

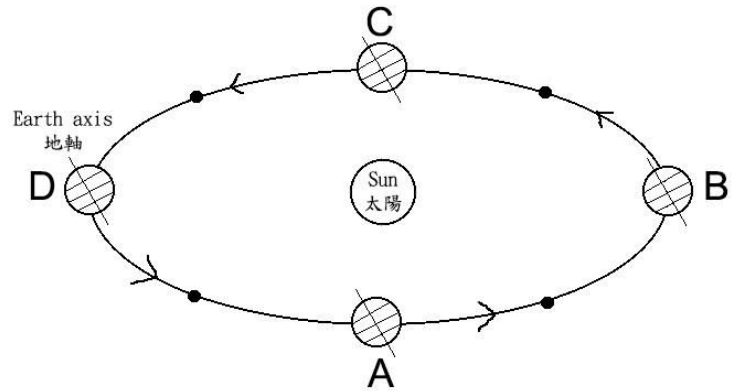
第十六屆中學生天文訓練計劃  
16<sup>th</sup> Astronomical Training Programme for Secondary School Students  
筆試試卷 Exam Paper  
時間：30分鐘 Time allowed: 30 mins

甲部：選擇題 (12分)

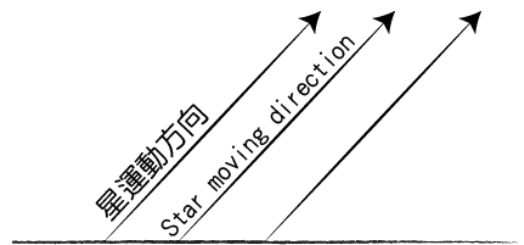
Section A: Multiple Choice Questions (12 Marks)

1. 以下那一個雙筒望遠鏡較適合年輕初學者觀星？  
Which of the following binoculars is the most suitable for young stargazing beginner?
- A. 5 x 35
  - B. 7 x 20
  - C. 10 x 30
  - D. 22 x 50

2. 根據右圖，那個位置代表北半球的春天？  
According to the graph, which position represents the spring season of the Northern Hemisphere?
- A. A
  - B. B
  - C. C
  - D. D



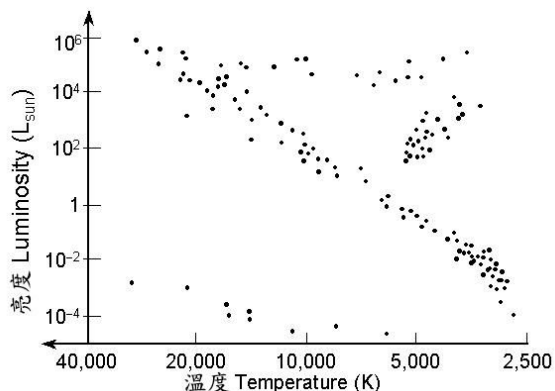
3. 從右方圖中可判別出我們正位於\_\_\_\_\_面向\_\_\_\_\_。  
From the following figure, we are locate at \_\_\_\_\_ and facing \_\_\_\_\_.
- |                            |         |
|----------------------------|---------|
| 位於                         | 面向      |
| Locate at                  | Facing  |
| A. 北半球 Northern Hemisphere | 東方 East |
| B. 北半球 Northern Hemisphere | 西方 West |
| C. 南半球 Southern Hemisphere | 東方 East |
| D. 南半球 Southern Hemisphere | 西方 West |



4. 以下太陽結構和其平均溫度是對的？  
Which of the following pair of information about the Sun is correct?
- |               |                   |
|---------------|-------------------|
| 太陽表面          | 黑子本影              |
| Solar Surface | Umbra of Sun Spot |
| A. 4,000K     | 2,000K            |
| B. 4,000K     | 6,000K            |
| C. 6,000K     | 4,000K            |
| D. 6,000K     | 8,000K            |

5. 白矮星主要是借以下那種力防止其進一步收縮？  
Which of the following factor helps white dwarf to avoid contraction?
- A. 氣體壓力 Thermal Pressure
  - B. 萬有引力 Gravity
  - C. 中子簡併壓力 Neutron Degeneracy Pressure
  - D. 電子簡併壓力 Electron Degeneracy Pressure

6. 以下那一顆恆星位於赫羅圖的右上方：  
Which of the following star locates at the top right on the HR Diagram :
- G2
  - O3
  - B4
  - K5



7. 以下那個現象符合狹義相對論？  
Which of the following are the phenomena about special relativity is correct?
- 運動觀測者比靜止觀測者量度到較慢的光速  
Moving observer can observe a slower velocity of light than stationary observer.
  - 靜止觀測者發現到運動物件的時間過得較慢  
Stationary observer can observe a time dilation of a moving object.
  - 只要兩事件在一觀測者眼中是同時發生，該兩事件對其他觀測者都是同時發生  
Two simultaneous events in a particular reference of frame are also simultaneous in any other reference of frame.
  - 靜止觀測者發現到運動物件長度較長  
Stationary observer can observe a length elongation of a moving object.
8. 以下那些恆星是冬季六邊形頂點上的成員？  
Which of the followings stars are the member of winter hexagon?
- |           |            |
|-----------|------------|
| (i) 畢宿五   | Aldebaran  |
| (ii) 老人星  | Canopus    |
| (iii) 參宿四 | Betelgeuse |
| (iv) 天狼星  | Sirius     |
- 只有(i)和(iv) (i) and (iv) only
  - 只有(ii)和(iii) (ii) and (iii) only
  - 只有(i)、(iii)和(iv) (i), (iii) and (iv) only
  - 以上皆是 All of the above

9. 以下那個組合是正確的？  
Which of the following combination is true?

