Self-study Resource for Primary Mathematics

**Introduction**

|  |  |
| --- | --- |
| **Theme** | Reasonable sharing of taxi fare |
| **Related Topics, Learning Units or Learning Objectives**  | * make use of the knowledge in learning unit 6N1 Decimals (IV) to perform the division involving decimal(s), perform mixed arithmetic operations of not more than four numbers and solve problems;
* make use of the knowledge in learning unit 6M4 Speed to solve problems related to time intervals and speed;
* foster students the skills of observation, analysis and comprehension;
* foster students the ability to communicate with others in mathematical language; and
* develop students the attitude to be open minded, with independent thinking, respect and accept others’ opinions when solving mathematical problems.
 |
| **Overall Ideas** | * In this worksheet, students will learn how to make use of different cognitive tools to organise information, analyse and solve problems through the situations of sharing the taxi fare reasonably.
* The worksheet includes two parts. The first part uses relatively simple daily life situations and data to help students recognise how to use cognitive tools, tables and timelines to organise information. Students will then analyse and summarise the obtained data and display the data with images for helping them to solve problems with mathematical knowledge.
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| **Estimated time of completion** | 60 minutes |
| **Prerequisite knowledge** | Students are required to have knowledge on division of decimals, time intervals and speed. |
| **Suggestions** | After completing the worksheets, students are encouraged to explain their ideas in class. It helps create an interactive atmosphere, develop students’ communication skills and establish a positive attitude towards problem-solving. |

**Part I：Simple Sharing of Taxi Fare**

Mrs Hung and her daughter went shopping at a department store on Sunday. After shopping, they found that the items they bought were very heavy. Thus, they decided to take taxi home. While waiting for the taxi, Mrs Hung and her daughter met Mrs Luk at the taxi stand, and so they invited Mrs Luk to take taxi with them. Mrs Luk’s home was closer, and she got off the taxi first. When Mrs Luk got off the taxi, the time and distance travelled was exactly half of the whole ride. At the end of ride, Mrs Hung paid all the taxi fare first, and would collect the fare from Mrs Luk after calculating the split of taxi fare at home. Here is the receipt of the taxi fare:



Taxi Fare Receipt

|  |  |  |
| --- | --- | --- |
| Plate Number | KG 2XXX |  |
| Pick-up date & time | 18/11/2022 | 17:30 |
| Drop off date and time | 18/11/2022 | 17:46 |
| Total kilometres |  | 10.4 |
| Total fare |  | HK$93.00 |

1. Organise Information
2. Mrs Luk suggests the following way to share the taxi fare.

|  |  |
| --- | --- |
| D:\MES\Z Others\Clipart\Clipart_pinky\Character\百子櫃角色\楊太.jpgMrs Luk | There are three persons to share the taxi ride. Let’s divide the taxi fare into three equal parts. How much should each of us pay? |

Each person should pay：

 93 $÷$ 3

= 31 (dollars)

Do you agree with Mrs Luk’s suggestion? Why?

|  |
| --- |
| No. Mrs Luk did not take the whole ride of taxi. If they divided the taxi fare  |
| of whole ride into three equal parts, it was not fair to Mrs Luk. |

1. Read the information in the previous page carefully. Use the **table** below to organise the drop off time, time travelled and distance travelled of Mrs Luk, Mrs Hung and her daughter properly.

|  |  |  |  |
| --- | --- | --- | --- |
| Passenger | Mrs Luk | Mrs Hung | Daughter |
| Drop off time(in term of the 24-hour time) | 17:38 | 17:46 | 17:46 |
| Time travelled (min) | 8 | 16 | 16 |
| Distance travelled (km) | 5.2 | 10.4 | 10.4 |



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**The table** is the most practical cognitive tool. Information is organised in a row by column format systematically to enable

(1) comparison of data across different categories;

(2) review of the relationship between information.

Reference Material：

PSHE Key Learning Area, CDI (2017). “*The Integrative Use of Generic Skills*”

1. Using the information organised in the table above,
	1. Label the drop off time of the three persons with “↑” on the **timeline** below.



17:30 17:35 17:40 17:45

↑

Mrs Hung and her daughter’s drop off time

↑

Mrs Luk’s drop off time

↑

Start of ride

* 1. Fill in the blanks with the distance travelled of the three persons as represented by the cartoon figures.

Mrs Luk

5.2 km

10.4 km

Mrs Hung

10.4 km

Daughter



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**The timeline** is a cognitive tool commonly used to arrange activities and procedures in a chronological order. We mark the events on a timeline in accordance with their time of occurrence to facilitate analysis or planning. In particular, for historical events, we often use a timeline to show the progression of incidents. Note that the timeline only illustrates the order of the events but not the causal relationship between the incidents, which is usually more complicated than that can be shown in a timeline.

