

# Comparison and Contrast

Level: S3

Subject: Biology

Topic: Knowledge Structure<sup>1</sup> – Comparison and Contrast

### Introduction:

The ELA is designed to develop in students an understanding of how the pattern of knowledge ‘Comparison and Contrast’ \* could be expressed in English. In the ELA, students learn how to use words or phrases such as *like*, *different from*, etc. to construct ‘Comparison and Contrast’ sentences to discuss scientific facts and observations. These words or phrases and their related sentence patterns are introduced and practised along with the knowledge students learned through the medium of Chinese in S3 Biology.

The ELA can be implemented in a double lesson of 80 minutes. In the first session, students are introduced to the words, phrases and sentence patterns related to ‘Comparison and Contrast’ and complete fill-in-the-blank and sentence writing exercises. In the second session, students are given further practice on comparing and contrasting scientific facts and observations through a series of integrated reading and writing tasks. The lesson plan and worksheets for the learning activities are included in this teaching package.

\*Patterns of knowledge are those patterns through which knowledge is organized. They include Description, Sequence, Cause and Effect, Definition, Classification, Hypothesis, Exemplification and Evaluation. For more information, please refer to the attachments, which are taken from the sources below:

1. *English for Science*, by Fran Zimmerman, HKIEd Lib. PE 1127.S3 Z56 1989
2. *Teaching Ideas for Content Subject Teachers in English-medium Schools*, by EDB, <http://www.edb.gov.hk/index.aspx?nodeID=1918&langno=1>

### Acknowledgement

This set of materials was produced jointly by the teachers of Christ College and the ELA research team.

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<sup>1</sup> ‘knowledge structures’ are also known as ‘rhetorical functions’

## ELA Lesson Plan

**Description:** This ELA makes use of the knowledge about food substances, balanced diets, and blood cells (Section 12.2, 12.3 and 12.7 of the CDC Science syllabus) to introduce to students the words, phrases and sentence patterns related to ‘Comparison and Contrast’. The lesson begins with two questions, one about the similarity between two substances and the other the difference. Students are asked to answer them first in Chinese and later in English. The teacher can then make use of the opportunity to introduce to students words, phrases and sentence patterns which they could use to express ‘Comparison and Contrast’. In the final part of the ELA, students are given more challenging ‘Comparison and Contrast’ tasks on Biology and other science subjects.

**Content Objectives:** After completing the activity, students should be able to:

- compare the main types of food substances
- compare red blood cells, white blood cells and blood platelets

**Language Objectives:** After completing the activity, students should be able to:

- understand and use the English terms related to comparing and contrasting (e.g., *like, unlike, similar, different from, both, neither, whereas, but*);
- understand and use correct English expressions for discussing the similarities of and differences between the main types of food substances, e.g.,
  - *Vitamin C differs from vitamin D. The sources of vitamin C are fresh fruits and vegetables whereas the sources of vitamin D are milk and egg yolks.*
  - *Proteins contain nitrogen but fats do not.*
  - *Unlike proteins, both fats and carbohydrates can be stored.*
  - *Our body needs small amounts of both vitamins and minerals.*
  - *Both carbohydrates and fats provide energy.*
  - *A balanced diet contains more grain products than meat.*
  - *There is not as much meat as grain products in a balanced diet.*
  - *Grain products contain more carbohydrates than proteins.*
  - *Grain products contain fewer proteins than carbohydrates.*
  - *Fats provide more energy than carbohydrates do.*
  - *Fats provide more energy but proteins provide less energy.*
  - *Both carbohydrates and proteins provide less energy than fats do.*
  - *Unlike carbohydrates and fats, proteins cannot be stored.*
- Understand and use correct English expressions for discussing the similarities of and differences between red blood cells and white blood cells, e.g.,
  - *Like red blood cells, white blood cells are produced in the bone marrow.*
  - *In contrast to white blood cells, the number of blood platelets in 1 mm<sup>3</sup> of blood is smaller. White blood cells kill germs that get*

- into our body to protect us against diseases.*
- *In 1 mm<sup>3</sup> of blood, the number of blood platelets is smaller than that of the red blood cells.*

- Activities:
- Warm-up Exercise – individual work with peer support. (5 min)
  - Introducing Related Words, Phrases and Sentence Patterns – individual work with peer support. (30 min)
  - Consolidation – individual work with peer support. (45 min)

Materials: 2 sets of worksheets (工作紙一 熱身練習, WS2: *Class Exercise*)

Remarks:

Students may bring their Biology textbook/notes for reference.

