

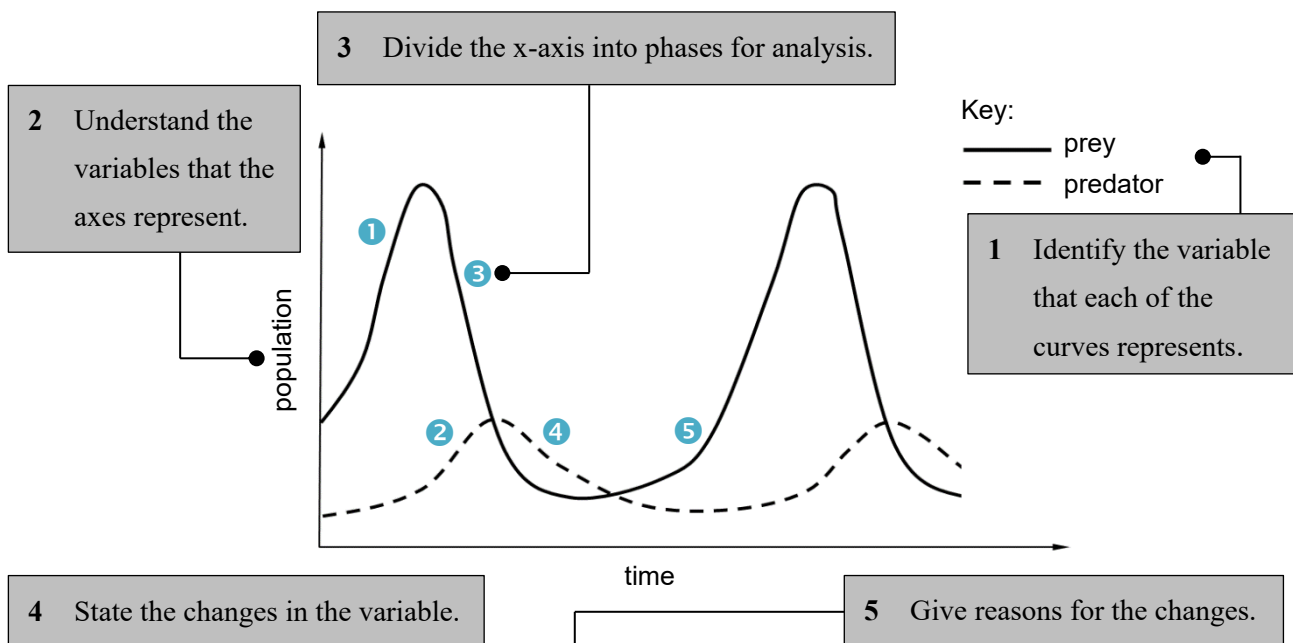
Skill building pack: Data handling

Interpreting line graphs

From the worksheet *Describing trends in line graphs*, we learnt how to use suitable words to *describe* the trend shown by a line graph. In this worksheet, we will further learn how to *make interpretations* of line graphs. The skills of interpreting a graph with two curves are discussed below.

- Identify the variable that each of the curves represents.
- Understand the variables that the **axes** represent.
- **Divide** the x-axis into **phases** to help analyse the data if applicable.
- For each curve, notice whether the variable is **increasing**, **decreasing** or **remaining constant**. Also, notice whether there is any relationship (e.g. cause-and-effect relationship) between the variables that the curves represent for the changes.
- Suggest reasons for the changes.

