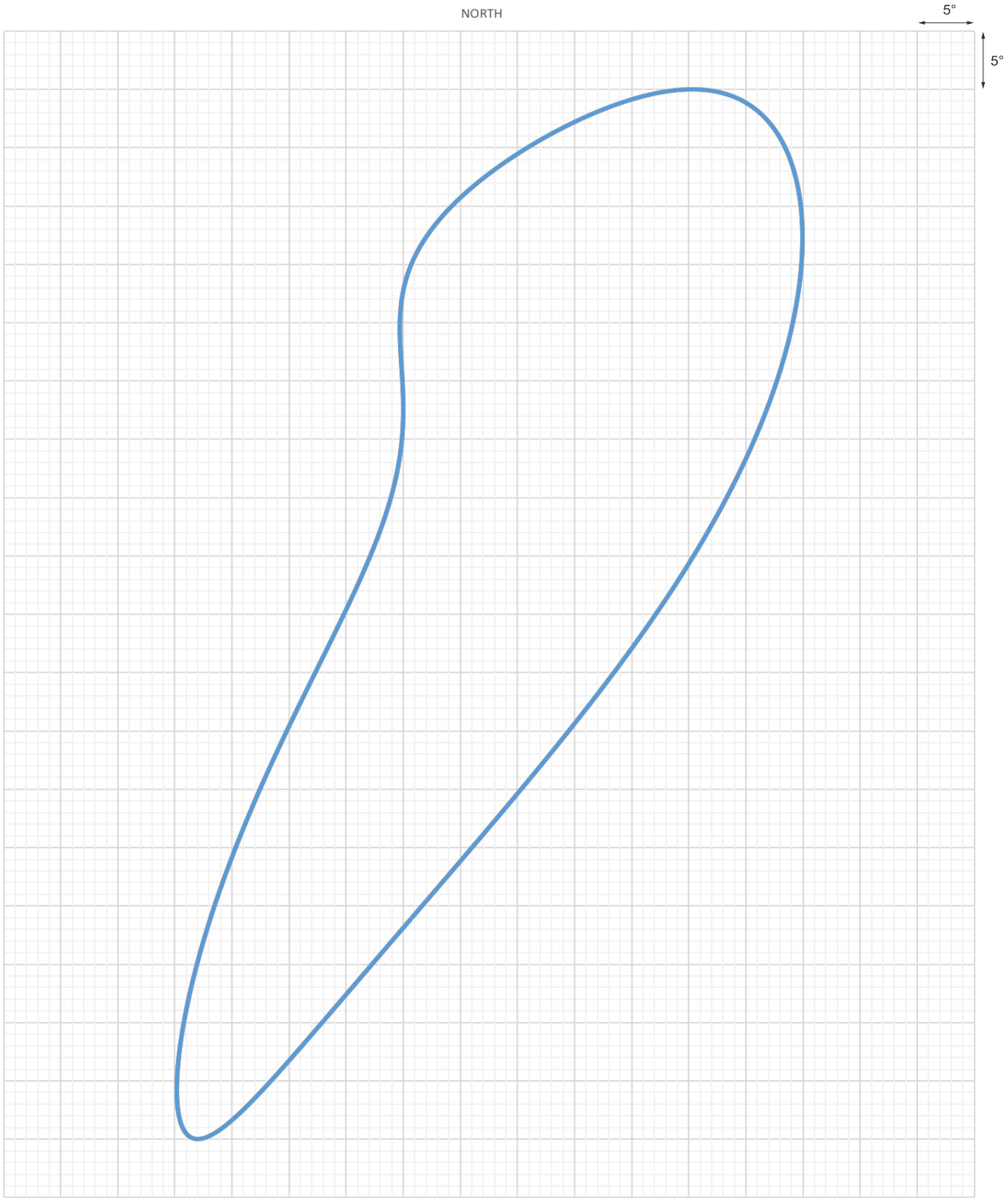
Included:

- A generated analemma (position of a Star taken from the surface of a planet with interval separated by mean solar day of the planet over an orbital period around a Star) of a fictitious planet orbiting around a Star.
- Result is graphed on a paper with each major grid representing 5°

The obliquity of the planet : _____

Observational Examination (Night)

Analemma on Planet X



P4: Exposure time from a Photograph

Instruction: Estimate an exposure time of a given “Star Trails” image.

