香港教育大學
The Education University of Hong Kong

Faculty of Liberal Arts and Social Sciences (FLASS)

Department of Mathematics and Information Technology (MIT)

Bachelor of Education (Honours) (Primary) - Mathematics

2021-2022

Couse title:	Capstone Project
Course Code:	SED4042-02E
Supervisor:	
Assignment Title:	Written report
Student name:	
Date of Submission:	28/04/2022

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Topic: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction

Fraction teaching has attracted the attention of mathematics teachers and educators worldwide since many learners probably have difficulties understanding the concept of fractions, especially students with dyslexia. Children with dyslexia have a poor working memory, arithmetic abilities, and word problem-solving. In Hong Kong, although the EDB has provided some guidelines to support particular learning disabilities, most of them are outdated and still insufficient for curriculum and teaching. So, in this project, I aim to reduce students' anxiety about mathematics and facilitate fraction teaching in children with dyslexia through music intervention.

Literature review

Definition of dyslexia

Dyslexia is a specific learning disability that involves difficulties in reading and spelling. It originated in neurobiology, characterized by difficulty in recognizing words accurately or fluently and poor spelling and decoding skills. (International Dyslexia Association, 2018). Due to language acquisition and writing difficulties, most of them have disabilities in mathematics learning.

The diagnosis of dyslexia

It is estimated that about 10-12% of the population has dyslexia among school-age children in Hong Kong. Among them, a slightly higher prevalence of dyslexia in boys, and the ratio of boys to girls is 1.6:1. (Chan et al., 2007)

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Music intervention

Many educators or therapists use music intervention to improve children's behavior, emotional problems, social skills, and academic performance in school. It is defined as "a systematic process of intervention that has an influence on the motor, language, social, cognitive, and academic abilities. (Dumont et al., 2017). Music therapy includes musical training (listening, singing, and playing instruments), rhythmic teaching (melodies, rhythm syllables, reading and notating music, clapping rhythm patterns), and music activities (background music, music games) (Tóth-Bakos, A., 2016). Music interventions positively affect the learning skills, stimulus-recognition abilities, and numeracy of students with dyslexia. (Bouloukou, F., Marin-Diaz, V., & Jimenez-Fanjul, N., 2021). Music intervention also positively affects spelling, arithmetic, writing, and working memory of students with dyslexia. (Mina, F., Darweesh, M.E.S., Khattab, A.N. et al., 2021).

The relationship on fractions concepts and music

Rhythm and music note values share the part-whole relation with fractions (Azaryahu et al., 2019). For example, in the time signature of 4/4, a whole note represents four beats, a half note represents two beats and the quarter note represents one beat. In addition, the note duration reflects the corresponding value of fractions. For example, a whole note represents 1, a half note represents 1/2, the quarter note represents 1/4, the eight note represents 1/8. Taking equivalent fractions as an example, a whole consists of four quarters (1 whole= 1/4 + 1/4 + 1/4 +1/4). In the same way, one whole note in music consists of four quarters notes (O＝♩＋♩＋♩＋♩).

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Referring to the above method, I designed a series of teaching packages for students with dyslexia. It focused on using music interventions to facilitate fraction teaching, including singing and clapping, reading the note value, percussion instruments, and creating music. The package had eight sessions, and each session incorporated a few musical elements. I hope students with dyslexia learn mathematics more confidently and happily. Here are the activities of my teaching package:

Session	Objective	Activities
Session 1	Recognize the musical notes and notes value.	Musical maze Creating a garden of music notes
Session 2	Understand the relationship of notes and math.	Creating musical note Musical pizza fractions
Session 3	Make equivalent fraction.	Musical pizza Build a rhythm block
Session 4	Teaching rhythm as fraction and recognize equivalent fraction (II)	Reading notation Singing and clapping Percussion instruments Making fractions strips
Session 5	Compare fraction with same and different denominators.	Identify note duration Comparing musical pizza fractions
Session 6	Order fraction on a number line.	Take a guess Place note values on a number line
Session 7	Add the fraction to fill each glass and make music with test tube.	Musical water xylophone
Session 8	Add/subtract fractions and solve word problems.	Music math Paper plate pizza fraction Play background music

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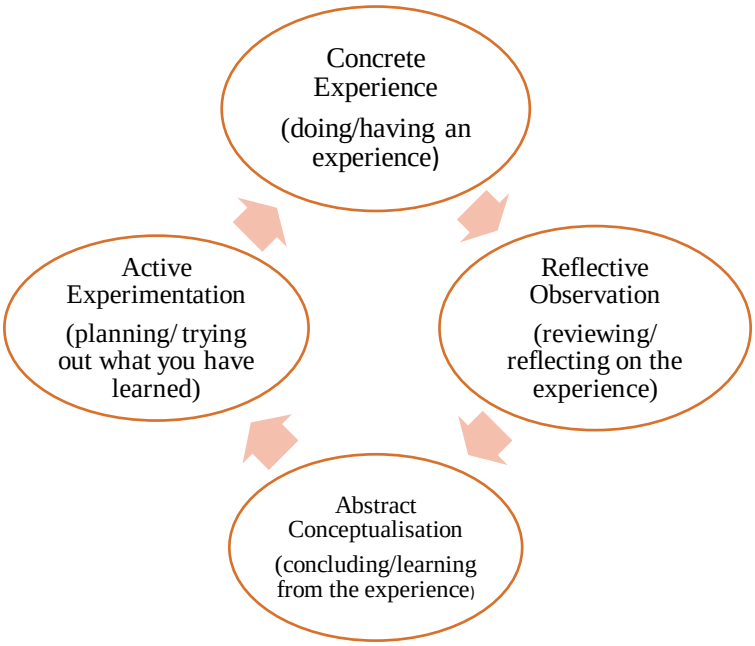
Methodology

My project is based on the Kolb's learning cycle (1984), a four-stage learning circle is used for action learning. The following diagram shows the process of action learning.



Kolb's learning cycle (1984)

It involved a combination of experience, reflection, conceptualization and experimentation. Students need to reflect on their learning experience and plan and design the teaching sessions. After completing the lessons, they need to conclude and reflect on what they learned.

Participants

This project will be carried out in tutoring center. 2 grade 5 students with dyslexia will be selected by the tutor to join the project. Students have attention-deficit hyperactivity disorder and mathematics learning disabilities are also included in this project, and students who perform well in the fraction operation are excluded from this project. The age range of students is 9-11 years old.

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Quantitative data collection

In my CP, the pre-and post-test aim to evaluate the music approach's effectiveness on students' fraction learning. The test question is adapted from the Territory-wide System Assessment from 2015-2020. There are 6 questions in total, each question is 1 mark. Question 1 and question 4 have 2 answers, each answer is 0.5 mark. Both tests represent fractions, compare fractions, order fractions, and calculate fractions. I added a music question to the post-test to assess whether students understood the relationship between music and mathematics (See Appendix 1). A survey is used to evaluate students' attitudes toward mathematics (See Appendix 2). Besides, formative assessment assesses students' learning process and adjusts the learning content for session 6, such as peer assessments and self-assessments. Worksheets will be used for each lesson to assess student performance in class. (See Appendix 3).

The following are the related topics for these questions：

Question 1	Understanding the part-whole concept of fractions
Question 2	Representing fractions
Question 3	Comparing fractions
Question 4	Equivalent fractions
Question 5	Calculating fractions
Question 6	Word problem

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Results

The character of my participants

A total of two students were included from tutoring school. Student A is a quiet 9-year-old girl. She has difficulties with math due to dyslexia. Student A is reluctant to express herself, but she is willing to follow my instructions to complete the task. Student B is an active 9-year-old boy with an attention deficit. He also diagnosed with dyslexia. Student B has a poor numeracy skill and comprehension. He has difficulty concentrating in class. He is not good at math, but he is very interested in music. He likes to answer questions about music.

Major findings

My project mainly focuses on the unit of fractions, including six topics: understanding the part-whole concept of fractions, representing fractions, recognizing equivalent fractions, ordering fractions, comparing fractions, and calculating fractions. There were two students participated in my project. The short-term objective of my project was to decrease students' anxiety about math and improve students' understanding of fractions through music intervention. At the same time, the long-term purpose was to help students develop positive attitudes towards mathematics learning.

Overall, my service package could meet my teaching objectives. Through various assessment tools, I can see the progress of my students.

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Pre-test and post-test

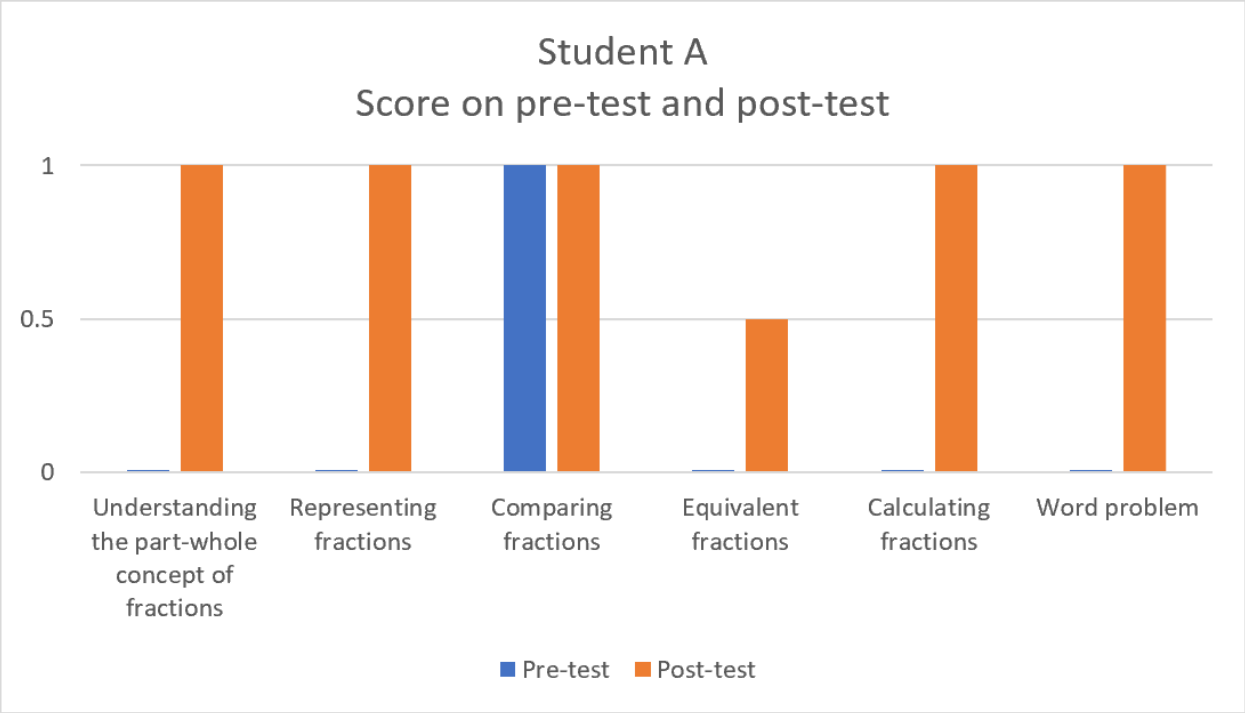

Figure 1: Pre-test and post-test of student A

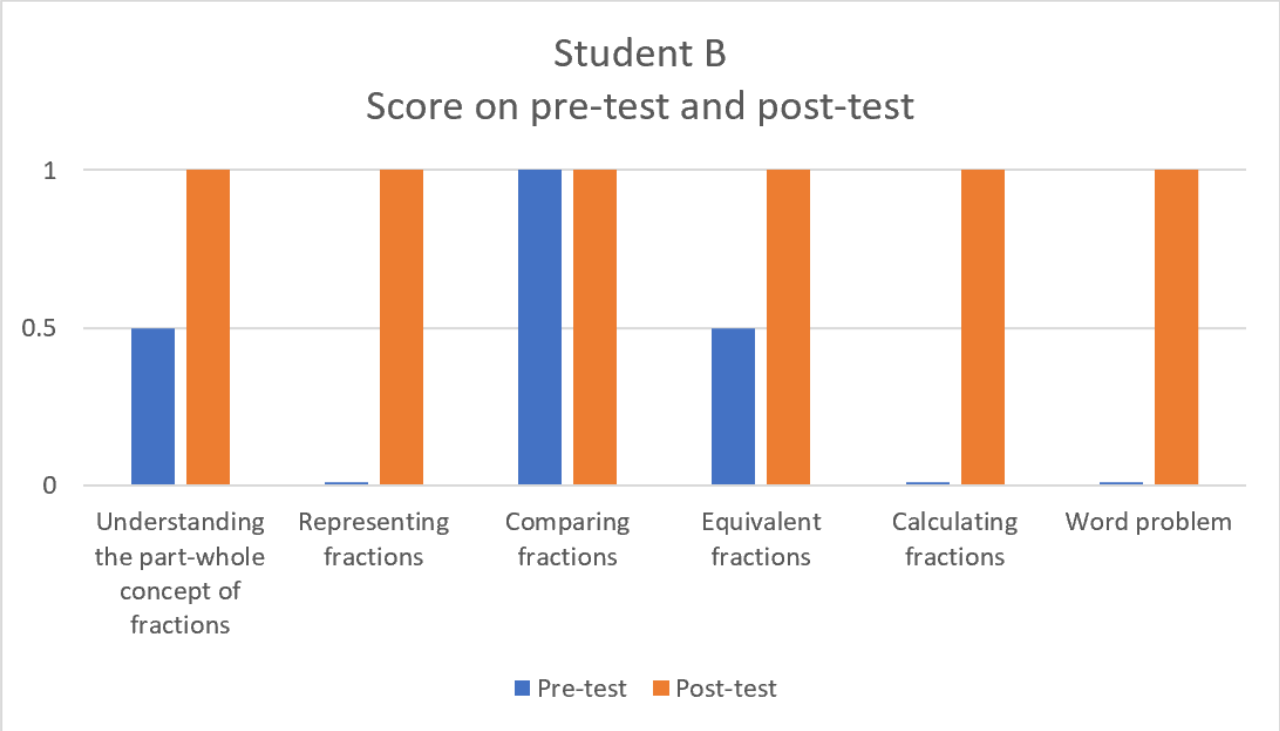

Figure 2: Pre-test and post-test of student B

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Overall, the student's performance on the post-test is better than on the pre-test.

The pre-test is the same as the math questions on the post-test. However, I added a music question to the post-test. Students can answer all of them correctly, proving that they understand the relationship between fractions and music. As shown in the above figure, there is a difference between pre-and post-test results. Student A only got one mark in the pre-test but almost full marks on the post-test. Student B got two marks in the pre-test but full marks in the post-test. The math ability of student B is better than student A. The scores on the post-test can reflect that the students understand the concept of fractions after completing eight sessions.

