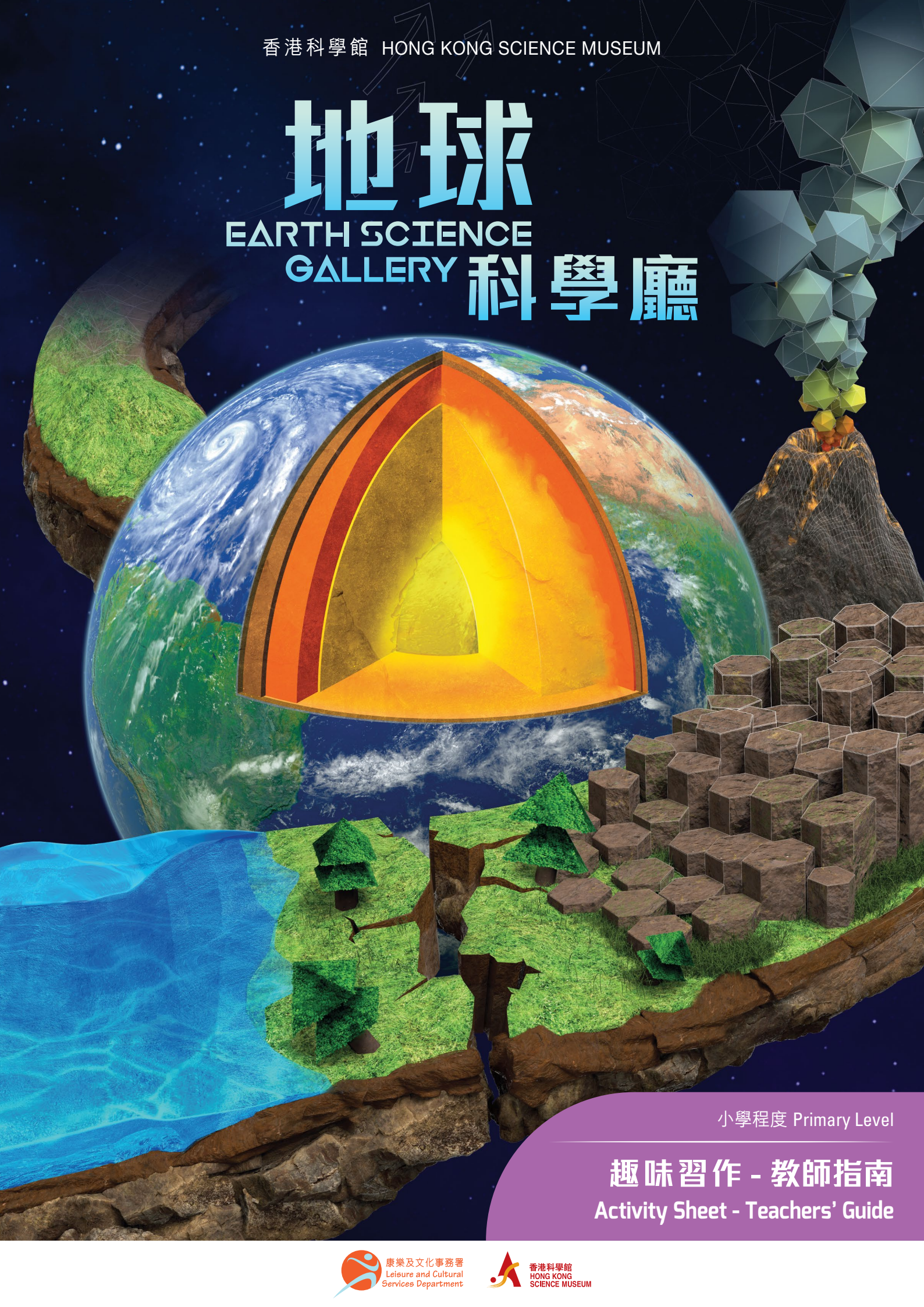


香港科學館 HONG KONG SCIENCE MUSEUM

地球

EARTH SCIENCE
GALLERY 科學廳



小學程度 Primary Level

趣味習作 - 教師指南
Activity Sheet - Teachers' Guide

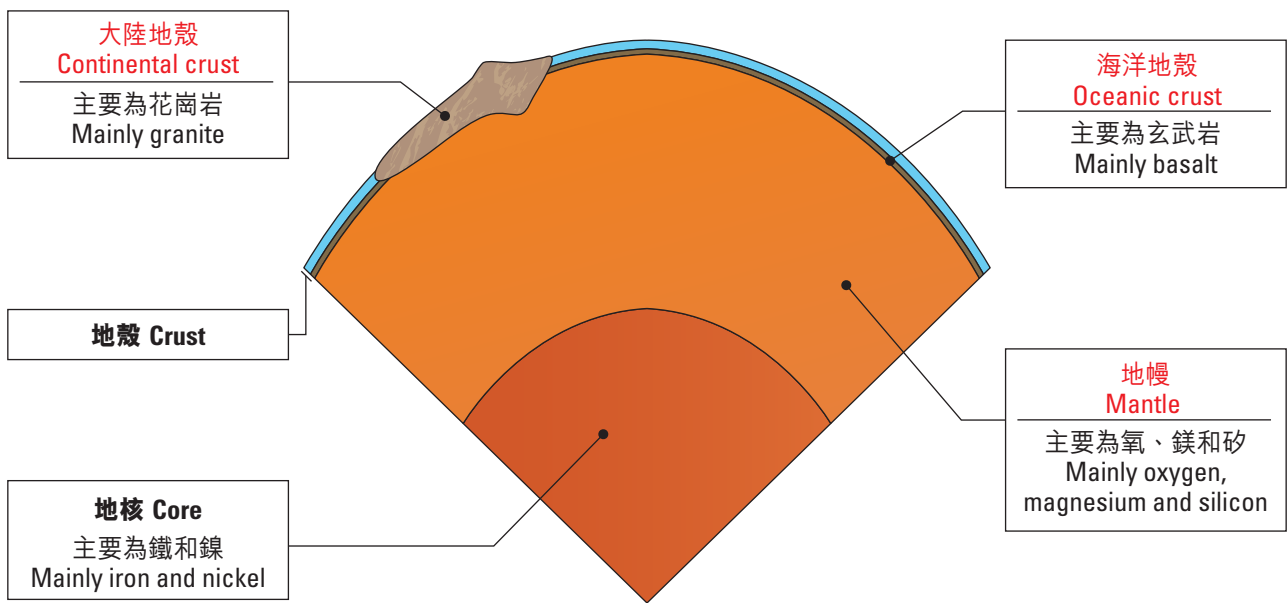
解構地球

UNEARTH OUR PLANET

地球的分層結構 Layered Earth

我們在地球外圍的地殼生活。如果將地球好像西瓜般剖開，你知道地殼之下有着甚麼結構嗎？

We live on the outer surface of Earth which is called the crust. Imagine if you were to cut open Earth like a watermelon, what would you find beneath the crust?



美味的地球 Yummy Earth

你能想到其他與地球層狀結構相似的食物嗎？試在方框內畫出這種食物並解釋它與地球的相似之處。

Can you think of another example of food that also has an Earth-like structure? Draw it in the space below and explain their similarities.

變動不息的地球

THE RESTLESS EARTH

板塊構造 Plate Tectonics

地球的最外層分裂成多塊板塊。根據你的地理常識，你能認出當中的七塊主要板塊的位置嗎？

The outermost surface of Earth is broken into pieces of tectonic plates. Based on your geological knowledge, can you identify the whereabouts of the seven major tectonic plates?