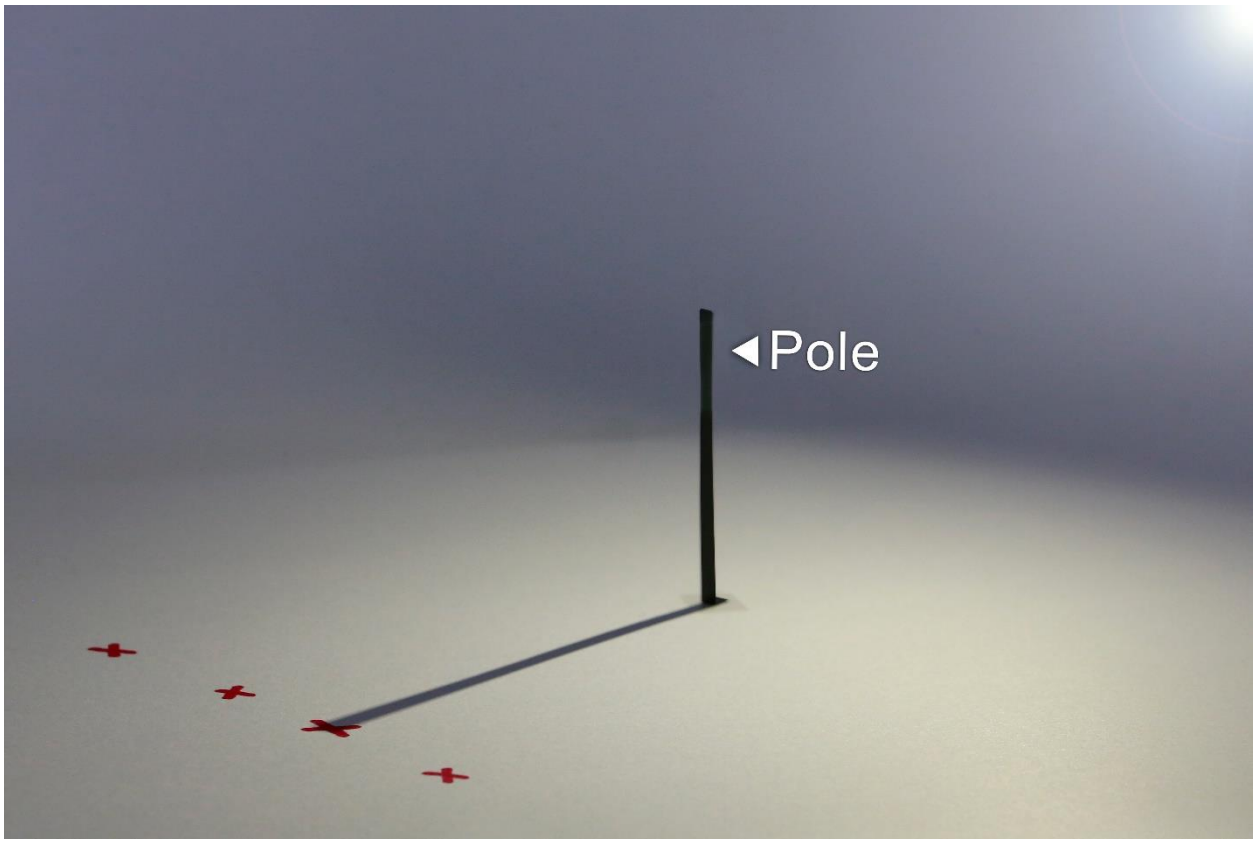
Included:

- A “Star Trails” image that was taken by a still camera capturing image over a period of time.
- Ruler

