

IESO 2016

Written Test No 2

Please follow the instructions while answering the questions. The questions are independent.

請依照指示說明來回答題目，不同題目之間是獨立的。

Marking the questions will be as follows:

回答題目之評分標準如下：

- *Questions with only one correct answer:* 1 point (= mark) for the correct answer , 0 point for a wrong answer

單選題: 正確之答案得 1 分；錯誤之答案得 0 分

- *Questions with many correct answers:* 1 point (= mark) for each correct answer, minus 0.5 for each wrong answer ; no question will be marked less than 0 (zero) even if the number of wrong answers exceeds the number of correct answers. There is always at least one wrong answer. So, even if you choose ALL the given answers, 0 (zero) will be applied.

Some questions may have a specific way of marking.

多選題: 每一個正確之答案得 1 分；每一個答錯之答案倒扣 0.5 分。同

一題目即使答錯多於答對之選項數目，最低就是得 0 分。每一個題目至

少都會有一個錯誤之選項，如果你勾選所有之選項，該題將以 0 分計

算。有一些題目可能會有特別之作答或評分方式。

Write answers on separate answer sheet.

答案寫在另外附上之答案紙上

1. The figure below depicts the temperature profiles of the northwestern Pacific Ocean during summer and winter. In both the profiles, the seasonal change in the structure of the ocean water column is limited to the shallow part.

下圖是西北太平洋某地的冬季和夏季溫度剖面圖，從兩個圖中可以看出海水柱的季節變化只侷限於淺層。

Choose the most appropriate explanation from the choices given below:

下列何者是最適合的解釋：

The seawater is well mixed down to a few hundred meters because . (*Just one correct answer*).

海水均勻混合只限於表水幾百公尺，是因為？(單選題)

- a) In summer, the wind speed in the area is very high.
夏季時, 本地的風速非常高
- b) In summer, sunlight warms the shallow water strongly.
夏季時, 陽光劇烈地加熱了表水
- c) In winter, the wind speed in the area is very high.
冬季時, 本地的風速非常高
- d) In winter, sunlight warms the shallow water strongly.
冬季時, 陽光劇烈地加熱了表水

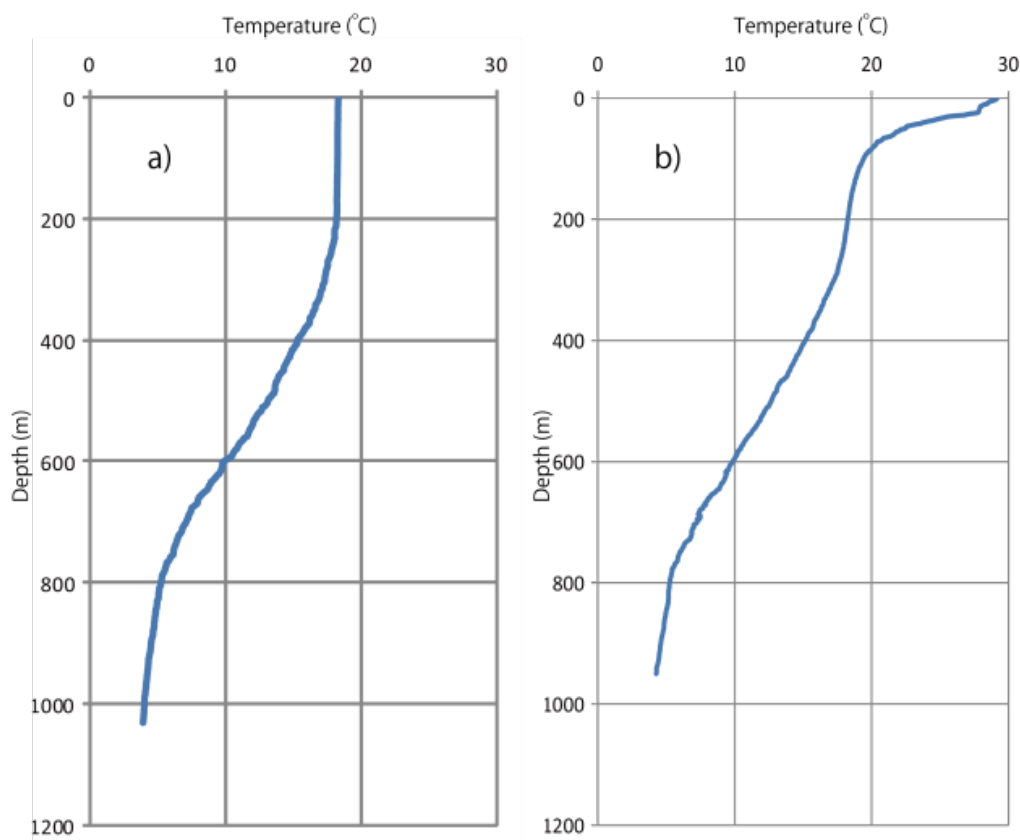


Figure: Temperature profiles of the northwestern Pacific Ocean during winter and summer.