Mathematics Attitudes Survey Results

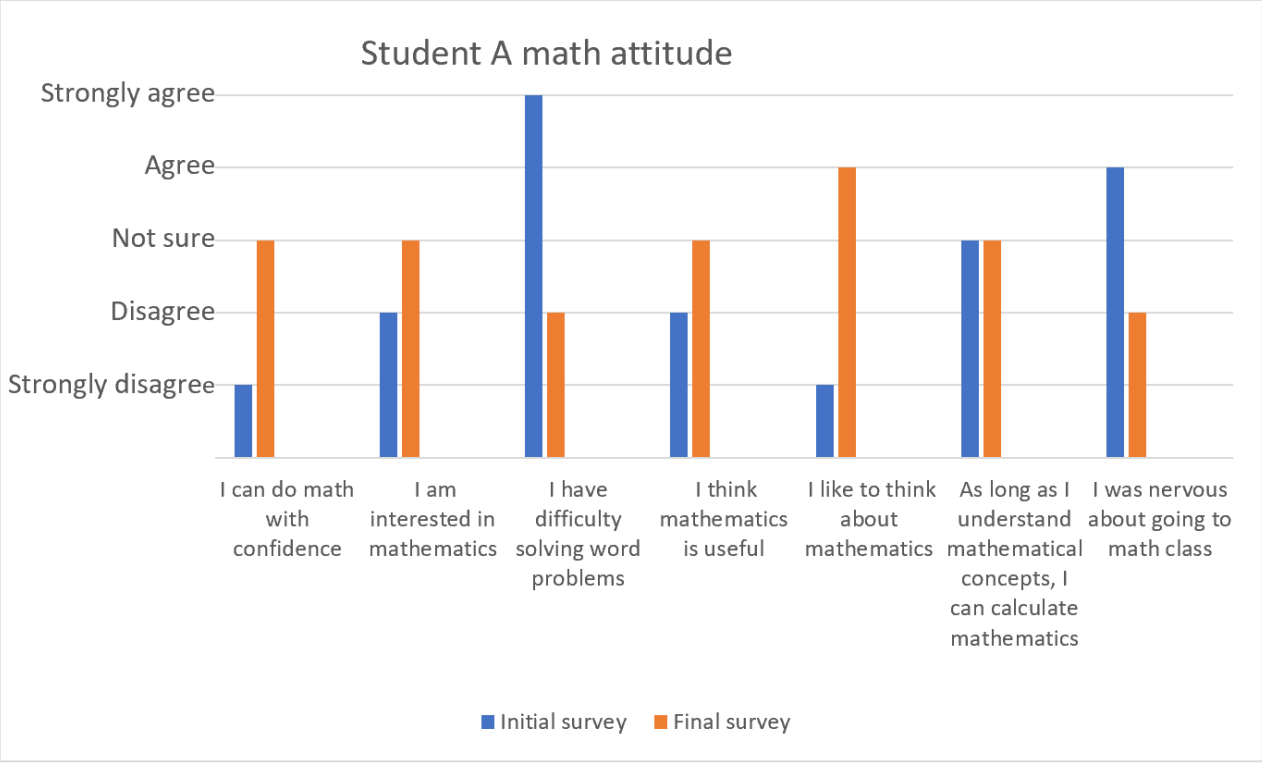

Figure 3: Student A' s attitude towards Mathematics

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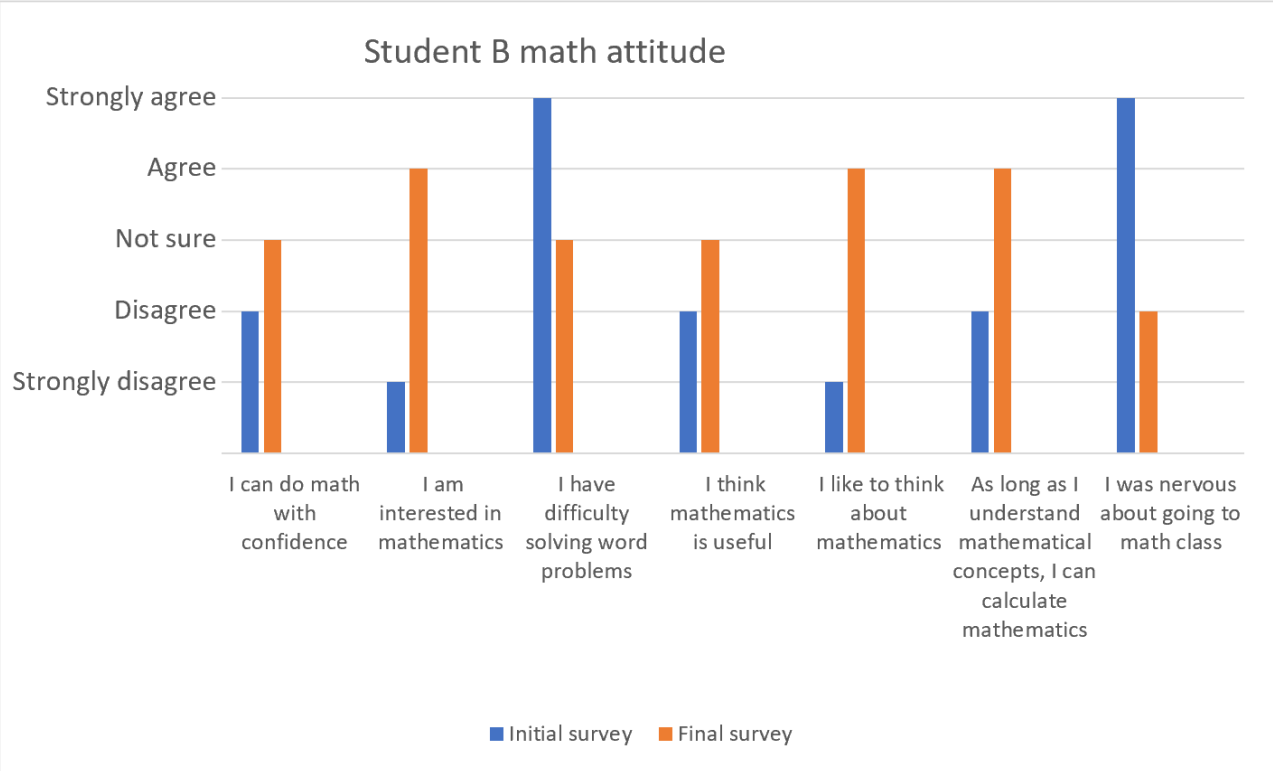

Figure 4: Student B' s attitude towards Mathematics

From the Figure 3&4, it can be known that there is a difference in the students' attitudes towards mathematics before starting the session and after completing the session. In the initial survey, both of them have negative attitude towards mathematics. However, they developed a positive attitude toward math after completing the whole project. For example, both students felt that math is not exciting and useless before the project, and even they felt nervous during math lessons. During the session, I observed that two students were relaxed in music math class. After finishing the whole project. They think math was fun, they like learning math through music.

Formative assessment and worksheets (See Appendix 2&3)

From the self-assessment of the students after all 8 lessons, they are happy with the math lessons. For instance, the students think they can solve the problems and try their best to finish the class missions. Student A gives herself in the lesson a score 8 out of 10, while student B gives himself in the lesson a

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full mark. The peer-assessment indicates both two students satisfy one another's performance in the lesson. Everyone participates in the class discussion and helps each other actively. Students need to finish the worksheet each lesson. In general, students perform well as they complete every worksheet. Except for the fourth lesson, where the students could not answer the questions of equivalent fractions, they correctly answered the worksheets on other topics. Hence, I can conclude the students enjoy the lessons and they like music-math classroom from their performance.

Thus, music intervention can reduce students' anxiety about mathematics. In addition to improving students' math ability, my project hopes to help students eliminate math anxiety, change their perception of math as monotonous, and make them love math. I can adjust my teaching package after realizing what students think about math.

Peer and supervisor evaluation

To improve my project, I asked my classmates for their opinions on incorporating different musical elements into my class. After the session, I shared the teaching video with my classmates, and they gave me some essential ideas, such as time management and content adjustment. In addition, my supervisor gave me some valuable advice, including improving students' motivation and ways to increase interaction. Their feedback helped me continually adjust my teaching package and reflect on how I can help my students effectively.

Discussion

Differences from the original proposal

My project is different from the original plan. Initially, I hoped to carry it out in a practice school with a target of 5 students. Due to school closures, the school needed to catch up on course progress; it

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could not provide me with students. Therefore, I carried out the whole project in a tutoring center. There are two fifth-grade students participated. In addition, due to covid-19 and limited time, I changed the class period to 8 sessions, and each session was shortened from 1 hour to 30 minutes, but the eighth session was 1 hour.

I asked my classmates and supervisor for their opinions, so I incorporated more musical elements into the session, below is the music-math activities I have added:

	Original proposal	Modified proposal
Session 1	Musical chairs	Musical maze Creating a garden of music notes
Session 2	Musical dice Musical pizza fractions Singing and clapping	Creating musical note Musical pizza fractions
Session 3	Build a rhythm block Making fraction strips	Musical pizza Build a rhythm block
Session 4	Make a note pizza	Reading notation Singing and clapping Percussion instruments Making fractions strips
Session 5	Place note values on a number line	Identify note duration Comparing musical pizza fractions
Session 6	Add up the notes Musical dice	Take a guess Place note values on a number line
Session 7	Musical water glasses	Musical water xylophone Play a song
Session 8	Play background music	Music math Paper plate pizza fraction Play background music

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In Session 3, students still do not have a complete understanding of equivalent fraction, I have added more time to teach this topic. After understanding the students' learning situation, I also changed the teaching order. The following is the original and changed teaching sequence：

	Original proposal	Modified proposal
Session 1	Recognize the musical notes and notes value.	
Session 2	Understand the part-whole concept of fraction.	
Session 3	Teaching rhythm as fraction and recognize equivalent fraction	Recognize equivalent fraction(I)
Session 4	Comparing fraction	Teaching rhythm as fraction and recognize equivalent fraction (II)
Session 5	Ordering fraction	Comparing fraction
Session 6	Adding and subtracting fractions	Ordering fraction
Session 7	Creating music with fraction	
Session 8	Solve problems with fractions	Adding and subtracting fractions. Solve problems with fractions

Overall, students can follow my instructions to finish all tasks. Through learning math with music, the motivation of students has increased. I also learned how to make a project better. I constantly reflect on what I got in each class. I hope my teaching package can help more students with special needs.

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Discussion with literature review

The literature gave me essential guidance to do this project. I've found many ways to incorporate musical elements into math classes. From the results collected after the entire project, musical interventions increased math fun and improved students' math abilities, and the result consists of the previous literature. Rhythm and musical notes can improve the abilities of operation and symbol recognition in math, and hence they can consolidate students' memory. It matches the experiment result from Lovemore, which is music intervention positively affects fractions teaching, and students' motivation and practical knowledge have been significantly improved. (Lovemore et al., 2021). For those students who have special education needs, dyslexia and dyscalculia particularly, musical notes are a more effective study method to learn fraction. Since the students can express the fraction clearly after they understand the relationship between fraction and math and learn the values of musical notes. It matches with the experiment result of Courey, academic music interventions help students understand fraction symbols, fraction sizes, and fractions equivalences. (Courey et al., 2012) Besides, music intervention can reduce students' math anxiety through musical training, rhythmic teaching, and background music (Tóth-Bakos, A., 2016). In my project, students enjoy the activities when they are learning music, and they do not refuse math as they did before. Since the relaxed lesson and music-math class decrease anxiety and change the students' behavior, they can participate in the class actively. For instance, the students consolidate their memory in rhythm training and beat learning, and they also apply the concepts of fractions in learning the rhythm. However, the background music for reducing anxiety is not significant in my project, because I only played the background music in session 8, I didn't see a significate effect on reducing students' math anxiety. However, I can see that students have reduced math anxiety and increased their motivation by teaching musical notes and rhythm.

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Limitation and implication

In carrying out my project, there were a few limitations for my projects.

1. Insufficient teaching time

Each section is 30 minutes, and I don't have enough time to teach the whole session. Although the teaching content has been adjusted, it is difficult for students to receive all the content in a limited time, such as recognizing notes and values. During the first three classes, the students had trouble remembering them, causing me to slow down teaching new content. Besides, students have limited time to complete worksheets, so there is not enough time to check answers and give feedback.

2. Learning differences

Two students have different learning styles, I need to adjust the teaching methods to meet their needs. Since they studied at different schools, I need to take the time to understand how they are learning. If a student has low motivation, it is easy to influence another student. Students tend to feel discouraged and give up during class because they do not understand topics. Neither student likes math word problems, so it takes a lot of time to help students solve problems slowly.

3. No teacher evaluation of students

Due to school suspension, my project was carried out in a tutoring center. So, I couldn't find school teachers to help assess students. This may lead to deviation in my assessment of students' performance.

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Suggestions of my teaching package

To make my project more optimized, here are some suggestions to improve my project.

1. Build a trusting relationship

Since students have math anxiety, I think it starts with building a relationship of trust with students. The teacher is their best friend and asks the students to write down their thoughts and record their moods every day before starting the class. Teachers reward, encourage and listen to students' needs. In addition, provide more interactive games to help students build friendships and increase learning motivation.

2. Subdivide the learning content

Because students learn differently, some complex topics, such as comparing and calculating fractions, need to be subdivided and use more time to learn. First, in comparing fractions, it can be subdivided into two teaching topics, including comparing same and different denominators. I will teach this topic in two sessions. Secondly, in calculating fractions, I will subdivide this topic into four sessions: addition and subtraction, fractions with the same denominator and different denominators. I believe that the most effective way for students with learning needs to learn mathematics is to simplify and subdivide the learning focus and gradually guide students to construct new knowledge.

3. Use electronic software to assess student performance

After completing the whole class, students are tired and do not want to exercise and do questionnaires. Therefore, using electronic software can increase students' engagement and save class time, such as using Kahoot to answer questions and using Padlet to express their feelings. Then the teacher gives immediate feedback, which can improve students' motivation and teaching efficiency.

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Conclusion

My teaching package aims at facilitating fraction teaching in children with dyslexia using music intervention. There are six topics: understanding the part-whole concept of fractions, representing fractions, recognizing equivalent fractions, ordering fractions, comparing fractions, and calculating fractions. Students can learn a fraction in fun, such as singing and clapping, reading the note value, percussion instruments, and creating music. Music intervention improves students' math abilities and reduces students' anxiety about math. No student cannot be educated, but there is such a teacher who cannot teach students well. I believe that every student is unique and talented. As a professional teacher, in addition to teaching knowledge, it is also essential to care about students' learning differences. We need to learn innovative methods of teaching mathematics. I believe that fractions are no longer a complex subject if we teach them the right way.

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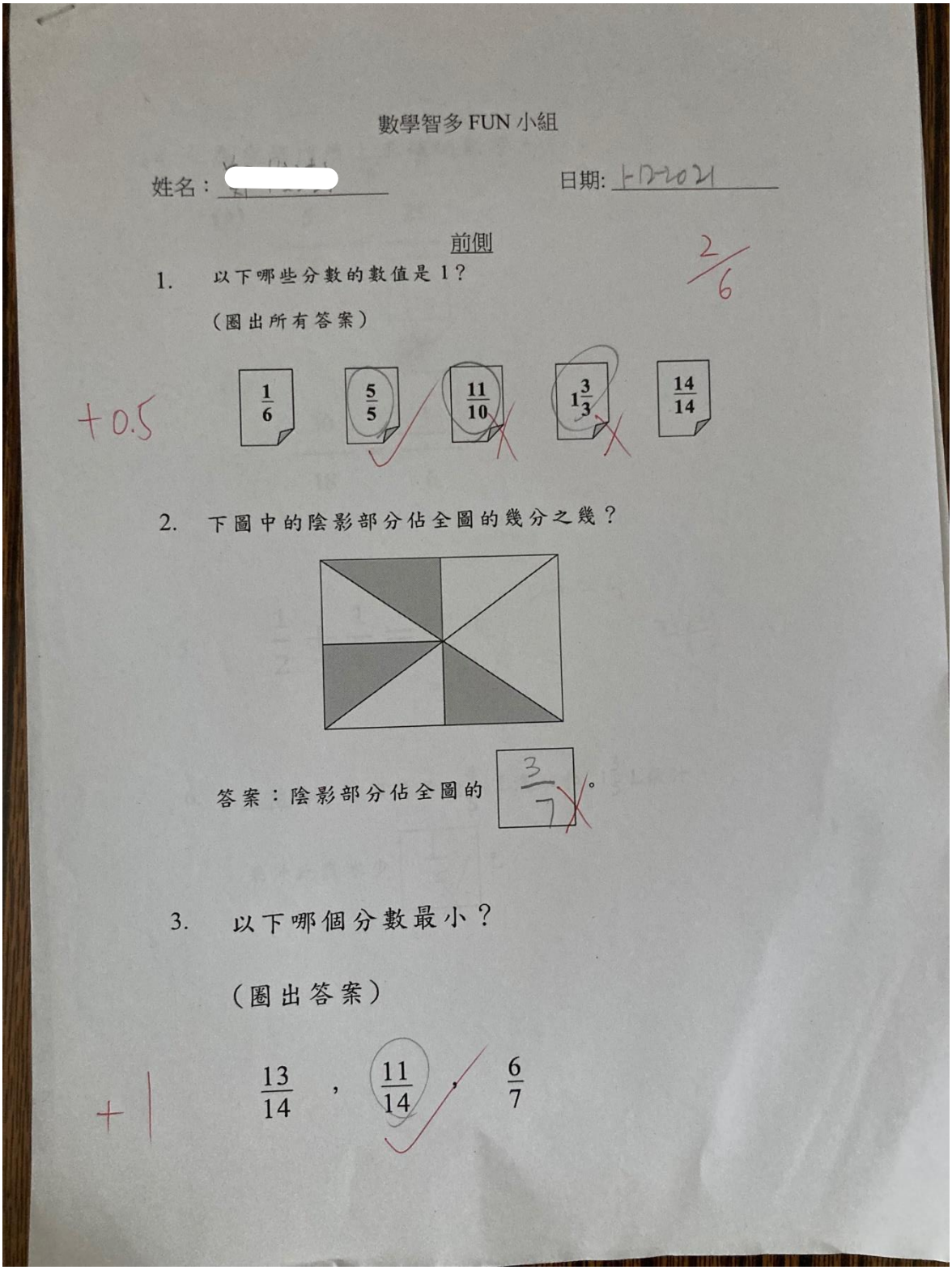
Appendix 1