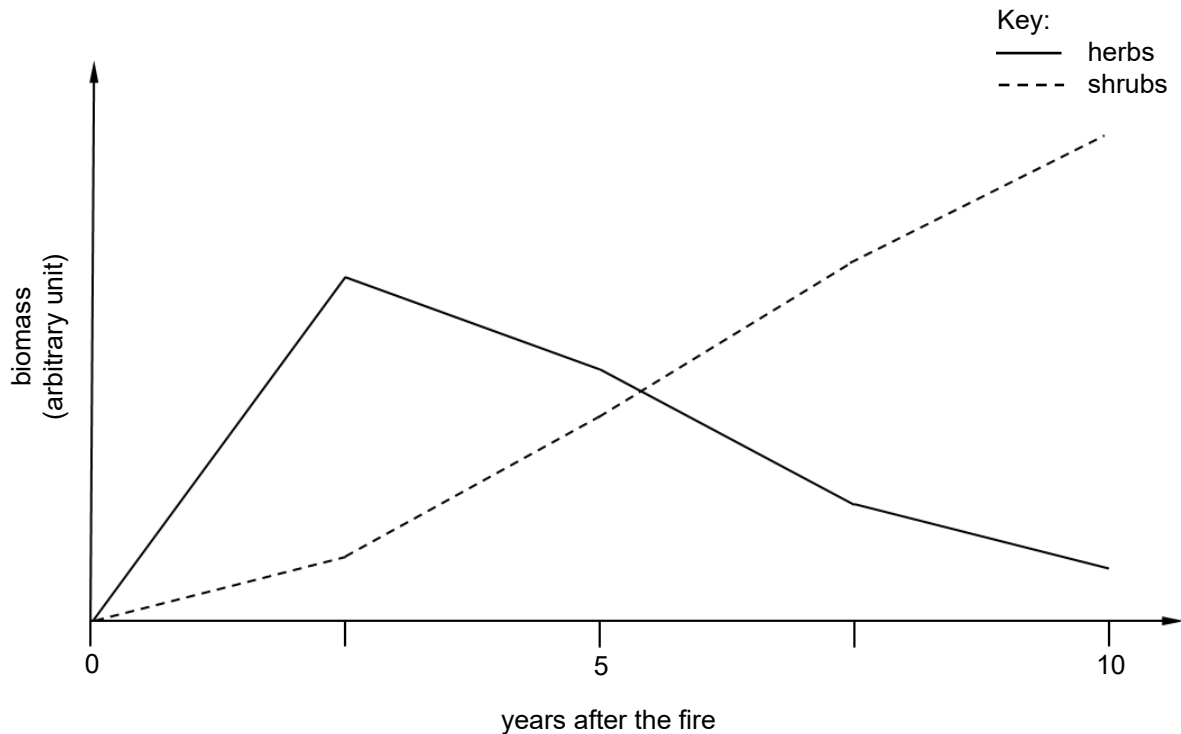
Below is an example of interpreting a line graph which illustrates a predator-prey cycle.



- 1 First, the prey population increases because it has plenty of food and breeds.
- 2 Then, the predator population increases. This is because a large number of prey means more food is available for the predator.
- 3 The prey population decreases because a large number of predator feed on it.
- 4 The predator population decreases because the food supply becomes limited.
- 5 The number of prey recovers and the cycle repeats itself.

Practice

- 1 An investigation was carried out to study a land destroyed by fire. The vegetation on this land is grouped as herbs and shrubs. The graph below shows the changes in biomass of each type of vegetation over 10 years.



Describe and explain the pattern of succession on this land.

Initially, the biomass of herbs increased because herbs started to grow in the soil.

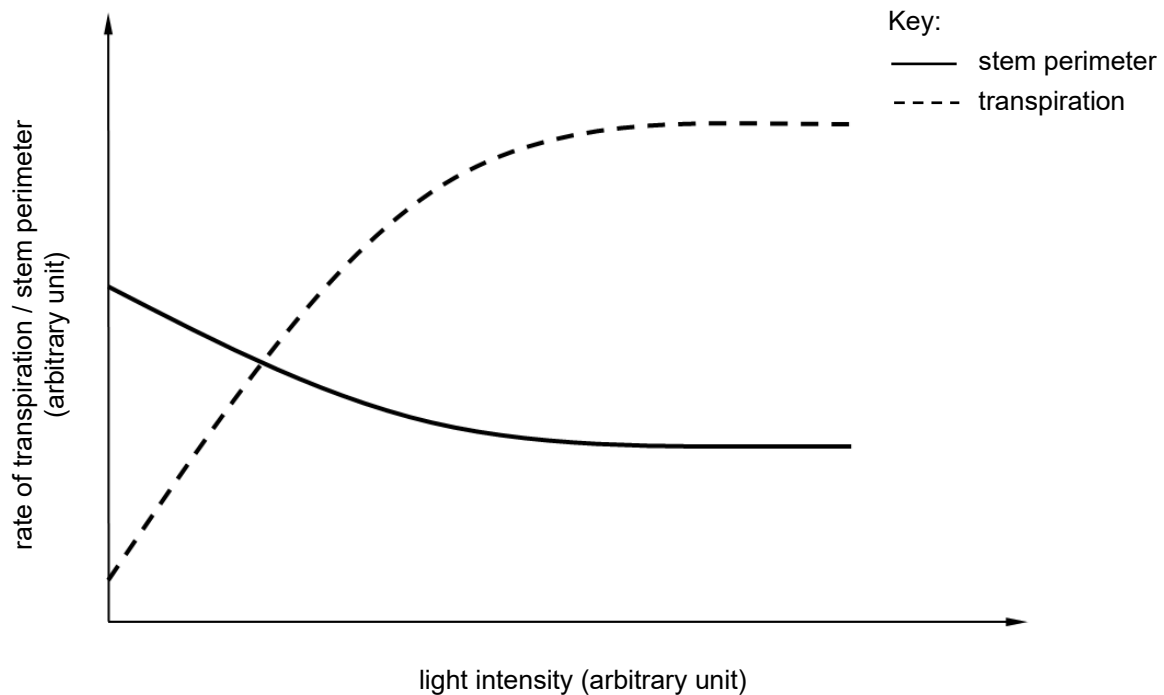
They became the dominant species due to limited competition for light availability.

