

第十七屆中學生天文訓練計劃

17th Astronomical Training Programme for Secondary School Students

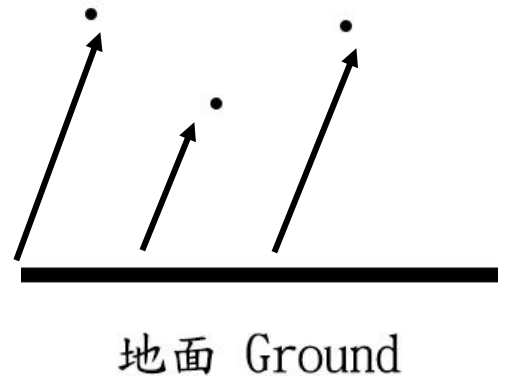
筆試補考試卷 Re-exam Paper

時間：30 分鐘 Time allowed: 30 mins

甲部：選擇題 (12 分)

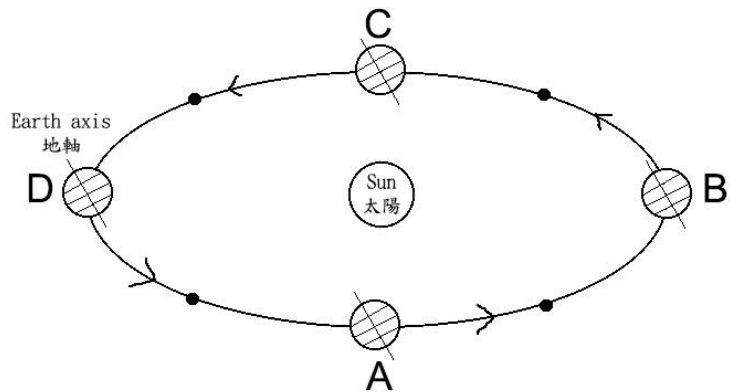
Section A: Multiple Choice Questions (12 Marks)

1. 根據相內星星的軌跡，請估計該處的位置及面向的方向。
According to the star trails in the figure, estimate the location of the place and the facing direction.



- A. 北半球東方 East at North Hemisphere
- B. 北半球西方 West at North Hemisphere
- C. 南半球東方 East at South Hemisphere
- D. 南半球西方 West at South Hemisphere

2. 根據右圖，那個位置代表北半球的秋分？
According to the graph, which position represents the autumn equinox of the Northern Hemisphere?



- A. A
- B. B
- C. C
- D. D

3. 地球上不可能看到以下哪個行星現象？

Which of the following astronomical phenomena cannot be observed on the Earth?

- A. 土星凌日 The transit of Saturn
- B. 火星逆行 The retrograde motion of Mars
- C. 金星盈虧 The phases of Venus
- D. 金星東大距 The eastern elongation of Venus

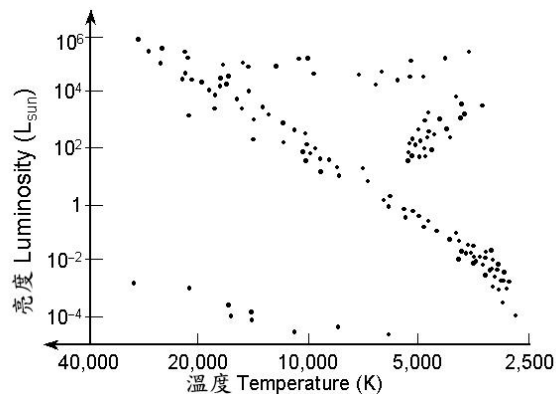
4. 在日全食期間，月球主要遮蔽了_____，因此才可觀察到日珥。

During the total solar eclipse, the moon mainly covers the _____ such that the observation of solar prominence is possible.

