

Please furnish the following information before the commencement of the examination		
Full Name of the Candidate:		
Examination Centre: Colombo/Batticaloa/Jaffna/Kelaniya/Peradeniya/Ruhuna/Vaunia Campus		
Index Number:	Telephone Number:	Email:
Date of Birth:	Age as of 2013.01.01	
School & Grade:		Signature of the Candidate:

INSTITUTE OF PHYSICS, SRI LANKA

THE 2ND SRI LANKAN JUNIOR ASTRONOMY OLYMPIAD COMPETITION-2012

Duration: 1 hour and 30 minutes

This paper consists of 32 questions in two parts (A & B) printed in seven (07) pages.

Use the attached answer sheet to provide answers to 30 questions in Part-A and two questions in Part - B. Use the attached blank sheets for your calculations.

Submit all sheets including the question paper to the supervisor at the end of the examination. (The order of questions arranged in paper to paper is different. Therefore, it is essential to submit your question paper together with the answer sheets to facilitate marking.)

Electronic calculators are allowed.

PART A

(Answers to Part A should be provided in the answer sheet attached at the end of this question paper)

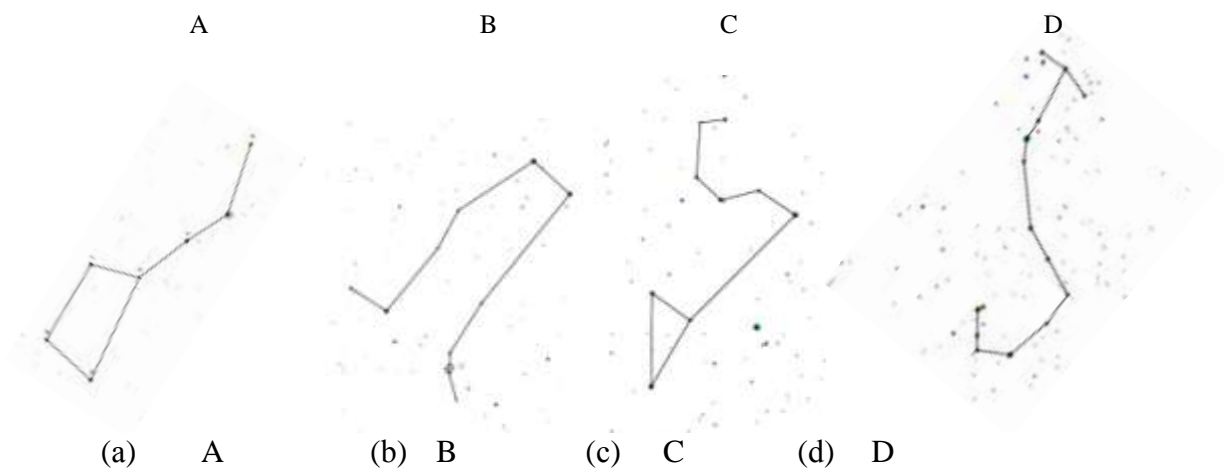
1. Which of the following phenomena is not useful in estimating the distance between two celestial bodies?
 - (a) Venus transits over the disk of the sun
 - (b) Stars with no proper motion appear to change their position in the sky when viewed six months apart.
 - (c) Doppler shift exhibited by stars
 - (d) A Total Solar Eclipse.

2. What is the f-number of a telescope?
 - (a) The ratio between focal length and diameter of primary mirror/lens
 - (b) The ratio between diameter and focal length of primary mirror/lens
 - (c) The ratio between focal length and diameter of the eyepiece
 - (d) The ratio between diameter and focal length of the eyepiece

3. One way to increase the resolving power of a telescope is to
- (a) Make its mirror bigger.
 - (b) Replace its mirror with a lens of the same diameter.
 - (c) Make its mirror smaller.
 - (d) Observe objects using longer wavelengths.

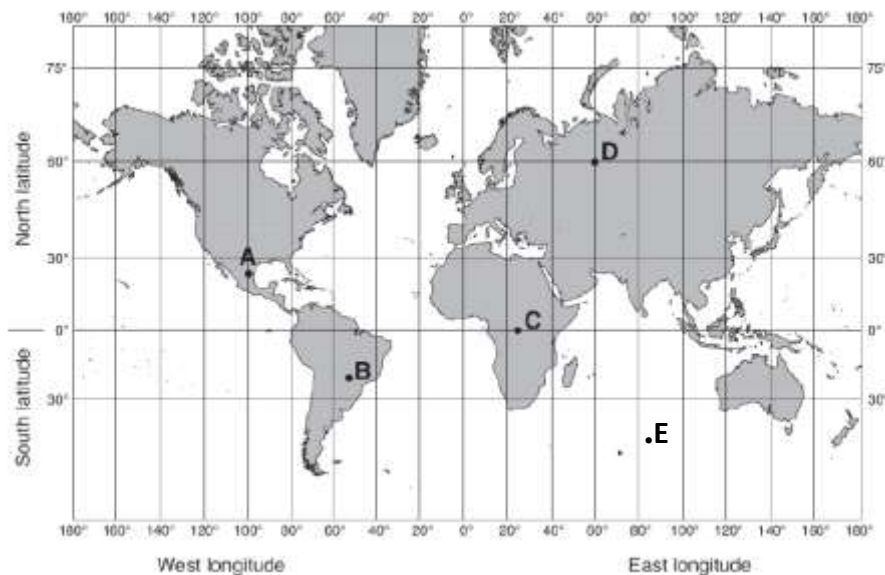
4. What is the period of the sunspot cycle ?
- (a) 365 days
 - (b) 11 years
 - (c) 28 days
 - (d) 22 years