A 非洲板塊
African Plate

B 南極洲板塊
Antarctic Plate

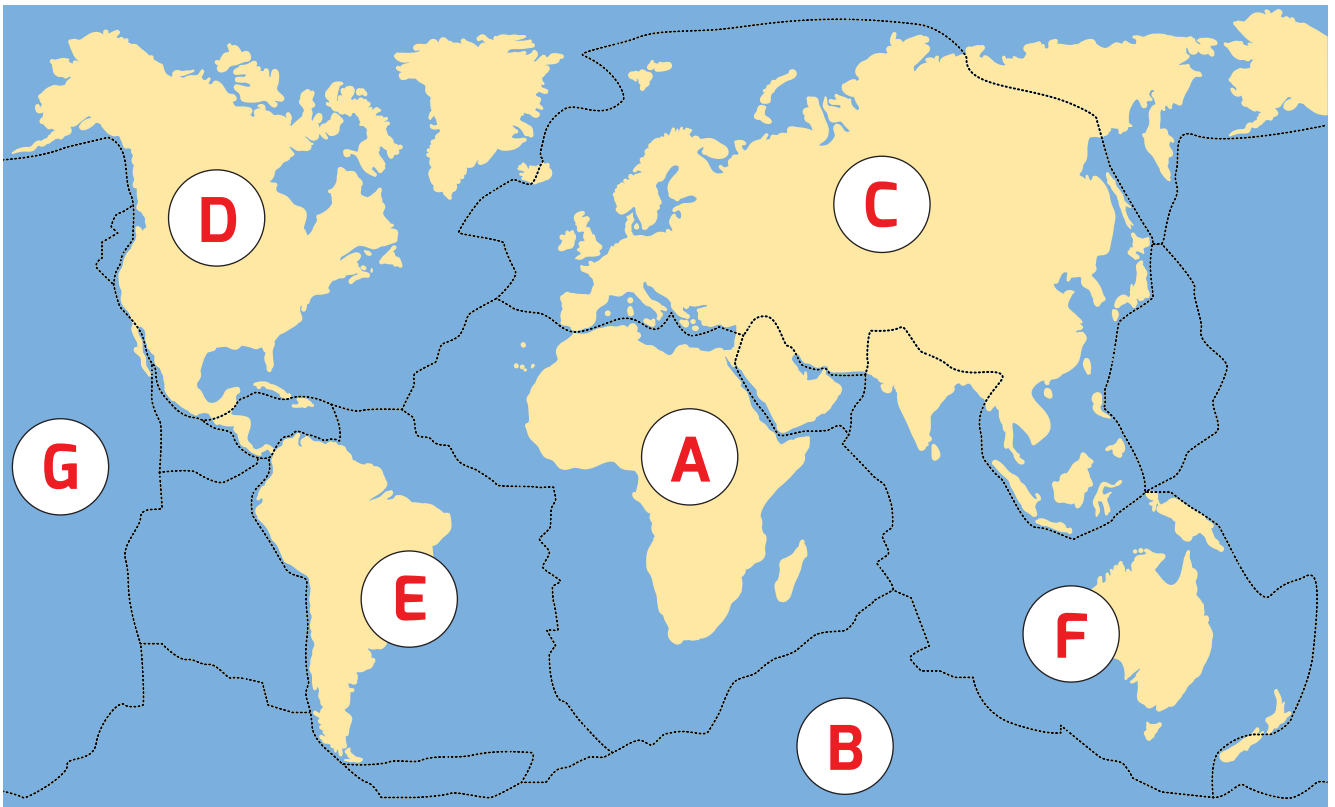
C 歐亞板塊
Eurasian Plate

D 北美洲板塊
North American Plate

E 南美洲板塊
South American Plate

F 印澳板塊
Indo-Australian Plate

G 太平洋板塊
Pacific Plate



移動中的大陸 Continents on the Move

各個大陸的位置一直在改變。約在三億年前，所有陸塊都是相連的。你能完成「大陸移動之旅」嗎？
The positions of the continents are always changing. Around 300 million years ago, all landmasses were connected. Can you complete the journey of the continents?



約在三億年前 Around 300 million years ago

地球上只有一片廣闊的超級大陸，稱為 盤古大陸。

All landmasses existed as a single, gigantic supercontinent called Pangaea.



約二億年前 Around 200 million years ago

板塊移動導致超級大陸開始分裂。

Plate tectonics drove the supercontinent to split.

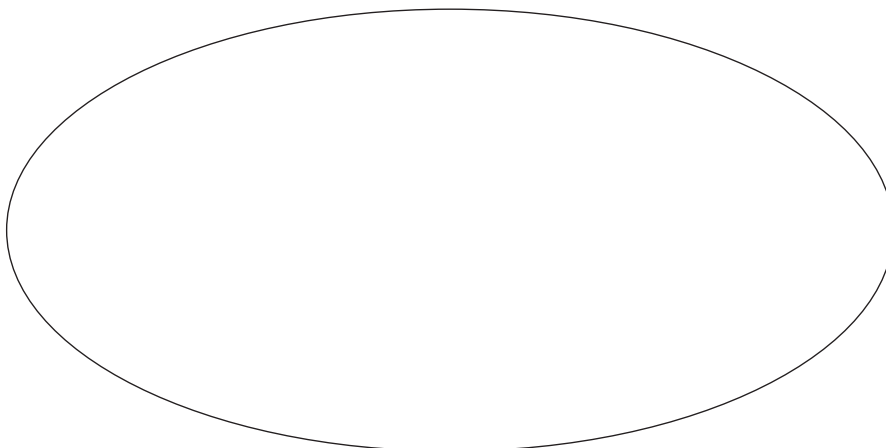


現在 Now

板塊運動至今仍然影響着各大洲的位置。現在的陸塊分為七大洲，依面積由大至小排列分別是：亞洲、非洲、北美洲、南美洲、南極洲、歐洲和澳洲。

Plate motion continues. Today the landmasses on Earth are separated into seven continents. In the order of size from largest to smallest, they are Asia, Africa, North America, South America, Antarctica, Europe and Australia.

