香港科學館 · 專題展覽 HONG KONG SCIENCE MUSEUM · SPECIAL EXHIBITION

中華人民共和國香港特別行政區
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20th 周年紀念 ANNIVERSARY

THE HONG KONG JOCKEY CLUB SERIES
香港賽馬會呈獻系列

永生傳說 ETERNAL LIFE

透視古埃及文明 Exploring Ancient Egypt

2.6–18.10.2017

活動習作
Activity Sheet

適合初中學生
for junior secondary school students

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聯合主辦
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同心同步 同進 RIDING HIGH TOGETHER

透視人體 — 醫學成像
A Window into the Human Body — Medical Imaging

科學家利用電腦斷層掃描研究埃及木乃伊。其實相同的技術早以廣泛應用於現代醫學上，用作診斷疾病和痛症。

Scientists use Computerised Tomography (CT) Scan to study the Egyptian mummies. The same technique is commonly and widely available in modern medicine to diagnose possible causes of illness or pain.

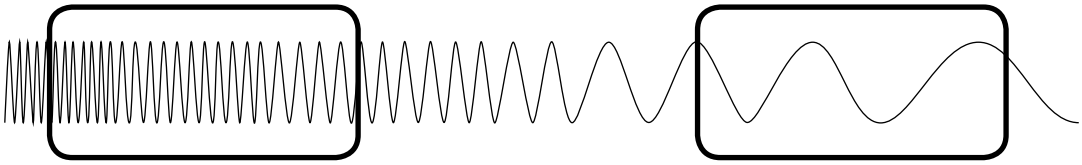
回答以下問題，看看醫學成像技術怎樣解開木乃伊和你的秘密。
Answer the following questions to see how some modern imaging techniques can help unlock mummies', as well as your secrets.

I) 電腦斷層掃描利用 X 射線來生成身體的影像。你認為在下圖的電磁波譜中，哪部分屬於 X 射線？

答案：_____

CT Scan uses X-rays to generate images of the body. Which part of the electromagnetic spectrum shown below refers to X-rays?

Answer: _____



A 短波長
Short wavelength

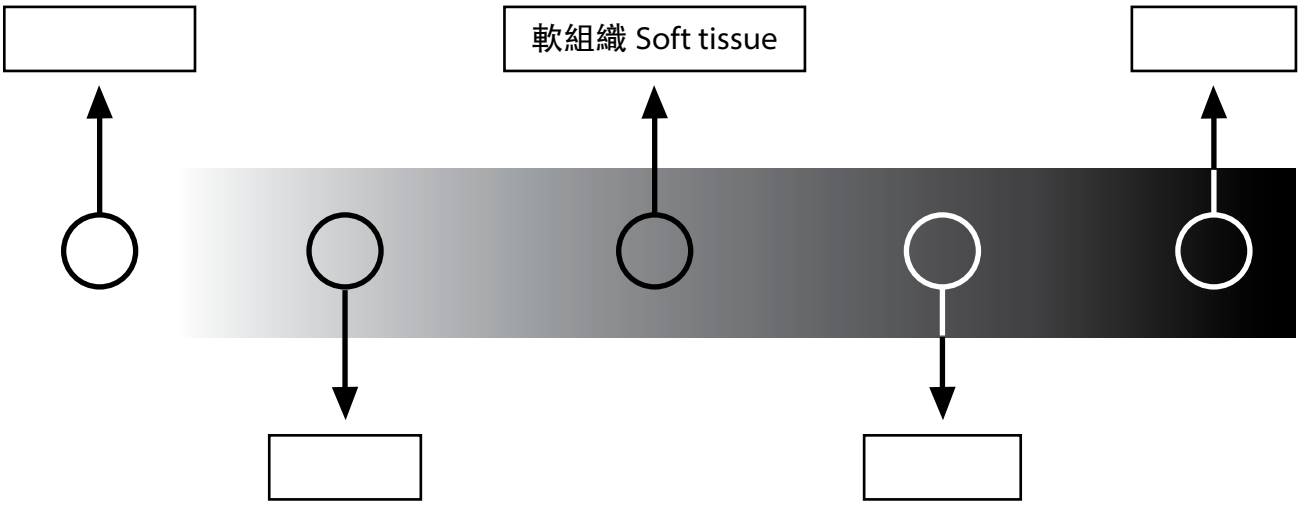
B 長波長
Long wavelength

II) X 射線是高頻率的電磁波，能夠輕易穿透低密度的物質，卻不能通過高密度的物質。你認為下列哪個身體部分可以明顯地阻擋 X 射線穿過呢？試把它（們）圈出來。

X-rays are beams of high frequency electromagnetic wave that can easily pass through low density materials but not through high density ones. Circle the body part(s) that can significantly block X-rays.