圖：西北太平洋某地的冬季和夏季溫度剖面圖

2. Choose the correct statements describing the paleomagnetism of sediments and igneous rocks of the oceanic plate. (*More than one correct answer.*)

下列有關沉積物和海洋板塊中火成岩的古地磁學的敘述，哪些正確？（多選題）

- a) The igneous rocks can record an ancient magnetic field acquired when they cool from high temperatures.

當火成岩從高溫冷卻時，可以記錄當時的地磁場

- b) The igneous rocks cannot record an ancient magnetic field because they were originally hot magma before solidification.

火成岩在固結前是高熱的岩漿，因此無法記錄當時的地磁場

- c) The sediments deposited on the igneous rocks record an ancient magnetic field, as magnetization is acquired by heat derived from the igneous rocks.

沉積在火成岩上的沉積物能紀錄古地磁場，是因為磁化需要火成岩產出的熱能

- d) The sediments deposited on the igneous rocks have magnetic minerals that record an ancient magnetic field at the time of deposition.

沉積在火成岩上的沉積物能紀錄古地磁場，是因為其中有磁性礦物紀錄沈積時的地磁場

3. As shown in the figure below, relative humidity is measured by using a pair of thermometers with a dry bulb and a wet bulb. The wet bulb is wrapped by gauze to keep it moist by the pot of water. Which of the statements below are correct? (*More than one correct answer.*)

如下面之圖示，相對濕度可以用一對乾球與濕球溫度計來測量，濕球是以紗布包裹並連結一小水瓶以保持濕潤。下面那些敘述是正確的？（多選題）

- a) If the air is unsaturated, dry bulb temperature is always higher than wet bulb temperature.

如果空氣為未飽和，乾球溫度總是比濕球溫度高

- b) If the air is unsaturated, wet bulb temperature always equals dew-point temperature.

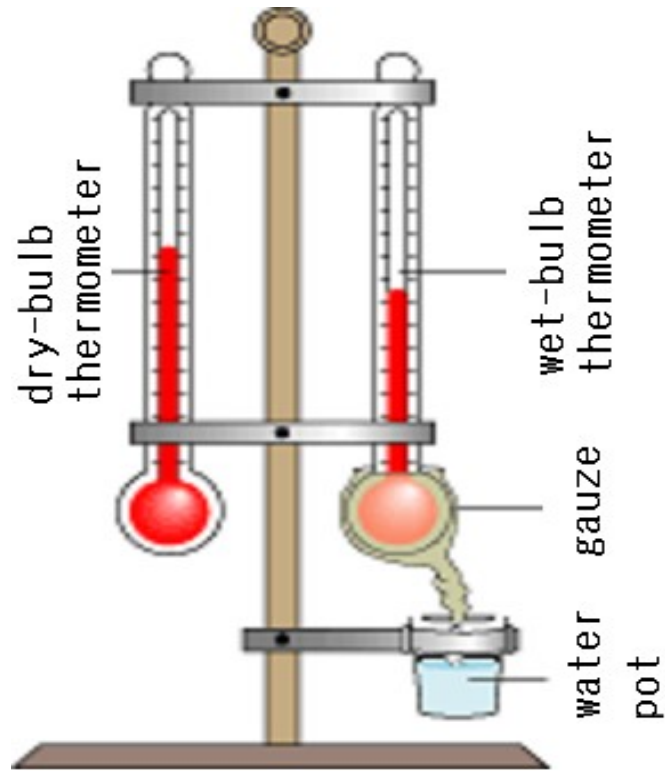
如果空氣為未飽和，濕球溫度總是和露點溫度相同

- c) If the difference in temperature between the dry bulb and wet bulb remains the same, relative humidity is higher when the dry bulb temperature is higher.

如果乾球溫度與濕球溫度之差值不變，乾球溫度較高時之相對濕度也較高

- d) If the difference in temperature between the dry bulb and wet bulb remains the same, water vapor content is greater when the dry bulb temperature is higher.