The biomass of shrubs increased because the soil became thicker and thicker for their growth.

After about 2.5 years after the fire, the biomass of herbs decreased because of the increasing competition with shrubs for water and nutrients and being shaded by shrubs.

After about 6 years, the biomass of shrubs became greater than that of herbs because shrubs grew over the herbs and became the dominant species.

- 2 The graph below shows the changes in the rate of transpiration and the stem perimeter of a herbaceous plant under different light intensities.



Describe and explain the changes in the rate of transpiration and the stem perimeter of the plant under different light intensities.

Initially, the rate of transpiration of the plant increases while the stem perimeter decreases with the increase in light intensity. When the light intensity increases further, both the rate of transpiration and the stem perimeter become steady. This is because when light intensity increases, the stomata of the plant open wider and hence the rate of transpiration increases. The increased rate of transpiration results in a negative pressure in the xylem vessels, causing the stem perimeter to decrease. Up to a certain light intensity, the rate of transpiration levels off because there are some other factors limiting the rate. Therefore, the negative pressure in the xylem vessels does not increase further and the stem perimeter remains unchanged.

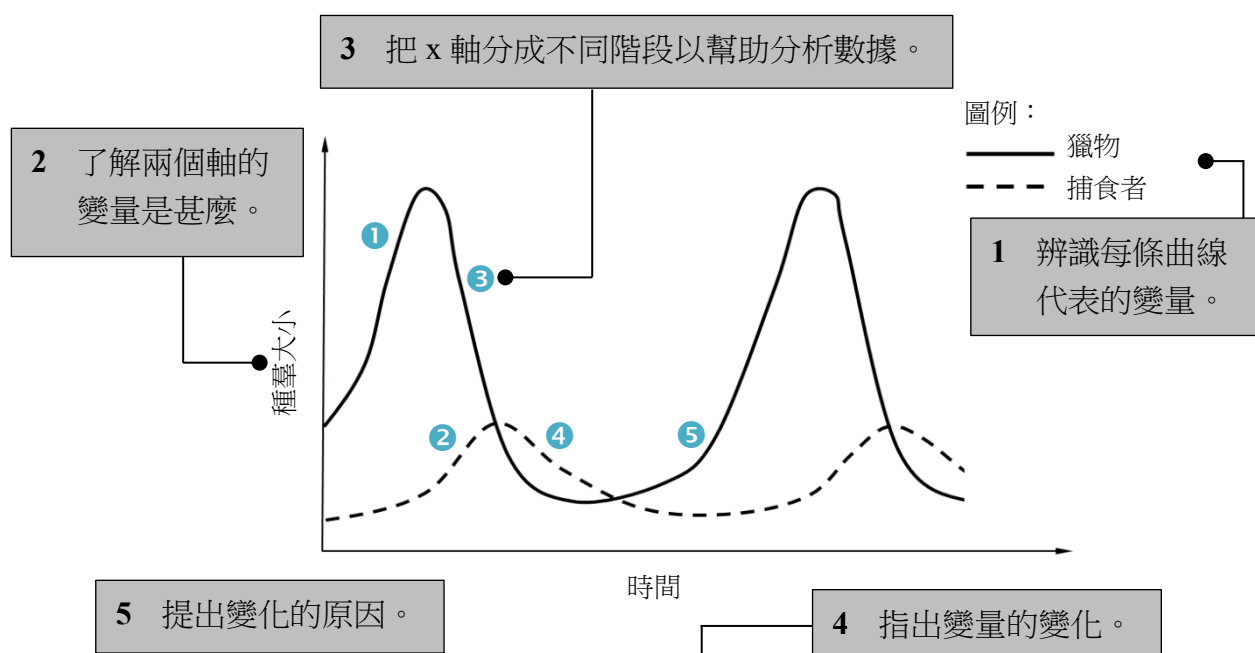
技巧提升教材：數據處理

詮釋線圖

從工作紙「描述線圖的趨勢」，我們學習到怎樣運用適當的詞語去**描述**線圖所展現的趨勢。在本工作紙，我們會進一步學習怎樣**詮釋**線圖的內容。以下介紹畫有兩條曲線的線圖的詮釋技巧。

- 辨識每條曲線代表的變量。
- 了解兩個**軸**的變量是甚麼。
- 有時可以把 x 軸分成不同**階段**，幫助分析數據。
- 留意每條曲線的變量正在**增加**、**減少**還是**維持不變**。另外，留意各項變量之間的變化是否有關係（例如因果關係）。
- 提出變化的原因。

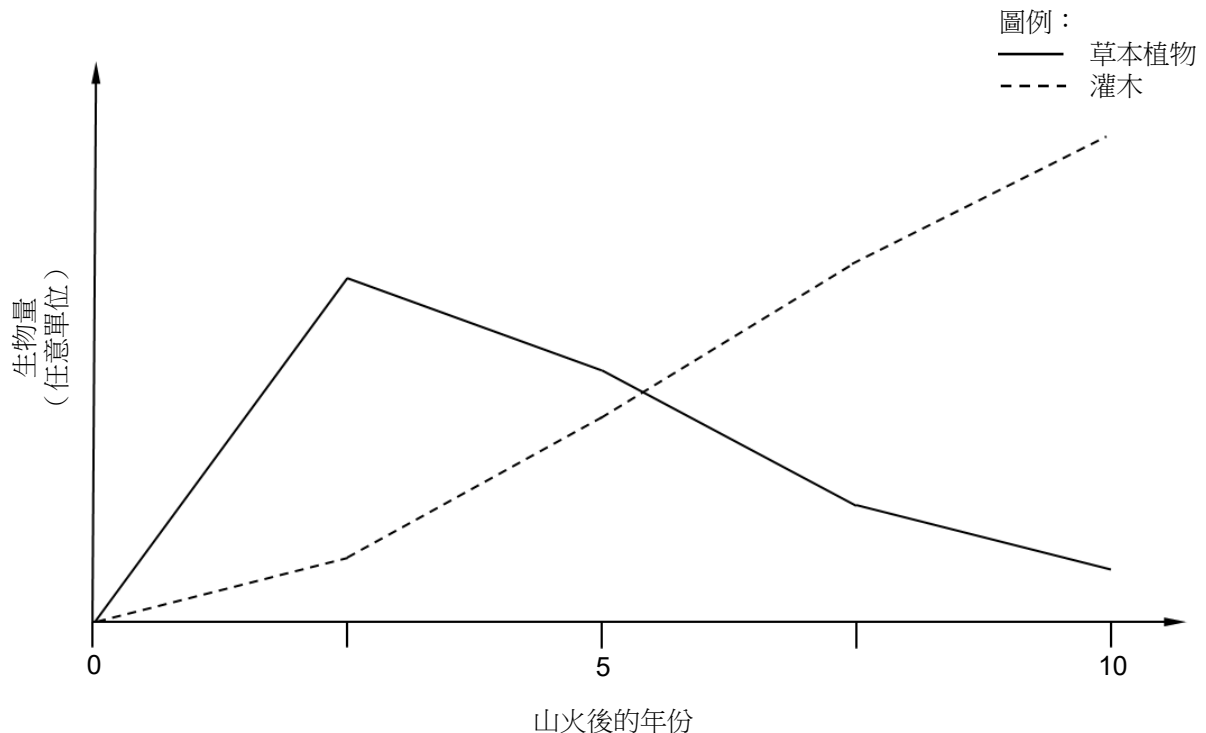
下面是一個例子，示範怎樣詮釋線圖。圖示捕食者和獵物數目的週期性變化。



- 獵物有充足食物，能大量繁殖，數目因而增加。
- 獵物數目增加，為捕食者提供更多食物，捕食者的數目因而增加。
- 大量捕食者捕食大量獵物，獵物的數目因此下降。
- 由於食物供應減少，捕食者的數目也隨之減少。
- 獵物的數目得以回升，週期重新開始。