Pre-test



數學智多 FUN 小組

姓名：[redacted]　　日期: 1-12-2021

前側

1. 以下哪些分數的數值是 1？

2/6

（圈出所有答案）

+0.5

$\frac{1}{6}$　$\frac{5}{5}$　$\frac{11}{10}$　$1\frac{3}{3}$　$\frac{14}{14}$

2. 下圖中的陰影部分佔全圖的幾分之幾？

答案：陰影部分佔全圖的 $\frac{3}{7}$。

3. 以下哪個分數最小？

（圈出答案）

+1

$\frac{13}{14}$ ， $\frac{11}{14}$ ， $\frac{6}{7}$

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4. 在空格內填上正確的數字。

(a) $\frac{5}{12} = \frac{25}{\boxed{60}}$

+0.5

(b) $\frac{30}{18} = \frac{\boxed{90}}{6}$

5. $\frac{1}{2} + \frac{1}{4} =$ $\frac{1}{2}+\frac{1}{2}$ $=1$

LCM = 4

$2\overline{)24}$
12

6. 蕙蘭為野餐預備了 $2\frac{4}{5}$ L汽水和 $1\frac{3}{5}$ L果汁。

果汁比汽水少 $\boxed{\frac{1}{5}}$ L。

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數學智多 FUN 小組

姓名：[redacted]　　日期: 12月19

前側

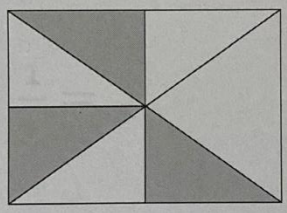
1. 以下哪些分數的數值是 1？

（圈出所有答案）

1/6

$\frac{1}{6}$　$\frac{5}{5}$　$\frac{11}{10}$　$1\frac{3}{3}$　$\frac{14}{14}$

2. 下圖中的陰影部分佔全圖的幾分之幾？



答案：陰影部分佔全圖的 3/7。

3. 以下哪個分數最小？

（圈出答案）

+1

$\frac{13}{14}$，$\frac{11}{14}$，$\frac{6}{7}$

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4. 在空格內填上正確的數字。

(a) $\frac{5}{12} = \frac{25}{\square}$ 75

(b) $\frac{30}{18} = \frac{\square}{6}$ 1

5. $\frac{1}{2} + \frac{1}{4} =$ $\frac{2}{6}$

6. 蕙蘭為野餐預備了 $2\frac{4}{5}$ L汽水和 $1\frac{3}{5}$ L果汁。

果汁比汽水少 $\square$ $\frac{7}{5}$ L。

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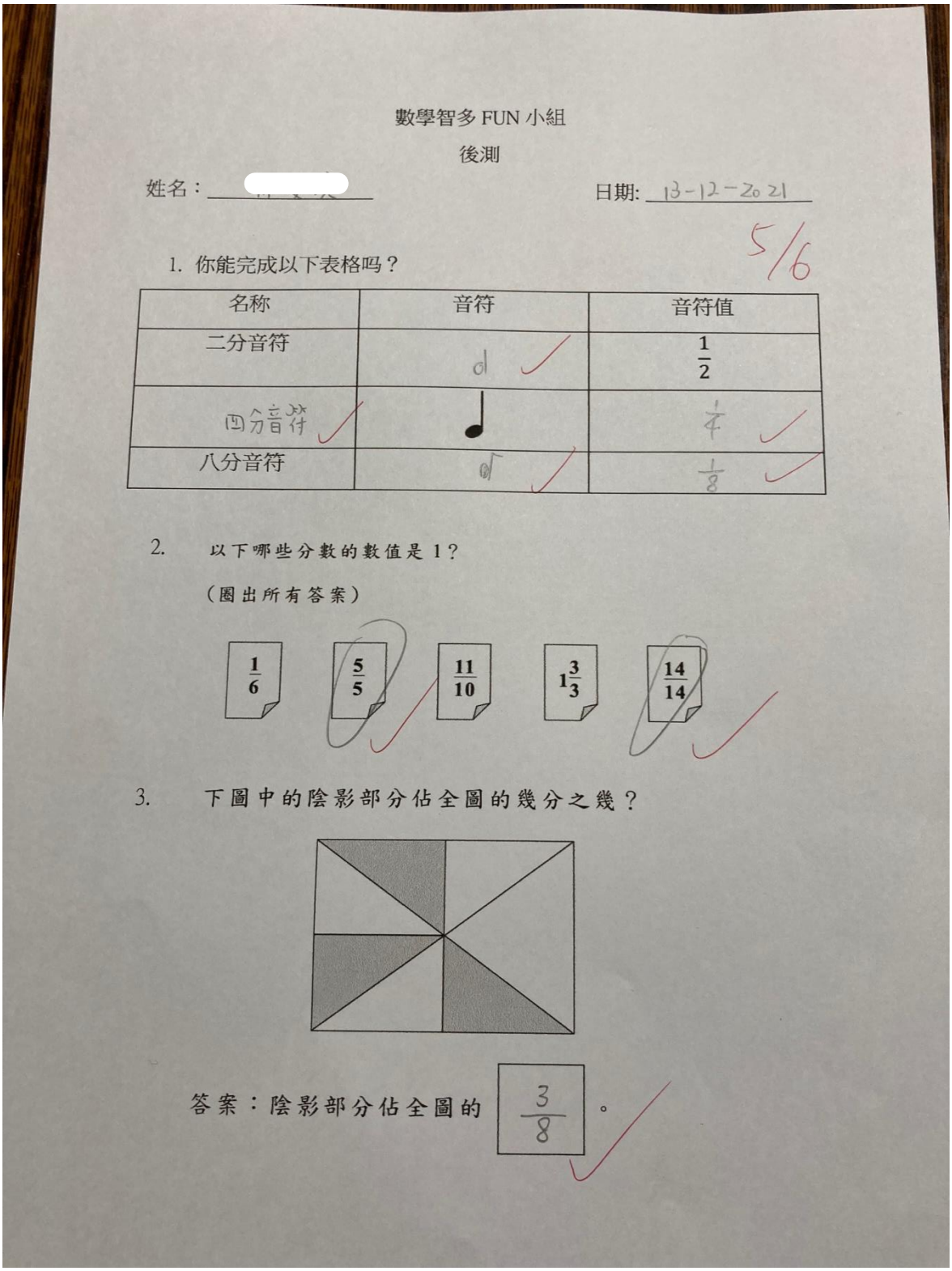
Post-test



數學智多 FUN 小組

後測

姓名：[redacted]　　日期: 13-12-2021

5/6

1. 你能完成以下表格吗？

名称	音符	音符值
二分音符	𝅗𝅥	$\frac{1}{2}$
四分音符	♩	$\frac{1}{4}$
八分音符	𝅘𝅥𝅮	$\frac{1}{8}$

2. 以下哪些分數的數值是 1？

（圈出所有答案）

$\frac{1}{6}$　$\frac{5}{5}$　$\frac{11}{10}$　$1\frac{3}{3}$　$\frac{14}{14}$

3. 下圖中的陰影部分佔全圖的幾分之幾？

答案：陰影部分佔全圖的 $\frac{3}{8}$ 。

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4. 在空格內填上正確的數字。

(a) $\frac{5}{12} = \frac{25}{\square}$ 70 ✗

(b) $\frac{30}{18} = \frac{\square}{6}$ 10 ✓

5. $\frac{1}{2} + \frac{1}{4} = \square$ $\frac{3}{4}$ ✓

6. 蕙蘭為野餐預備了 $3\frac{3}{10}$ L汽水和 $1\frac{3}{5}$ L果汁。

果汁比汽水少 $\square$ L。 $1\frac{7}{10}$ ✓

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數學智多 FUN 小組

後測

姓名：[redacted]　　日期: 13-12-2021

6/6

1. 你能完成以下表格吗？

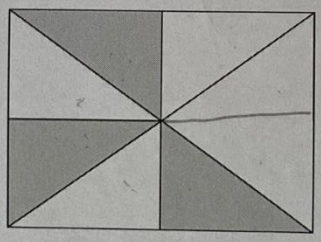
名称	音符	音符值
二分音符	𝅗𝅥 ✓	$\frac{1}{2}$
四分音符 ✓	♩	$\frac{1}{4}$ ✓
八分音符	𝅘𝅥𝅯 ✓	$\frac{1}{8}$ ✓

2. 以下哪些分數的數值是 1？

（圈出所有答案）

$\frac{1}{6}$　$\frac{5}{5}$　$\frac{11}{10}$　$1\frac{3}{3}$　$\frac{14}{14}$

3. 下圖中的陰影部分佔全圖的幾分之幾？



答案：陰影部分佔全圖的 $\frac{3}{8}$ ✓。

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4. 在空格內填上正確的數字。

(a) $\frac{5}{12} = \frac{25}{\boxed{60}}$

(b) $\frac{30}{18} = \frac{\boxed{10}}{6}$

5. $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4}$

$= \frac{3}{4}$

6. 蕙蘭為野餐預備了 $3\frac{3}{10}$ L汽水和 $1\frac{3}{5}$ L果汁。

果汁比汽水少 $\boxed{1\frac{7}{10}}$ L。

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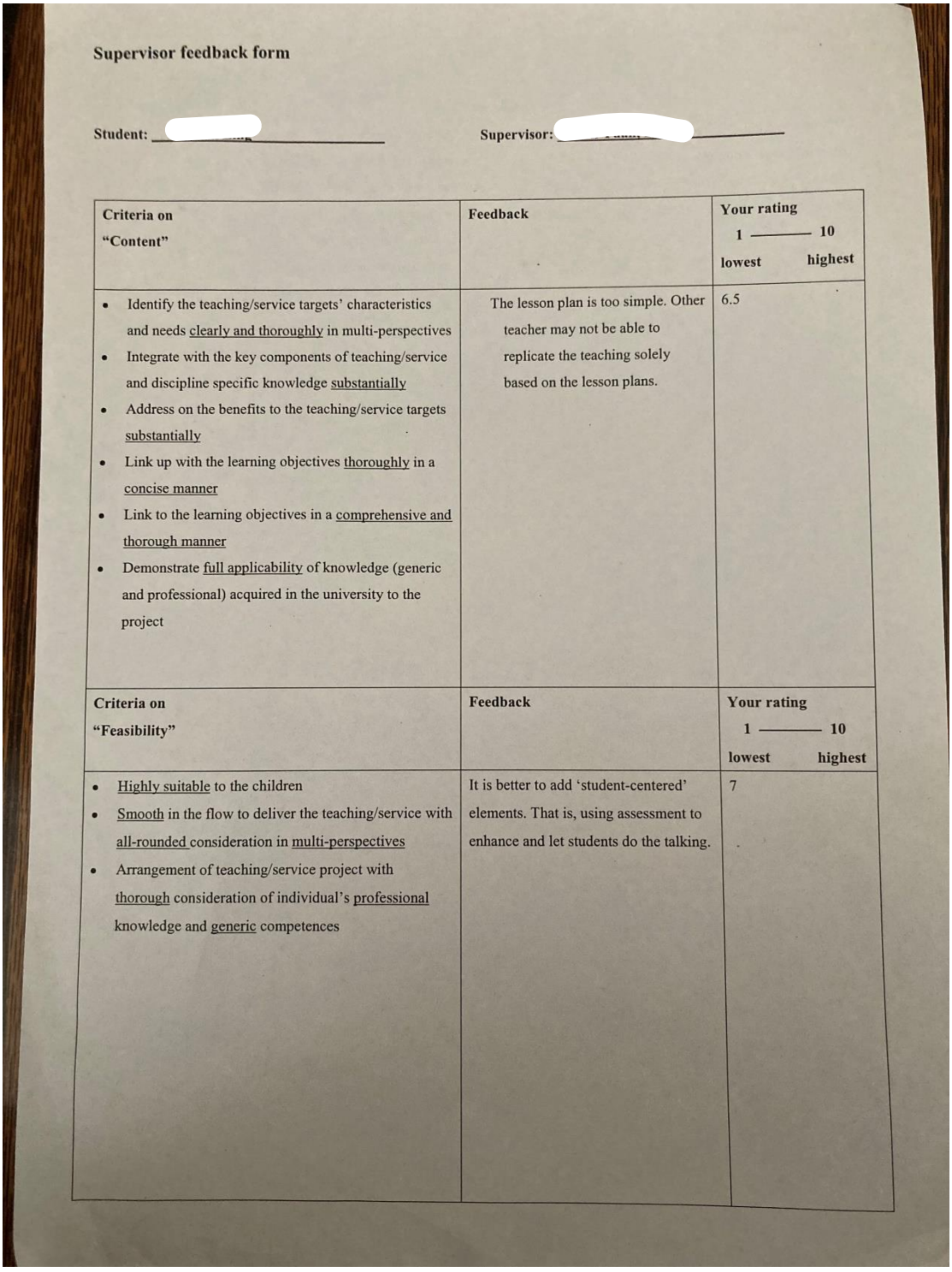
Appendix 2

Supervisor feedback



Supervisor feedback form

Student: [redacted] **Supervisor:** [redacted]

Criteria on "Content"	**Feedback**	**Your rating** 1 ——— 10 **lowest** **highest**
• Identify the teaching/service targets' characteristics and needs clearly and thoroughly in multi-perspectives • Integrate with the key components of teaching/service and discipline specific knowledge substantially • Address on the benefits to the teaching/service targets substantially • Link up with the learning objectives thoroughly in a concise manner • Link to the learning objectives in a comprehensive and thorough manner • Demonstrate full applicability of knowledge (generic and professional) acquired in the university to the project	The lesson plan is too simple. Other teacher may not be able to replicate the teaching solely based on the lesson plans.	6.5
Criteria on "Feasibility"	**Feedback**	**Your rating** 1 ——— 10 **lowest** **highest**
• Highly suitable to the children • Smooth in the flow to deliver the teaching/service with all-rounded consideration in multi-perspectives • Arrangement of teaching/service project with thorough consideration of individual's professional knowledge and generic competences	It is better to add 'student-centered' elements. That is, using assessment to enhance and let students do the talking.	7

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Criteria on "Creativity"	Feedback	Your rating 1 ——— 10 lowest highest
• Demonstrate highly innovative ideas thoroughly in the teaching/service proposal • The activities designed are able to synthesize new learning experience for the children in a deeper sense	The project facilitates fraction teaching in children with dyslexia using music intervention, which is very innovative. Music knowledge and their interests and motivation to attend math could also be the evidence of the efficacy of the project.	8.5