如果乾球溫度與濕球溫度之差值不變，乾球溫度較高時之水蒸氣含量也比較高。



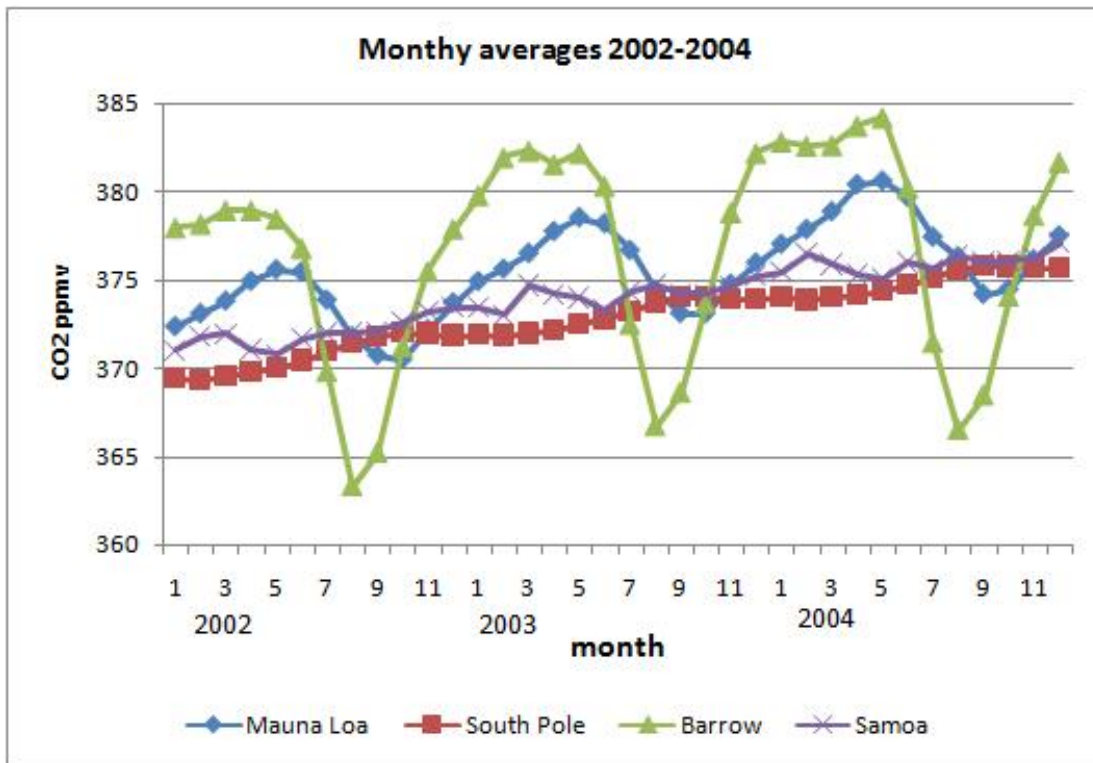
4. The figure below shows the seasonal variations of atmospheric carbon dioxide as measured in Barrow, Alaska (71.3°N, green triangles), Mauna Loa, Hawai'i (19.6°N, blue diamonds), South Pole (90° S, red squares), and Samoa (Pacific island at 13.76°S, purple crosses) for three consecutive years, 2002-2004.

下圖顯示 Barrow, Alaska(71.3 N, 綠色三角形), Mauna Loa, Hawaii(19.6 N, 藍色菱形), South Pole(90 S, 紅色四方形), 以及 Samoa(太平洋小島 13.76 S 紫色 十字形)等四個地點，2002-2004 連續三年量測之大氣二氧化碳的季節變化。

- Why are the amplitudes of oscillation relatively higher in the Northern Hemisphere? (*More than one correct answer.*)

為什麼北半球之震盪振幅相對較高?(多選題)

- a) Human population is relatively higher in the Northern Hemisphere.
北半球之人口數相對較多
- b) Forest cover is relatively higher in the Northern Hemisphere.
北半球之森林覆蓋相對較高
- c) Vascular plants are absent in Antarctica.
南極沒有高等的維管植物
- d) Ocean area is relatively more in the Southern Hemisphere, which causes more CO₂ absorption.
南半球之海洋面積相對較大，導致較多的二氧化碳被吸收



5. Seasonal CO₂ maxima in the South Pole occur in September (9th month), whereas in Barrow and Mauna Loa, they occur in May (5th month). Why? (*Just one correct answer.*)

南極二氧化碳季節的極大值發生在 9 月(第 9 月)但是在 Barrow 以及 Mauna Loa 卻是發生在 5 月(第 5 月) 為什麼 ? (單選題)

