(OM01) Know your Sky [16 marks]

Use the skymap "Map-OM01" to answer the questions below.

(OM01.1) Mark all the objects listed below with a box (□) around the object. Label each of your marked objects with the corresponding Object No. **4**

Object No.	Object Name	Object No.	Object Name
1	β Aur	5	δ Gem
2	δ Cep	6	β CVn
3	δ Cnc	7	α Lyn
4	δ Cet	8	β Per

(OM01.2) Mark the positions of the following 6 galaxies from the Messier Catalogue using a plus sign (+) and label them with their corresponding Messier number. **6**
M32, M51, M74, M81, M94, M101

(OM01.3) Draw the Ecliptic on the map and label it as "E". **2**

(OM01.4) A total solar eclipse occurred on 1 August 2008. At a certain place on Earth the totality occurred at local noon.

(OM01.4a) Mark the position of the Sun at the time of the eclipse with a cross (×) and label it as "S". **1**

(OM01.4b) Draw the Moon at the appropriate position on the map as seen from the same location on 28 July 2008 at local noon, and label it as "M". The drawing should be of appropriate shape and orientation, but need not be to scale. The bright side of the Moon should be shaded. **3**

(OM02) Know your Grid [16 marks]

Use the skymap "Map-OM02" to answer the questions below.

The constellation lines and boundaries (as per IAU standards) of two constellations denoted as C1 and C2 are shown in the full-sky map. Alternative depictions of the same constellations according to a few cultures are also shown on the right panel for your reference, if needed. A certain coordinate grid is also shown.

(OM02.1) Identify the constellations C1 and C2 and write their names (of Latin origin) or IAU abbreviations in the table in the Summary Answersheet. **1**

(OM02.2) Three empty red squares and three empty blue circles are shown on the map. There is a grid line passing through each of these squares and circles.

(OM02.2a) The lines that pass through the red squares are lines of constant **1**
Ecliptic latitude (β) / Ecliptic longitude (λ) / Declination (δ) / Right Ascension (α) / Galactic latitude (b) / Galactic longitude (l).
Tick (✓) the correct option in the Summary Answersheet.

(OM02.2b) The lines that pass through the blue circles are lines of constant **1**
Ecliptic latitude (β) / Ecliptic longitude (λ) / Declination (δ) / Right Ascension (α) / Galactic latitude (b) / Galactic longitude (l).
Tick (✓) the correct option in the Summary Answersheet.

(OM02.3) Identify the North and South poles of the grid. Label these points as "N" and "S", respectively on the map "Map-OM02". **1**

(OM02.4) Two of the following are present in the given sky map. Identify these by marking with appropriate symbols (shown below) on the corresponding entire curve/line. **2**

(i) Ecliptic (small bars like ⊣⊣⊣)

(ii) Celestial Equator (small circles like ⊸⊸⊸)

(iii) Galactic Equator (small crosses like ⤫⤫⤫)

(OM02.5) Mark the Vernal Equinox (VE) and Autumnal Equinox (AE) on the grid with ⊗ and write VE and AE beside them, respectively. **2**

(OM02.6) Indicate the direction of the Sun's annual motion by drawing an arrow close to the Vernal Equinox. **1**

(OM02.7) Write the values, in appropriate units, inside each red square and blue circle given on the "Map-OM02", of the corresponding grid lines passing through them. **3**

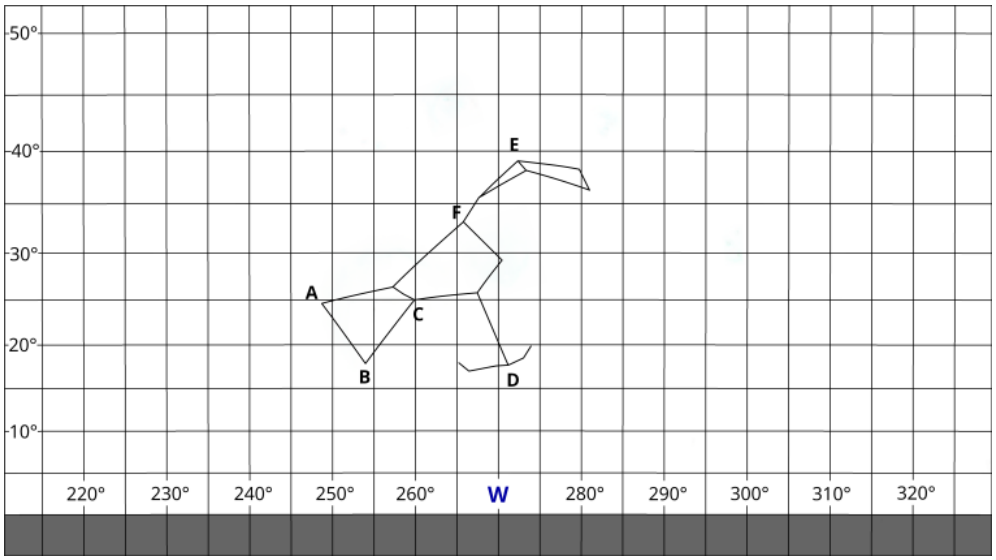
(OM02.8) The location of 4 constellations (apart from C1 and C2) are shown on the grid by light-green shaded areas. Consider the following list of constellations. **4**

Aquarius (Aqr), Cygnus (Cyg), Leo (Leo), Orion (Ori), Perseus (Per), Sagittarius (Sgr).

On the map "Map-OM02", label the appropriate shaded areas with the IAU abbreviations of the constellations that are present in the above list. Mark a cross (×) on those shaded areas, if any, which do not appear in the above list.

(OM03) Know your Time [18 marks]

The given sky map (in Mercator projection) shows the constellation of Orion as seen from a certain location X (longitude $\lambda_X = 70°$ E) on 21 March 2025 at 22:00 local time. The point "W" marks the cardinal West point. The altitude and azimuth values are marked on the grid.



(OM03.1) What is the approximate latitude (ϕ_X) of the location X? **4**

(OM03.2) The grid provided on the Summary Answersheet has the same projection (Mercator), and the angular scale in both azimuth and altitude are identical to that of the grid provided in the question. On this grid draw to scale the constellation of Orion as it will be at another location Y (with latitude $\phi_Y = 40°$ S and longitude $\lambda_Y = 50°$ W) on 21 January 2026 at 18:00 local time. An approximate outline of the constellation is enough, with the points A–F being marked clearly. Identify the cardinal point "P" shown on the grid (tick (✓) the appropriate box in the Summary Answersheet). You may make suitable approximations to arrive at your answer. **14**

You may use the following relations between the Hour Angle (H), Declination (δ), Altitude (a), Azimuth (A) and Latitude (ϕ):

$$\cos H = \frac{\sin a - \sin\delta \sin\phi}{\cos\delta \cos\phi}$$

$$\sin\delta = \sin\phi \sin a + \cos\phi \cos a \cos A$$