練習

- 1 一名科學家進行研究，以探究一塊被山火破壞的土地。這塊土地上的植被分為草本植物和灌木兩類。下圖顯示這兩類植被的生物量在山火發生後 10 年的變化。



描述並解釋發生在這塊土地上的演替形式。

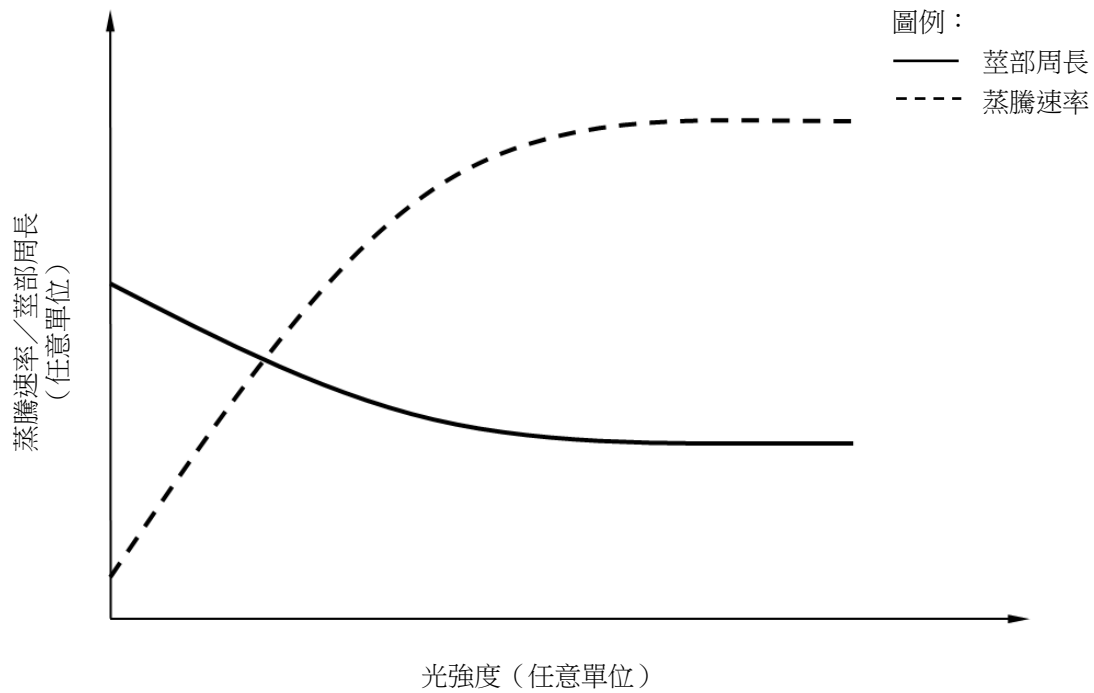
起初，草本植物開始在土壤生長，其生物量因而 增加。由於沒有其他植物競爭陽光，草本植物成為了優勢種。

土壤層隨時間變得愈來愈厚，支持灌木生長，灌木的生物量因而 增加。

在山火發生後的大約 2.5 年，草本植物與灌木對水份和營養素的競爭日增，加上草本植物被灌木遮蔽，草本植物的生物量因此逐漸 減少。

大約 6 年後，整體灌木較草本植物生長得更快，成為了優勢種，使灌木的生物量變得高於草本植物的生物量。

2 下圖顯示一株草本植物在不同光強度下，其蒸騰速率和莖部周長的變化。



描述並解釋這株植物在不同光強度下，其蒸騰速率和莖部周長的變化。

起初，當光強度增加，植物的蒸騰速率上升，而莖部周長則減少。之後，當光強度達至某個水平並進一步增加時，蒸騰速率和莖部周長都維持不變。這是因為當光強度增加，植物的氣孔張得較大，植物的蒸騰速率因而上升。蒸騰速率的上升使木質導管內的負壓力增加，導致莖部周長減少。當光強度達至某個水平時，植物的蒸騰速率不再上升，這是由於有其他因素限制了蒸騰速率。由於蒸騰速率保持水平，所以木質導管內的負壓力不再增加，莖部周長也維持不變。