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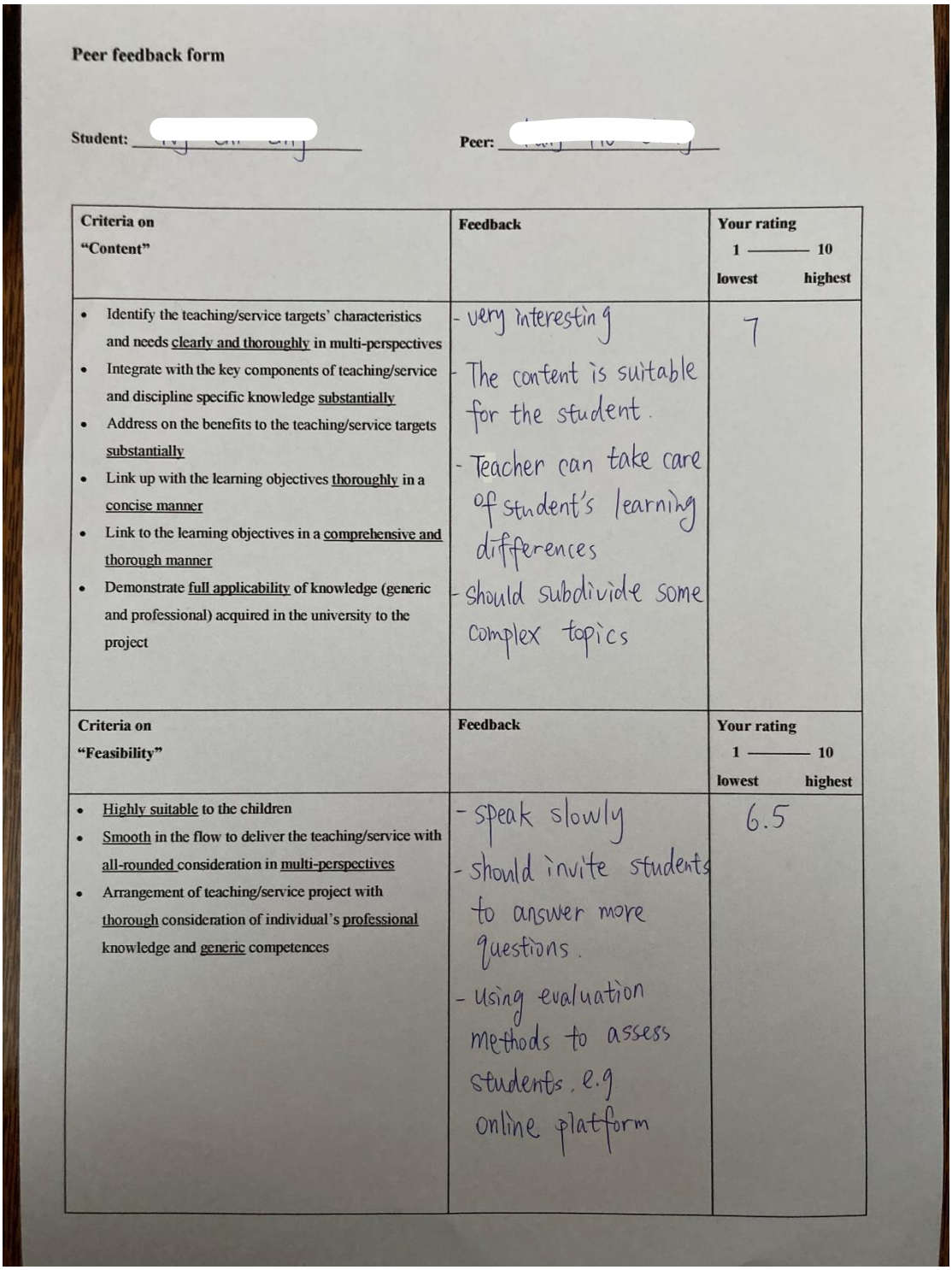
Peer feedback form



Peer feedback form

Student: [redacted] **Peer:** [redacted]

Criteria on "Content"	**Feedback**	**Your rating** 1 ——— 10 lowest highest
• Identify the teaching/service targets' characteristics and needs clearly and thoroughly in multi-perspectives • Integrate with the key components of teaching/service and discipline specific knowledge substantially • Address on the benefits to the teaching/service targets substantially • Link up with the learning objectives thoroughly in a concise manner • Link to the learning objectives in a comprehensive and thorough manner • Demonstrate full applicability of knowledge (generic and professional) acquired in the university to the project	- very interesting - The content is suitable for the student. - Teacher can take care of student's learning differences - Should subdivide some complex topics	7
Criteria on "Feasibility"	**Feedback**	**Your rating** 1 ——— 10 lowest highest
• Highly suitable to the children • Smooth in the flow to deliver the teaching/service with all-rounded consideration in multi-perspectives • Arrangement of teaching/service project with thorough consideration of individual's professional knowledge and generic competences	- speak slowly - should invite students to answer more questions. - using evaluation methods to assess students. e.g online platform	6.5

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Criteria on "Creativity"	Feedback	Your rating 1 ——— 10 lowest highest
• Demonstrate highly innovative ideas thoroughly in the teaching/service proposal • The activities designed are able to synthesize new learning experience for the children in a deeper sense	- Using music intervention is very creative and interesting - The activities can attract students - should add more interactive games.	8

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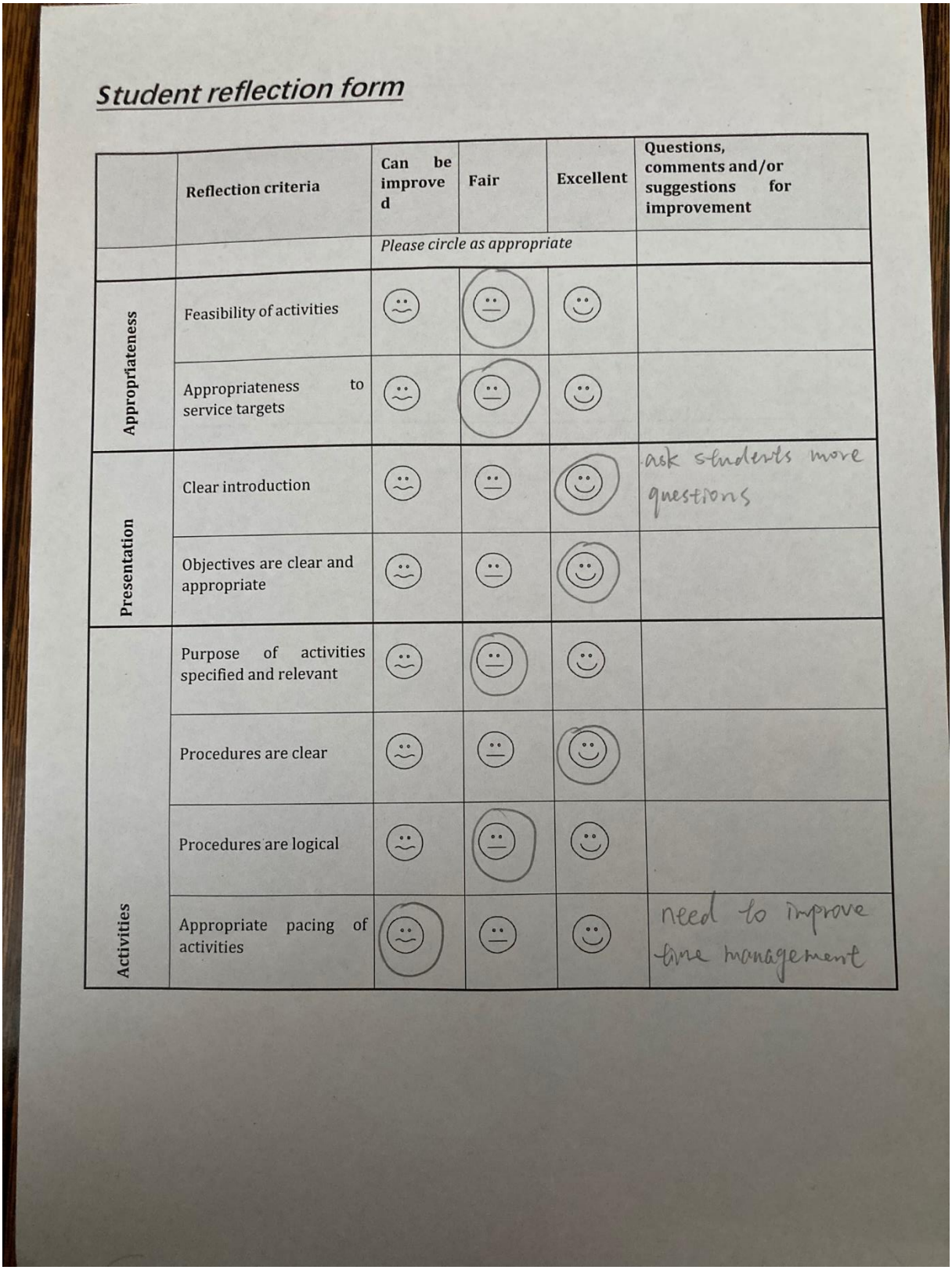
Student reflection form



Student reflection form

	Reflection criteria	Can be improved	Fair	Excellent	Questions, comments and/or suggestions for improvement
		Please circle as appropriate			
Appropriateness	Feasibility of activities	☹	😐	☺	
	Appropriateness to service targets	☹	😐	☺	
Presentation	Clear introduction	☹	😐	☺	ask students more questions
	Objectives are clear and appropriate	☹	😐	☺	
Activities	Purpose of activities specified and relevant	☹	😐	☺	
	Procedures are clear	☹	😐	☺	
	Procedures are logical	☹	😐	☺	
	Appropriate pacing of activities	☹	😐	☺	need to improve time management

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General comments or suggestions on session plan:

I still need to improve the time management.
After finishing the session, it is best to ask students to say what they're feeling and what they've learned.
Let the students summarize the content of the class.

1. Reliable and objective monitoring / evaluation systems.
2. Precise and concise elaborations / descriptions.

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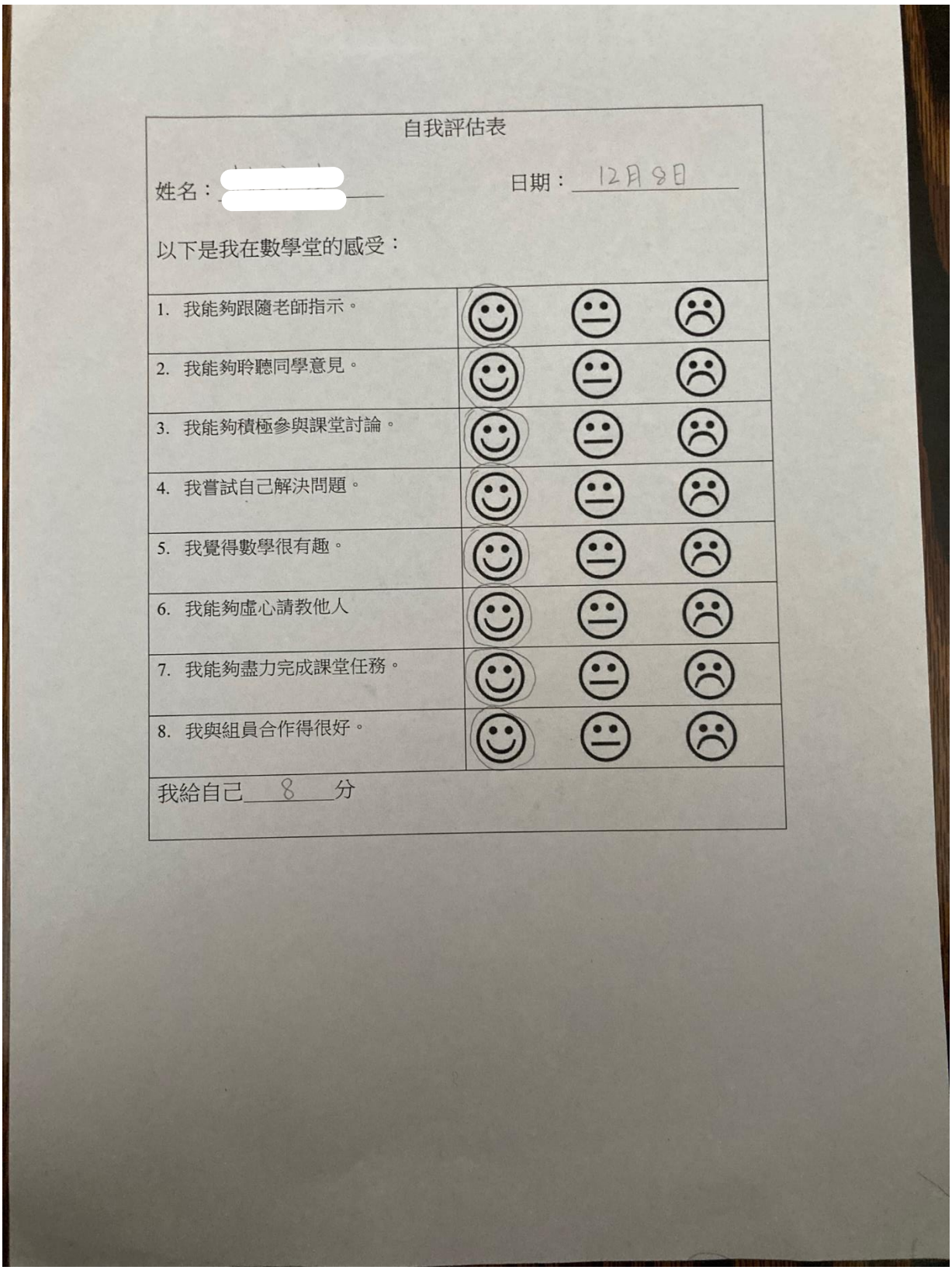

自我評估表

姓名：[redacted]　　日期：12月8日

以下是我在數學堂的感受：

1. 我能夠跟隨老師指示。	☺	😐	☹
2. 我能夠聆聽同學意見。	☺	😐	☹
3. 我能夠積極參與課堂討論。	☺	😐	☹
4. 我嘗試自己解決問題。	☺	😐	☹
5. 我覺得數學很有趣。	☺	😐	☹
6. 我能夠虛心請教他人	☺	😐	☹
7. 我能夠盡力完成課堂任務。	☺	😐	☹
8. 我與組員合作得很好。	☺	😐	☹

我給自己 8 分

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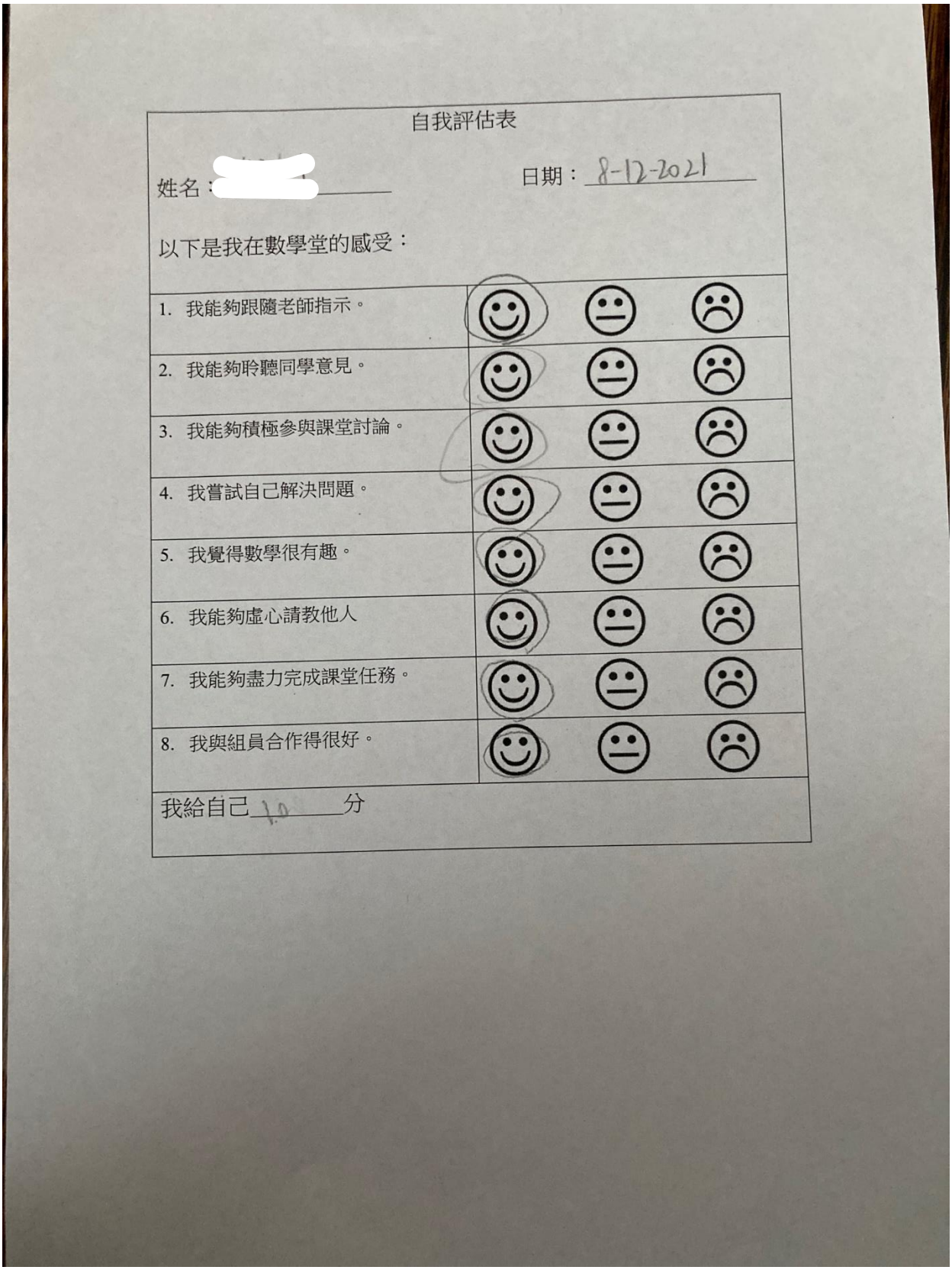