- A. 輻射層 Radiative Zone
- B. 光球層 Photosphere
- C. 色球層 Chromosphere
- D. 日冕 Corona

5. M 型主序星位於赫羅圖的：
In the HR Diagram , type M main-sequence stars locate at :

- A. 右上 Top right
- B. 右下 Bottom right
- C. 左上 Top left
- D. 左下 Bottom left

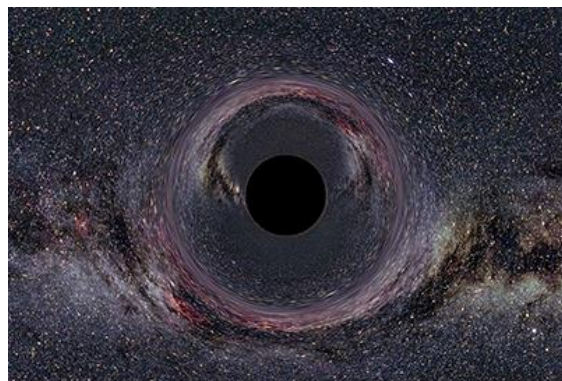


6. 以下那一個深空天體列表內是暗星雲？
Which of the following deep sky object catalogues is about dark nebulae?

- A. 科德韋爾天體列表 Caldwell Catalogue
- B. 巴納德天體列表 Barnard Catalogue
- C. 赫歇爾天體列表 Herschel Catalogue
- D. 星雲和星團新總表 New General Catalogue of Nebulae and Clusters of Stars

7. 右圖是模擬以下那一個廣義相對論的現象？
Which of the following general relativity phenomena is being simulated in the figure?

- A. 羅倫茲收縮 Lorentz Contraction
- B. 時間膨脹 Time Dilation
- C. 光速不變 The Constancy of Speed of Light
- D. 黑洞 Black hole



8. 以下那句有關恆星的敘述是正確的？
Which of the following statements about stars is/are correct?


- I) 原始恆星是由於分子雲收縮而形成。
Protostar is formed by the collapse of a molecular cloud.
 - II) 超新星是大質量恆星演化末期的星體爆炸。
Supernova is the explosion at the last stellar evolutionary stages of a massive star.
 - III) 中子星的形成主要是由於重力大於電子簡併壓力。
The formation of neutron star is mainly due to the fact that the gravity of the star is greater than its neutron degenerate pressure.
- A. 只有 I 及 II I and II only
 - B. 只有 I 及 III I and III only
 - C. 只有 II 及 III II and III only
 - D. 以上皆是 Above of the above

乙部：傳統題 (13 分)

Section B: Conventional Questions (13 Marks)

1. 獵戶座大星雲是位於獵戶座的一個深空天體，小強計劃帶備一支望遠鏡以目視觀測。以下是該星雲的資料：

Orion nebula is a deep sky object in Lyra, Siu Keung plans to observe it with a telescope. The following are the information of it :

與地球距離 Distance to Earth	1344 光年 (light years)	
視大小 Apparent Dimension	65 角分 (arcmins)	
視星等 Apparent Magnitude	4	

- (a) 獵戶座大星雲屬於那一類星雲？ (1 分)
What types of nebula does the Orion Nebula belong to? (1 mark)

Diffuse Nebula / Emission Nebula

- (b) 那類型的恆星能產生出這類星雲？ (1 分)
What types of stars can generate this type of nebula? (1 mark)

O/B type stars

- (c) 那一個月份這深空天體會在午夜時出現在天頂？ (1 分)
Which month does this deep sky object appear at the zenith mid-night? (1 mark)