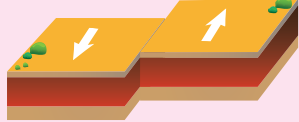
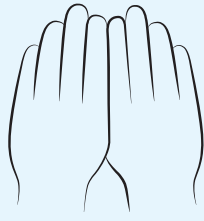
陸塊在未來可能又會再次聚合，形成另一個超級大陸。試想像並在下方畫出這個超級大陸的形狀。
All landmasses may reunite again to form a new supercontinent in the future. What would it look like? Draw your imaginary supercontinent in the space below.



板塊邊緣 Plate Boundaries

隨着板塊移動，板塊之間的相互作用產生了三種板塊邊緣：

As the tectonic plates move, the interaction between the plates creates three types of plate boundaries:

<p>種類 Types</p>	<p>聚合型板塊邊緣 Convergent plate boundary</p> 	<p>張裂型板塊邊緣 Divergent plate boundary</p> 	<p>錯動型板塊邊緣 Transform plate boundary</p> 
<p>試試看 Try it with your hands</p>	 	 	 
<p>板塊移動方向 Direction of plate movement</p>	<p>互相靠近 Towards one another</p>	<p>互相遠離 Apart from one another</p>	<p>互相擦過 Slide past one another</p>
<p>有沒有形成新地殼？ Is crust created? (✓ / ✗)</p>	<p>✗</p>	<p>✓</p>	<p>✗</p>
<p>相關的構造地貌 Related tectonic landform</p>	<p>溝槽 / 火山 (火山弧) Trenches / Volcanos (volcanic arcs)</p>	<p>山脊 (海洋中脊) / 裂谷 (Mid-ocean) Ridges / Rifts (Valley)</p>	<p>沒有重大影響 No major effect</p>

板塊運動造成的地質活動

GEOLOGICAL PROCESSES DRIVEN BY PLATE TECTONICS

火山作用 Volcanism

板塊運動令地殼底部局部熔融，產生岩漿。火山便是岩漿湧出地表的噴出口。根據火山的活躍程度，科學家將它們分成三類，試把火山和它們的例子配對。

Tectonic movements can result in partial melting of the lower crust, forming magma. Volcanoes are openings where the magma escapes to the surface. Scientists classify volcanoes into three different types according to the type of volcanic activity. Match the volcano types with their examples.

預期不會再次爆發
Not expected to erupt again

過去一萬年
最少爆發過一次
At least one eruption in the past 10,000 years

過去一萬年未曾爆發過，
但有機會再次爆發
No eruptions in the past 10,000 years, but expected to erupt again

