

Observing competition – planetarium round

Solutions and points

Note: For questions requiring giving a position, correct to 1° gets full marks (usually **1 point**), correct to 2° gets half marks (usually **0.5 point**).

1. Earth

Max 25 points

- A) On the map of the sky, mark and label the nova and the Moon and draw the shape and position of the comet. **[2+1+3]**

- B) In the table below, circle only those objects which are above the astronomical horizon.
[+0.5 for each correct, -1 for each incorrect]

M20 – Trifid Nebula	o Cet – Mira	δ CMa – Wezen
α Cyg – Deneb	M57 – Ring Nebula	β Per – Algol
δ Cep – Alrediph	α Boo – Arcturus	M44 – Praesepe (Beehive Cluster)

- C) When the coordinate grid is visible, mark on the map the northern part of the local meridian and the ecliptic north pole. **[3+2]**

- D) For the displayed sky, give the :

geographical latitude of the observer : $\varphi = 50^\circ \pm 1^\circ$ **[1]**

Local Sidereal Time : $\theta = 5^h 25^m \pm 8^m$ **[2]**

time of year, by circling the calendar month :

Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec. **[2]**

- E) Give the names of the objects, whose approximate horizontal coordinates are :

azimuth $A_1 = 45^\circ$ and altitude $h_1 = 58^\circ$: ... **M 45** **[1]**

azimuth $A_2 = 278^\circ$ and altitude $h_2 = 20^\circ$: ... **α Leo** **[1]**

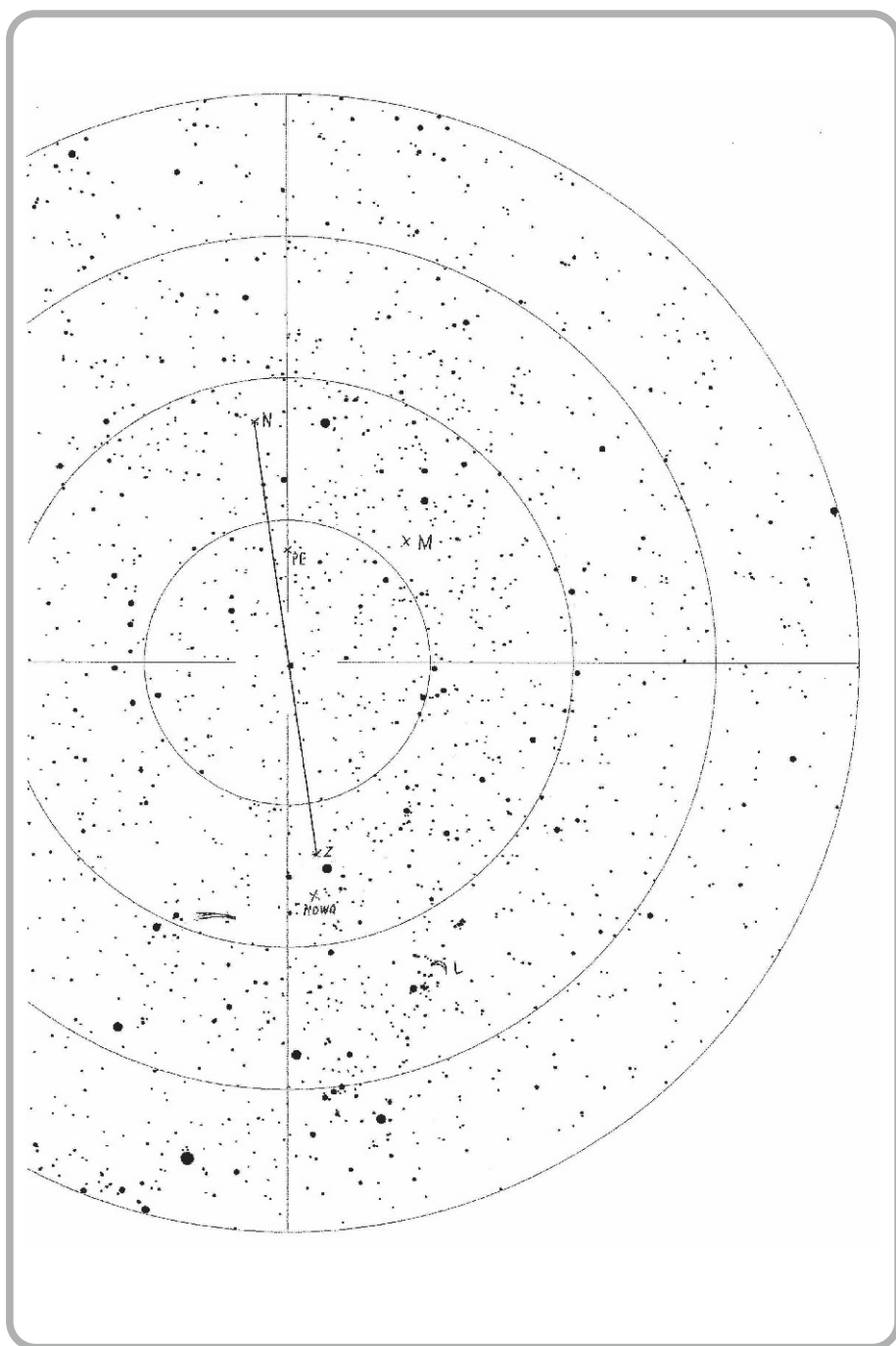
- F) Give the horizontal coordinates (azimuth, altitude) of :

