S3 Topic 5

Properties of Quadrilaterals

Level: Key Stage 3

Dimension: Measures, Shape and Space
Module: Learning Geometry through a Deductive Approach
Unit: Quadrilaterals

Student ability: Average

Content Objectives:

After completing the activity, students should be more familiar with the properties of quadrilaterals.

Language Objectives:

After completing the activity, students should be able to

- understand the English terms for describing the properties of five types of quadrilaterals (e.g., *trapezium, parallelogram, rectangle, square and rhombus*);
- use the English terms to describe the properties of the five types of quadrilaterals, e.g.,
  - *A parallelogram is a quadrilateral that has two pairs of parallel sides.*
  - *A square is a quadrilateral that has four equal sides, four right angles, equal diagonals and two pairs of parallel sides.*
  - *A trapezium is a quadrilateral that has a pair of parallel sides.*
  - *A rectangle is a quadrilateral that has equal diagonals, four right angles and two pairs of parallel sides.*
  - *A rhombus is a quadrilateral that has two pairs of parallel sides and four equal sides.*
- follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite knowledge:

Students should have learned about the properties of quadrilaterals through the medium of Chinese

Time: 1 lesson (35 minutes)

Procedure:

1. The teacher should first distribute the worksheets to the whole class.
2. In part A, the teacher may provide support to students (e.g. reminding them of the properties of polygons).
3. The teacher should pronounce the names of quadrilaterals clearly and slowly (for the first time) so that students can master their pronunciation and remember them better.
4. Where necessary, the teacher should help students to revise the content of the previous lessons so that students would feel more familiar with the topic and be more confident in learning through English.
5. The teacher should prompt students that some properties can apply to more than one quadrilateral.
6. The teacher can ask students to finish Part B and C by themselves.
7. In checking with the whole class the answers to question 1 in Part B, the teacher may lead students to give more elaborated answers by asking why they think, for example, it is a rhombus, and not a square. By doing so, the teacher can promote more classroom interaction in English and conduct formative assessment simultaneously by checking whether students can talk about the properties of different types of quadrilaterals in English.
8. Teacher can walk around the classroom to help if students have difficulties.

S 3 Mathematics

Properties of Quadrilaterals

Name:_____ Class:_____( )

A. The following are properties of some quadrilaterals.

(a) Having a pair of parallel sides.

(b) Having two pairs of parallel sides.

(c) Having four right angles.

(d) Having four equal sides.

(e) Having equal diagonals.

In the table below, mark a "√" in the box if the quadrilateral has the property.

	Properties				
Quadrilaterals	(a)	(b)	(c)	(d)	(e)
Trapezium					
Parallelogram					
Rectangle					
Square					
Rhombus					

Vocabulary:

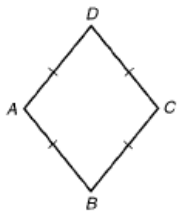
Quadrilateral 四邊形 *parallel 平行* *diagonals 對角線*

Trapezium 梯形 *Parallelogram 平行四邊形* *Rectangle 長方形*

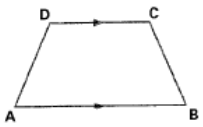
Square 正方形 *Rhombus 菱形*

B. Fill in the blanks.

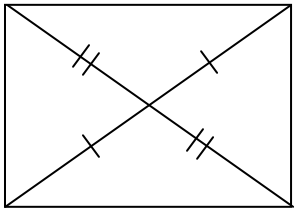
Referring to the figures below, use the names of the quadrilaterals to complete the sentences.

1. 

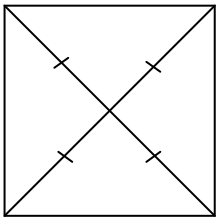
This is a _____.

2. 

This is a _____.

3. 