The teacher may prepare a visualizer to display students' works and a computer connected with an LCD project to show the answers to facilitate discussions.

Steps:

**Warm-up Exercise** – individual work with peer support. (5 min)

*Refer to Teacher's note (TN1)*

1. Arrange students into groups. To promote peer learning, adopt mixed English language ability grouping so that the more able students may help the less able ones.
2. State the learning objectives of this ELA lesson – to learn how to use appropriate language to express similarity and difference in English. Remind students that they have already learned most of the content knowledge used in this lesson through the medium of Chinese.
3. Distribute 工作紙一 熱身練習 and WS2 *Class Exercise*.
4. Ask students to answer Questions 1 and 2. Remind students to answer part (a) in Chinese and part (b) in English. Encourage students to use their own words in the 1<sup>st</sup> trial when answering part (b).

*Refer to Teacher's note (TN2)*

5. When discussing the answers, try to make use of words and phrases students have used in the 1<sup>st</sup> trial and demonstrate the proper use of these words and phrases. This can better engage students in the discussion and help build up students' confidence of using English in this lesson.

**Introducing Related Words, Phrases and Sentence Patterns** – individual work with peer support. (30 min)

6. Start with **Comparing similarities** in WS2. Go through Item 1. Ask students to choose the right phrases to complete the sentence on the similarities between vitamins and minerals.
7. Check answers.

*Refer to Teacher's note (TN3)*

8. Go through Item 2 in WS2. Ask students to complete the sentence with the phrases given

in Item 1.

9. Check answers.
10. Return to 工作紙一. Let students have a second trial of answering 1 (b) by using the phrases and sentence patterns just introduced.
11. Check answers. Ask one or two students to read out their answers in complete sentences.
12. Move on to **Contrasting differences** in WS2. Go through Items 3, 4 and 5.
13. Then, return to 工作紙一 and ask students to answer 2 (b) a second time.
14. After the completion of 工作紙一, go through Items 6 to 8 in WS2 to introduce some more examples of words and phrases used in comparison and contrast.

**Consolidation** – individual work with peer support. (45 min)

*Refer to Teacher's note (TN4)*

15. Ask students to read the table in **Further Practice** and complete Items 1 to 4.
16. Remind students that they have learned the information shown in the table in Unit 12.3 Balanced Diet (均衡膳食).
17. Check answers. Meanwhile, ask students whether the statements are about similarity or difference.
18. Move on to **Part I of More Challenging Exercise**. Briefly introduce the table.

*Refer to Teacher's note (TN5)*

19. Let students complete Items 1 to 4.
20. Check answers.

*Refer to Teacher's note (TN6)*

21. Ask students to read the passage in **Part II** in 3 to 5 minutes. Encourage students to ask their group members for help if necessary.
22. Go through Questions 1 to 4 with students.

*Refer to Teacher's note (TN7)*

## Teacher's notes

TN 1: In the warm-up exercise, there are both questions in Chinese and English. The teacher may instruct students to answer each in the corresponding language.

TN 2: The teacher should walk around the classroom and see if any students need support. In the meantime, the teacher should note down some good answers from students for demonstration.

TN 3: The checking of answers is an opportunity for all students to practise listening and speaking skills. The teacher should read the answers in complete sentences once and ask the class to repeat after him/her. Then, the teacher may select one or two students to repeat after the whole class.

TN 4: In the consolidation session, students need to apply the words, phrases and sentence patterns just learned to complete the tasks. These tasks are arranged according to their level of difficulty. **Further Practice** involves the skills of reading tabulated data in a familiar context. **Part I of More Challenging Exercise** requires students to read a table about physical properties of metals which may be unfamiliar to them. **Part II of More Challenging Exercise** is a reading comprehension exercise that requires students to extract information from a passage on different types of blood cells (The content is covered in Unit 12.7 Our Circulatory System, an extension part of the IS curriculum). Students will need to present the similarities and differences in a table and then write sentences about them.