- a) Energy production and thus emission of CO₂ peak in winter.
能量生產導致之二氧化碳排放峰值發生在冬季
- b) Excess of respiration over photosynthesis peaks in winter.
呼吸作用超過光合作用之峰值發生在冬季
- c) Excess of photosynthesis over respiration peaks in winter.
光合作用超過呼吸作用之峰值 發生在冬季
- d) Oceans liberate more CO₂ in summer.
夏季海洋釋放出較多之二氧化碳

6. Paleo coral terraces are usually dated using a suitable method for reconstruction of paleo sea level changes. This is made possible because of : *(Just one correct answer.)*

採用適當的研究方法研究經過定年的古珊瑚階地可以重建古海面高度變化的原因是：（單選題）

- a) Corals grow at a slower rate during high sea level stands and faster during low sea level stands.
高海面時，珊瑚生長速率較慢，而於低海面時，珊瑚生長速率較快
- b) Corals growing in the deep sea are sensitive to the overhead pressure, which is a function of sea level
珊瑚生長於深海中且對其上因海面變動而導致之水壓變化敏感
- c) Most corals host photosynthetic symbionts, which require sunlight. This makes corals grow within ~ 50 m of the sea surface.
大部分的珊瑚具有需要陽光的共生藻，因此珊瑚生長於距海平面 50m 以內之深度
- d) Carbonate precipitation by corals is thermodynamically favored only close to the sea surface.
珊瑚所分泌之碳酸鈣骨骼因化學熱力的關係僅能生長於靠近海表面的地方

7. Paleosurfaces containing dead corals, when dated precisely, give information on the time of : *(More than one correct answer.)*

保存有死亡珊瑚骨骼的古層面，經過精確的定年後，可提供下列哪些事件的發生時間？（多選題）

- a) abrupt sea level rise
快速海面上升
- b) sea level fall
海面下降
- c) abrupt subsidence of land
快速陸地沈降
- d) abrupt uplift of land
快速陸地抬升

8. A time of higher sea level stand (corrected for tectonic changes on land) usually indicates :
(More than one correct answer.)

扣除構造運動對陸地的影響因素之後，高海水面時期通常表示？(多選題)

- a) Lower atmospheric CO₂ and CH₄.
較低的大氣 CO₂ 及 CH₄ 濃度
- b) Lower ice volume of the Earth.
地球上的冰川體積較小
- c) Higher carbonate precipitation in the oceans by marine organisms (corals, pteropods, coccoliths and foraminifera).
海洋生物（珊瑚、軟體動物、球形藻、和有孔蟲）分泌較多的碳酸鈣殼體
- d) Higher dust content in the atmosphere.
大氣中有較高的灰塵含量

9. What is the geological structure of the picture below? (Just one correct answer.)

下列哪一選項為下圖中的地質構造？（單選題）

- a) Meteorite crater
隕石坑
- b) Volcanic crater
火山爆裂口
- c) Erosional anticline
侵蝕的背斜
- d) Erosional syncline
侵蝕的向斜



10. The photographs below represent sedimentary structures observed in the field.

下列 4 張相片代表於野外所觀察到的沈積構造。

- a) Which of the photographs below represents a sedimentary feature formed by biogenic activity ?

哪一張相片代表生物活動所造成之沈積構造？

Photo A B C D

相片 A B C D

- b) Which of the photographs below represents a sedimentary structure formed by differential loading ?

哪一張相片代表差異負重所造成之沈積構造？

Photo A B C D

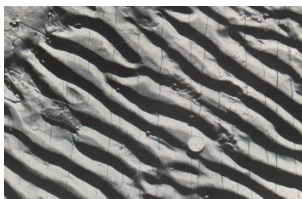
相片 A B C D

- c) Which of the photographs below represents a sedimentary structure formed by desiccation ?

哪一張相片代表地表脫水所造成之沈積構造？

Photo A B C D

相片 A B C D



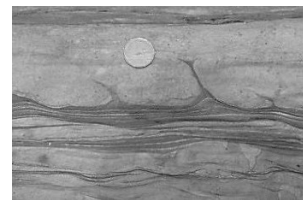
A



B



C



D

11. The following are some laws of historical geology. Which is a correct choice of laws **unsuitable** for determining the relative ages of two kinds of rocks in contact?

下述為歷史地質學常常引用的定律，下列哪一選項為**不適合**用來判斷兩接觸地層間的相對年代的定律？(單選題)

1: Law of original/lateral continuity

原始側向連續定律

2: Law of original horizontality

原始水平定律

3: Law of cross-cutting relationship

截切定律

4: Law of superposition

疊積定律

5: Law of faunal succession

生物連續定律

6: Law of inclusion

包裹定律

Choose the correct alternative : (Only one correct answer.)