自我評估表

姓名：[redacted]　　日期：8-12-2021

以下是我在數學堂的感受：

1. 我能夠跟隨老師指示。	☺	😐	☹
2. 我能夠聆聽同學意見。	☺	😐	☹
3. 我能夠積極參與課堂討論。	☺	😐	☹
4. 我嘗試自己解決問題。	☺	😐	☹
5. 我覺得數學很有趣。	☺	😐	☹
6. 我能夠虛心請教他人	☺	😐	☹
7. 我能夠盡力完成課堂任務。	☺	😐	☹
8. 我與組員合作得很好。	☺	😐	☹

我給自己 10 分

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同儕互評表

姓名：[redacted]　　日期：8/12/2021

評價組員：[redacted]

請回想剛才活動時組員的表現，填寫以下表格。

「1-5 分：1 為最低，5 為最高」

	1	2	3	4	5
1. 組員樂於參與討論				✓	✓
2. 組員能一起計算題目					✓
3. 組員能幫助他人回答問題					✓
4. 組員投入課堂活動					✓

我對她／他的課堂表現（滿意）／ 不滿意）

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同儕互評表

姓名：[redacted]　　日期：12月8日

評價組員：[redacted]

請回想剛才活動時組員的表現，填寫以下表格。

「1-5 分：1 為最低，5 為最高」

	1	2	3	4	5
1. 組員樂於參與討論					✓
2. 組員能一起計算題目					✓
3. 組員能幫助他人回答問題					✓
4. 組員投入課堂活動					✓

我對她／他的課堂表現（滿意）／ 不滿意）

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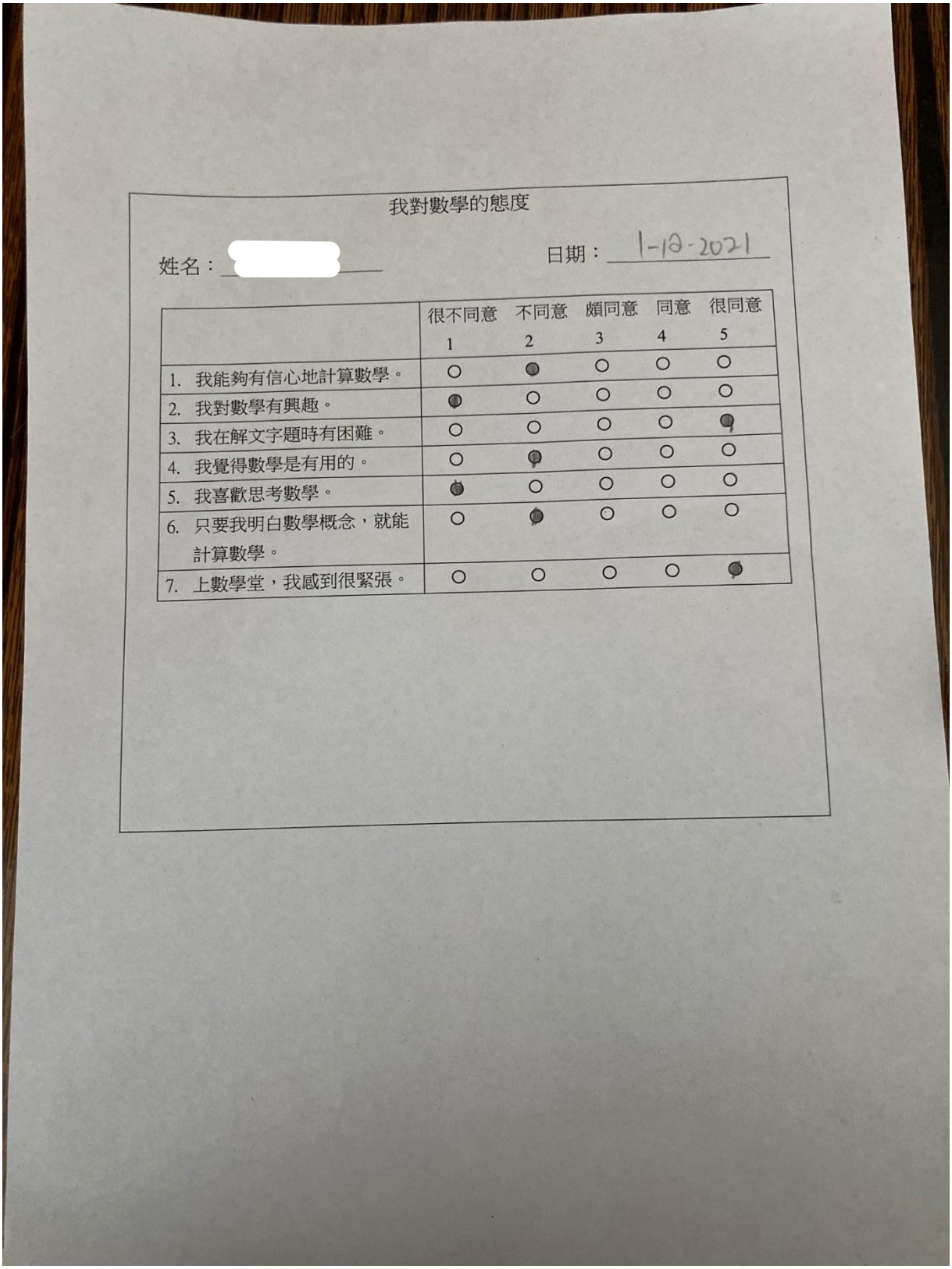
Initial survey



我對數學的態度

姓名：[redacted]　　日期：1-10-2021

	很不同意 1	不同意 2	頗同意 3	同意 4	很同意 5
1. 我能夠有信心地計算數學。	○	●	○	○	○
2. 我對數學有興趣。	●	○	○	○	○
3. 我在解文字題時有困難。	○	○	○	○	●
4. 我覺得數學是有用的。	○	●	○	○	○
5. 我喜歡思考數學。	●	○	○	○	○
6. 只要我明白數學概念，就能計算數學。	○	●	○	○	○
7. 上數學堂，我感到很緊張。	○	○	○	○	●

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我對數學的態度

姓名：[redacted]　　日期：1-12-2021

	很不同意 1	不同意 2	頗同意 3	同意 4	很同意 5
1. 我能夠有信心地計算數學。	●	○	○	○	○
2. 我對數學有興趣。	○	●	○	○	○
3. 我在解文字題時有困難。	○	○	○	○	●
4. 我覺得數學是有用的。	○	●	○	○	○
5. 我喜歡思考數學。	●	○	○	○	○
6. 只要我明白數學概念，就能計算數學。	○	○	●	○	○
7. 上數學堂，我感到很緊張。	○	○	○	●	○

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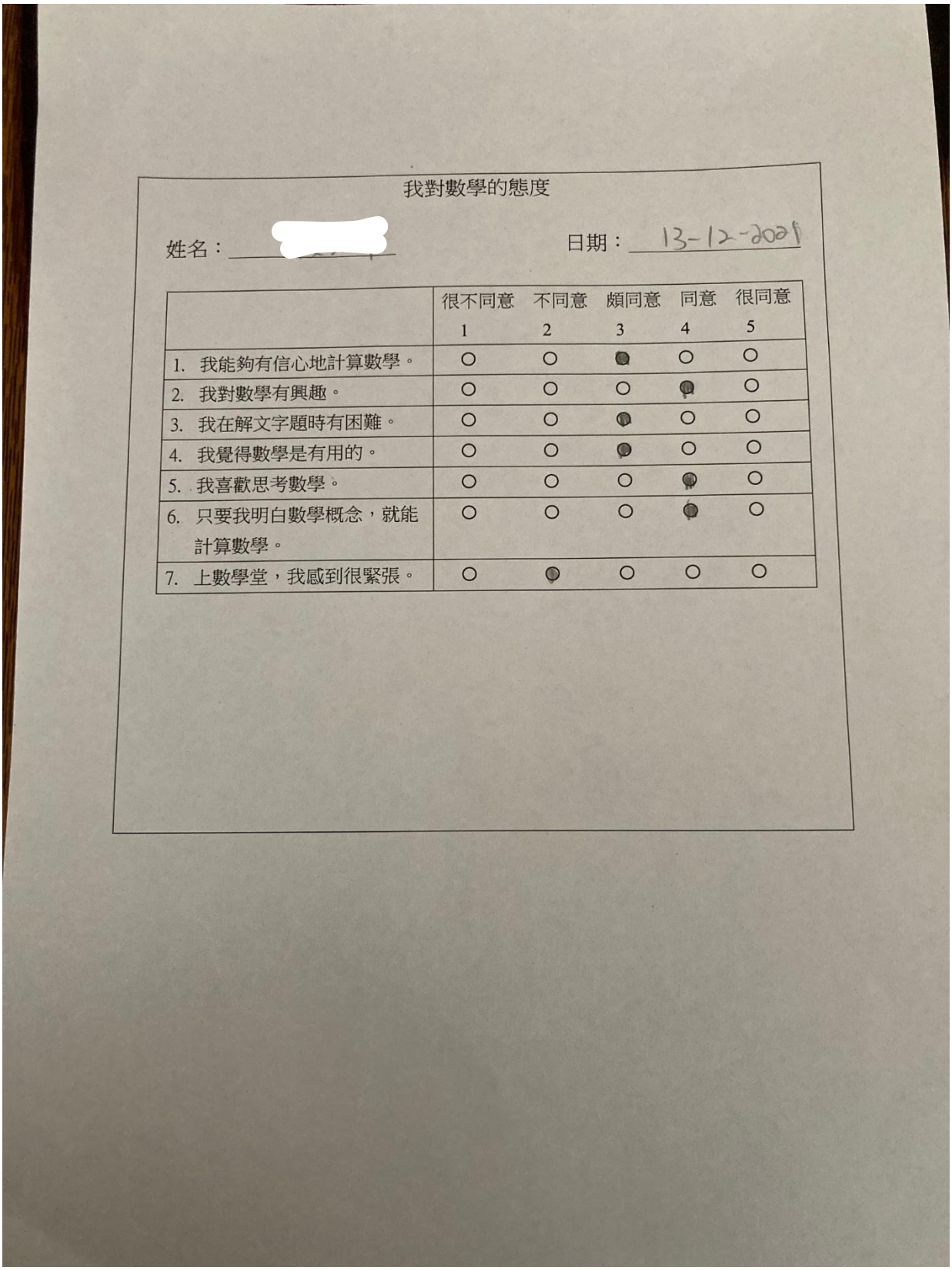
Final survey



我對數學的態度

姓名：[redacted]　　日期：13-12-2021

	很不同意 1	不同意 2	頗同意 3	同意 4	很同意 5
1. 我能夠有信心地計算數學。	○	○	●	○	○
2. 我對數學有興趣。	○	○	○	●	○
3. 我在解文字題時有困難。	○	○	●	○	○
4. 我覺得數學是有用的。	○	○	●	○	○
5. 我喜歡思考數學。	○	○	○	●	○
6. 只要我明白數學概念，就能計算數學。	○	○	○	●	○
7. 上數學堂，我感到很緊張。	○	●	○	○	○

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我對數學的態度

姓名：[redacted]　　日期：12月13日

	很不同意 1	不同意 2	頗同意 3	同意 4	很同意 5
1. 我能夠有信心地計算數學。	○	○	●	○	○
2. 我對數學有興趣。	○	○	●	○	○
3. 我在解文字題時有困難。	○	●	○	○	○
4. 我覺得數學是有用的。	○	○	●	○	○
5. 我喜歡思考數學。	○	○	○	●	○
6. 只要我明白數學概念，就能計算數學。	○	○	●	○	○
7. 上數學堂，我感到很緊張。	○	●	○	○	○

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有關學生數學課堂表現的評估

學生姓名：_____ 班別：_____

評估老師姓名：_____ 日期：_____

請為學生的課堂表現評分，在適當方格內填上「✓」。

「1-5 分：1 為最低，5 為最高」

	1	2	3	4	5
1. 學生能夠積極投入課堂。					
2. 學生能積極與他人討論。					
3. 學生能提出數學問題。					
4. 學生能積極回答問題。					
5. 學生能嘗試解決數學問題。					
6. 學生對計算數學的信心增加了。					

請寫出你對他／她的一點讚賞和需要改善的地方：

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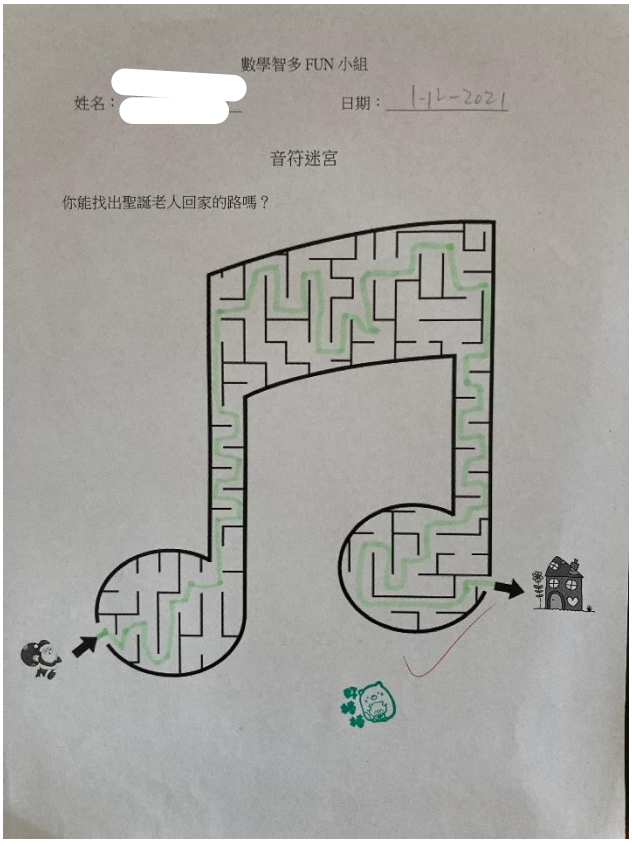
Appendix 3

