

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



軍事天才  凱撒大帝
JULIUS CAESAR
MILITARY GENIUS & MIGHTY MACHINES

趣味習作
ACTIVITY SHEET

1. 凱撒大帝 — 誰是誰非！ JULIUS CAESAR—RIGHT OR WRONG!

我是尤利烏斯·凱撒，是古羅馬的獨裁者、大將軍、政治家、演說家。你對我的認識有多深？細閱以下敘述，請將你認為正確的填上「✓」，錯誤的填上「×」。

I am Julius Caesar, a dictator, a general, a politician and an orator of ancient Rome.

How much do you know about me?

Read the statements below. Put a tick ✓ if it is correct and × if it is incorrect.

1. 我是羅馬帝國的皇帝。
I was a king of the Roman Empire.
2. 七月的英文名稱 (July) 是為了紀念我而定的。
The month of July was named after me to recognize my contribution.
3. 我改革曆法，令四年為一閏年。
I reformed the calendar by introducing a leap year every four years.
4. 我轉用抄本，棄用卷軸。
I converted the scroll to codex, that is, the book.
5. 我曾經說過：「我來到，我看見，我征服」。
I once said, " VENI VIDI VICI ".
6. 羅馬硬幣有我的肖像。
I appeared on some Roman coins.
7. 我死於戰場。
I died in a battle.
8. 我喜愛詩歌和閱讀，更是一位作家。
I loved poems and books. I was an author too.
9. 我花了十天便在萊茵河上建好了一條橋。
I built a bridge over River Rhine in 10 days.

2. 「我來到，我看見，我征服」 "VENI VIDI VICI" I CAME, I SAW, I CONQUERED.

這句精要而聞名的說話，是我在澤拉戰役後(公元前47年)所說的。你知道這段說話出現在哪件展品上嗎？
I coined these famous words after the Zela Battle (47 BC). Do you know which exhibit displays these wordings?

我帶領羅馬士兵東征西討，為方便訂定軍用路線，製成了普丁格地圖。普丁格地圖顯示出羅馬帝國邊界擴張到最高峰時人們對世界的認識。

I led the Roman soldiers and fought around the world. I made The Tabula of Peutinger, a road map for planning. It showed the world as we knew it during the apex of the Roman expansion.



試在普丁格地圖第五段展品中，找出以下答案。

Please look for the answers at the exhibit "The Tabula of Peutinger Segment V".

1. 「條條大路通羅馬」起源於古羅馬道路系統中的羅馬市中心，亦即圖中的圓環，試指出有多少條道路由該處出發？

"All Roads lead to Rome" takes its origins from the ancient Roman road system where roads radiated from the capital of Rome. The circle on the map is the town centre of Rome.

How many roads extends from there?

2. 你知道這些圖例代表甚麼嗎？

What do these map symbols represent?









3. 「羅馬不是一天建成的」 "ROME WAS NOT BUILT IN A DAY"

我一生為土地而戰，我的軍隊精銳忠心。我的步兵兵團都經過嚴格訓練，裝備完善，聞名於世。你能列出他們的裝備嗎？

I battled all my life for land. My army was vigorous and loyal. My soldiers, "Legionaries" or foot soldiers were all well-trained and equipped. Can you name the armament that they carried?

