Ratio and Rate

Level: Key Stage 3

Dimension: Number and Algebra
Module: Comparing Quantities
Unit: Ratio and Rate

Student ability: Average

Content Objectives:

After completing the activity, students should be more familiar with the concepts of ratio and rate and their applications to everyday examples.

Language Objectives:

After completing the activity, students should be able to

- understand and use the English terms associated with ratio and rate (e.g., *ratio, rate, speed, fraction, divide, distance, quantity, actual, scale, scale factor, representative fraction*);

- understand the English expressions for explaining the key concepts (ratio, rate & scale), e.g.,
  - *A ratio is a comparison of two numbers. We generally separate the two numbers in the ratio with a colon (:). For example, if we want to write the ratio of 8 and 12, we can write this as 8:12 or as a fraction 8/12, and we say the ratio is eight to twelve.*
  - *The order of the numbers in a ratio is important. For example, a ratio of 8:12 is not the same as a ratio of 12:8.*
  - *To compare ratios, write them as fractions. The ratios are equal if they are equal when written as fractions.*
  - *A scale is a ratio between two sets of measurements. A map is an example of a scale drawing. A distance of 1 cm on the map may represent an actual distance of 500 m. A scale is usually written as a fraction and is called the representative fraction.*
  - *A rate is a ratio of two quantities of different units, for example, in expressing how long it takes to do something, such as travelling a certain distance. To walk 3 kilometres in one hour is to walk at the rate of 3 km/h.*

- follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite Knowledge:

Students are expected to have learned the concepts ratio and rate through the medium of Chinese.

Time: 3 lessons (3 x 35 minutes)

Procedure:

Lesson 1: With the help of the teacher and based on knowledge of similar problems in Chinese, the students work through task 1 and task 2 in activity 1 and deduce the meaning of the mathematical terms at the top of the worksheet. The teacher should demonstrate the pronunciation of the terms. Students then practise calculation based on questions in English through a pair-work speaking activity.

Lesson 2: With the help of the teacher and based on knowledge of similar problems in Chinese, the students work through the worksheet on p.3 and deduce the meaning of the mathematical terms at the top of the worksheet. The teacher should demonstrate the pronunciation of the terms. Students then practice calculation based on questions in English through a pair-work speaking activity using a map they are familiar with.

Lesson 3: Students then continue to practise speaking using the floor plan. Finally, the teacher introduces the crossword puzzle to consolidate the vocabulary learnt.

Explanatory Notes for Teachers

1. The aim of this teaching material is to give students the opportunity to practise speaking skills and the skill of answering questions in the topic of ratio and rate in English. It is therefore expected to be carried out after the completion of the topic "Ratio and Rate" in Chinese.
2. For learning to be meaningful, discussion topics (e.g. the number of family members, the number of lessons per cycle, the number of laboratories) which students are familiar with are used.
3. The teacher should ask students to work in pairs for the pair-work speaking activity. If the number of students is too large (e.g. four students) in a group, the time for each student to practise will be reduced. At the same time, some students will sit back and not contribute to the conversation.
4. The teacher could ask students to think about and write down the answer and calculation for the pair-work activity before they really start the conversation.
5. The teacher should walk around the whole classroom to support different groups if they have any difficulties.
6. The map of Cheung Hong Estate was used in Activity 2 because the students in the school where the materials were trialled are familiar with the district and therefore would be more interested in the discussion. The teacher can modify the map to cover other locations.
7. The teacher should allow some measuring errors when students calculate the actual distance in Task 2 and pair-work speaking Activity 2 (e.g. if the distance on the map is 4.Icm, it is acceptable for students to write down 4cm or 4.2cm and then use their measured distance to calculate the actual distance).
8. The extra scenario (Floor plan of a student's flat) is used to allow student A and student B to exchange roles (asking/answering questions) and practise more. The teacher can, depending on the ability of the students, include/exclude this part.
9. It is important that the teacher should be flexible in adjusting the teachipg schedule to. suit the needs of students. If they cannot finish the pair-work speaking activity in Lesson 1, the teacher can shift the introduction of scale to the latter part of lesson two, etc. There will be more free time in Lesson 3 to allow the teacher to do revision with students.