TN 5: The teacher may demonstrate how to read the table using the melting point of silver (960 °C) as an example. Then, the teacher may ask students to tell the density of gold (19.3 kg/L) to check their understanding.

TN 6: To round up Part I, the teacher may explain to students that they have just practised how to extract information from a comparison-and-contrast table and how to express the comparison and contrast in sentences. These skills are frequently used in studying science.

TN 7: Before checking the answers to Question 1, ask students if they realise that the last three paragraphs are organized in a way which facilitates the comparison and contrast of the three types of blood cells. After checking the answers, remind students that a table is a useful way to present information for comparison and contrast.

Questions 3 and 4 require students to present an answer which shows both the similarity and the difference between two types of blood cells. The teacher may need to help students organize and present the information point by point.

## Comparison and Contrast

### 熱身練習

以下問及 單元 12.2 食物的成份 及 12.3 均衡膳食 的內容。

1. a) 維生素 D 及鈣質的功用有什麼相似之處？

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b) What is the similarity (相似之處) between vitamin D and calcium in terms of their functions?

(1<sup>st</sup> trial)

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(2<sup>nd</sup> trial)

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2. a) 指出維生素 C 及 D 的食物來源的差異。

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State the difference between vitamin C and D in terms of their food sources.

(1<sup>st</sup> trial)

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(2<sup>nd</sup> trial)

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## Comparison and Contrast

### Class Exercise

#### Comparing similarities

(維生素) { **are like / are unlike** } (礦物質)  
1. Vitamins { **are similar to / are different from** } minerals. Our body needs **both** in small amounts.

**resemble / differ from**

(碳水化合物) { \_\_\_\_\_ } (脂肪) (提供)  
2. Carbohydrates { \_\_\_\_\_ } fats. **Both** provide energy to us.  
{ \_\_\_\_\_ }

#### Contrasting differences

(蛋白質) { \_\_\_\_\_ } (氮) { **but** }  
3. Proteins { \_\_\_\_\_ } fats. Proteins contain nitrogen { **while** }  
fats do not. { \_\_\_\_\_ } { **whereas** }

4. Carbohydrates { \_\_\_\_\_ } proteins. Carbohydrates can be stored (儲存)  
 { \_\_\_\_\_ }  
 { \_\_\_\_\_ } proteins cannot.  
 { \_\_\_\_\_ }

**In contrast to** }  
 5. **Compared to** } \_\_\_\_\_, fats can be stored.  
**Unlike** }

(均衡膳食) (穀類製品)  
 6. A balanced diet contains **more** grain products **than** meat.

7. There is **not as much** meat **as** grain products in a balanced diet.

8. Grain products contain \_\_\_\_\_ carbohydrates \_\_\_\_\_ proteins.

9. Grain products contain \_\_\_\_\_ proteins \_\_\_\_\_ carbohydrates.



## Further Practice

Read the information in the table and then fill in the blanks.

Food substances	Carbohydrates	Proteins	Fats
(能量值) Energy value (kJ/ g)	17.1	18.2	38.9
Can be stored?	Yes	No	Yes

1. Fats provide \_\_\_\_\_ energy \_\_\_\_\_ carbohydrates do.
2. Fats \_\_\_\_\_ proteins. Fats provide \_\_\_\_\_ energy but proteins provide \_\_\_\_\_.
3. Carbohydrates \_\_\_\_\_ proteins. Both provide less energy than fats do.
4. \_\_\_\_\_ carbohydrates and fats, proteins cannot be stored.

## More Challenging Exercise

Part I: Read the information in the following table

The Physical Properties of Six Metals

<i>Metal</i>	<i>Density (kg/L)</i>	<i>Melting Point (°C)</i>	<i>Boiling Point (°C)</i>
Group I			
Copper	8.9	1083	2595
Silver	10.5	960	2212
Gold	19.3	1063	2966
Group II			
Zinc	7.14	420	907
Cadmium (鎘)	8.65	321	765
Mercury	13.60	-38.87	357

(adapted from *English for Science*, by Fran Zimmerman, p.23)

Circle the answer that best completes the statement according to the information in the table.

