Observing competition – planetarium round

Solutions and points

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

1. Earth [total 25 p.]

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 = 6]**

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 – Triffid 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 = 5]**

D) For the displayed sky, give the :

geographical latitude of the observer : $\varphi = 50° \pm 1°$ **[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 º and altitude $h_1 = 58$ º : . . .**M 45** . . . . . , **[1]**

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

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

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

The Andromeda Galaxy (M 31) : $A_4 = 108° \pm 2°$; $h_4 = 41° \pm 2°$ **[0.5 + 0.5]**

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

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

2. Mars **[total 25 p.]**

H) Give the areographic (Martian) latitude of the observer : $\varphi =$ **22.5 °** **[2]**

I) Give the altitudes of upper h_u and lower h_l culmination of :

Pollux (β Gem) : $h_u =$ **61° ± 0.5°**; $h_l =$ **-50° ± 1° (calculated)** **[1+2]**

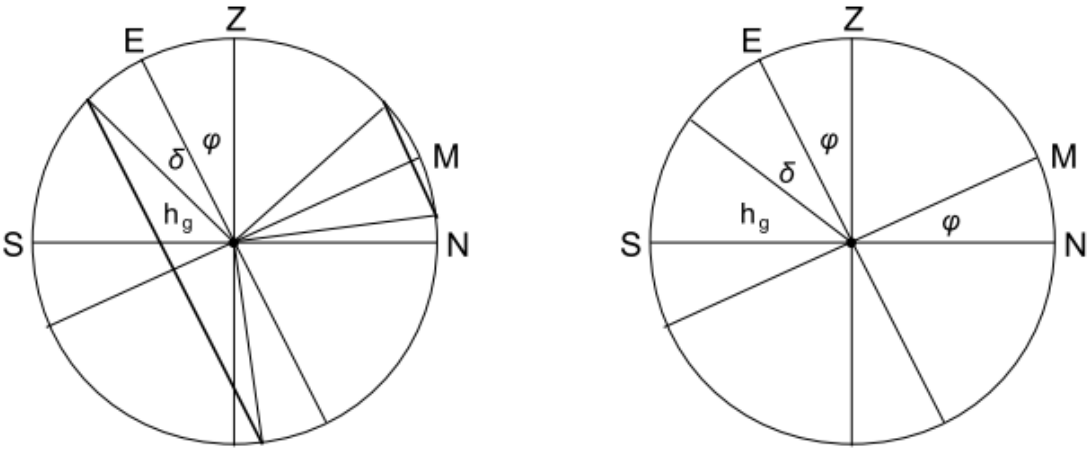
Deneb (α Cyg) $h_u =$ **32° ± 0.5°** ; $h_l =$ **13° ± 0.5°** [**1+1]**

J) Give the areocentric (Martian) right ascension and declination of :

Regulus (α Leo) $\delta =$ **-22.5° ± 0.5° ,** from culmination: $h_u =$ **45° ± 0.5°** **[2]**

Toliman (α Cen) $\delta =$ **-48° ± 0.5°,** from culmination: $h_u =$ **19.5° ± 0.5°** **[2]**

K) Sketch diagrams to illustrate your working in questions (I) and (J) above : **[2+2]**



L) On the map of the sky, mark (with a cross) and label ("M") the Martian North Pole **[2]**.

M) Give the azimuth of the direction in which the observer moved away from the Martian base :

$A =$ **330°-180° = 150 °.** **[2]**

N) Estimate the location of the base on Mars, and circle the appropriate description :

a. near the Equator *b.* **<u>near the northern Tropic circle</u>** **[3]**

c. near the northern Arctic circle *d.* near the North Pole

O) The time axis below shows the Martian year and the seasons in the northern hemisphere. Mark the date represented by the planetarium display on the axis. **[3]**