Exposure time: _____

P5: Find True North from Moon shadow

Instruction: Draw an arrow pointing North in the data sheet

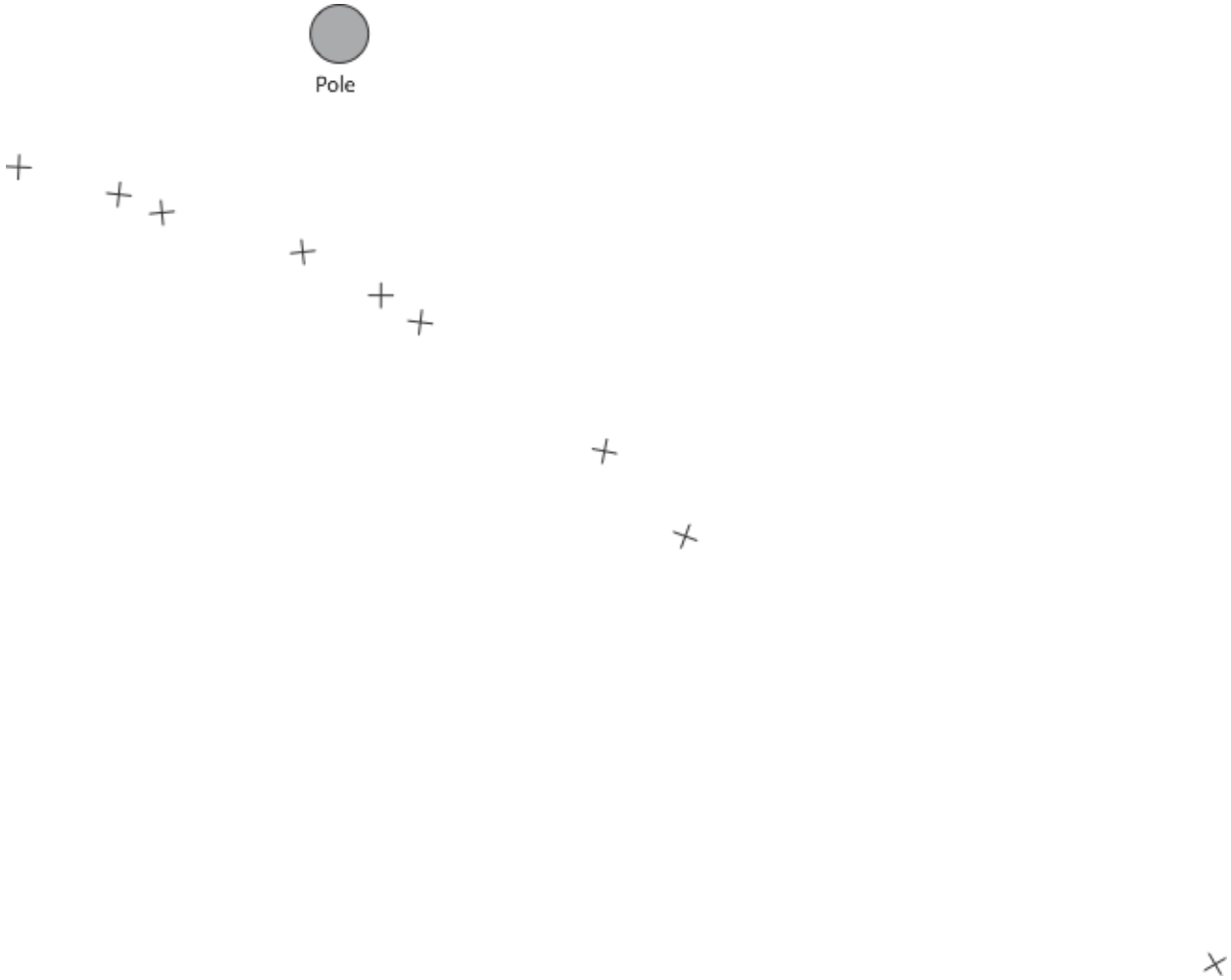


Included:

- Simulated position of moon shadows of a pole at certain intervals in the span of a day.
- The observer is located in the Southern hemisphere at latitude 27°S.
- The moon's declination that night is +15°
- Ruler, Compass (drawing tool), Geometry kit

Observational Examination (Night)

Data sheet



P6: Find Latitude from Equatorial Mount

Instruction: Without altering the polar alignment, find the observer's latitude based on a previously polar-aligned equatorial mount.

Included:

- An Equatorial Mount Telescope that has already been **properly** aligned to a location in the northern celestial pole.
- Bubble Level.
- Latitude dial on the mount is covered (you may not use it).

Latitude: _____

P7: Precision Polar Alignment with Equatorial Mount

Instruction: Perform a polar alignment on the equatorial mount provided

Included:

- Equatorial Mount with polar scope (has not been polar aligned)
- Date and Time (GMT, UTC+0) of the time performing the polar alignment
- Diagram of the sky's position at the time
- A light source to be substituted with Polaris to be used for proper polar alignment (already visible in the polar scope)
- Longitude of observer

Date and Time : 30 Aug 2017 / 23:30

Longitude : 10^{0} E