5. Which of these constellations, what is the odd one?



6. From the observations of the Moon and lunar eclipses and subsequent calculations performed by Aristarchus, which of the following can NOT be determined?
- (a) The radius of the Moon
 - (b) The radius of the Sun
 - (c) The distance between Earth and Moon
 - (d) The mass of the Moon

- Answer to the questions 7-9 using the following map. Letters A to E represent different locations on the globe.



7. At which location could an observer *not see* the Polaris in the night sky at any time during the year?
- (a) A (b) B (c) C (d) D
8. Which location receives 12 hours of daylight and 12 hours of darkness on March 21st?
- (a) A (b) B (c) C (d) All of the above
9. At which location on June 21st is the Sun directly overhead at solar noon. ?
- (a) A (b) B (c) C (d) All of the above
10. What is the second brightest star in the night sky ?
- (a) Proxima Centauri (b) Canopus (c) Regulus (d) Pollux
11. What is the name of the orbit which enables a spacecraft to reach a certain planet with a minimum effort?
- (a) Ziolkowski orbit (b) Hoffman orbit
- (c) Braun orbit (d) Goddard orbit
12. Which group of asteroids stays steady relative to Jupiter in its orbit?
- (a) Apollo asteroids (b) Kuiper asteroids
- (c) Trojan asteroids (d) Oort asteroids
13. Which planet has the strongest magnetic field relative to the size of the planet?
- (a) Earth (b) Jupiter
- (c) Mercury (d) Venus
14. Suppose that you are observing the planet Mercury just after sunset. What is the maximum angle that can be observed between the sun and Mercury?
- (a) 42° (b) 11° (c) 28° (d) 23.5°
15. If Leo is setting at this moment, what is the constellation of the zodiac that is rising from the eastern horizon?
- (a) Sagittarius (b) Libra
- (c) Aquarius (d) Cancer

16. Why Pluto was removed from the solar system since 2006?

- (a) It was not geometrically spherical.
- (b) Its orbit is not clean.
- (c) It orbits around the sun.
- (d) It has satellites orbiting around itself.

17. Which of the following is **not true**?

- (a) Solar System has eight planets.
- (b) Solar System was formed as an effect of a supernova explosion.
- (c) Solar System was formed before the formation of Sun.
- (d) Atmosphere of Venus is mainly made out of Carbon dioxide. [CO_2]

18. Consider the following two statements describing a celestial body

- * It goes in an elliptical orbit.
- * It comes near Sun in specific periodic time periods.

Which of the following is **best matched** with the above?

- (a) Meteor
- (b) Comet
- (c) Asteroid
- (d) Meteorite

19. Which of the following years that one **could not have** observed a Venus transit?

- (a) 2004
- (b) 1874
- (c) 1882
- (d) 1760

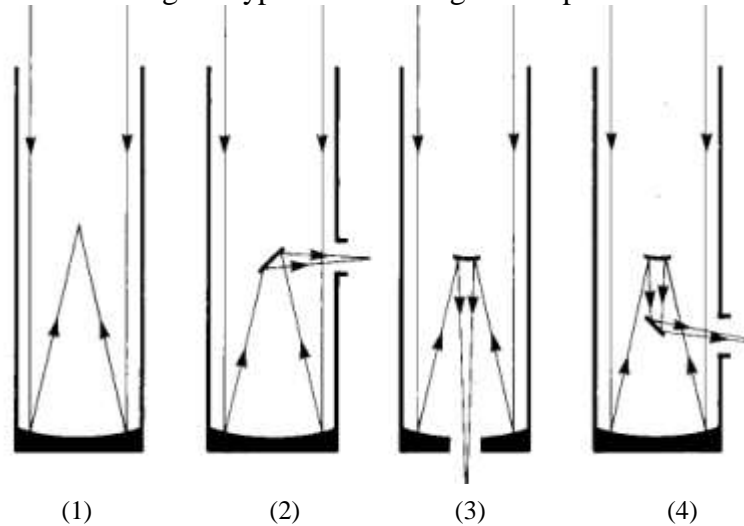
20. If the focal length of the objective of a telescope is 1 m and the focal length of its eye piece is 20 mm, the magnification power of the telescope is?