頭盔
Helmet

護甲
Armour

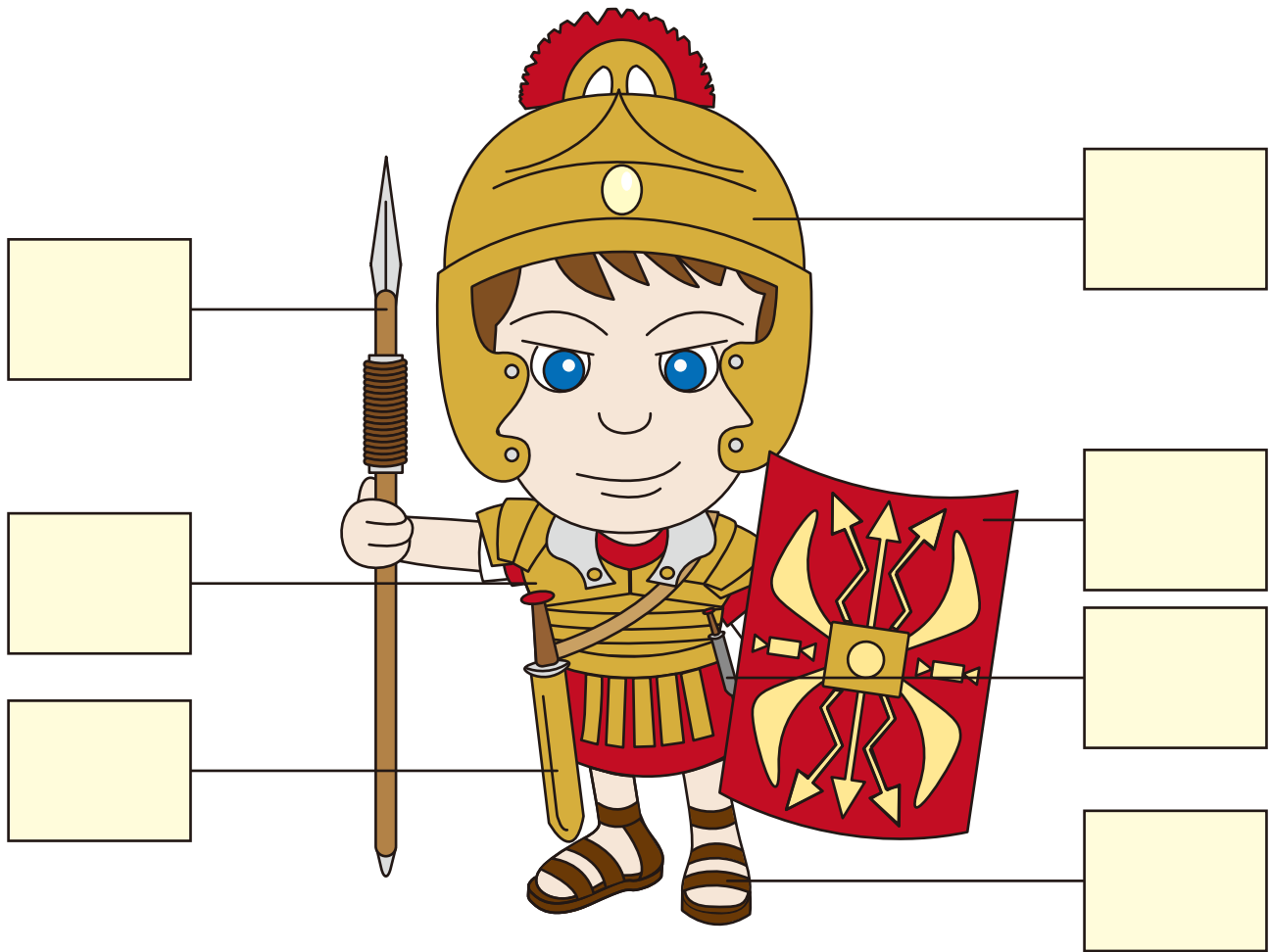
小刀
Dagger

盾
Shield

矛
Javelin

劍
Sword

涼鞋
Sandals



羅馬小知識：
Know More About Romans:



羅馬士兵會把身體靠攏在一起，將盾牌重疊形成「烏龜」陣式；這種陣式在戰鬥時可讓士兵立於不敗之地。

Roman soldiers march closely and overlap their shields in the form of a tortoise. This is called "Testudo" and is an unbeatable formation when attacking enemies.



配合強力的作戰武器，歐洲、非洲、亞洲都被納入我的帝國版圖。

你知道它們的用途嗎？請寫上何種裝置能幫助或攻克以下目標：

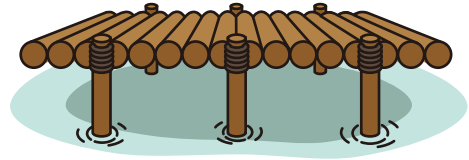
Together with the powerful battling machines, I acquired lands in Europe, Africa and Asia.

Do you know the functions of these machines?

Please identify the machines that were once used to attack the following targets:

A. 攻城鎚

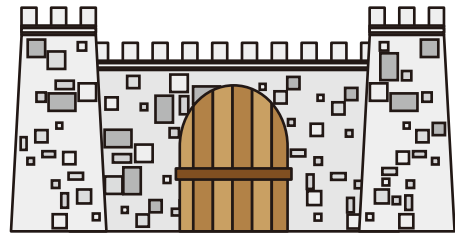
Assault ram



橋
Bridge

B. 攻城塔

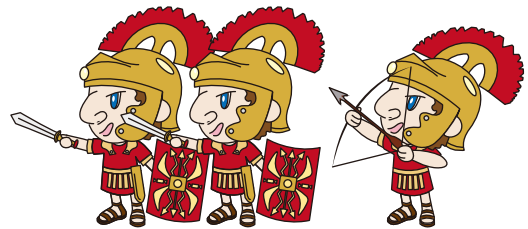
Assault tower



城門
Gate of castle

C. 投石器

Onager



敵人
Enemies

D. 打樁機

Pile driver



物理小知識：
Know More About Physics:



英文中的投石器(Onager)意思為野驢，意即發射後會向後撞。這正表現了牛頓力學的第三定律——力是成對出現的，包括作用力及伴之而來的反作用力。The name "Onager" means mule. It is because when released, the machine gives a big kick. This demonstrates the Newton's third law – Forces always occur in pairs, action and the associated reaction.