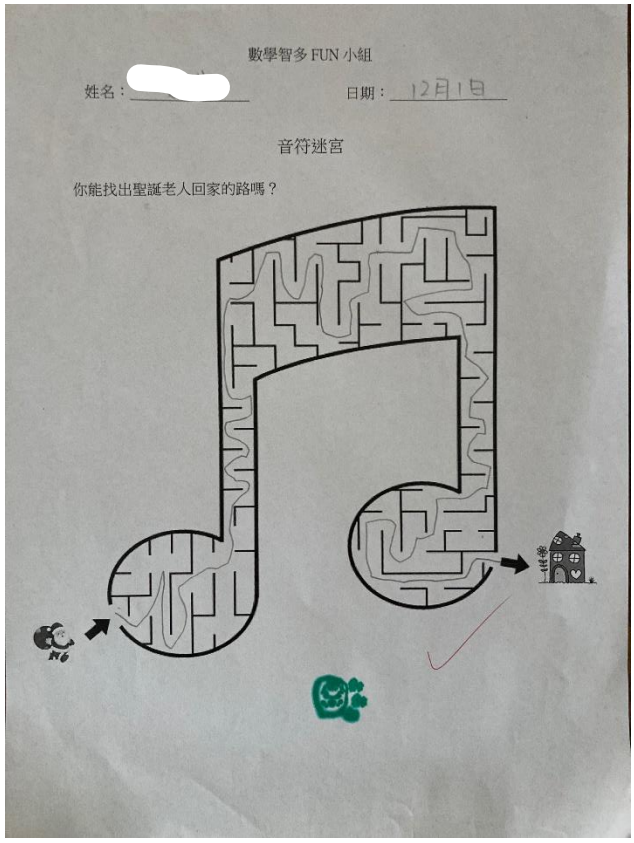
Session 1 worksheet


數學智多 FUN 小組

姓名：[redacted]　日期：1-12-2021

音符迷宮

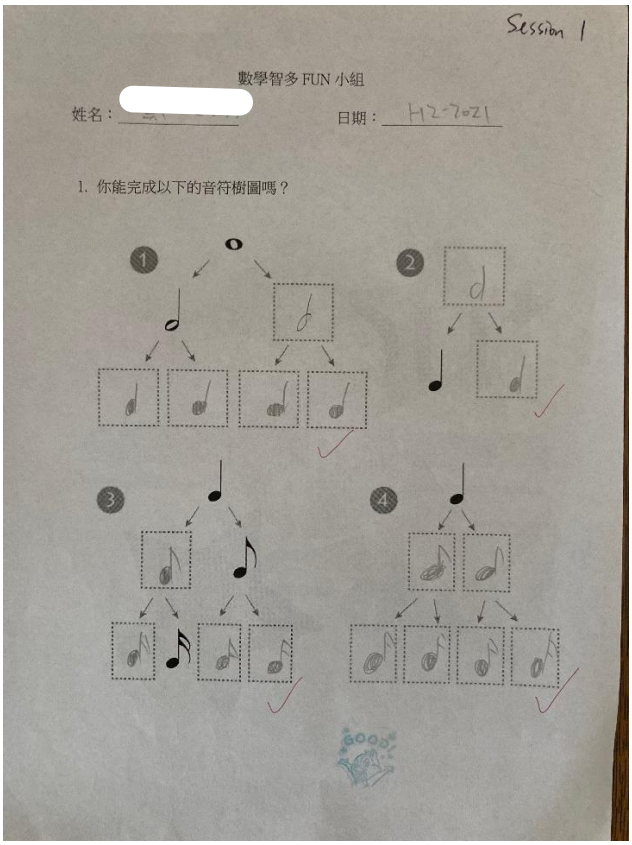
你能找出聖誕老人回家的路嗎？


數學智多 FUN 小組

姓名：[redacted]　日期：12月1日

音符迷宮

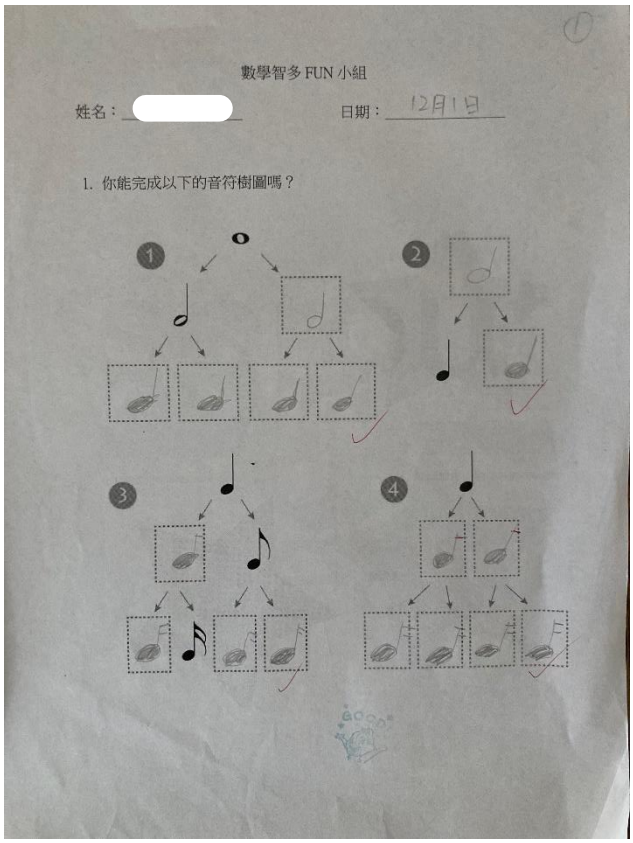
你能找出聖誕老人回家的路嗎？


Session 1

數學智多 FUN 小組

姓名：[redacted]　日期：12-2021

1. 你能完成以下的音符樹圖嗎？


數學智多 FUN 小組

姓名：[redacted]　日期：12月1日

1. 你能完成以下的音符樹圖嗎？

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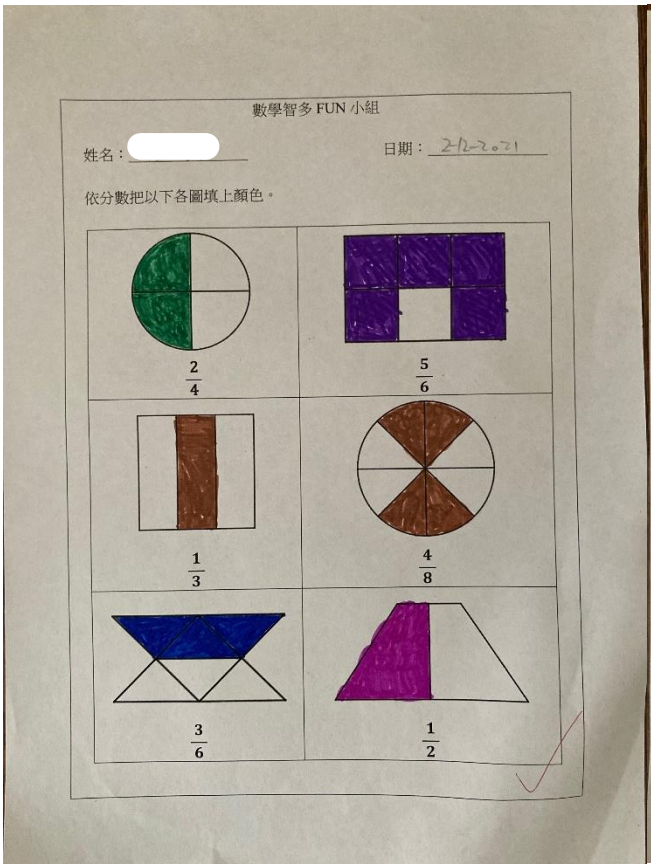
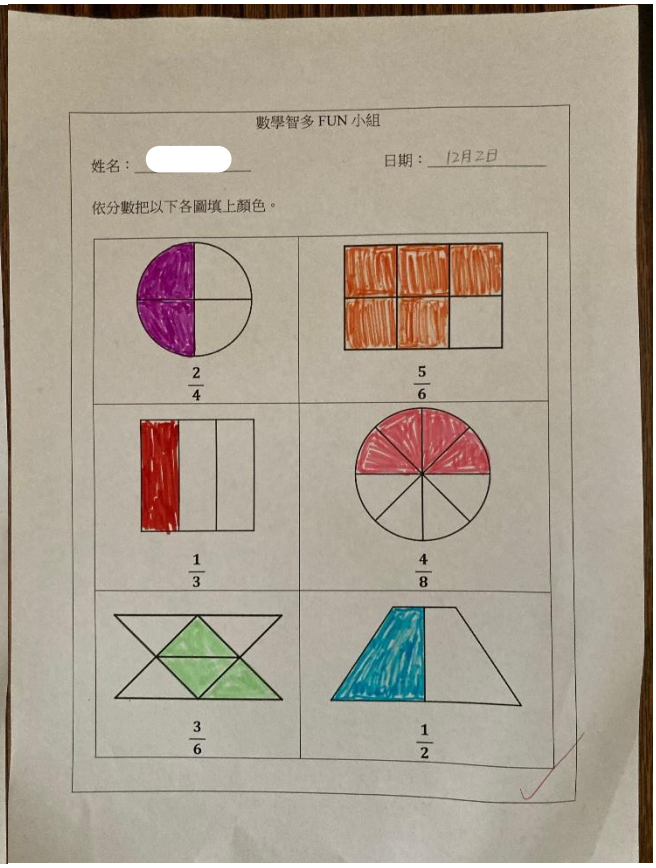
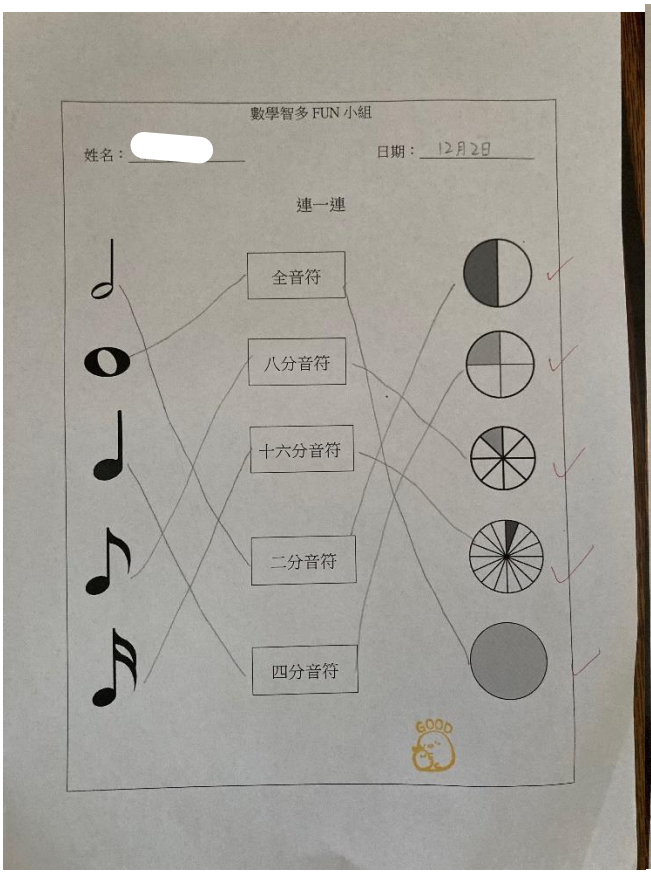
Session 2 worksheet







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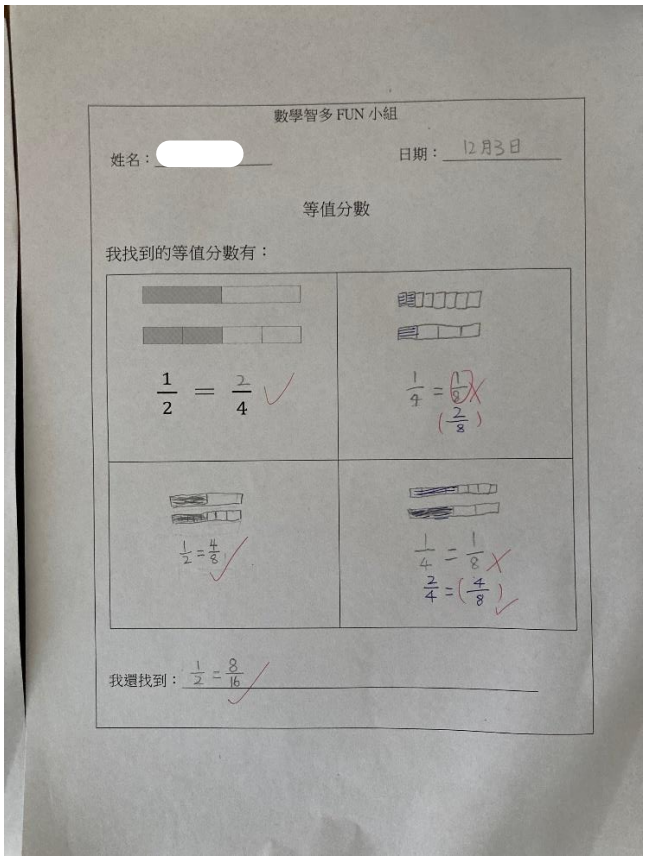
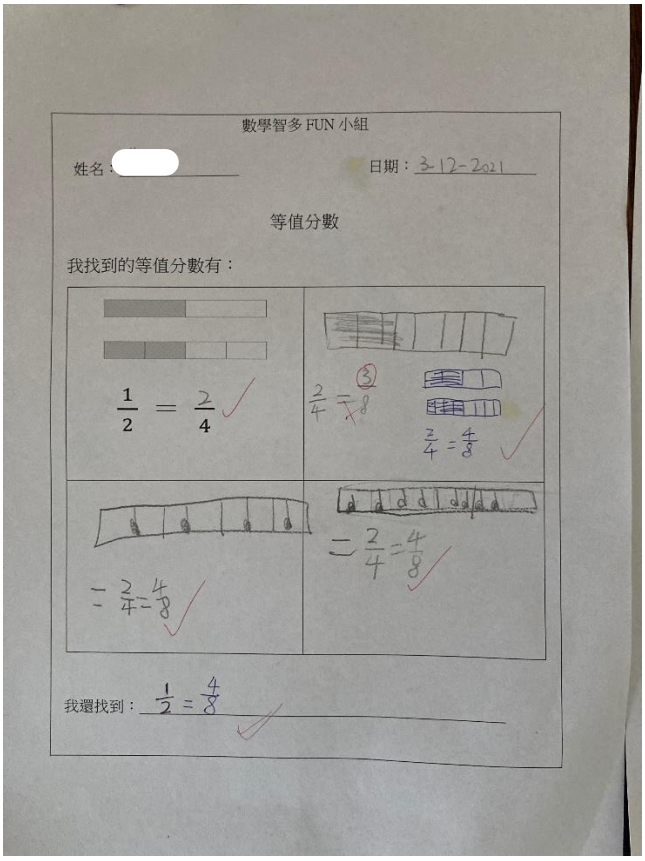
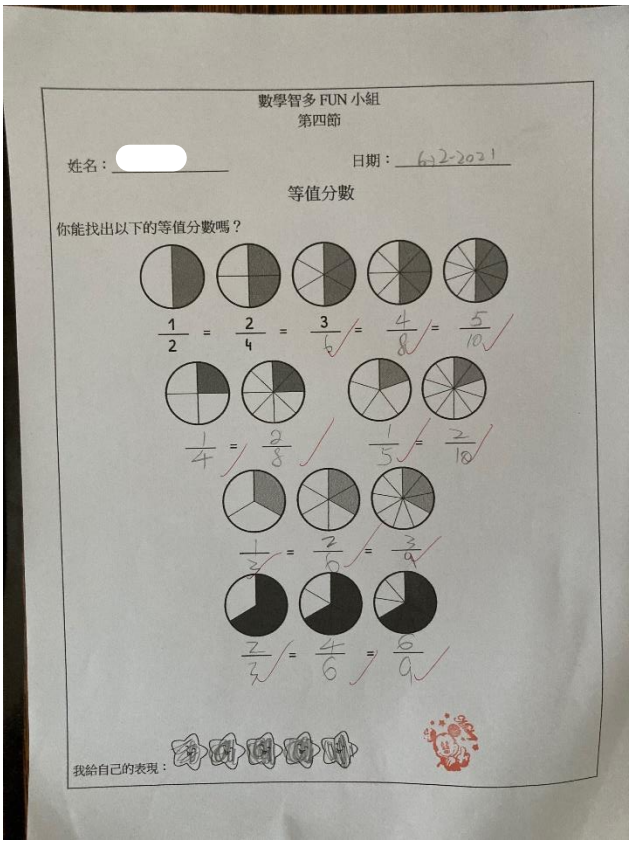
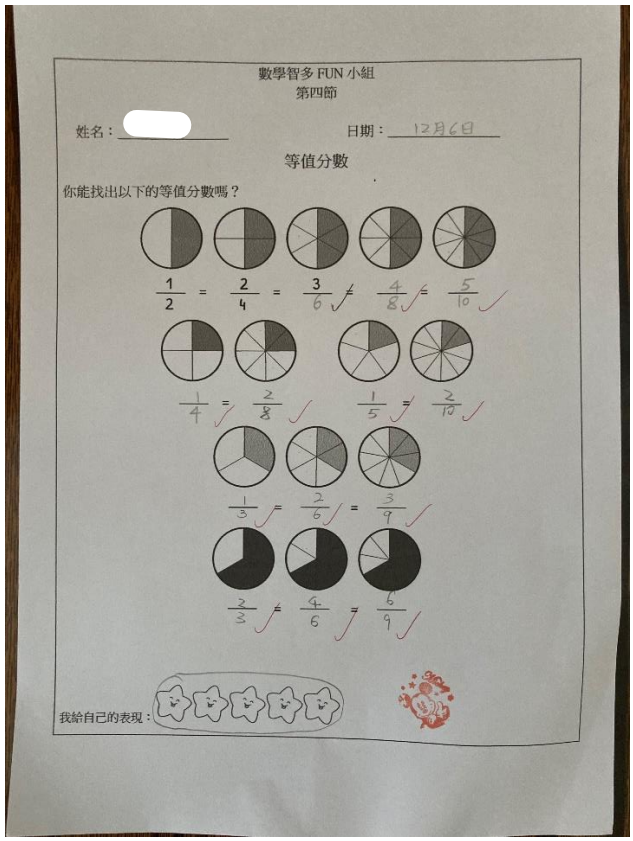
Session 3 worksheet