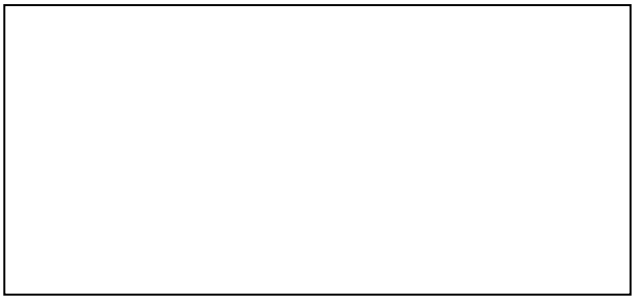
This is a _____.

4. 

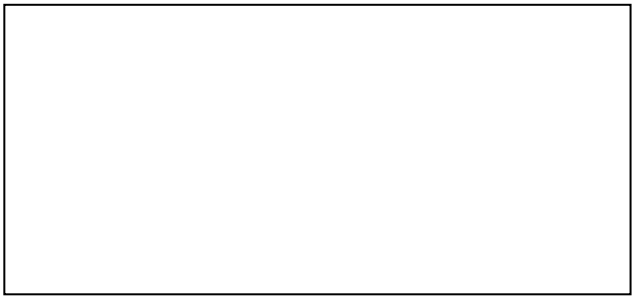
This is a _____.

C. Drawing

1. Draw a trapezium, not a rectangle, in the space provided.



2. Draw a rectangle, not a square, in the space provided.



Suggested Answers

A. The following are properties of some quadrilaterals.

(a) Has a pair of parallel sides.

(b) Has two pairs of parallel sides.

(c) Has four right angles.

(d) Has four equal sides.

(e) Has equal diagonals.

In the table below, mark a "√" in the box if the quadrilateral has the property.

	Properties				
Quadrilaterals	(a)	(b)	(c)	(d)	(e)
Trapezium	√				
Parallelogram	√	√			
Rectangle	√	√	√		√
Square	√	√	√	√	√
Rhombus	√	√		√	

Vocabulary:

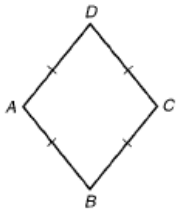
Quadrilateral 四邊形 *parallel 平行*

Trapezium *梯形*　　*Parallelogram* *平行四邊形*　　*Rectangle* *長方形*

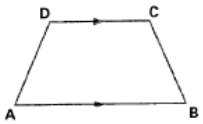
Square *正方形*　　*Rhombus* *菱形*

B. Fill in the blanks.

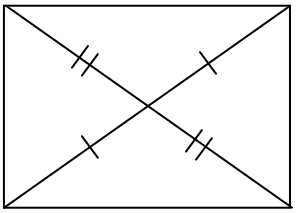
Referring to the figures below, use the names of the quadrilaterals to complete the sentences.

1. 

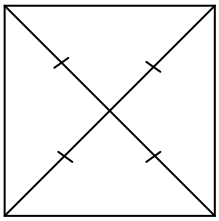
This is a _rhombus_____.

2. 

This is a trapezium_____.

3. 

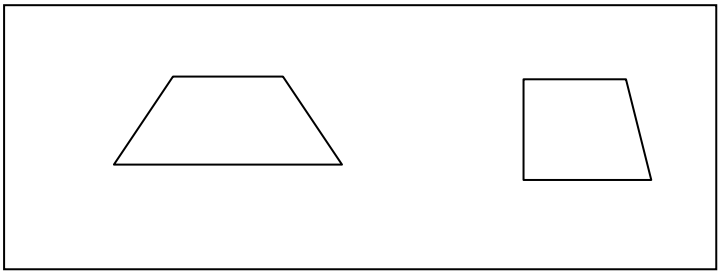
This is a parallelogram_____.

4. 