4. 條條大路通羅馬 ALL ROADS LEAD TO ROME

羅馬士兵不單是英勇的戰士，更是出色的建築師。他們在羅馬帝國內大量興建道路、競技場、水道、拱門、堡壘、雕柱和圍牆。羅馬人確實是工程與建築的大師，很多建築物(多位於地中海)至今仍屹立不倒，吸引世界各地的遊客前往參觀。羅馬人利用科學與簡單機械，建立起羅馬帝國。其實，他們常用的物理學原理包括重力、摩擦力、滑輪與繩、齒輪、位能與動能。仔細看看下方的羅馬建築和裝置，在空格上填上它們所應用的物理學原理。

Roman soldiers were not just good fighters, they were good builders too. They built famous Roman roads, colosseums, aqueducts, arches, fortresses, columns and walls around the territory. Ancient Romans were masters of engineering and architecture. Many of these structures (around the Mediterranean Sea) are still standing and attracting many visitors around the world. Romans applied science principles and used simple machines to build the Roman Empire. Physics principles commonly put into applications are gravity, friction, pulleys and rope, gears, potential and kinetic energy. Below are pictures showing the Roman constructions. Please write down the physics principles applied.

摩擦力
Friction

重力
Gravity

齒輪
Gears

滑輪與繩
Pulleys & rope

位能與動能
Potential & kinetic energy



龜甲攻城鎚
Ram in Testudo



羅馬拱門
Roman arch



陸上計程器
Land odometer



垂準儀
Groma



考卡托雷起重機
Calcatorian crane

5. 工具背後的物理學 PHYSICS BEHIND THE MACHINES

A. 位能(PE) 與 動能(KE)

Potential Energy (PE) vs. Kinetic Energy (KE)

位能是貯藏的能量形式，而動能是將其能量轉化成運動形式，兩者互相轉化，例如現今的打樁機就是利用升高的位能轉變為動能撞擊地面打造地基。

Potential energy (PE) is the stored energy of a physical system and kinetic energy (KE) is its transformation of energy as motion. PE and KE are interchangeable, such as a modern pile driver storing PE by raising the pile to a higher position and changing it to KE as the pile hits the ground.



打樁機
Pile driver

位能(PE) → 動能(KE)

相反地，動能轉變為位能的例子有：

An example of the reverse action from kinetic to potential energy is:



過山車
Roller coaster

動能(KE) → 位能(PE)

車卡從低位衝向(KE)迴旋路軌的高位(PE)

The roller coaster is rushing (KE) to a higher position of the looping orbit (PE)

現在測試一下你是否能辨別以下過程是位能變動能(PE to KE)還是動能變位能(KE to PE)：

Now test yourself to identify whether the following actions are PE to KE or KE to PE:

1. 替投石器上弦(絞緊)

Winding up the onager

2. 彈球飛離投石器

Stone flying from the onager

3. 士兵爬上攻城塔

A soldier climbing up the assault tower

4. 水從水道推動水車磨碎穀物

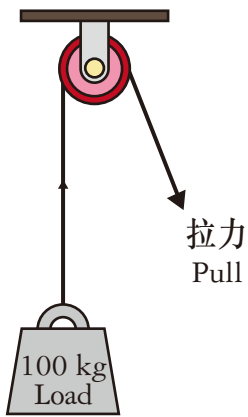
Water in the aqueduct turning water wheel to grind grains

5. 工人在考卡托雷起重機滾輪中跑動令重物提升

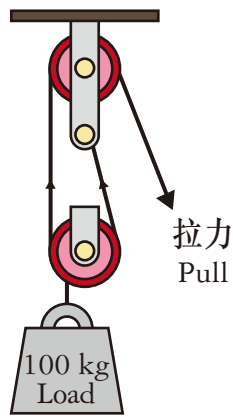
Workers running in the wheel of the Calcatonian crane to lift up heavy weights

B. 滑輪與繩

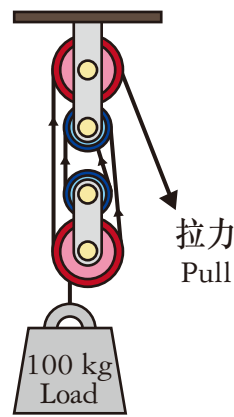
Pulleys and ropes



A



B



C

Load = 負荷
Pull = 拉力

1. 比較各種滑輪組，哪種最省力？

Compare the above three pulley systems. Which one uses the least force?

2. 為甚麼？

Why?

物理小知識：
Know More About Physics:



想不想探索一下滑輪如何運作？

不妨到展品「滑輪」感受一下吧！

Do you want to explore how pulley works?

Feel it and explore at the exhibit "Pulleys".