Class: _____ ( ) Name: _____ Mark: _____

ACTIVITY 1: Ratio and Rate

Task 1:

Vocabulary:

Rate 率	Speed 速率	Divide 除
Ratio 比	Distance 距離	Quantity 數量
Actual 真實的		

Part A:

1) How many family members are there in your family?

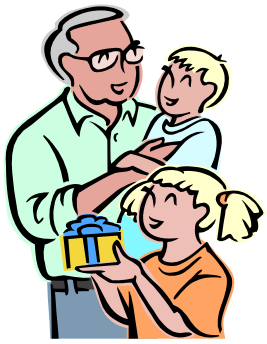
   There are _____ members in my family.

2) How many of your family members are students?

   There is / are _____ students in my family.

3) What is the ratio of family members who are students to the total number of members?

   The ratio= _____:_____



Part B:

1) How many lessons are there in one cycle?

   There are _____.

2) How many Mathematics, English and Chinese lessons respectively do you have in one cycle?

   I have _____.

3) What is the ratio of Mathematics lessons to the total number of lessons in one cycle?

   The ratio =

4) What is the ratio of Mathematics lessons to English lessons to Chinese lessons?

   The ratio =

Pair-work speaking activity 1:

Complete (完成) the following pair-work speaking activity.

Student A: Let's start.
Can I ask you some questions?
How many male teachers teach your class this year?

Student B: There are _____.

Student A: How many female teachers teach your class this year?

Student B: There are _____.

Student A: What is the ratio of male teachers to female teachers?
Show the steps here:

Student B: The ratio of male teachers to female teachers is _____.

Student A: How many Liberal Studies lessons are there in one cycle?

Student B: There are_____.

Student A: What is the ratio of Liberal Studies lessons to Chinese History lessons to Integrated Science lessons?
Show the steps here:

Student B: The ratio of _____
_____

Student A: What is the ratio of _____ to _____ to _____?

Student B: The ratio of _____
_____.

(Use similar pattern to discuss the number of classrooms and laboratories.)

Student B: What is the ratio of _____

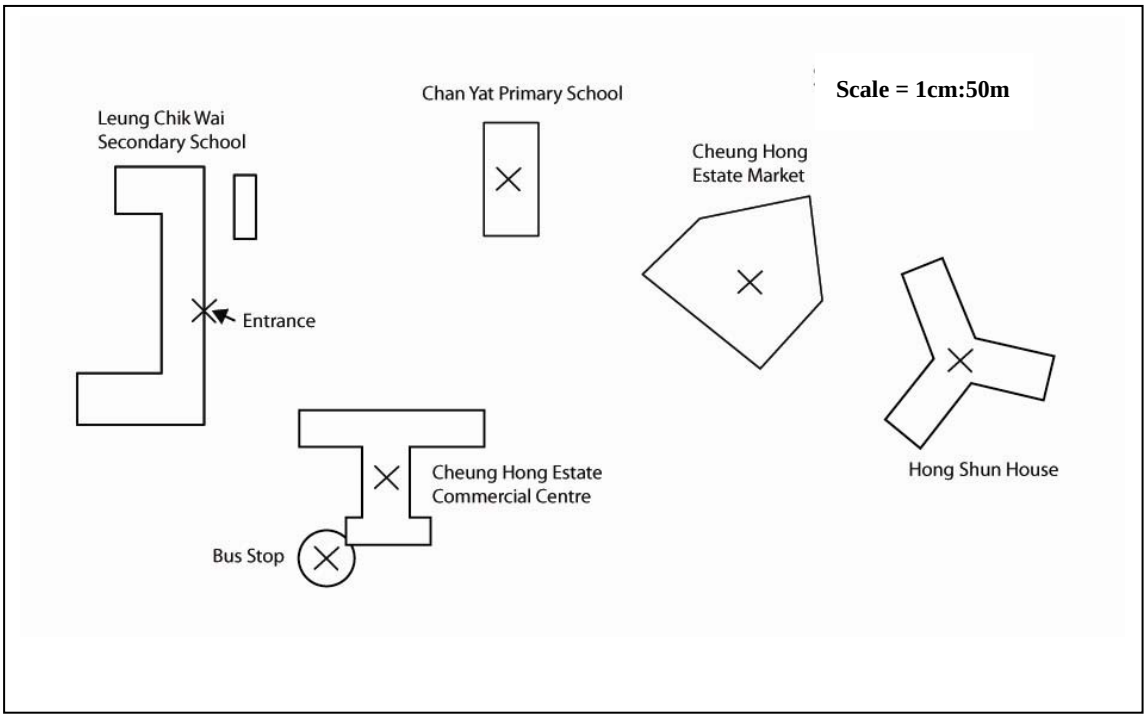
Student A: The ratio of _____.