	深空天體 Deep Sky Object	星座 Constellation	類別 Category
A	馬頭星雲 Horsehead Nebula	飛馬座 Pegasus	暗星雲 Dark nebula
B	獵戶座大星雲 Great Orion Nebula	獵戶座 Orion	反射星雲 Reflection nebula
C	奧米加星團 Omega clusters	半人馬座 Centaurus	球狀星團 Globular clusters
D	蟹狀星雲 Crab nebula	巨蟹座 Cancer	超新星殘骸 Supernova Remnant

10. 固定攝影常被運用於以下那一種目標？

Which of the following is usually the target of fixed tripod method?

- A. 星流跡                                          Star Trail  
 B. 彗星                                              Comet  
 C. 高倍行星                                        High Resolution Planet Photography  
 D. 暗星雲                                          Dark Nebula

11. 農曆中潤月是由於一個月份沒有了\_\_\_\_\_。

In Lunar Calendar, intercalation of a month is due to the absence of \_\_\_\_\_.

- A. 三十一號                                        The 31th day  
 B. 新月                                              The New Moon  
 C. 節氣                                              Minor Solar Term  
 D. 中氣                                              Major Solar Term

12. 暗物質的假設是由於發現了\_\_\_\_\_。

The hypothesis of "Dark Matter" is due to the fact that \_\_\_\_\_.

- A. 遙遠星系的紅移比預期小  
 The redshift of distant galaxy is smaller than expected  
 B. 遙遠星系的紅移比預期大  
 The redshift of distant galaxy is larger than expected  
 C. 以恆星光度計算的星系總質量比預期小  
 The estimated total mass of galaxy by brightness is smaller than expected  
 D. 以恆星光度計算的星系總質量比預期大  
 The estimated total mass of galaxy by brightness is larger than expected

**乙部：傳統題 (13分)**

**Section B: Conventional Questions (13 Marks)**

1. 在2016年的7月小明計劃觀測整個M31仙女座星系(約3個月亮的大小)。

In the July of 2016, Siu Ming plans to observe a full view of M31 Andromeda Galaxy (~ 3 moon size).

(a) M31中的M是屬於那一個深空天體目錄？ (1分)

What deep sky catalogue does the letter "M" in M31 represent? (1 mark)

(b) 在以下表格內選出一個合適的日子以避免月光影響觀測，並簡述原理。 (2分)

Choose a suitable date without the influence of moonlight from the table with reason. (2 marks)

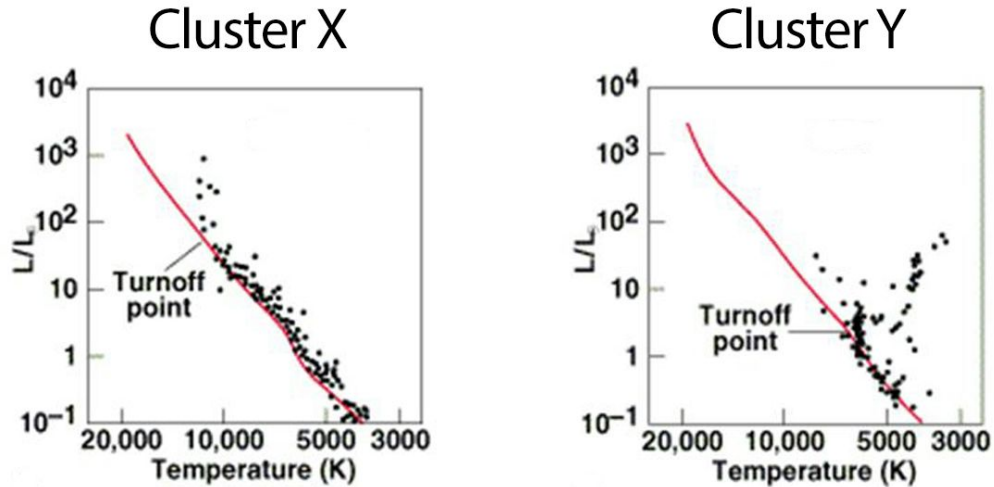
公曆日期	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
7 月	農曆 日期	初七	初八	初九	初十	十一	十二	十三	十四	十五	十六	十七	十八	十九	二十	廿一	廿二	廿三

(c) 小明攜帶兩支望遠鏡A及B，請選出其中一支合適的鏡作觀測，計算並解釋原因。 (3分)

Siu Ming brought two telescopes A and B. Please choose a suitable one with reason based on calculation. (3 marks)

望遠鏡 A       : F5/130mm       望遠鏡 B       : F10/200mm       使用目鏡       : 25mm / 視場 50度  
 Telescope A   : F5/130mm       Telescope B   : F10/200mm       Eyepiece       : 25mm / FOV 50 degree

2. 下圖是來自兩個不知名星團X及星團Y的赫羅圖。  
Figure shows the HR diagram from two unknown Cluster X and Y.



- (a) 那一個星團較年老？試解釋之。  
Which of the clusters is older? Explain your answer (2分)  
(2 marks)
- (b) 請分別估計星團X及星團Y在可見光範圍的主要顏色。  
Suggest the main visible color of the Cluster X and Cluster Y respectively. (2分)  
(2 marks)
- (c) 它們那一個較像球狀星團？試解釋之。  
Which of them is likely to be an globular cluster? Explain your answer. (2分)  
(2 marks)
- (d) 試列舉出一個星團X的例子。  
Suggest an example of Cluster X. (1分)  
(1 mark)