1. The density of zinc is the same as / lower than that of mercury.
2. The melting point of mercury is lower than / as low as that of cadmium.
3. Mercury is similar to / is different from all other metals. At room temperature (e.g. 25 °C), mercury is liquid and / whereas all other metals are solid.
4. Like / In contrast to Group II metals, Group I metals have high boiling points.

**Part II: Read the following passage that introduces the three types of blood cells in our body.**

Blood contains different types of blood cells in a liquid called **plasma** (血漿). Each type of blood cells has its special **functions** (功能) and **properties** (特質). Three types of blood cells, namely red blood cells, white blood cells and **blood platelets** (血小板), are introduced below.

Red blood cells are red in colour and have a **biconcave** (兩面凹的) disc shape. They are produced in the **bone marrow** (骨髓). In  $1\text{ mm}^3$  of blood, about 5 000 000 of red blood cells can be found. They carry oxygen from the lungs to the rest of the body.

White blood cells have no colour and their shape is **irregular** (不規則的). Like red blood cells, they are produced in the bone marrow. However, they are present in smaller numbers. In  $1\text{ mm}^3$  of blood, there are only about 7 000 white blood cells. They kill **germs** (病菌) that get into our body and protect us against **diseases** (疾病).

Blood platelets, similar to white blood cells, have an irregular shape and no colour. Like other blood cells, they are produced in the bone marrow. In  $1\text{ mm}^3$  of blood, there are about 250 000 white blood cells. They help form **clots** (凝塊) that plug the damaged part of **blood vessels** (血管) and stop blood loss.

**Questions**

1. Summarize the functions and properties of blood cells in the following table.

	<b>Red blood cells</b>	<b>White blood cells</b>	<b>Blood platelets</b>
<b>Shape</b>			
<b>Colour</b>			
<b>Number</b> (/ $\text{mm}^3$ )			
<b>Site of production</b>			
<b>Function</b>			

2. Compare the numbers of blood platelets and red blood cells in  $1\text{ mm}^3$  of blood.

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3. State one similarity and one difference between red blood cells and white blood cells.

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4. Compare and contrast the functions and properties of white blood cells and blood platelets.

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## Comparison and Contrast

### 熱身練習

以下問及 單元 12.2 食物的成份 及 12.3 均衡膳食 的內容。

1. a) 維生素 D 及鈣質的功用有什麼相似之處？

維生素 D 跟 鈣質 一樣 助人體建立堅固的牙齒及骨骼。

維生素 D 與 鈣質 同樣 令人體牙齒及骨骼堅固。

c) What is the similarity (相似之處) between vitamin D and calcium in terms of their functions?

Vitamin D is like / is similar to / resembles calcium.

Both / They help make strong teeth and bones.

2. a) 指出維生素 C 及 D 的食物來源的差異。

維生素 C 是來自新鮮水果及蔬菜 而 維生素 D 則來自牛奶及蛋黃。

b) State the difference between vitamin C and D in terms of their food sources.

Vitamin C is unlike / is different from / differs from vitamin D. The sources of vitamin C are fresh fruits and vegetables but / while / whereas the sources of vitamin D are milk and egg yolks.

## Comparison and Contrast

### Class Exercise

#### Comparing similarities

1. Vitamins (維生素) { are like / are unlike (礦物質)  
are similar to / are different from } minerals. Our body needs **both** in small amounts.  
resemble / differ from

2. Carbohydrates (碳水化合物) { are like  
are similar to  
resemble } (脂肪) fats. **Both** (提供) provide energy to us.

#### Contrasting differences

3. Proteins (蛋白質) { are unlike  
are different from  
differ from } fats. Proteins contain nitrogen (氮) { **but**  
**while**  
**whereas** }

4. Carbohydrates { are unlike  
are different from  
differ from } proteins. Carbohydrates can be stored (儲存)
- { but  
while  
whereas } proteins cannot.