下列哪一選項為**不適合**用來判斷兩接觸地層間的相對年代的定律組合？（單選題）

Alternative a : 1, 2

a) 1, 2

Alternative b : 3, 4

b) 3, 4

Alternative c : 5, 6

c) 5, 6

Alternative d : 1, 2, 3

d) 1, 2, 3

Alternative e : 4, 5, 6

e) 4, 5, 6

12. P wave from an earthquake arrived at a station at 03:01 am. Figure 1 shows the seismogram recorded at the station. Figure 2 shows the relation between the P-wave and S-wave travel times (t_p and t_s , respectively) and epicentral distance (km).

地震發生後，P 波到達測站的時間是早上 03 點 01 分，如圖一的震波圖所示。而圖二則為 P 波和 S 波到達不同距離的測站時，對應到的理論走時。

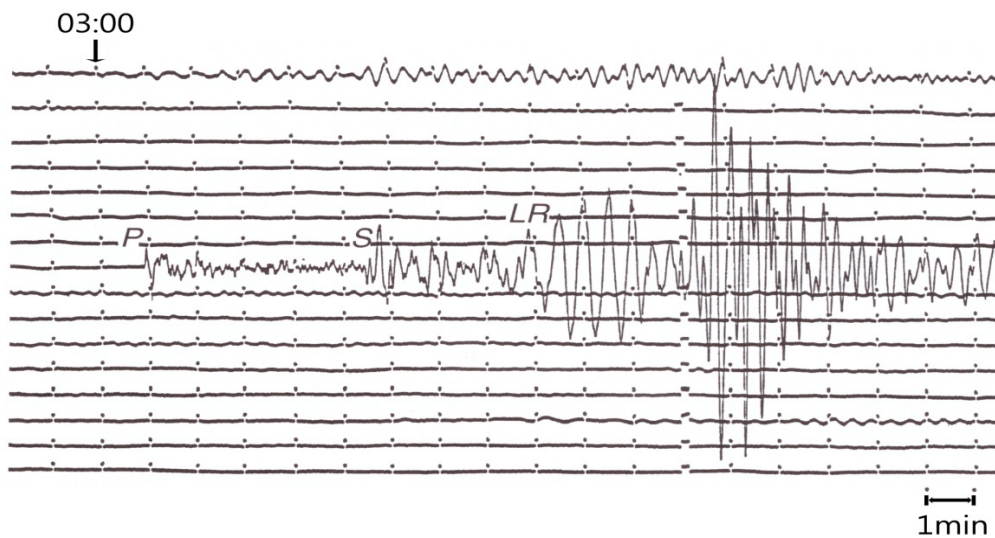


Figure 1

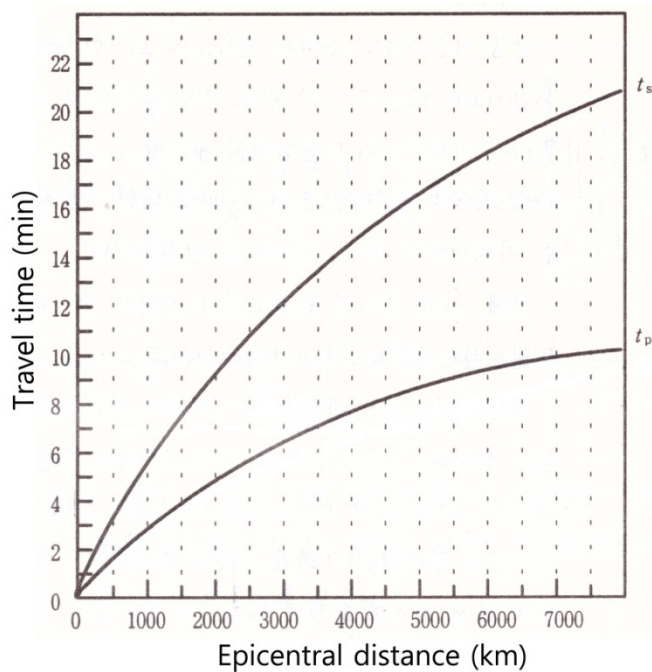


Figure 2

13. Choose the correct answer (*only one correct answer*) 請選擇正確答案(單選題)

(1) Approximately how far is the seismic station from the earthquake epicenter?

請問這個地震的震央離測站多遠?

- a) 1000 km
- b) 2500 km
- c) 4000 km
- d) 5000 km

(2) Approximately at what time did the earthquake occur?