ACTIVITY 2: Scale

Task 2: Vocabulary:

Scale 比例尺	Representative fraction 分數比例尺	Entrance 入口
Scale factor 比例因子	Enlargement 擴大	Reduction 縮小
Bus stop 巴士站	Commercial Centre 商場	Market 市場
Primary School 小學		

Look at the map below:



With the given representative fraction, a distance of 1 cm on the map represents (代表) an actual distance of _____ m.

Scale factor = $\frac{\text{the distance on the map}}{\text{the actual distance}}$

= _____

So, the actual distance between Chan Yat Primary School and Cheung Hong Estate Market

=

Pair-work speaking activity 2:

Complete (完成) the following pair-work speaking activity.

Student A: Let's start.
Can I ask you some questions?
What is the distance between the school entrance and the bus stop *on the map*?

Student B: The distance between the school entrance and the bus stop is _____cm.

Student A: What is the **actual** distance between them?
Show the steps here:

Student B: The actual distance between them is _____.

Student A: What is the distance between_____ and _____*on the map*?

Student B: The distance _____

_____

Student A: What is the **actual** distance between them?

Show the steps here:

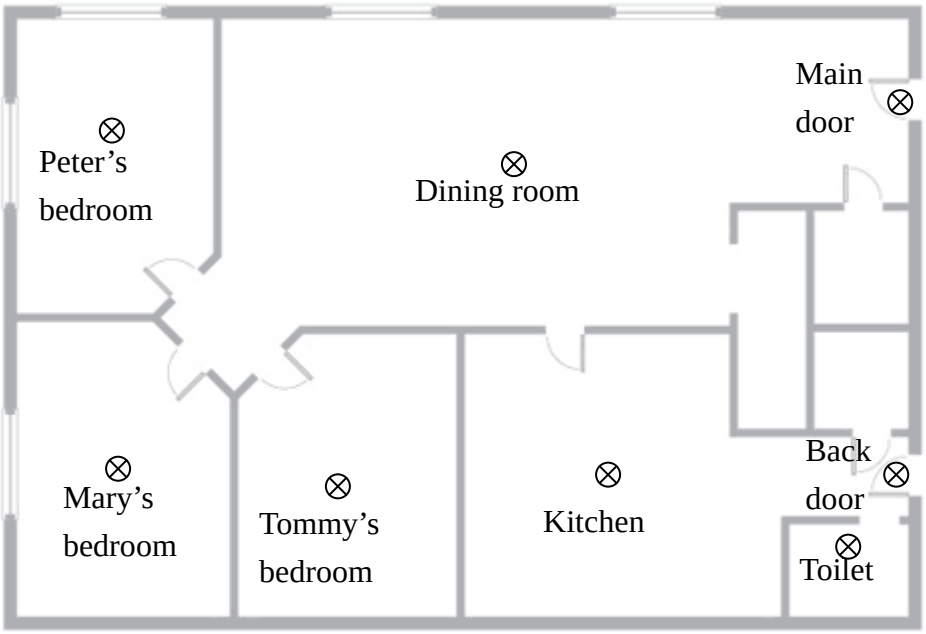
Student B: _____

(Use similar pattern to discuss about the actual distance between other places with the floor plan on next page.)

Student B: What is _____?

Student A: _____.