III) 不同的組織 / 物質（例如脂肪、骨、軟組織、金屬和氣體）因為擁有不同的密度，在 X 射線照片（X 光片）上會形成不同顏色或灰度的影像。低密度的物質會呈現黑色，而密度非常高的物質則呈現白色。在空格內填上會呈現該顏色的組織 / 物質。

Different types of tissues/ matters (e.g. fat, bone, soft tissue, metal and gas) with different densities show up as a radiography picture in different colours or shades of grey. Low density matter appears black while very dense matter appears white. In the boxes below, name the tissues/ matters that appear in those colours.



細心看看展覽內木乃伊的 X 射線影像，有沒有留意到一些不同形狀的亮白物件呢？知道它們是甚麼嗎？猜猜它們是由甚麼物料造成吧？

Take a closer look at the radiographies of the mummies in the exhibition. Do you recognise some bright white objects that come with different shapes? What are those objects? Can you guess what they are possibly made of?

IV) X 射線屬於高能量的輻射，長期暴露於輻射之中不單止有損健康，亦可能致癌。在進行電腦斷層掃描的地方，你認為應該貼出下例哪個警示標誌呢？試把它圈出來。

X-rays are high energy radiation that is harmful under prolonged exposure and may cause cancer. Circle the warning sign that should be on display where CT Scan is in operation.

V) 電腦斷層掃描的輻射劑量比傳統的 X 光成像高一百至一千倍。如果要檢查子宮內的胎兒，你會用電腦斷層掃描嗎？還有其他比較安全的醫學成像技術呢？

答案：_____可以用來檢查子宮內的胎兒。與電腦斷層掃描不同，這項技術不會用到輻射，而是利用人類耳朵聽不到、頻率非常高的 _____ 波。

The radiation doses of CT Scan are 100 to 1,000 times higher than conventional x-ray imaging. Can you think of another medical imaging technique that is more suitable to visualise foetus in the womb?

Answer: _____ is used to examine the foetus in the womb. Unlike CT Scan that applies radiation, the method uses very high frequency _____ waves, which the human ear cannot detect.

VI) 昔日想研究被包裹的木乃伊，將裹屍布解封是唯一的途徑，但這樣往往會破壞遺體。考古學家現在就可以採用非入侵性的技術，例如電腦斷層掃描來研究木乃伊。你還想到甚麼技術可以協助考古學家發掘更多木乃伊的秘密，而又不用破壞遺體呢？

答案：_____

In the past, the only way to learn about a mummy was by unwrapping it, which destroyed the mummies. Archaeologists can now use non-invasive technology to study mummies and CT scan is one of these new technologies. Name some other less destructive or non-invasive methods to examine a mummy.