真正的發震時間應該是?

- a) 2 :36
- b) 2 :46
- c) 2 :56
- d) 3 :01

(3) Approximately at what time will the P-wave arrive at a station 4500 km away from the epicenter?

P波要跑到4500公里之外的測站，其到達時間應該為?

- a) 3 :00
- b) 3 :02
- c) 3 :04
- d) 3 :10

14. The table below shows surface sea water properties observed at regions, "A", "B" and "C".

Which statements given below are correct? (*More than one correct answer.*)

(Assume that surface salinity can be affected by evaporation and precipitation only.

下表是 A、B、C 三個區域的表層海水性質，下列哪些敘述是正確的(多選題)

(假設表水鹽度只受蒸發與降雨影響)

Region	Temperature(°C)	Salinity (g/kg)	Density (kg/m ³)
A	(a)	36.0	1027
B	12	35.5	1027
C	12	34.0	(b)

- a) The temperature of region "A" is less than 12 °C.

A 區域的海水溫度低於 12° C

- b) The density of region "C" is between 1000 and 1027 kg/m³.

C 區域的海水密度介於 1000 kg/m³ 和 1027 kg/m³ 之間

- c) The value of 'evaporation minus precipitation' at region "A" is higher than those at regions "B" and region "C".

A 區域的"蒸發減降雨"的量值高於 B 區域和 C 區域

- d) If we sample equal volumes of water from "A" and "B" and mix them (assuming they are maintained at their original temperature), water density will increase.

如果將相同體積的 A 區域海水和 B 區域海水相混合，海水密度將會增加

15. Global warming can be caused by an _____: (*several correct answers.*)

下列哪些選項會導致全球暖化?(多選題)

- a) Increased rate of thermonuclear fusion in the Sun.

太陽熱核融合的速率增加

- b) Increased greenhouse gases in the Earth's atmosphere.

地球大氣之溫室氣體增加

- c) Increased atmospheric humidity.

大氣濕度增加

- d) Increased sulphate aerosols in the atmosphere.

大氣硫酸根類懸浮微粒增加

16. Oceanic regions of both the hemispheres lying **in the same latitude** as the desert belts are characterized by _____. (*More than one correct answer.*)

南北兩半球位在與沙漠帶同緯度的海洋區域有哪些特徵?(多選題)

a) Dry, stable conditions with little cloud.

乾燥、少雲的穩定條件

b) Hot, humid days with high winds.

炎熱、潮濕且伴有強風的日子

c) Rainy conditions.

易下雨的條件

d) A rapid increase in temperature.

溫度快速上升

e) High surface salinity.

表層鹽度高

17. Heat and gravity and geosphere dynamics. Choose all the correct statements below. (More than one correct answer.)

熱、重力與地圈動力學，下列敘述哪些是正確的？(多選題)

a) The energy type leading to the geosphere dynamics is only heat.

導致地圈動力學的能量種類僅有熱

b) The energy type leading to the geosphere dynamics is only potential energy.

導致地圈動力學的能量種類僅有位能

c) The energy type leading to the geosphere dynamics includes both heat and potential energy (linked with “gravity”).

導致地圈動力學的能量種類包括熱與位能（與重力有關）

d) The density differences between the various zones of the lithosphere are only due to differences in chemical and mineral composition.

岩石圈中不同區帶的密度不同，其原因僅僅是因為它們的化學及礦物組成不同

e) The density differences between the various zones of the lithosphere are only due to temperature differences and their cooling over time.

岩石圈中不同區帶的密度不同，其原因僅僅是因為它們溫度的不同，以及它們隨著時間的冷卻現象

f) The density differences between the various zones of the lithosphere are due to differences in chemical and mineral composition AND their cooling over time due to heat exchange.

岩石圈中不同區帶的密度不同，其原因是因為它們的化學及礦物組成不同，以及它們因為熱交換導致隨著時間的冷卻現象

18. Geothermal energy and its uses.地熱能和它的利用

Temperature increases gradually as depth increases in the lithosphere. (*More than one correct answer.*)

岩石圈中隨著深度的增加溫度亦逐漸增加（多選題）

- a) The geothermal gradient is the same at all points of the lithosphere.
岩石圈中所有地點的地溫梯度都一樣
- b) The geothermal gradient is steeper/higher in areas where extension thinned the lithosphere.
岩石圈中伸張變薄處的地溫梯度較陡/高
- c) The geothermal gradient is steeper/higher in continental areas where the crust is thick.
岩石圈中大陸地區地殼較厚處的地溫梯度較陡/高
- d) The geothermal gradient is steeper/higher in areas of intense volcanism.
在火山密集地區的地溫梯度較陡/高