5. **In contrast to** }  
**Compared to** } proteins, fats can be stored.  
**Unlike** }

- (均衡膳食) (穀類製品)
6. A balanced diet contains **more** grain products **than** meat.
7. There is **not as much** meat **as** grain products in a balanced diet.
8. Grain products contain more carbohydrates than proteins.
9. Grain products contain (a) not as many / (b) fewer proteins (a) as / (b) than carbohydrates.

## Further Practice

**Read the information in the table and then fill in the blanks.**

Food substances	Carbohydrates	Proteins	Fats
(能量值) Energy value (kJ/ g)	17.1	18.2	38.9
Can be stored?	Yes	No	Yes

1. Fats provide more energy than carbohydrates do.
  2. Fats are unlike / are different from / differ from proteins. Fats provide more energy but proteins provide less (energy).
- Carbohydrates are like / are similar to / resemble proteins. Both provide less energy than fats do.
3. In contrast to / Compared to / Unlike carbohydrates and fats, proteins cannot be stored.

## More Challenging Exercise

**Part I: Read the information in the following table**

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**Circle the answer that best completes the statement according to the information in the table.**

1. The density of zinc is the same as / lower than that of mercury.
2. The melting point of mercury is lower than / as low as that of cadmium.
3. Mercury is similar to / is different from all other metals. At room temperature (e.g. 25 °C), mercury is liquid and / whereas all other metals are solid.
4. Like / In contrast to Group II metals, Group I metals have high boiling points.

**Part II: Read the following passage that introduces the three types of blood cells in our body.**

Blood contains different types of blood cells in a liquid called **plasma** (血漿). Each type of blood cells has its special **functions** (功能) and **properties** (特質). Three types of blood cells, namely red blood cells, white blood cells and **blood platelets** (血小板), are introduced below.

Red blood cells are red in colour and have a **biconcave** (兩面凹的) disc shape. They are produced in the **bone marrow** (骨髓). In 1 mm<sup>3</sup> of blood, about 5 000 000 of red blood cells can be found. They carry oxygen from the lungs to the rest of the body.

White blood cells have no colour and their shape is **irregular** (不規則的). Like red blood cells, they are produced in the bone marrow. However, they are present in smaller numbers. In 1 mm<sup>3</sup> of blood, there are only about 7 000 white blood cells. They kill **germs** (病菌) that get into our body and protect us against **diseases** (疾病).

Blood platelets, similar to white blood cells, have an irregular shape and no colour. Like other blood cells, they are produced in the bone marrow. In 1 mm<sup>3</sup> of blood, there are about 250 000 white blood cells. They help form **clots** (凝塊) that plug the damaged part of **blood vessels** (血管) and stop blood loss.

**Questions**

1. Summarize the functions and properties of blood cells in the following table.

	<b>Red blood cells</b>	<b>White blood cells</b>	<b>Blood platelets</b>
<b>Shape</b>	biconcave disc shape	irregular shape	irregular shape
<b>Colour</b>	red	no colour	no colour
<b>Number ( / mm<sup>3</sup> )</b>	about 5 000 000	about 7 000	about 250 000
<b>Site of production</b>	bone marrow	bone marrow	bone marrow
<b>Function</b>	They carry oxygen from the lungs to the rest of the body.	They kill germs that get into our body and protect us against diseases,	They help form clots that plug the damaged part of blood vessels and stop blood loss.

2. Compare the numbers of blood platelets and red blood cells in 1 mm<sup>3</sup> of blood.  
In 1 mm<sup>3</sup> of blood, the number of blood platelets is smaller than that of the red blood cells.
3. State one similarity and one difference between red blood cells and white blood cells.  
Like red blood cells, white blood cells are produced in the bone marrow.  
Red blood cells are red whereas white blood cells have no colour. (or difference in shape or function)

4. Compare and contrast the functions and properties of white blood cells and blood platelets.

Like white blood cells, blood platelets have an irregular shape and no colour. Besides, both are produced in the bone marrow.

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In contrast to white blood cells, the number of blood platelets in 1 mm<sup>3</sup> of blood is smaller.

White blood cells kill germs that get into our body to protect us against diseases.

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