OBSERVATIONAL ROUND – QUESTION SHEET

Telescope: 150/750 Newton
Eyepieces: 25 mm, 10 mm, Barlow lens: 2x

Note:

- Telescope is already polar aligned.
- In case of bad sky conditions at low altitudes, task 1 and 2 will be replaced by alternative tasks 1 and 2 (see page 3). In this situation, the telescope assistant will cross out Tasks 1 and 2.
- You have to use 25 mm eyepiece for tasks 1, 3 and 4.
- For these tasks, if you finish before the allotted time, you must keep tracking the object with the telescope till the end of allotted time. The telescope assistant will check the object only at the end of the allotted time.
- For task 2, we recommend using 10 mm eyepiece and Barlow 2x.
- For task 5, you are not allowed to use the telescope.

TASK 1: FINDERSCOPE ALIGNMENT

available time: 5 minutes 5 points

- The finderscope is NOT aligned at the beginning. **Point the telescope to Saturn and align the finderscope parallel to the main tube.**

If the alignment of Saturn is not within the crosshair of the finderscope, the telescope assistant will correct it – and you receive only partial or no points.

TASK 2: OBSERVATION OF SATURN

available time: 10 minutes 15 points

- In the upper box, the circle represents the disk of Saturn and the horizontal line is the E-W direction on the sky. Pay attention to direction of North (see top right corner).
  Mark position of Titan by a cross.

- The smaller box on the bottom right corner of first box is for drawing the rings of Saturn. Again the circle represents the disk of Saturn.
  Draw the rings of Saturn in this box with the correct size and orientation.
  Both the outer and inner edges of the ring are necessary, no faint ring details or gaps are needed.
  Keep orientation of the image the same as the orientation in the upper box.

- **Estimate the angular distance (in arcsec) and position angle (in degrees) of Titan relative to the center of Saturn.** You may do your calculations besides the answer.

  Apparent major axis of the ring: 43"

TASK 3: M57 – FIELD OF VIEW

available time: 10 minutes total: 10 points

- **Find the planetary nebula M57 (in constellation Lyra), and put it in the centre of the field of view in the main scope.**
- The star chart in the answer sheet shows a part of constellation Lyra. In this chart, **draw the FOV circle around M57 as accurately as possible.**

If you cannot find M57, the assistant will help you, but only after 5 minutes. In this case you will lose the marks for pointing to the object.

TASK 4: VARIABLE STAR – AF CYGNI

available time: 15 minutes total: 15 points

- **Use the given charts of the constellation Cygnus to find the variable star AF Cyg.**
  The large scale finder chart has normal orientation (N is up E is to the left)
  The smaller scale chart has 'telescope' orientation (S is up W is to the left)
  Brightness of reference stars are given without decimal points. e.g. '97' means 9.7 magnitude
  If you do not find AF Cyg, the telescope assistant cannot help you to point to it in this task.

- **Estimate the magnitude of AF Cyg by comparing it with the reference stars** and write it down, with decimal point, at one decimal accuracy (i.e. 9.7).
  Write the time of your observation in UTC. You may ask telescope assistant for the time in the local time zone (CEST).

TASK 5: NAKED EYE BRIGHTNESS ESTIMATION

available time: 5 minutes 5 points

- **Estimate the visual magnitude of the two naked-eye stars marked on the stellar chart of constellation Ursa Minor:**
  a) ζ UMi (zeta UMi = Alifa) – STAR 2
  b) γ UMi (gamma UMi = Pherkad) – STAR 1
  c) Write your estimate with one decimal accuracy (e.g. 8.6).
- **Estimate the angular distance between γ UMi (STAR 1) and Polaris in degrees.**

TASK 1/ ALTERNATIVE: **FINDERSCOPE ALIGNMENT**

available time: 5 minutes 5 points

- The finderscope is NOT aligned at the beginning. **Point the telescope to Altair (α Aql) and align the finderscope parallel to the main tube.**

If the alignment is not satisfactory, the telescope assistant will correct it – and you receive only partial or no points.

TASK 2 / ALTERNATIVE: **EPSILON LYRAE**

available time: 10 minutes 15 points

- **Find ε Lyr, and make a drawing of the field of view (with the object and other stars) with 10mm eyepiece.**
  Label the directions North and East by two arrows and mark them as 'N' and 'E'.
- **Estimate the angular distance between the wide pair (ε1-ε2), and estimate the position angle of the same pair.**
- **Increase the magnification with 2x Barlow lens to be able to resolve and separate the two close pairs. Estimate the angle** (in degrees to the nearest integer) **subtended by the two close pairs relative to each other.** (The enclosed angle of the two lines going through the two narrow pairs).
  Do not give any PA, only the relative angle of the two close pairs. No drawing is needed.