Floor Plan of student flat



Scale: 1: 80

Activity 3: Puzzle

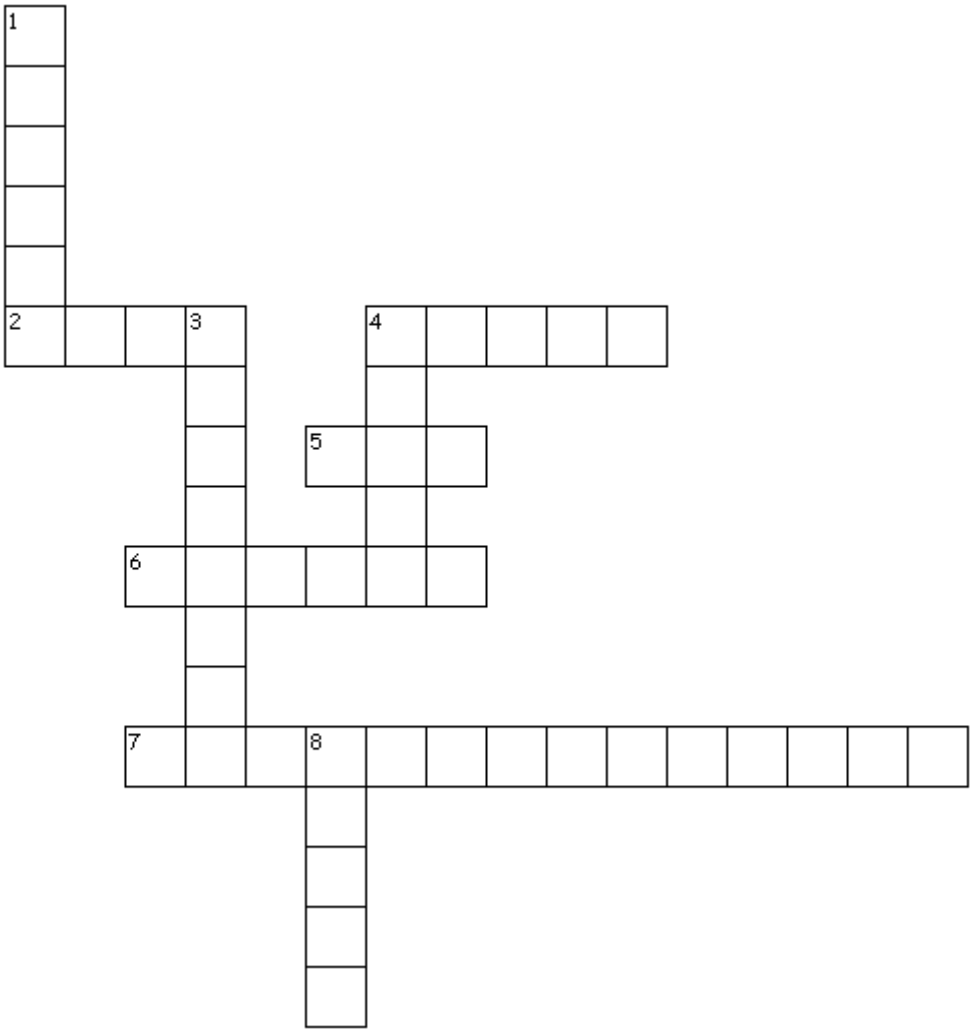
Use the vocabulary learnt in this chapter to fill in the crossword puzzle.

Across

2. a comparison (比較) of two quantities of different kinds
4. distance divided by time
5. a very common kind of scale drawing
6. we go there to buy foods and vegetables
7. the scale of a map is called a ___ fraction (R.F.)

Down

1. H.C.F. means Highest Common ___
3. when we enter a building, we have to pass through it, e.g. door
4. it usually appears on the map to let people know the actual length
8. compare (比較) two (or three) quantities of the same kind by division. It has no units.



Answer for Activity 3: Puzzle

Across

2. Rate
4. Speed
5. Map
6. Market
7. Representative

Down

1. Factor
3. Entrance
4. Scale
8. Ratio