10/11/12/1

- (d) 小強發現在 20mm 的目鏡下，該星雲的視大小被放大至 35 度，請問該望遠鏡的焦距是多少？ (約至整數) (2 分)
Siu Keung realizes that the apparent dimension of the object becomes 35 degree under a 20 mm eyepiece, what is the focal length of the telescope? (to the nearest integer) (2 marks)

$$20 \times 35 \times \frac{60}{65} = 646 \text{ mm}$$

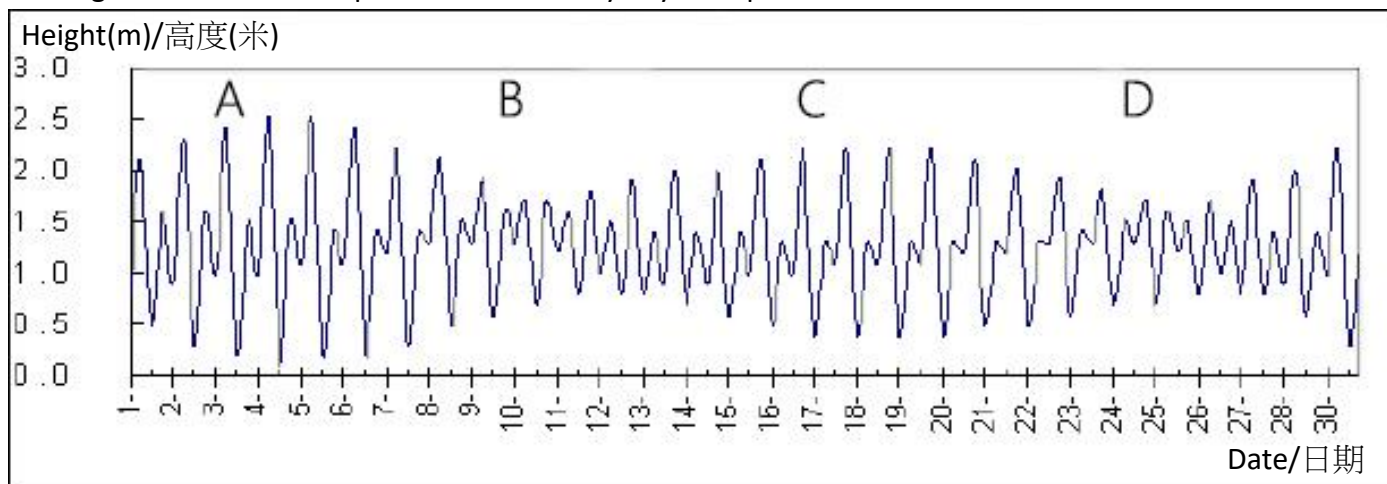
- (e) 若該望遠鏡的焦比是 f/5，小強能否用該望遠鏡看到 13 等的暗星？ (2 分)
If the focal ratio of the telescope is f/5, can Siu Keung observe a faint star with apparent magnitude 13 by using this telescope? (2 marks)

$$6 + 5 \log \left(\frac{646 \div 5}{7} \right) = 12.33 < 13$$

No. Siu ming cannot observe

2. 下圖是來自某年某月香港鰂魚涌的潮汐預報圖。

Figure shows the tide prediction of Quarry Bay in a specific month.



(a) 為甚麼圖中 A 及 C 的日子中潮汐波幅特別高？ (1 分)

In the figure, why dates A and C have a high amplitude of tide? (1 mark)

Moon/Sun/Earth align in a straight line/ colinear

(b) 若在 D 日子的黃昏時看到月亮，請指出在 A、B、C、D 中那日是初一？試簡述之。 (3 分)

If one can observe the moon in the morning on date D, which date among A,B,C, D is the lunar first day? Explain your answer briefly. (3 marks)

Since D is around first quarter moon, C is the new moon, A is thir quarter moon and B is the full moon. Lunar first day is in new moon. Therefore C is the lunar first day.

(c) 若這一個月份將出現日全食，請指應在 A、B、C、D 中那一天？試簡述之。 (2 分)

If total solar eclipse will appear in this month, which date among A,B,C, D will it be? Explain your answer briefly. (2 marks)

Solar eclipse must be in new moon, therefore C is the date of solar eclilpse.

全卷完 End of Paper