Sirius (α CMa) : $A_3 = 340^\circ \pm 2^\circ$; $h_3 = 20^\circ \pm 1^\circ$ **[0.5+0.5]**

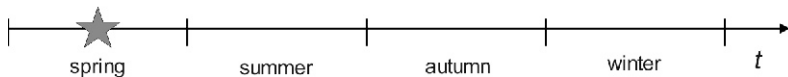
The Andromeda Galaxy (M31) : $A_4 = 108^\circ \pm 2^\circ$; $h_4 = 41^\circ \pm 2^\circ$ **[0.5+0.5]**

- G) Give the equatorial coordinates of the star marked on the sky with a red arrow :

$\alpha = 3^h 24^m \pm 15^m$; $\delta = 49^\circ \pm 3^\circ$ **[1+1]**



Max 25 points



Night Observation Q1 – Little Dolphin

Marking scheme :

On Drawing 1 :

Draw as the view of the constellation Delfinus (Del) through the finder scope.	
all 4 stars of the parallelogram	[1]
the 'tail'	[1]
correct scale	[1]
correct shape	[1]
additional field stars	[1]

With an arrow, mark the apparent direction of motion of the stars across the field of view of the finder scope caused by the rotation of the Earth. [2]

Label the stars with the Bayer designations given on the map (α , β , γ , δ and ϵ). [1]

Also label the brightest of these 5 stars " $m_{\max}$ ". [1]

Also label the faintest of these 5 stars " $m_{\min}$ ". [1]

On Drawing 2 :

Draw the view of the Little Dolphin through the larger telescope.	
all 4 stars of the parallelogram	[4]
the 'tail'	[1]
correct scale	[1]
correct shape	[1]
additional field stars	[1]

With an arrow, mark the apparent direction of motion of the stars across the field of view of the finder scope caused by the rotation of the Earth. [2]

Label the stars of the Little Dolphin α' , β' , γ' , δ' and ϵ' such that they match the labels of the stars in the constellation Delfinus as given on the map. [3]

Label the brightest of these stars " $m_{\max}$ ". [2]

Total [25]

Night Observation – Q2 Measuring Declination

Marking scheme:

Draw of field of view (any stars)

- if picture present position of S1, S2, Sx stars [3]
- if there is more stars presented on attached maps [1]
- mark North directions on picture of FoV [1]
- mark East directions on picture of FoV [1]

Proper method of observations:

- if cross is parallel to N-S and E-W [0]
- and total score will be calculated from previous points
- cross twisted from N-S and E-W direction [2]
- proper position angle of cross corresponding to formula used for calculations [4]

If student will need make a measurements in two or more different position angle they will receive 4 points if all of them will be corrected

- Proper formula for δ_x calculation [6]
- several repetitions of stopwatch measuring. [3]
- or
- if student will give any subjective estimation of time measuring [2]
- (from watching the transit of star under cross etc.)
- Proper calculation for δ_x calculation [2]
- proper estimations of final error [2]