If you cannot find ε Lyr, the assistant can point to it for you, but only after 5 minutes. In this case you will lose the marks for pointing the telescope to the object.
The telescope assistant will check the object at the end of the 10 min limit. If you are ready sooner, keep the star in the FOV, and wait for the check.

Student ID code: ☐☐☐-☐☐

PLANETARIUM ROUND – ANSWER SHEET

3 projected images with questions. Each part is 15 minutes long. Total time: 45 minutes.

PROBLEM 1

This is the sky above Keszthely at midnight. The projected sky does not show any Solar System objects.

QUESTIONS / TASKS:

1.1. There are 3 novae on the projected sky at 2nd magnitude. Mark their positions by circles on the star chart. (Please circle only 3 stars. If there are more than 3 circles, then each one in a wrong location will result in 1 point deduction.) [ ]

1.2. The Messier objects have been removed from the star chart given you. Mark all the Messier list globular clusters present in the projected sky on the star chart using crosses (X) and write the Messier number of each object near the cross marks. [ ]

1.3. The projected sky corresponds to the second half of which month (at midnight CEST) in Keszthely? Circle the correct month.

JAN / FEB / MAR / APR / MAY / JUN / JUL / AUG / SEP / OCT / NOV / DEC [ ]

1.4. What is the local sidereal time? (To an accuracy of 15 minutes.)

…… [ ]

1.5. List six zodiacal constellations, which are partly or entirely visible. (Use the official IAU abbreviations or IAU designation. Every constellation named which is not visible in the projected sky will result in 1 point deduction.)

……

……

……

……

……

……

[ ]

PROBLEM 2

We are standing somewhere on the Earth. The projected sky does not show any Solar System objects.

QUESTIONS / TASKS:

2.1. Determine the geographical latitude of this observing site: ……..° [ ]
In which hemisphere is the site situated? N / S (Circle the right one.) [ ]

2.2. Determine the azimuth of the 3 brightest stars on the projected sky. Azimuth is measured from North towards the East. Write the name of these stars in English or using their Bayer designation and their azimuths in the list below.

Bright star / name: ……..…… Az: ……° [ ]

Bright star / name: ……..…… Az: ……° [ ]

Bright star / name: ……..…… Az: ……° [ ]

2.3. Yellow × signs show the position of 3 comets. Which comet is closest to the ecliptic? (Circle the number below.)

1 / 2 / 3 [ ]

2.4. List nine constellations that contain circumpolar stars seen from the given observing site. (Use the official IAU abbreviations or IAU designation.)

……

……

……

……

……

……

……

[ ]

2.5. Mintaka (δ Orionis) is setting at this moment. How many hours earlier did it rise? (To an accuracy of 15 minutes.)

…… [ ]

PROBLEM 3

For this view, we are now standing on the Moon. At this instant viewed, the Earth is centrally eclipsing the Sun (see the red circle on the sky). Consequently the Moon is at one of its nodes now. Assume the longitudinal and latitudinal librations are exactly 0° at this moment.

QUESTIONS / TASKS:

3.1. At the time of this observation, which season is it in Hungary? (Circle the correct answer.)

Spring / Summer / Autumn / Winter [ ]

3.2. There is a yellow circle on the projected sky (next to the red circle), which denotes minor planet Juno, which is at a distance of exactly 3 au from the Sun at this moment. Estimate its distance to the Moon at this instant. (Rounded to the nearest integer in units of million km.) Assume all orbits to be circular.

…….million km [ ]

3.3. Approximately how much time (in Earth days) after the projected event will …

…the Sun set at your observing site? …… [ ]

…the Earth set at your observing site? …… [ ]

3.4. Determine the Lunar (Selenographic) coordinates of this observing site (as defined in the lunar map on the next page):

……. [ ]

What is the name of the large surface lunar area, where your observing site is situated? Do not use your national language, please use the official IAU nomenclature.
(See lunar map on next page.)

…… [ ]

3.5. Estimate the distance from the observing site to the Apollo-11 landing site (0.6875 N, 23.4333 E):

…… km [ ]