

## ASTRONOMY written test IESO 2011

Name \_\_\_\_\_ Country \_\_\_\_\_

1. Imagine that a new planet, named Pippo, is discovered beyond Pluto. Its revolution period is 320 years. What would be its average distance from the Sun in Astronomical Units (AU), assuming circular orbit? **\_/1 pt.**

- a. 23.4 AU
- b. 30.7 AU
- c. 46.8 AU
- d. 93.6 AU

2. A person weights 70 kg on Earth, if he goes to the surface of the Moon and Jupiter, he weights: **\_/1 pt.**

- a. more on the Moon and Jupiter than on Earth
- b. more on Jupiter and less on the Moon than on Earth
- c. more on the Moon and less on Jupiter than on Earth
- d. less on the Moon and Jupiter than on Earth

3. Given your passion for Astronomy, your friends have given you a sidereal watch as a present for your birthday. At 10 a.m. you adjust it with the time of your clock. Following the time given by the sidereal watch, when arriving at the railway station next day to catch the 8.00 a.m. train, you find that the train is not there. What do you do? **\_/1.5 pt.**

- a. I wait for the train because it will be there in few minutes
- b. I go home because the train has already left few minutes before my arrival
- c. I wait for the train because it will be there in some hours
- d. I guess the train has been cancelled today.

4. In a science fiction movie, the main character decides to look for his friends' spaceship, lost on Mars surface, using an optical telescope placed on the Earth. The resolution of the telescope is 1 arcsec and Mars is at a distance of 60 million km. What is the minimum size of the spacecraft to allow him to see it? **\_/1,5 pt.**

- a. 2.90 m
- b. 290.9 km
- c. 290.9 m
- d. 2.90 km

5. Looking at the given stellar map, can you estimate the position of the Sun as seen from Sirius, using the same map? **\_/ 2 pt.**

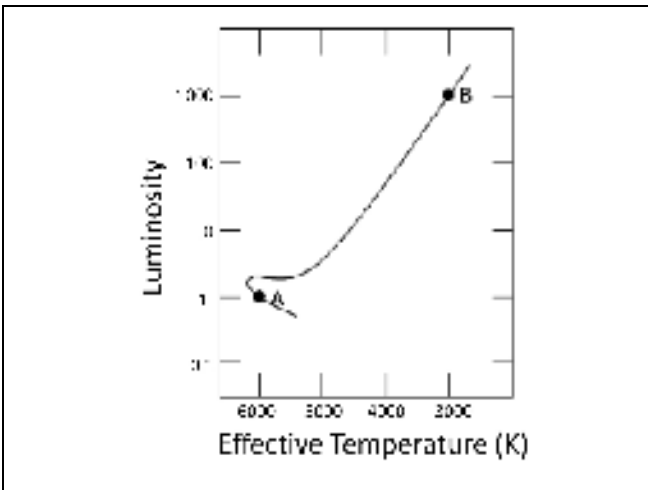
- a. yes, the Sun is diametrically opposed to Sirius in the constellation of Hercules
- b. no, the Sun is not visible from Sirius

- c. yes, the Sun is diametrically opposed to Sirius in the constellation of Ursa Minor
- d. yes, the Sun is diametrically opposed to Sirius in the constellation of the Octans

6. Assume the diameter of the Moon to be 20% smaller than the reality, what should the average distance between the Earth and the Moon be, in order to still have total solar eclipses on the Earth? **/1.5 pt.**

- a. 20% bigger than the reality
- b. 80% smaller than the reality
- c. 20% smaller than the reality
- d. 80% bigger than the reality

7. The following illustration shows the Hertzsprung–Russell (H-R) diagram for an evolutionary track of our Sun. The Sun currently locates at position A, but it will to move to position B after 5 billion years. (Assume the Sun is a blackbody and its current radius is  $7 \times 10^5 \text{ km}$ .  $1 \text{ AU} = 1.5 \times 10^8 \text{ km}$ .)



(i) When the Sun evolves to B, what is its radius? Calculate it by using the information of the diagram. **/1.5 pt.**

- a) 100 times larger
- b) 57.8 times larger
- c) 126.4 times larger
- d) 157.3 times larger

(ii) Write your process of calculation. **/1.5 pt.**

8. The synodic period of a certain asteroid is  $8/7$  years. Assume the Earth revolution speed is 30 km/s. Answer with the rounded-off figure below decimal point. In the assumption of circular orbit, find:

(i) the period of the revolution of the asteroid (year) **/1 pt.**

(ii) the radius of the revolution orbit (AU) **/1 pt.**

(iii) the speed of the asteroid (km/s) **/1 pt.**

**TOTAL SCORE: 14.5**