Answer: _____

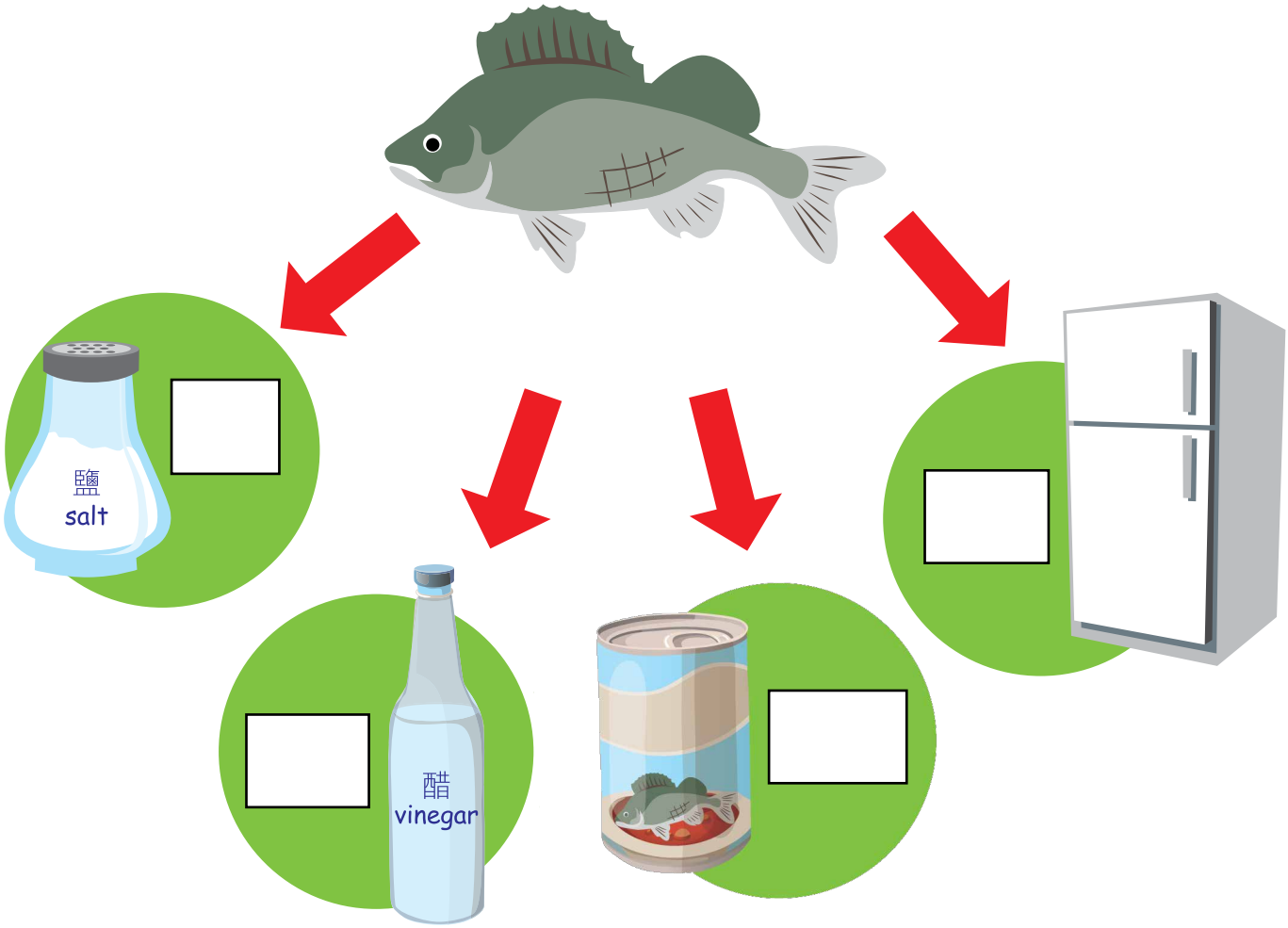
_____

防腐保鮮
Keep It Fresh

古埃及的遺體防腐師以製作木乃伊來保存遺體。他們的防腐技術精湛，以致於這些木乃伊仍然能夠保存至今。把一條沒有處理過的死魚放在桌面上，牠很快就會開始腐爛，並散發出難聞的氣味。但有賴食品科技的發展，我們現在已經可以很有效地延長食物的保質期。

Ancient Egyptian embalmers preserved dead bodies by mummification. Their techniques were so good that the mummies were preserved till today. Imagine leaving an untreated dead fish on the table. It starts to decay and smells badly. Thanks to advancement in food technology, we now have ways to extend the shelf life of foods.

I) 在圓圈內填上魚的防腐方法：
Label the food preservation techniques used to preserve the fish:



II) 哪種鹽可用作食品防腐？

答案：_____

What kinds of salt can be used for food preservation?

Answer : _____

III) 為甚麼古埃及的遺體防腐師要將遺體放在泡鹼內？

答案：_____

Why did ancient Egyptian embalmers cover the dead body with natron?

Answer: _____

IV) 除上述的食品防腐方法外，你能想到其他方法嗎？

答案：_____

Can you think of other ways for food preservation?

Answer: _____

你可以前往位於二樓的食品科學廳參觀，發掘更多食品防腐的方法。

You may visit the Food Science Gallery on the 2/F to explore various ways of food preservation.

