

Practical Test (Astronomy)

Read the following contents (2 pages) in 5 minutes.

In 20XX, you will be an astronaut investigating astronomical object X in the solar system. In the planetarium, the following three situations (A~C) will be reproduced (the time shown in the planetarium is Earth time):

- A. The diurnal motion of the Sun and stars on the equator of Object X (2 rotations) .
- B. The culmination (highest position) of the Sun 100 km north of that equator (repeat 2 times) .
- C. The diurnal motion of stars 30 days (Earth time) after B (repeat 2 times) .

Answer the questions on the next page **after** viewing the projection in the planetarium. If needed, you may use the following physical constant:

- Solar constant on the earth: $1.4 \times 10^3 \text{ Wm}^{-2}$

- Caution 1 : Do not talk with each other in the planetarium. The running time is 12 minutes.
- Caution 2 : You may bring a question sheet, memo pad, and a small light inside the planetarium.
If needed, you may take notes inside a planetarium.
- Caution 3 : A great circle on the celestial sphere passing through zenith represents the celestial meridian and ticks are displayed every 10 degrees.
- Caution 4 : Do not begin answering the questions until an invigilator signals that you may do so.
- Caution 5 : The examination time is 20 minutes after the projection.
- Caution 6 : You can use a calculator, if needed.



Questions

- Q1) Estimate the rotation period of object X in Earth time.
a) 6 hours b) 9 hours c) 12 hours d) 21 hours e) 24 hours f) 30 hours
- Q2) Roughly estimate the radius of object X. You can assume that the shape of object X is spherical.
a) 1100 km b) 570 km c) 480 km d) 380 km e) 290 km f) 200 km
- Q3) Estimate the revolution period of object X. The eccentricity of the object can be assumed as zero.
a) 3 months b) 1 year c) 3 years d) 5 years e) 30 years f) 150 years
- Q4) Estimate the distance of object X from the sun in astronomical units.
a) 0.4 au b) 0.9 au c) 1 au d) 3 au e) 5 au f) 30 au
- Q5) Estimate the solar irradiation on the Object X.
a) $1.4 \times 10^2 \text{ Wm}^{-2}$ b) $4.5 \times 10^2 \text{ Wm}^{-2}$ c) $6.9 \times 10^2 \text{ Wm}^{-2}$ d) $1.4 \times 10^3 \text{ Wm}^{-2}$
e) $2.7 \times 10^3 \text{ Wm}^{-2}$ f) $1.4 \times 10^4 \text{ Wm}^{-2}$