活火山
Active volcano

睡火山
Dormant volcano

死火山
Extinct volcano



日本富士山
Mount Fuji, Japan



香港糧船灣超級火山
High Island Supervolcano, Hong Kong

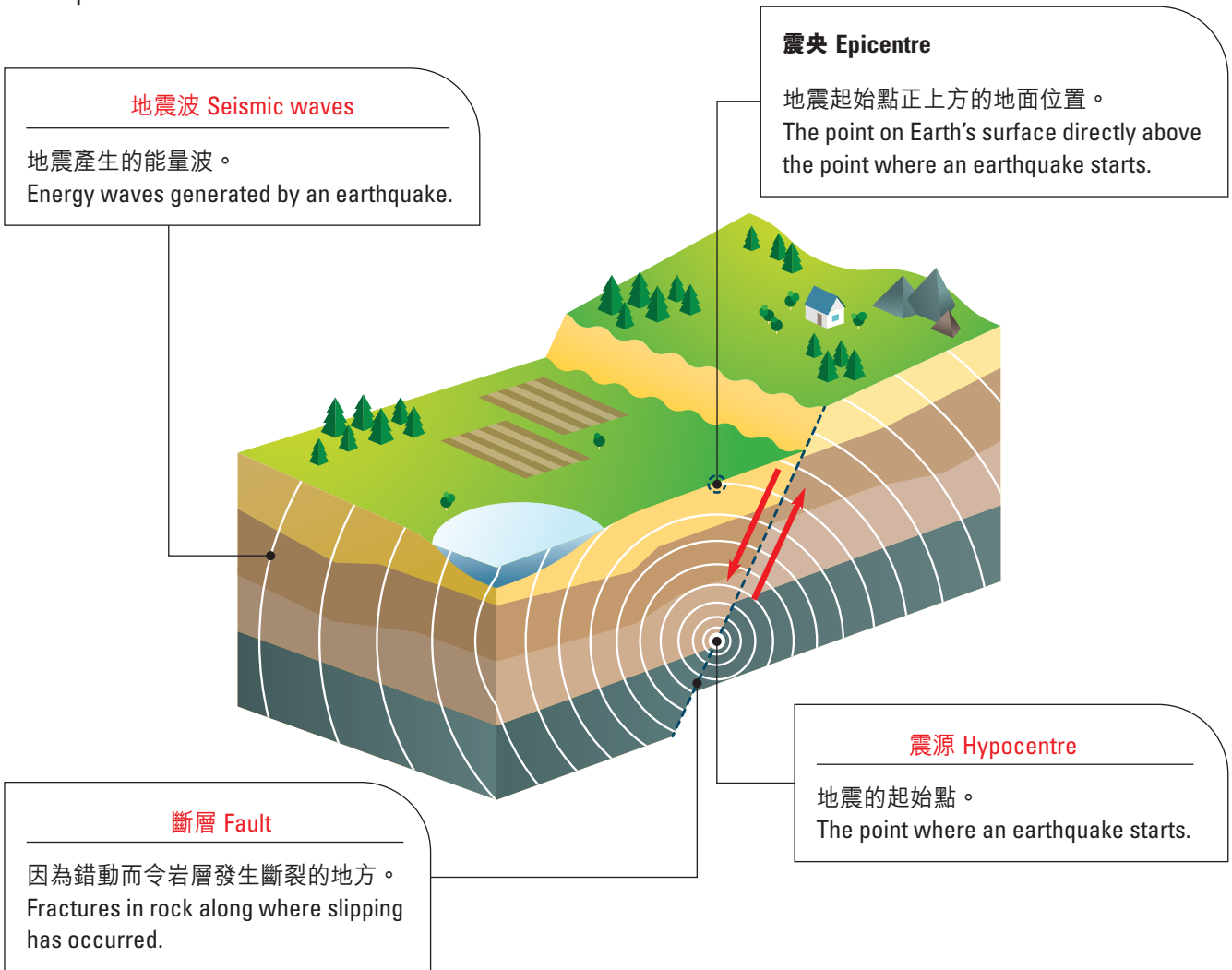


夏威夷冒納羅亞火山
Mauna Loa, Hawaii

地震 Earthquakes

板塊就像一塊巨大的拼圖互相緊鎖着。隨着板塊持續移動，相鄰板塊之間不停積聚壓力，直至岩石無法承受而斷裂，引發地震。

Tectonic plates interlock like a massive jigsaw. The non-stop plate movement causes pressure to build up between adjacent plates until eventually the rocks cannot withstand and break, resulting in earthquakes.



與展品互動 Interact with Exhibit

「環太平洋火山帶」是太平洋板塊與多塊板塊（包括印澳、北美洲和菲律賓板塊等）的交匯處，它是世界上地震和火山活動最頻密的地帶！

參觀展廳內的展品：**板塊地圖**。你能找到在太平洋周邊一個馬蹄形的地震、火山活躍帶嗎？

The "Ring of Fire" is the belt where the Pacific Plate meets many surrounding tectonic plates, such as the Indo-Australian, North American and Philippine Plates. It is the most seismically and volcanically active zone in the world!

Visit our exhibit: **Boundary Map**. Can you find a horseshoe-shaped seismically and volcanically active belt around the edges of the Pacific Ocean?