- (a) 10
- (b) 20
- (c) 50
- (d) 200

21. What is the closest star among the following, seen from Earth?

- (a) Bernard's Star
- (b) Proxima Centauri
- (c) Sirius A
- (d) Sun

22. Choose the answer containing the types of reflecting telescopes shown in the following order.



- (a) 1- Prime focus, 2- Newton focus, 3- Cassegrain focus, 4- Coude' focus
- (b) 1-Newton focus , 2- Prime focus , 3- Cassegrain focus , 4- Coude' focus
- (c) 1-Newton focus , 2- Prime focus , 3- Coude' focus , 4- Cassegrain focus
- (d) 1- Prime focus, 2- Newton focus, 3- Coude' focus , 4- Cassegrain focus

23. What is the largest natural satellite in the Solar System?

- (a) Ganymede
- (b) Titan
- (c) Europa
- (d) Callisto

24. Consider the following three stages in formation of a star.

- 1 The gas molecule solidifies due to high pressure. As a result the temperature as well as the pressure inside increases.
- 2 A magnanimous cloud is formed by a huge mass of gases and dust revolving as a greater speed in the space.
- 3 The gas molecules explode and release energy.

Which of the following represents the correct order of the above stages?

- (a) 1,2,3
- (b) 2,3,1
- (c) 2,1,3
- (d) 1,3,2

25. Consider the following three statements about the explosion of stars

- 1 If the exploding star has a mass exceeding roughly more than three times of our Sun ($3M_{\odot}$), the explosion is known as a "Super Nova" explosion.
- 2 If the exploding star has a less mass than our Sun (M_{\odot}), the explosion is known as a "Nova" explosion.
- 3 Uranium and Gold are formed as a result of a Super nova explosion.

Correct statements among the above are,

- (a) 1 Only (b) 2 & 3 Only
(c) 1 & 3 Only (d) All 1,2 & 3

26. Which one of the following **is not correct** about the ecliptic of the Sun?

- (a) Apparent path of the Sun is known as ecliptic.
(b) On March 21st the Sun moves to the South of the Celestial equator.
(c) Twelve constellations are located in the ecliptic.
(d) On September 23rd Sun's apparent path intercepts the celestial equator.

27. The relative velocity of a certain galaxy at a distance of 7 Mpc away would be (use the value of Hubble's constant as 70 km/s per Mpc).

- (a) 7 km/s (b) 10 km/s (c) 70 km/s (d) 490 km/s

28. Hertzsprung- Russell diagram (HR diagram) is a tool used in Astronomy in common. Which one of the following represents a usage of HR diagram?

- (a) Measuring the age of the universe.
(b) Finding the mass of a star.
(c) Finding the constituents of the star.
(d) Finding the apparent magnitude of a star.

29. Which of the following two coordinates are used to **locate** a celestial object in the sky?

- (a) Declination and Right ascension
(b) Latitude and longitude
(c) Equatorial diameter and radius
(d) Declination and altitude

30. By July 14th 2015, the "New Horizons", which is the fastest man made spacecraft ever launched, will arrive to study a celestial object. What is the name of that celestial object?

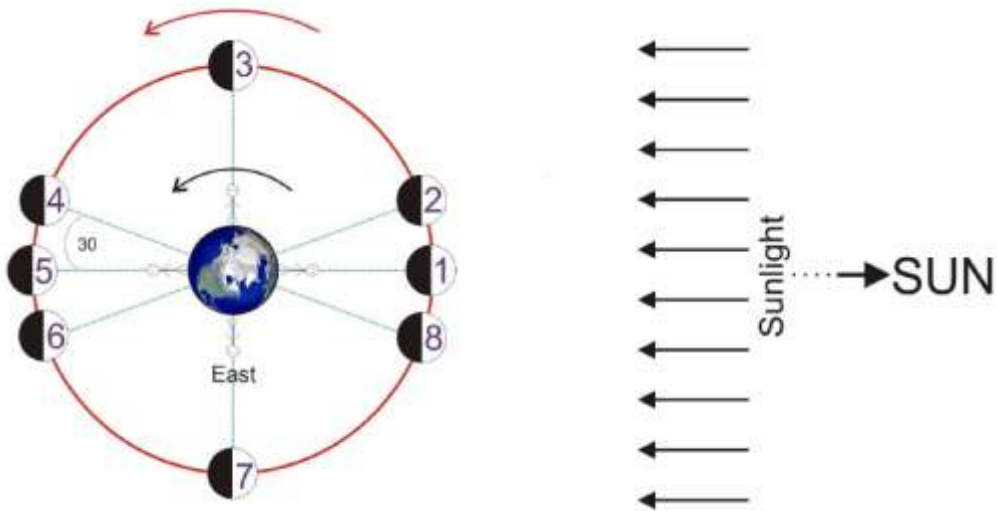
- (a) Halley's comet (b) Pluto
(c) Sedna (d) Eris

PART B

Please provide your answers to this part using the space provided (under No. 31 and No. 32) in the answer sheet. Write your name and index number on top of each and every additional sheet (if used).

- 31. Draw a picture of the Hubble's Tuning fork classification of galaxies in the box given below naming the basic types of galaxies.

- 32. Following is a picture showing Sun and a certain position of moon during its orbit around the Earth. Draw the phases of the moon at given positions in the orbit on the spaces provided under No.32 in the answer sheet.(1st one is done for you).



Consider the upper side of answer script as the direction of North.