

OP01 (45 points)

This is the simulated sky in February 10, 2025 as seen from Quan Tượng Đài, an ancient observatory located in Huế, Vietnam. The Sun is not shown in the simulation.

a) (5 points) In which constellation is the Sun located? Write its Latin name or IAU abbreviation.

Solution	Point
Capricornus/Cap	5

b) (5 points) Which constellation is at the West cardinal point? Write its Latin name or IAU abbreviation.

Solution	Point
Aquila/Aql	5

c) (14 points) Check the boxes next to the constellations hosting the visible planets (points will be deducted for incorrect or excess answers). Underline the name of the checked constellation (in the answer sheet) where Mercury is located.

Aries/Ari ☐ Taurus/Tau ☐ Gemini/Gem ☐ Cancer/Cnc ☐
 Leo ☐ Virgo/Vir ☐ Libra/Lib ☐ Ophiuchus/Oph ☐
 Scorpius/Sco ☐ Sagittarius/Sgr ☐ Capricornus/Cap ☐ Aquarius/Aqr ☐
 Pisces/Psc ☐ Orion/Ori ☐ Auriga/Aur ☐ Cetus/Cet ☐

Solution	Point
Aries/Ari ☐ Taurus/Tau ☒ Gemini/Gem ☒ Cancer/Cnc ☐ Leo ☐ Virgo/Vir ☐ Libra/Lib ☐ Ophiuchus/Oph ☐ Scorpius/Sco ☐ Sagittarius/Sgr ☐ <u>Capricornus/Cap</u> ☒ Aquarius/Aqr ☒ Pisces/Psc ☒ Orion/Ori ☐ Auriga/Aur ☐ Cetus/Cet ☐ <i>+2 points for each correct answer.</i> <i>+1 point for checking all correct answers.</i> <i>-1 point for each incorrect or excess answer.</i>	11

Mercury is at Capricornus (<u>underlined</u>)	3
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d) (16 points) Check the boxes next to 7 stars (in the answer sheet) that are missing from this simulated sky (points deducted for incorrect or excess answers).

Hamal/ α Ari ☐	Menkalinan/ β Aur ☐	Mirach/ β And ☐
Alhena/ γ Gem ☐	Diphda/ β Cet ☐	Schedar/ α Cas ☐
Menkar/ α Cet ☐	Sadalmelik/ α Aqr ☐	Alderamin/ α Cep ☐
Scheat/ β Peg ☐	Algol/ β Per ☐	Sadr/ γ Cyg ☐
Ankaa/ α Phe ☐	Rigel/ β Ori ☐	Fomalhaut/ α PsA ☐

Solution			Point
Hamal/ α Ari ☐	Menkalinan/ β Aur ☒	Mirach/ β And ☒	16
Alhena/ γ Gem ☐	Diphda/ β Cet ☐	Schedar/ α Cas ☒	
Menkar/ α Cet ☒	Sadalmelik/ α Aqr ☐	Alderamin/ α Cep ☐	
Scheat/ β Peg ☒	Algol/ β Per ☐	Sadr/ γ Cyg ☒	
Ankaa/ α Phe ☐	Rigel/ β Ori ☒	Fomalhaut/ α PsA ☐	
+2 points for each correct answer.			
+2 point for checking all correct answers.			
-2 point for each incorrect or excess answer.			

e) (5 points) Estimate the local apparent solar time.

Solution	Point
16h00	
Within ± 30 m	5
Outside this range but within ± 60 m	2

OP02 (15 point)

Comet Hale-Bopp (C/1995 O1) appears in this simulated sky from February 15, 1997 to June 15, 1997.

a) (5 points) Determine the date (DD/MM) on which the comet nucleus is closest to Betelgeuse (α Ori).

Solution	Point
1/6	
Within ± 2 days	5
Outside this range but within ± 5 days	2

b) (5 points) Determine the date (DD/MM) on which the comet nucleus crosses the ecliptic.

Solution	Point
2/5	
Within ± 3 days	5
Outside this range but within ± 5 days	2

c) (5 points) Estimate the elongation ϵ of the comet nucleus from the Sun when it crosses the ecliptic.

Solution	Point
30° <i>Note: Adjust this value based on the previous answer, using a rate of ± 1 degree per day.</i>	
Within $\pm 5^\circ$	5
Outside this range but within $\pm 10^\circ$	2

OP03 (15 points)

This is the simulated sky above a site (45.4°S , 180°E) on the far side of the Moon, not so far from Von Kármán Crater, where Chang'e-4 became the first spacecraft to soft-land there in 2019. Now the Moon is in its first quarter at zero libration as viewed from Earth.

a) (5 points) In which constellation is the Sun located? Write its Latin name or IAU abbreviation.

Solution	Point
Sagittarius/Sgr	5

b) (5 points) In which constellation is the Earth located? Write its Latin name or IAU abbreviation.

Solution	Point
Virgo/Vir	5

c) (5 points) What is the altitude h of the Earth as observed from this site?

Solution	Point
On the far side of the Moon, Earth always remains below the horizon, resulting in a negative altitude.	3
Because the Moon is tidally locked and assuming zero libration, the absolute value of Earth's altitude is complementary to the site's latitude, thus is: $h = -(90^\circ - 45.4^\circ) = -44.6^\circ$.	2