19. Which of the statements below correctly describe the origin of the Earth's heat? (*More than one correct answer.*) 下列有關地球原始熱源的敘述哪些是正確的? (多選題)

- a) The Earth formed by accretion of planetesimals that collided with the growing Earth by converting their kinetic energy into heat.
地球透過吸收微行星撞擊而逐漸擴大，並將其動能轉換成熱能
- b) The Earth formed by fragments pulled from an original Sun and gave initially a hot planet.
地球為從原始太陽分裂出來的碎片所形成，所以形成之初就是一顆高溫的行星
- c) The solidification of the liquid outer core into an inner solid core generated some of the heat.
液態外地核固化成內地核所釋放的熱
- d) The heat emission from the hot inner core lead to the melting of the outer core area.
高溫的內地核釋放出的熱，融化了外地核

20. Which of the statements below correctly describe the temperature of the planets of the solar system ? (*More than one correct answer.*)

下列有關太陽系中行星溫度的敘述哪些是正確的? (多選題)

- a) The temperature of the Earth remains fairly constant; the heat output by radioactivity compensates the loss of heat.
地球的溫度常保恆溫，放射性活動所釋放的熱與熱損失相當
- b) The Earth gradually cools.
地球逐漸冷卻
- c) The cooling of the Earth caused the transition from liquid to solid, to form the first crust 4 billion years ago.

地球的冷卻導致地球從液態轉變成固態，在 40 億年前形成第一個地殼

- d) All the planets of the solar system loose heat.

太陽系中的全部行星都在散熱

21. When a person on the Earth witnesses a solar eclipse, an astronaut standing on the night side of the moon will _____ (*only one answer*).

當地球上的人可以看見日食的時候，此時若恰巧有一位太空人在月球的暗面（不受日光處）會看到什麼現象？（單選題）

- (a) also witness the solar eclipse 也會看見日食
- (b) witness no eclipse 看不到任何食的現象
- (c) witness an Earth eclipse 看見地球被食
- (d) witness a lunar eclipse 看見月食

22. The planet Mercury rotates around its axis every ~sixty days and orbits around the Sun every ~90 days. How many “Mercury days” (from sunrise to the next sunrise) make a “Mercury year”? (*only one answer*).

水星以大約 60 天的週期自轉，同時以約 90 天的週期繞行太陽。請問每個「水星年」相當於幾個「水星日」？（單選）

- (a) 0.5
- (b) 6
- (c) 9
- (d) 15
- (e) 30

23. At any given instant of time, the difference between the temperatures of the hottest and coolest places on the surface a planet in the Solar System is the highest _____ (*only one answer*)

不論在什麼時間來看，太陽系裡單一行星表面最高溫與最低溫的溫差最大的是哪個行星？為什麼？（單選題）

- (a) on the Earth because of the presence of hot deserts and polar ice
地球。因為地表上同時存在高溫的沙漠與南北極的冰
- (b) on Uranus, because its rotational axis is almost perpendicular to its orbit
天王星。因為它的自轉軸幾乎垂直於它的公轉軌道面
- (c) on Venus, because it has a carbon dioxide rich atmosphere
金星。因為它有一個富含二氧化碳的大氣

- (d) on Mercury because mostly the same side faces the Sun for a longer duration and it has no atmosphere

水星。因為它以單一面長期面對太陽而且它沒有大氣

24. Although Mercury is the smallest planet in the Solar System, its density (5400 kg/m^3) is close to that of the Earth (5500 kg/m^3), and has a weak magnetic field. The possible reason could be that _____ (*only one answer*)

雖然水星是太陽系裡最小的行星，它的密度（ 5400 kg/m^3 ）卻非常接近地球的密度（ 5500 kg/m^3 ），而且它的磁場非常微弱。最可能的原因是（單選題）

- (a) Its chemical composition is identical to that of the Earth
它的組成成份跟地球完全相同
- (b) Like the Earth, it has an iron core.
就和地球一樣，它擁有一個鐵核
- (c) Like the Earth, it has an ionosphere ; this causes a weak magnetic field.
就和地球一樣，它擁有電離層，造成它微弱的磁場
- (d) Its core has a chemical composition similar to that of the Sun, which has a core density of about 20000 kg/m^3
它的核心化學組成和太陽類似，而日核的密度高達 20000 kg/m^3

25. Although Venus is farther away from the Sun than Mercury, the average surface temperature of Venus is higher than that of Mercury because _____ (*several possible answers*)