熱帶氣旋 Tropical Cyclones

6

個熱帶氣旋形成的基本因素：
basic factors of tropical cyclone formation:

低壓區、合適的緯度、充足水汽、溫暖海面、偏弱垂直風切變、高空輻散

Low pressure area, suitable latitude, sufficient moisture, warm sea surface temperature, weak vertical wind shear, upper level divergence of ascending air

6

種熱帶氣旋的分類：
categories of tropical cyclone:

類別 Classification	接近風暴中心的 10 分鐘最高平均風力 (公里/小時) Max. 10-min mean wind speed near the centre (km/h)
熱帶低氣壓 Tropical Depression	41-62
熱帶風暴 Tropical Storm	63-87
強烈熱帶風暴 Severe Tropical Storm	88-117
颱風 Typhoon	118-149
強颱風 Severe Typhoon	150-184
超強颱風 Super Typhoon	185 或以上 or above

熱帶氣旋為我們帶來甚麼影響？你又會作出甚麼防風措施？

What are the impacts of tropical cyclones? How would you prepare for a typhoon?

熱帶氣旋會帶來狂風暴雨，而它帶來的湧浪及風暴潮會引致沿海地區水浸。

防風措施：鎖緊門窗、切勿外出、遠離岸邊等。

Tropical cyclones can bring heavy rain and strong winds while the swell and storm surge brought by the cyclone can cause coastal flooding. Precautions: securely lock all windows and doors, do not go outside, stay away from the shoreline, etc.

香港地質知多少 HK Geo-quiz

1. 香港最古老的岩石在 _____ 形成，這些岩石主要出現在赤門海峽北岸和馬鞍山。
The oldest rocks in Hong Kong were formed in the _____ and can be found on the northern shore of the Tolo Channel and at Ma On Shan.

A. 寒武紀 Cambrian period

B. 泥盆紀 Devonian period

C. 石炭紀 Carboniferous period

2. 連串的火山活動發生在侏羅紀中期和白堊紀早期，跨越約 2500 萬年。_____ 的超級火山爆發標示香港地區中生代火山活動的終結。

A series of volcanic activity occurred during the Middle Jurassic and Early Cretaceous periods, a timespan of about 25 million years. The _____ supereruption marked the end of Mesozoic volcanism in the Hong Kong region.

A. 糧船灣 High Island

B. 淺水灣 Repulse Bay

C. 大嶼山 Lantau Island

3. _____ 組是香港最年輕的岩層。
The _____ formation is the youngest rock formation in Hong Kong.

A. 赤洲 Port Island

B. 八仙嶺 Pat Sin Leng

C. 平洲 Ping Chau



香港的六角柱石群 Hexagonal Rock Columns in Hong Kong

香港擁有豐富的地質結構和岩石種類。於一億四千萬年前爆發的糧船灣超級火山更形成了舉世知名的六角柱石柱群。石柱群在西貢萬宜水庫東壩、果洲群島和西貢東部均可看到，它們組成了香港地質公園的核心部分。

Hong Kong has a rich diversity of geological structures and rock types. The eruption of the High Island Supervolcano 140 million years ago gave rise to the world-class hexagonal rock columns we see today. These columns can be seen at the High Island East Dam, on the Ninepin Islands, and across much of east Sai Kung. They are the centrepiece of Hong Kong Geopark.

4. 香港有數種常見的岩石，試把岩石與它們的特徵配對。
 Several kinds of rocks are common in Hong Kong. Try to match them with their characteristics.

岩石類型 Rock type

特徵 Feature



花崗質岩石
Granitic rocks



沉積岩
Sedimentary rocks



火山岩
Volcanic rocks

- ◇ 約佔本港岩石 50 %
Making up about 50% of rocks in Hong Kong
- ◇ 屬噴出性火成岩
Belonging to extrusive rocks
- ◇ 抗蝕能力相對高，形成高山，例如大東山
Relatively resistant to erosion, forming high mountains such as Tai Tung Shan