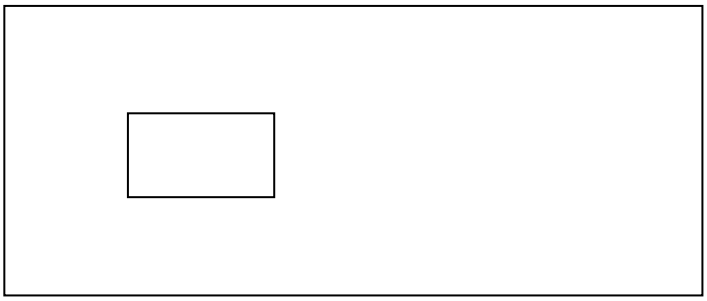
This is a square_____.

C. Drawing

1. Draw a trapezium, not a rectangle, in the space provided.



2. Draw a rectangle, not a square, in the space provided.



Explanatory Notes for Teachers:

1. As students have learnt about the properties of quadrilaterals through the medium of Chinese already, teachers are not expected to explain the concepts again in detail.
2. The teacher may do a very short review of the previous learning in Chinese before distributing the worksheet in English.
3. The teacher could point out that a square is also classified as a rectangle and also a parallelogram by definition.
4. Part B question numbers 3 and 4 are a bit tricky because the diagram shown is not drawn to scale and is not typical. Students should learn to classify the diagram according to the information provided (e.g. the right-angle sign and the equal length sign) but not by impression. If the teacher asked a student to answer the question but he/she gives a wrong answer, the teacher can ask another student to point out the mistake. It is a good chance for student to explain the mistake in English.
5. Part C provides students with the chance to draw the quadrilaterals themselves. It is a good opportunity for them to have hands-on experience of drawing the quadrilaterals themselves and of showing their creativity. Their answers could be different from each other. (e.g. trapeziums can be of different sizes, having a shorter base on top or at the bottom, or with one side tilted or two sides tilted).

6. summary of related content taught in Chinese (Source: textbook “Mathematics for Tomorrow” Book 3B from Manhattan Press):

平行四邊形

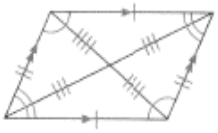
(a) 定義：兩組對邊分別平行的四邊形稱為平行四邊形。

(b) 平行四邊形的性質：

(i) 對邊相等

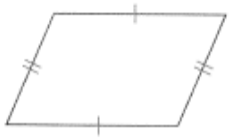
(ii) 對角相等

(iii) 對角線互相平分



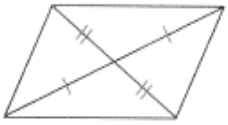
(c) 平行四邊形的判別條件：

(i) 兩組對邊分別相等

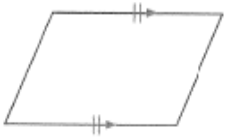


(ii) 兩組對角分別相等

(iii) 對角線互相平分



(iv) 一組對邊平行而且相等



長方形

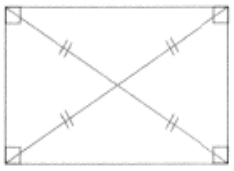
(a) 定義：有一個角是直角的平行四邊形稱為長方形。

(b) 長方形的性質：

(i) 具備平行四邊形的所有性質

(ii) 四個角都是直角

(iii) 對角線相等



菱形

(a) 定義：有兩條鄰邊相等的平行四邊形稱為菱形。

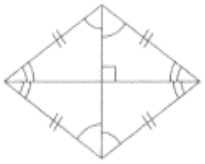
(b) 菱形的性質：

(i) 具備平行四邊形的所有性質

(ii) 四邊相等

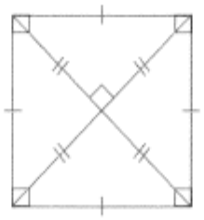
(iii) 對角線互相垂直

(iv) 對角線平分內角



正方形

(a) 定義：有一個角是直角及有兩條鄰邊相等的平行四邊形稱為正方形。



(b) 正方形的性質：

具備平行四邊形、長方形及菱形的所有性質