Session 4 worksheet





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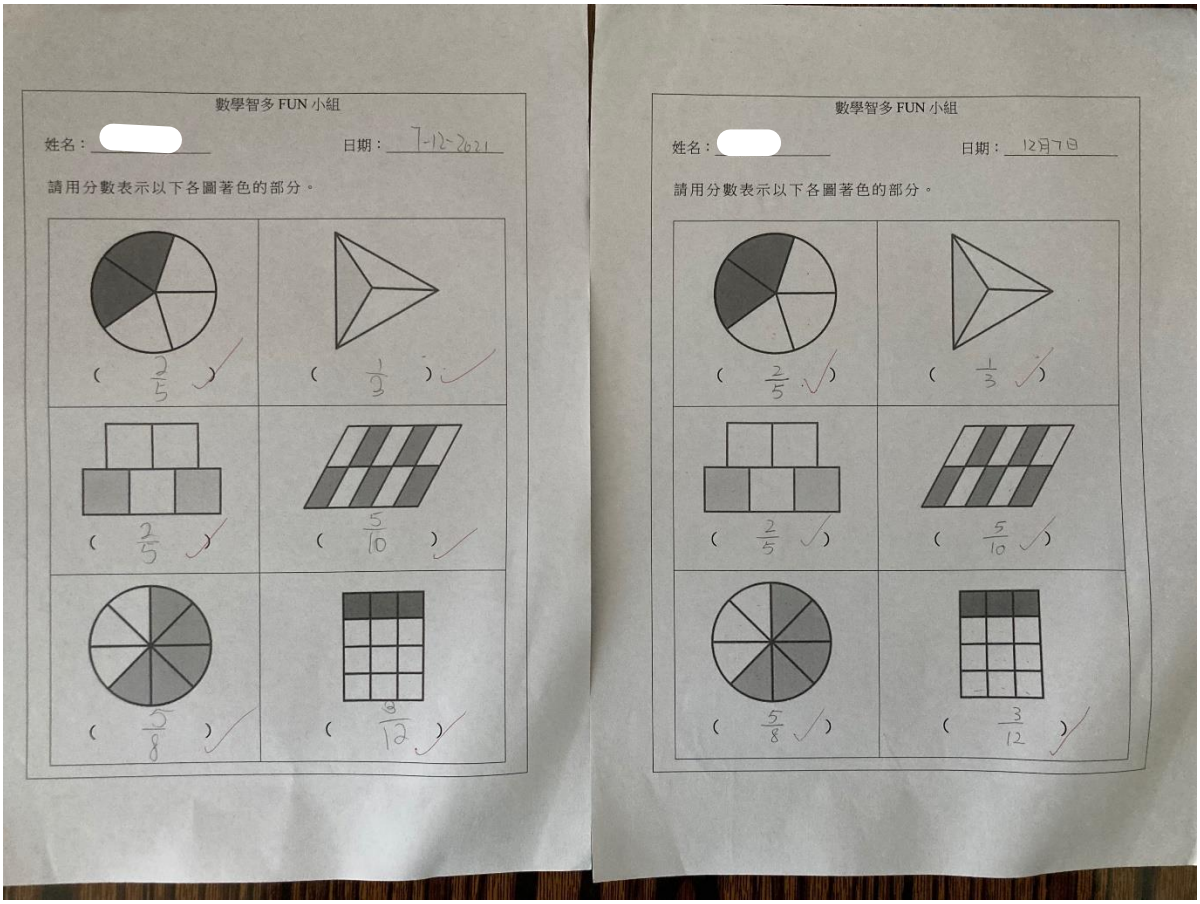
Session 5 worksheet


數學智多 FUN 小組

姓名：[redacted]　日期：7-12-2021

請用分數表示以下各圖著色的部分。

($\frac{2}{5}$) ($\frac{1}{2}$)

($\frac{2}{5}$) ($\frac{5}{10}$)

($\frac{5}{8}$) ($\frac{8}{12}$)

數學智多 FUN 小組

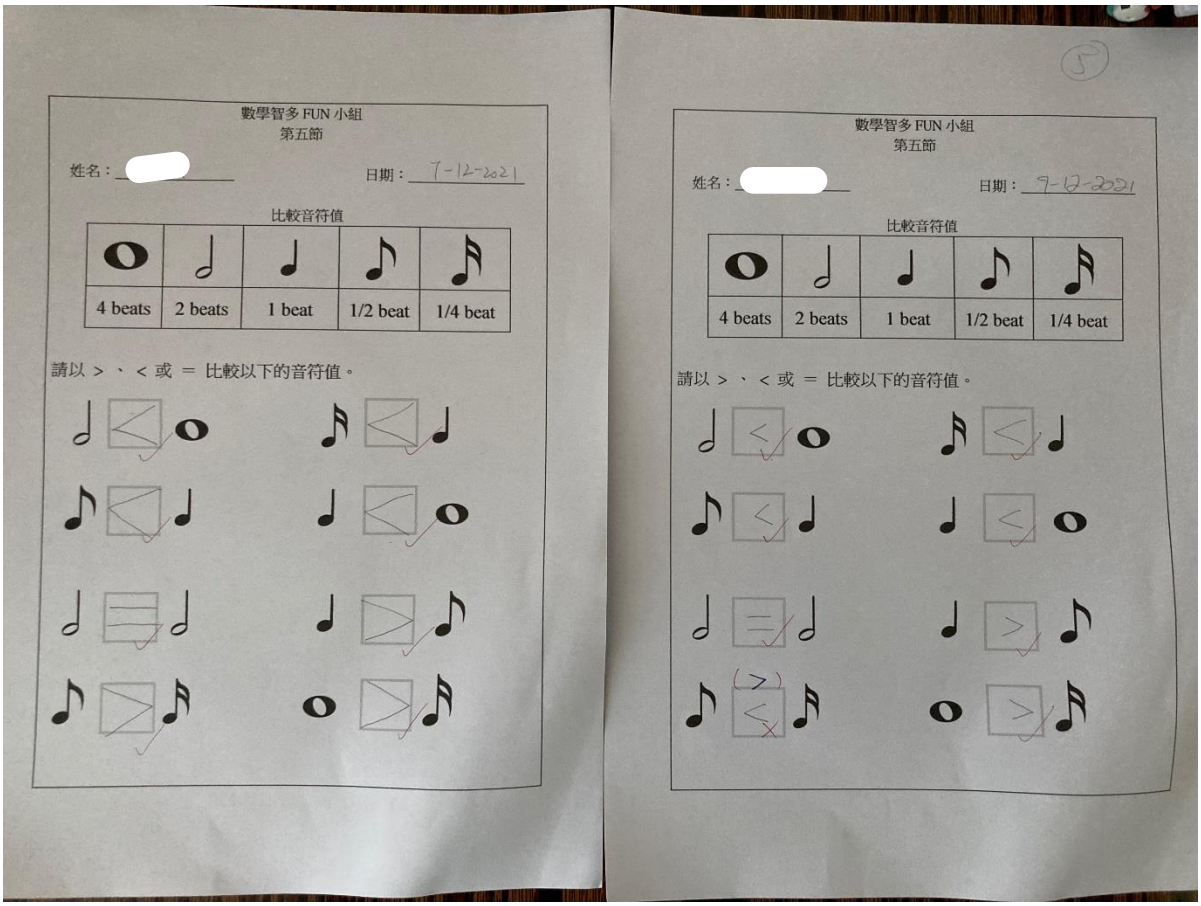
姓名：[redacted]　日期：12月7日

請用分數表示以下各圖著色的部分。

($\frac{2}{5}$) ($\frac{1}{3}$)

($\frac{2}{5}$) ($\frac{5}{10}$)

($\frac{5}{8}$) ($\frac{3}{12}$)


數學智多 FUN 小組
第五節

姓名：[redacted]　日期：7-12-2021

比較音符值

4 beats	2 beats	1 beat	1/2 beat	1/4 beat

請以 > 、< 或 = 比較以下的音符值。

數學智多 FUN 小組
第五節

姓名：[redacted]　日期：7-12-2021

比較音符值

4 beats	2 beats	1 beat	1/2 beat	1/4 beat

請以 > 、< 或 = 比較以下的音符值。

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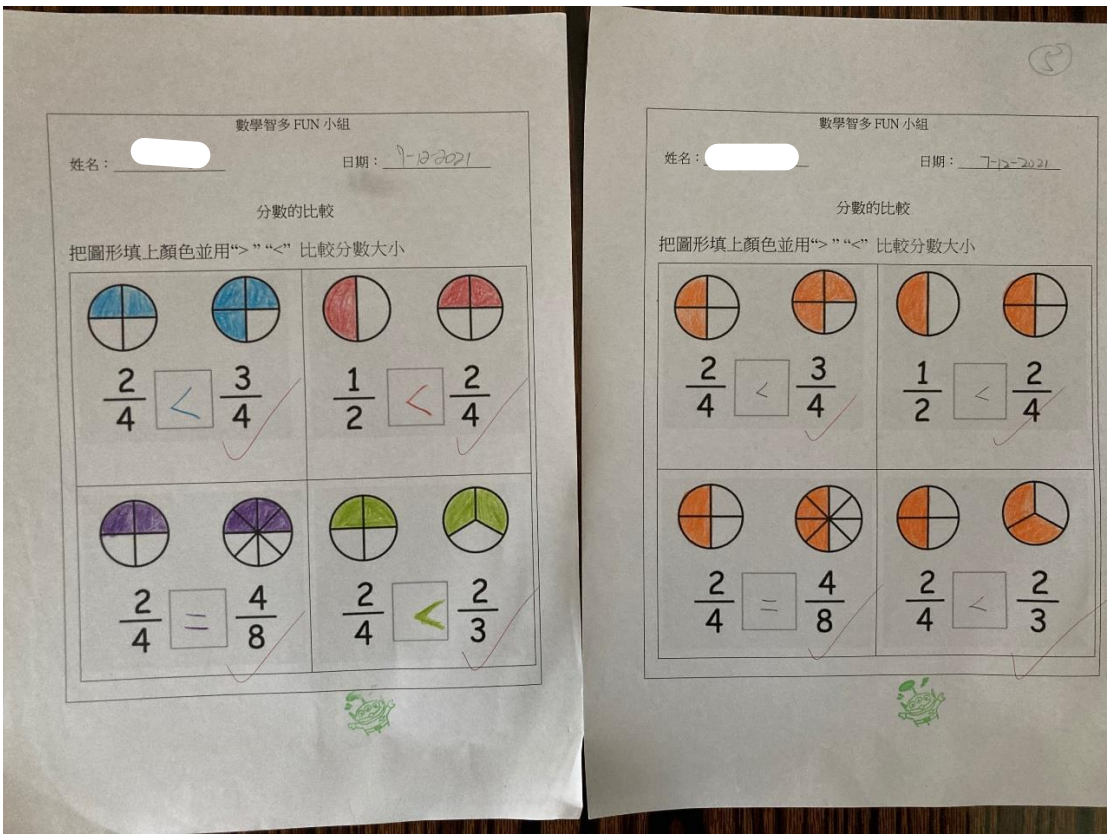
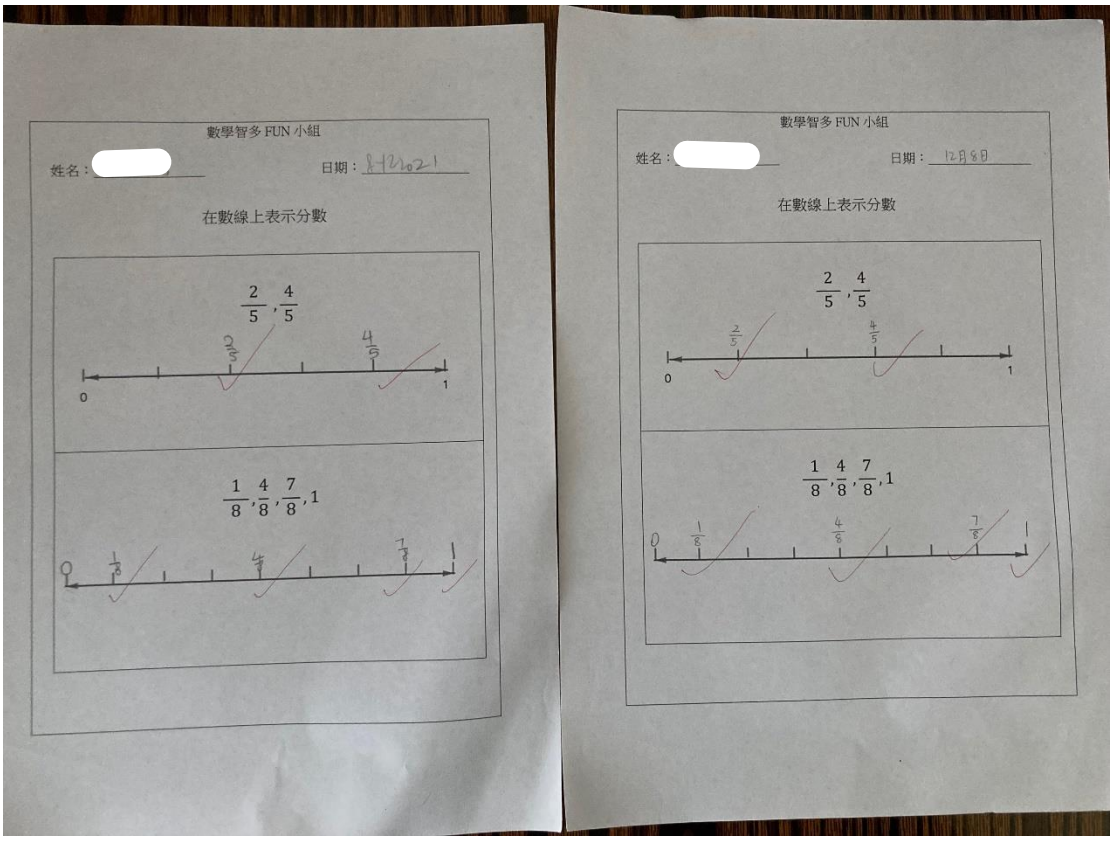


Session 6 worksheet



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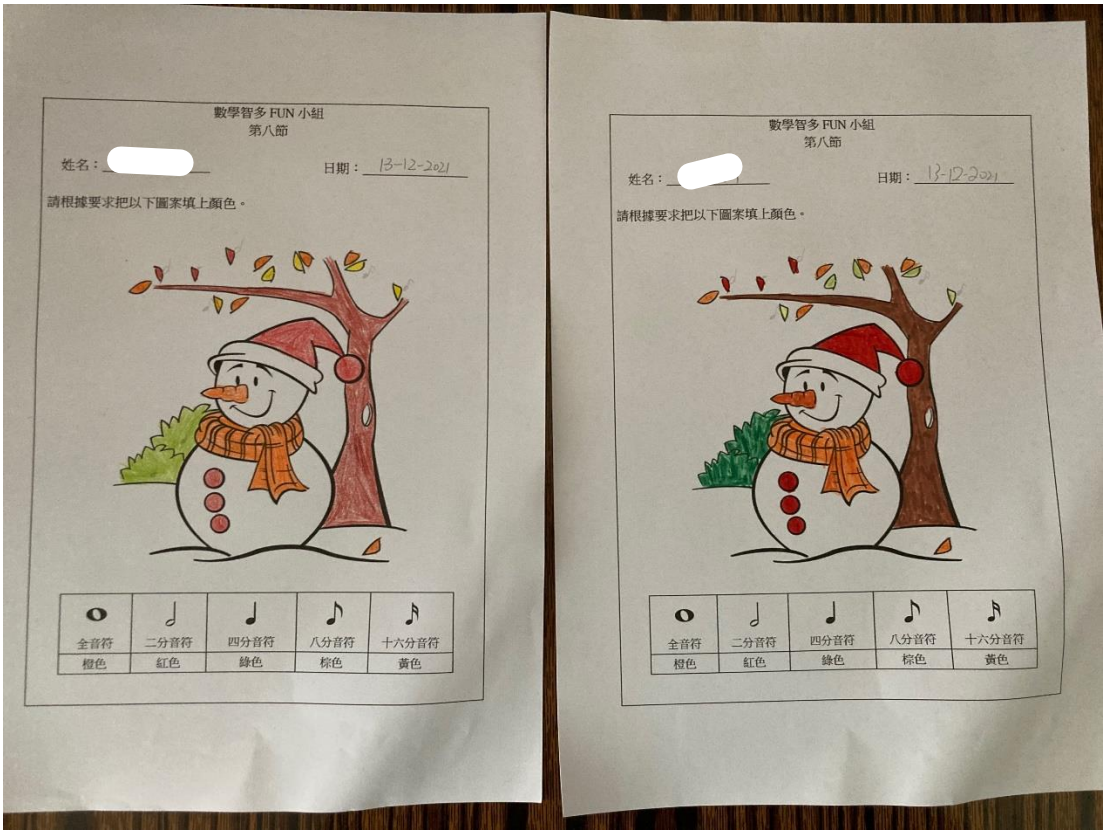
Session 8 worksheet