Reference Material：

PSHE Key Learning Area, CDI (2017). “*The Integrative Use of Generic Skills*”

1. Answer the questions
2. In Mrs Luk’s taxi ride, what is the average speed in km/h?

 5.2 $÷$ $\frac{8}{60}$

 = 39

 The average speed of Mrs Luk’s taxi ride is 39 km/h.

|  |  |
| --- | --- |
| Mrs Hung | Mrs Luk got off the taxi before my daughter and I. It is more reasonable for us to pay more. How should we calculate the split of the taxi fare? |

**Hint**: Use the diagram about the distances travelled on the last page to think about a reasonable solution.

Mrs Luk took half of the ride, and Mrs Hung and her daughter took the whole ride. Hence, it is more reasonable that the fare for the first half of the ride is shared by 3 persons, and the second half by 2 persons. From the diagram in Question 3b on last page, we can divide the taxi fare by 5, and calculate the split of fare for each person by how many parts she took. The fares for each person are respectively:

|  |  |
| --- | --- |
| Mrs Luk’s fare: 93 $÷$ 5= $18.6 | Each of Mrs Hung and her daughter’s fare: 93 $÷$ 5 $×$ 2= $37.2 |

**Part 2: Reasonable Sharing of Taxi Fare**

Mrs Luk, Mrs Lam, Mrs Hung and her daughter finished a volunteer service in an elderly care centre. Suddenly, heavy rain fell, and they decided to take a taxi together to return home. Mrs Lam’s home is farthest to the care centre, and Mrs Luk’s the closest, which is only $\frac{ 1 }{ 3 }$ of the distance of Mrs Lam’s. Mrs Hung and her daughter’s home is exactly at the middle between Mrs Luk and Mrs Lam’s home. The four persons got on a taxi at 5:10 p.m. Mrs Luk got off first, followed by Mrs Hung and her daughter, and at last Mrs Lam got off the taxi at 5:34 p.m. The total distance travelled was 14.4km for the whole ride, and the taxi fare was $131.2. Mrs Lam paid all the taxi fare first, and would collect the fare from the other three persons after calculating the split of taxi fare at home.

With reference to the methods used in Part 1, use cognitive tools such as tables and timelines to organise and analysis the information, and answer the following questions.

1. Organise information
2. Read the above information carefully, and use the following table to organise the drop off time, time travelled, and distance travelled by Mrs Luk, Mrs Lam, Mrs Hung and her daughter.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Passenger | Mrs Luk | Mrs Hung | Mrs Hung’s daughter | Mrs Lam |
| Drop off time(in term of the 24-hour time) | 17:18 | 17:26 | 17:26 | 17:34 |
| Time travelled (min) | 8 | 16 | 16 | 24 |
| Distance travelled (km) | 4.8 | 9.6 | 9.6 | 14.4 |



1. Use the timeline first, and then the diagram, to demonstrate the required information.
2. Label the timeline with appropriate time, and use “↑” to mark the drop off time of the four persons.

17:10 17:15 17:20 17:25 17:30 17:35



↑

↑

↑

↑

Start of ride

Mrs Lam’s drop off time

Mrs Luk’s drop off time

Mrs Hung and her daughter’s drop off time

1. In the following diagram, draw a bar to represent the distance travelled of each person. Label the bars with the suitable numbers.



Mrs Lam

14.4km

Mrs Hung

Mrs Luk

4.8km

9.6km

Daughter

9.6km

1. Answer the questions
2. How much should Mrs Lam collect from Mrs Luk, Mrs Hung and her daughter so that it would be reasonable? Why? Write down your answer in the box below.

Mrs Luk took $\frac{ 1 }{3}$ of the whole ride, Mrs Hung and her daughter took $\frac{ 2 }{3}$ of the whole ride, and Mrs Lam took the ride. Therefore, it is reasonable to divide the whole ride into three equal parts first. The first part should be shared by 4 persons, the second part should be shared by 3 persons, and the last part should be paid by Mrs Lam. From the diagram in Question 2b on the previous page, we can divide the total taxi fare by 8, and calculate the split of fare for each person by how many parts she took. The fares for each person are respectively:

|  |  |  |
| --- | --- | --- |
| Mrs Luk’s fare: 131.2 $÷$ 8= $16.4  | Each of Mrs Hung and her daughter’s fare: 131.2 $÷$ 8 $×$ 2= $32.8 | Mrs Lam’s fare: 131.2 $÷$ 8 $×$ 3= $49.2 |

Hence, it is reasonable for Mrs Lam to collect $16.4, $32.8 and $32.8 from Mrs Luk, Mrs Hung and her daughter respectively.

1. Mrs Luk spent the same time travelled in the two taxi rides. She thought that the average speed of the taxi in the two rides were the same. Do you agree? Explain.

 4.8 $÷$ $\frac{24}{60}$

 = 36

The average speed of the taxi for this trip of Mrs Luk’s is 36 km/h.

Mrs Luk’s thought is disagreed. The average speed of the taxi for the last ride is 39 km/h which is different to 36 km/h in this ride. Even though the time travelled are the same, the distances travelled are different in the two rides. Therefore, the average speed is different, too.

 ~ The End ~