雖然金星距離太陽比水星來的遠，它的表面平均溫度卻比水星的表面均溫來的高，這是因為（多選題）

- (a) Mercury has no atmosphere
水星沒有大氣
- (b) Venus has a carbon dioxide rich atmosphere
金星有個富含二氧化碳的大氣
- (c) Mercury has an atmosphere made of inert gases
水星有個由惰性氣體（inert gas）組成的大氣
- (d) Venus has sulphuric acid clouds
金星具有由硫酸組成的雲層

26. The atmosphere of Venus is much denser than that of the Earth. Some possible consequences are _____ (*several possible answers*) :

金星表面的大氣要比地球的大氣濃密得多，這個事實可能造成下列的哪些結果（多選題）

- (a) meteoroids less than 1.5 km in diameter completely burn out before touching the surface of Venus
直徑小於 1.5 公里的流星體在到達金星表面時就已經燃燒殆盡
- (b) Crater number density on Venus is much smaller than that on the Moon and Mars
金星表面的隕石坑密度遠小於月球及火星表面
- (c) Winds have lower kinetic energy per unit volume
每單位體積的風具有比較小的動能
- (d) Sound propagation speed is faster
聲音傳播的速度比較快

27. We find a large number of meteoritic impact craters on the Moon, but very few on the Earth.
Why? (*only one answer*)

我們在月球表面可以看到大量的隕石坑，在地球表面上的隕石坑數量卻不多。為什麼？（單選題）

- (a) Earth's magnetic field prevents most meteoroids from falling on the Earth.
因為地球的磁場阻絕了大部分落向地球的流星體
- (b) The reducing Earth's early atmosphere weathered all the meteoritic impact crater records.
因為地球早期的還原性大氣侵蝕掉這些隕石撞擊記錄
- (c) About 70% of the Earth is covered by oceans.
因為地表大約 70%是由海洋組成
- (d) The Moon has no atmosphere and hydrological cycle.
因為月球表面沒有大氣及水文循環

28. Which of the atmospheric components below **mainly controls** the Earth's weather (*only one answer*)? 下列地球大氣中的哪項成份主宰了地球的氣候（單選題）

- (a) Oxygen, which is liberated by plants during photosynthesis. It absorbs UV radiation in the stratosphere, thus heating the atmosphere.
來自植物光合作用的氧氣。它吸收了來自陽光的紫外線，因此造成大氣溫度上升
- (b) Nitrogen, because it combines with oxygen to form NO during thunderstorms.
氮氣。因為它會在雷雨時與氧氣結合成氮氧化物
- (c) Water vapor, because it evaporates from the oceans and condenses in the atmosphere transferring latent heat.
水蒸汽。因為它從海洋表面蒸發，而在大氣中凝結，並藉此傳導潛熱
- (d) Carbon dioxide, which is a greenhouse gas.
二氧化碳。因為它是溫室效應氣體

29. The rotation periods of Jovian planets (Jupiter to Neptune) range between 9 to 17 hours. They all have atmospheres made of hydrogen, helium, methane and ammonia. What could be a major consequence of fast rotation ? (*Only one answer*)

類木行星（木星至海王星）的自轉週期從 9 到 17 個小時不等。它們也都擁有由氫、氦、甲烷、以及氨所形成的大氣。這個快速的自轉可能導致下列的哪項主要的結果（單選題）

- (a) large differences in surface temperatures
表面溫度的巨大差異
- (b) absence of storms
沒有風暴
- (c) very strong winds
非常強的風
- (d) very low albedo
非常低的反照率

30. When a comet is far away from the Sun, we observe it to be a small spherical object through a telescope, but when it comes near the Earth, its appearance is with a coma and long tails. Which of the following statements are true ? (*several possible answers*)

一個距離太陽還十分遙遠的彗星，即使在望遠鏡裡看起來也還是個小圓點；但是當它靠近地球時，它卻顯現出彗髮和長長的彗尾。下列敘述何者正確？（多選題）

- (a) Gravitational force of the sun increases when the comet comes nearer and it stretches the comet
當彗星接近太陽時，太陽對它的重力變大，而將彗星拉長了
- (b) Invisible dark matter around the Sun smears the comet into a longer shape
太陽四周不可見的暗物質將彗星抹成長條形
- (c) Volatile matter in the comet starts sublimating ; solar radiation pressure and wind cause the tails to form.
彗星內的揮發物開始昇華；而太陽輻射壓力與太陽風形成了彗尾
- (d) The statement (c) is evidenced by the fact that the comet's tail always points away from the Sun
選項(c)可由彗尾永遠背對太陽得到證明