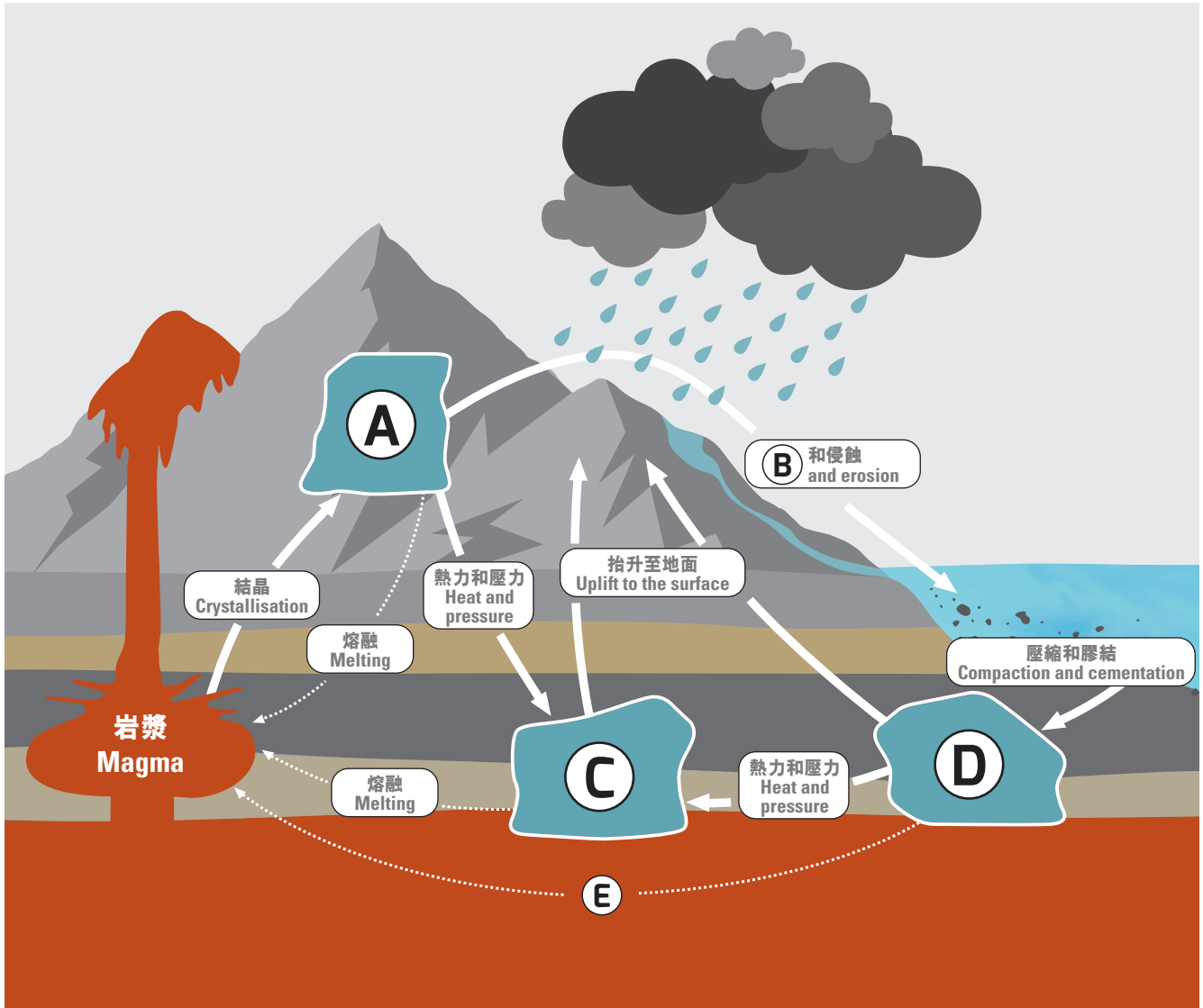
- ◇ 約佔本港岩石 35 %
Making up about 35% of rocks in Hong Kong
- ◇ 屬侵入性火成岩
Belonging to intrusive rocks
- ◇ 易受風化和侵蝕，形成較矮的山丘，例如獅子山
Vulnerable to weathering and erosion, forming relatively low hills like Lion Rock

- ◇ 約佔本港岩石 15 %
Making up about 15% of rocks in Hong Kong
- ◇ 由古老岩層風化侵蝕而形成的碎塊沉積而成
Formed by the deposition of weathered and eroded ancient rock fragments
- ◇ 常見於新界東北部，例如東平洲
Found in the northeastern New Territories, for example, Tung Ping Chau

岩石循環 Rock Cycle

經過長年累月，火成岩、變質岩和沉積岩會受地質活動影響而變成另一種岩石。請完成以下岩石循環圖。

Igneous rocks, metamorphic rocks and sedimentary rocks are transformed from one type into another through geological processes. Please complete the rock cycle diagram below.



A. 火成岩
Igneous rocks

B. 風化
Weathering

C. 變質岩
Metamorphic rocks

D. 沉積岩
Sedimentary rocks

E. 熔融
Melting

岩石偵探 Rock Detective

觀察以下岩石，並根據岩石辨別流程圖確認出它們的種類。

Study the rocks carefully and try to find out their identity based on the Rock Identification Chart below.