計計數
Do the Maths

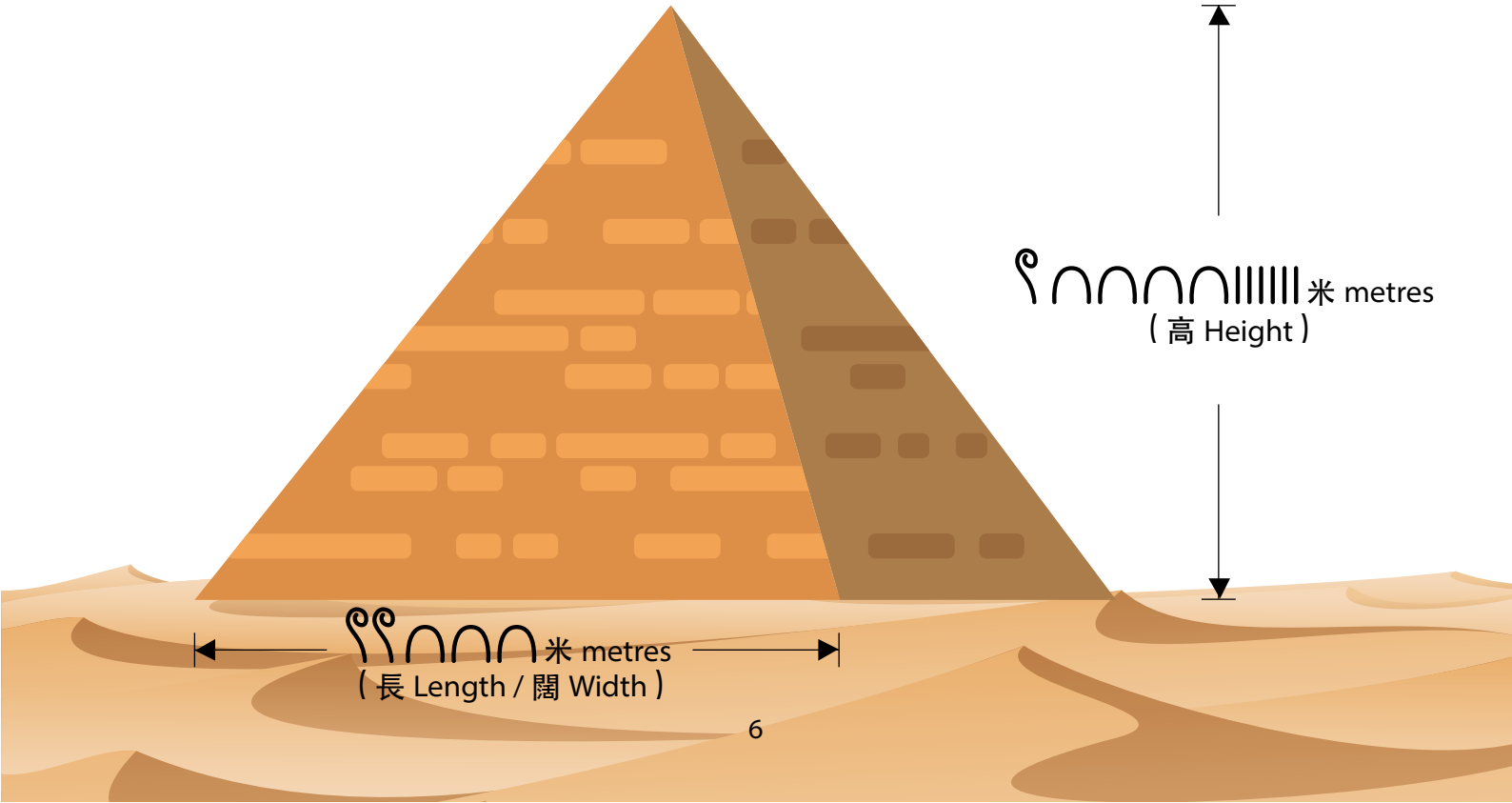
古埃及人用十進制計算，並利用符號標示數字。下面就是用來表示 1, 10, 100 和 1000 的符號：

Ancient Egyptians calculated numbers based on the decimal and they used signs to represent numbers. Shown below are the signs for 1, 10, 100 and 1000:

數字一般由左到右書寫，由數值比較大的符號開始。例如下圖是一組用來表示 3,246 這個數字的符號，最左一組表示 3000，之後就是 200, 40 和 6：

Numbers were usually written left to right, starting with the highest denominator. For example, in the number 3,246 the first number to appear on the left would be 3000, then 200, 40 and 6:

試計算出下面一個底部為正方形的金字塔的體積，尺寸已經利用埃及數學符號標示出來：
Now, try to calculate the volume of the square-based pyramid below with the indicated dimensions:



提示：金字塔的體積 = $\frac{1}{3}$ (底面積 X 高)

Tip: Volume of a pyramid = $\frac{1}{3}$ (Base area X Height)

長 / 闊 Length / Width = _____ 米 m

高 Height = _____ 米 m

金字塔的體積 Volume of the pyramid = _____

= _____立方米 m^3

以游泳池的體積來比較一下，讓你對金字塔的大小有個概念！

Do you have an idea how big the pyramid is? Let's compare the volume with that of a swimming pool!

一個標準游泳池的體積約是 2,500 立方米。

The volume of a standard swimming pool is about 2,500 m^3.

一個金字塔的體積相等於多少個游泳池的體積？ _____

The volume of the pyramid is equal to that of how many swimming pools? _____