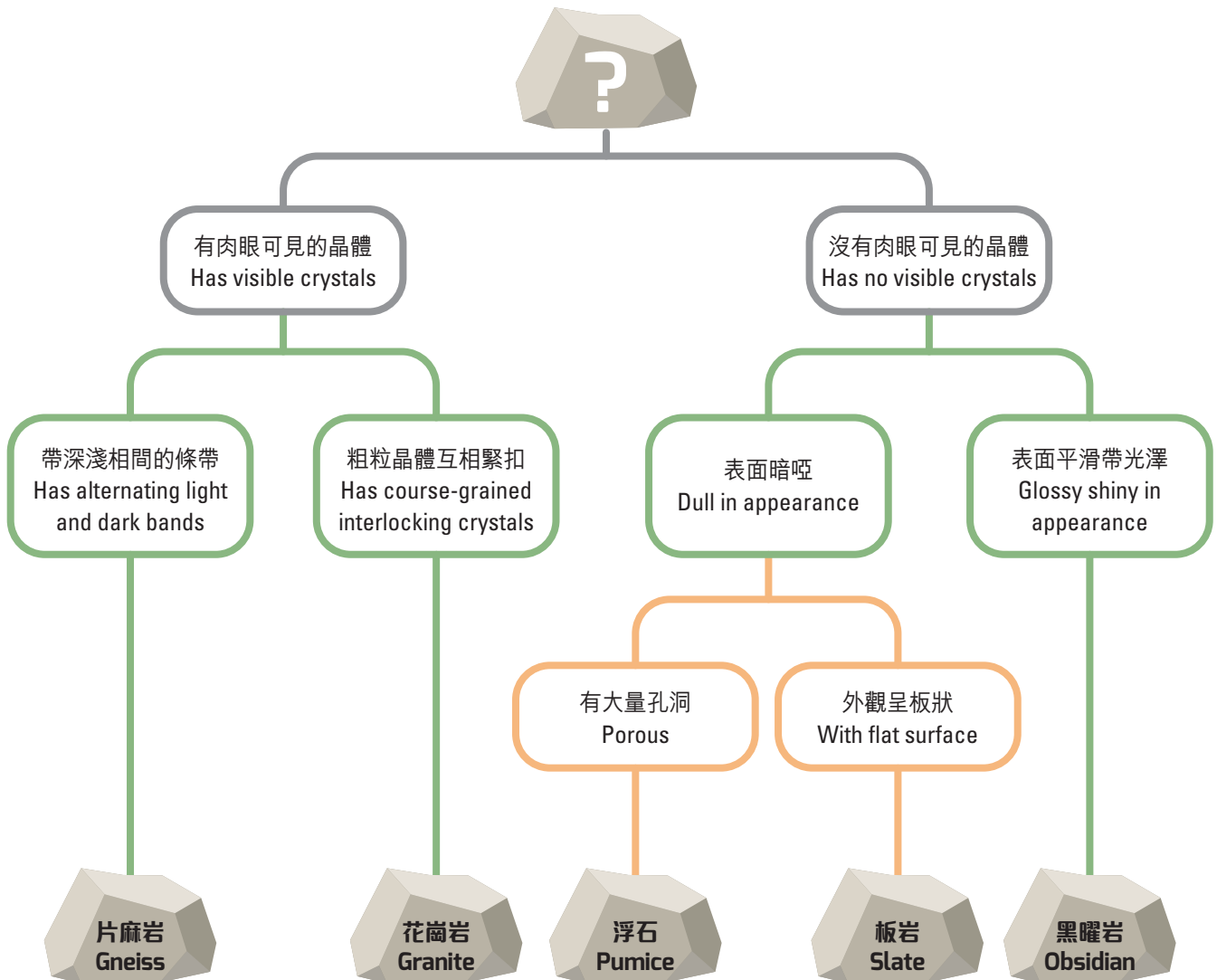
片麻岩
Gneiss



浮石
Pumice



板岩
Slate



岩石辨別流程圖
Rock Identification Chart

人類與自然的關係

HUMAN-NATURE RELATIONSHIP

人類的急速發展是否對地球造成不可逆轉的破壞？參觀完地球科學廳後，寫下你對人與自然關係的感想。

Is the rapid development of humanity causing irreversible damage to Earth? Write down your reflections on the relationship between man and nature after visiting the gallery.