數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

請根據要求把以下圖案填上顏色。

全音符	二分音符	四分音符	八分音符	十六分音符
橙色	紅色	綠色	棕色	黃色

數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

Music Math (Add the beats)

4 beats	2 beats	1 beat	1/2 beat	1/4 beat

1. ♩ + ♩ = 2
2. ♫ + ♩ = 1¼
3. 𝅝 + ♫ = 4¼
4. 𝅗𝅥 + 𝅝 = 6
5. ♫ + 𝅗𝅥 = 2¼
6. 𝅗𝅥 + ♫ = 2¼
7. ♩ + 𝅝 = 5
8. ♫ + 𝅗𝅥 = 2¼
9. ♩ + ♫ = 1¼
10. 𝅝 + 𝅗𝅥 = 6

$\frac{4}{12} + \frac{5}{12} = \frac{9}{12}$　$\frac{3}{9} + \frac{2}{9} = \frac{5}{9}$

$\frac{1}{7} + \frac{3}{7} = \frac{4}{7}$　$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

Music Math (Add the beats)

4 beats	2 beats	1 beat	1/2 beat	1/4 beat

1. ♩ + ♩ = 2
2. ♫ + ♩ = 1¼
3. 𝅝 + ♫ = 4¼
4. 𝅗𝅥 + 𝅝 = 6
5. ♫ + 𝅗𝅥 = 2¼
6. 𝅗𝅥 + ♫ = 2¼
7. ♩ + 𝅝 = 5
8. ♫ + 𝅗𝅥 = 2¼
9. ♩ + ♫ = 1¼
10. 𝅝 + 𝅗𝅥 = 6

$\frac{4}{12} + \frac{5}{12} = \frac{9}{12}$　$\frac{3}{9} + \frac{2}{9} = \frac{5}{9}$

$\frac{1}{7} + \frac{3}{7} = \frac{4}{7}$　$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$

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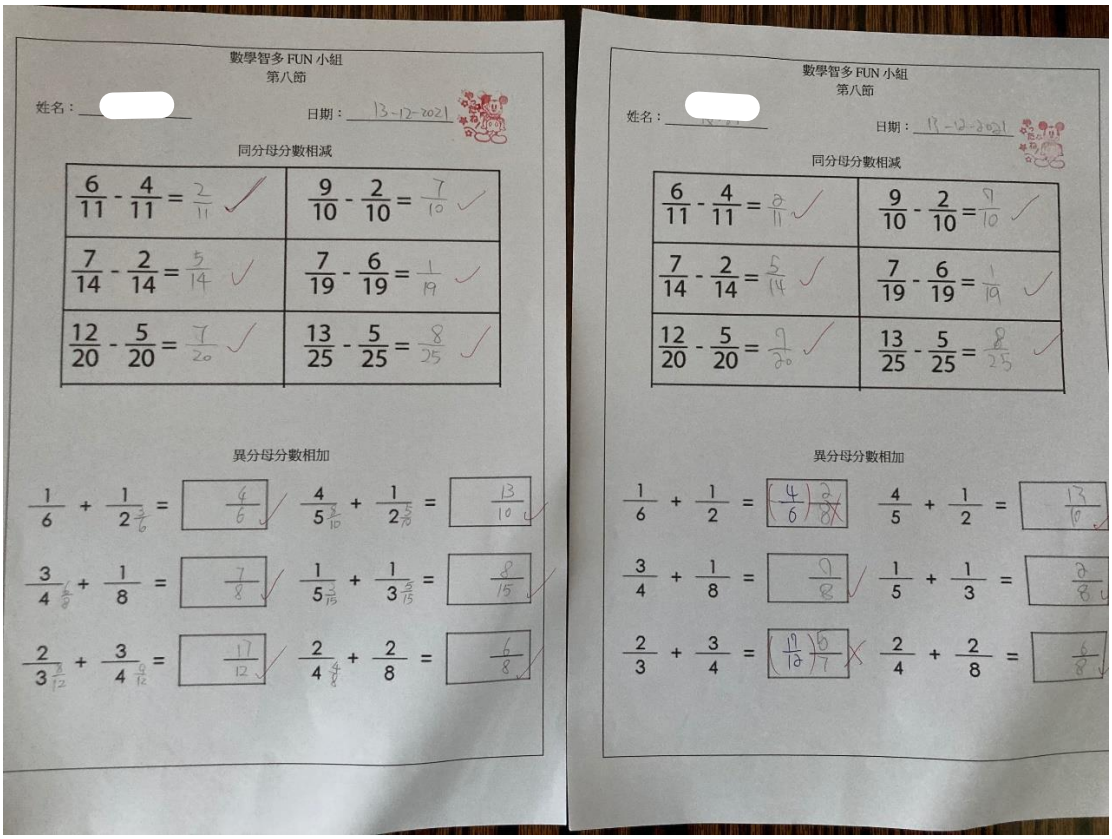


數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

同分母分數相減

$\frac{6}{11} - \frac{4}{11} = \frac{2}{11}$ ✓	$\frac{9}{10} - \frac{2}{10} = \frac{7}{10}$ ✓
$\frac{7}{14} - \frac{2}{14} = \frac{5}{14}$ ✓	$\frac{7}{19} - \frac{6}{19} = \frac{1}{19}$ ✓
$\frac{12}{20} - \frac{5}{20} = \frac{7}{20}$ ✓	$\frac{13}{25} - \frac{5}{25} = \frac{8}{25}$ ✓

異分母分數相加

$\frac{1}{6} + \frac{1}{2\frac{3}{6}} =$ [4/6] ✓　$\frac{4}{5\frac{2}{10}} + \frac{1}{2\frac{3}{10}} =$ [13/10] ✓

$\frac{3}{4\frac{6}{8}} + \frac{1}{8} =$ [7/8] ✓　$\frac{1}{5\frac{3}{15}} + \frac{1}{3\frac{5}{15}} =$ [8/15] ✓

$\frac{2}{3\frac{8}{12}} + \frac{3}{4\frac{9}{12}} =$ [17/12] ✓　$\frac{2}{4\frac{4}{8}} + \frac{2}{8} =$ [6/8] ✓

數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

同分母分數相減

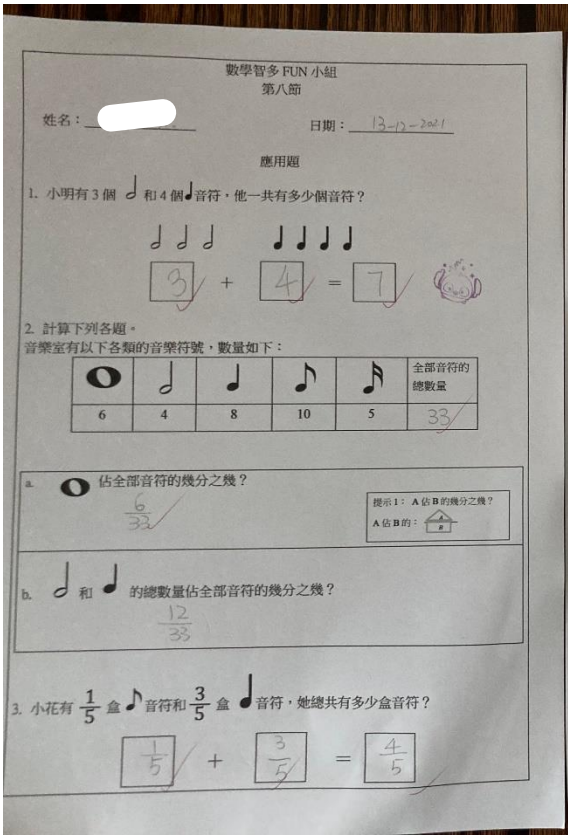
$\frac{6}{11} - \frac{4}{11} = \frac{2}{11}$ ✓	$\frac{9}{10} - \frac{2}{10} = \frac{7}{10}$ ✓
$\frac{7}{14} - \frac{2}{14} = \frac{5}{14}$ ✓	$\frac{7}{19} - \frac{6}{19} = \frac{1}{19}$ ✓
$\frac{12}{20} - \frac{5}{20} = \frac{7}{20}$ ✓	$\frac{13}{25} - \frac{5}{25} = \frac{8}{25}$ ✓

異分母分數相加

$\frac{1}{6} + \frac{1}{2} =$ [4/6 → 2/3] ✗　$\frac{4}{5} + \frac{1}{2} =$ [13/10] ✓

$\frac{3}{4} + \frac{1}{8} =$ [7/8] ✓　$\frac{1}{5} + \frac{1}{3} =$ [8/15] ✓

$\frac{2}{3} + \frac{3}{4} =$ [17/12 → 6/7] ✗　$\frac{2}{4} + \frac{2}{8} =$ [6/8] ✓



數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

應用題

1. 小明有 3 個 𝅗𝅥 和 4 個 ♩ 音符，他一共有多少個音符？

𝅗𝅥 𝅗𝅥 𝅗𝅥　♩ ♩ ♩ ♩

[3] + [4] = [7] ✓

2. 計算下列各題。
音樂室有以下各類的音樂符號，數量如下：

𝅝	𝅗𝅥	♩	♪	𝅘𝅥𝅯	全部音符的總數量
6	4	8	10	5	33 ✓

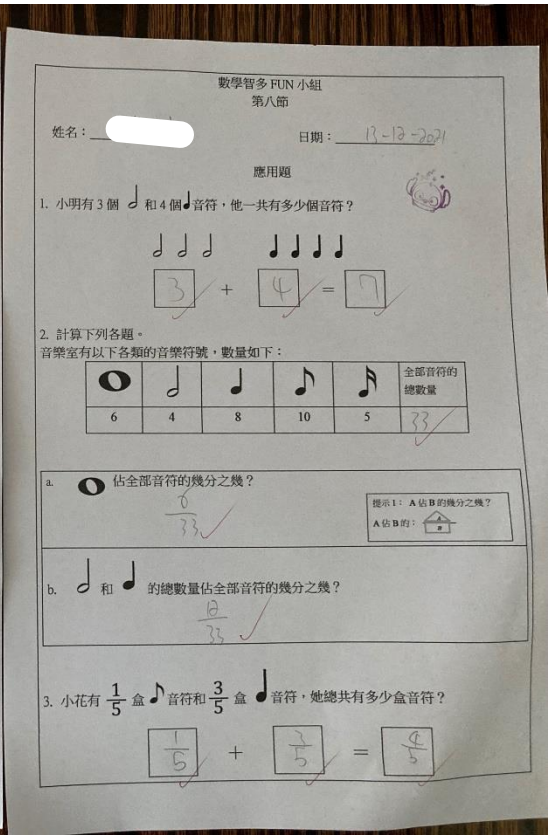
a. 𝅝 佔全部音符的幾分之幾？ $\frac{6}{33}$ ✓

提示 1：A 佔 B 的幾分之幾？
A 佔 B 的：

b. 𝅗𝅥 和 ♩ 的總數量佔全部音符的幾分之幾？ $\frac{12}{33}$

3. 小花有 $\frac{1}{5}$ 盒 ♪ 音符和 $\frac{3}{5}$ 盒 ♩ 音符，她總共有多少盒音符？

[1/5] + [3/5] = [4/5] ✓



數學智多 FUN 小組
第八節

姓名：[redacted]　日期：13-12-2021

應用題

1. 小明有 3 個 𝅗𝅥 和 4 個 ♩ 音符，他一共有多少個音符？

𝅗𝅥 𝅗𝅥 𝅗𝅥　♩ ♩ ♩ ♩

[3] + [4] = [7] ✓

2. 計算下列各題。
音樂室有以下各類的音樂符號，數量如下：

𝅝	𝅗𝅥	♩	♪	𝅘𝅥𝅯	全部音符的總數量
6	4	8	10	5	33 ✓

a. 𝅝 佔全部音符的幾分之幾？ $\frac{6}{33}$ ✓

提示 1：A 佔 B 的幾分之幾？
A 佔 B 的：

b. 𝅗𝅥 和 ♩ 的總數量佔全部音符的幾分之幾？ $\frac{12}{33}$ ✓

3. 小花有 $\frac{1}{5}$ 盒 ♪ 音符和 $\frac{3}{5}$ 盒 ♩ 音符，她總共有多少盒音符？

[1/5] + [3/5] = [4/5] ✓

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Appendix 4 lesson plan

Session 1:

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Recognize the musical notes and notes value.					
Objective: Students are able to write musical notes and identify the note value.					
Duration	Learning Outcome	Activity	Procedures	Materials	Accommodation for students with SpLD
12 mins	Review	Pre-test	Students are required to complete the pre-test.	Pre-test	Simplify questions and highlight all keywords in the questions
5 mins	Warm-up	**Musical maze**	Students follow the instructions to finish the worksheet. T brings out today's topic.	Worksheet	Provide color pens
10 mins	Recognize musical notes and identify the note value.	**Creating a garden of music notes**	● Each student get a large-size paper and a set of different pictures of shapes such as sun, cloud, flower and tree ● Students write down the whole note on the picture of the sun, half note on the pictures of cloud, quarter note on the pictures of flower, and eighth notes on the pictures of tree	Large-size paper, different pictures of shapes, glue	Provide different color papers

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			• Students stick those pictures on the large-size paper in order to create a garden of music notes • Teacher explains the relationships between notes		
3 mins	Review	Test	Students are required to complete the worksheet.	Worksheet	Tree-like diagram questions

Reflection:

Since the students are required to complete a pre-test, their learning motivation is relatively low. Students like "creating a garden of music notes" activity, so they can draw the pictures they like next time. With the elements of art, science and maths, they can attract students effectively. However, I still need to improve the time management, and the content should be simpler because the time is limited to 30 minutes. Before the next lesson, I will prepare a timer so that the lesson will be more fluent.

Session 2:

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Understand the relationship of notes and math				
Objective: (1) Students are able to match the fraction that parallels to note values. (2) Students can understand the part-whole concept of fraction				
Duration	Learning Outcome	Activity	Procedures	Materials
2 mins	Review	Watching video	Play the video, teacher and students review the musical note. Link: https://www.youtube.com/watch?v=YjFIlLKjmkI&t=107s	YouTube

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10 mins	Identify the musical note	**Creating musical note**	• Teacher gives students sticks, colorful cottons and glue, and demonstrates different music notes to them. • Students make the corresponding music notes with sticks and colorful cottons. • Teachers explain the relationships between music notes and maths, for example, a whole note represents 1, a half note represents ½, the quarter note represents ¼, the eight note represents ⅛. • Teacher gives labels to students so that they can write down the corresponding note value on the music notes they make.	Music note, stick, color cottons, glue and labels
13 mins	Understand that fraction means a portion of the whole	**Musical pizza fractions**	• Teacher provides 4 paper plates to each student. • First, write down the whole note on the first paper plate. • And then, students divide the paper plate into a half, 4 equal parts and 8 equal parts in order • Students write the music notes and their note value on the corresponding paper plates and cut the paper plates into different fraction. • Teacher explains a fraction is a part of a whole and demonstrates how each fraction forms the whole fraction	Paper plate, pen, scissor
5 mins	Represent the fractions	Read and color a fraction	Students are required to finish two worksheets including fill the color and match.	Worksheet, Color pen

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Reflection:

After 2 activities, students' learning motivation increases, but they still can't remember the values of notes. because of insufficient time, these 2 activities are rushed. Students like the first activity very much, but the instructions of the second one is not very clear. At first, the students don't understand what to do, but they finish the activity through the demonstration and explanation. Besides, the worksheet is too easy for the students, so I will add more challenging questions on it.

Session 3:

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Recognize equivalent fraction(I)				
Objective: Students are able to make equivalent fraction.				
Duration	Learning Outcome	Activity	Procedures	Materials
5 mins	Review	Play matching game	● Play matching game with ipad ● Students do the matching one by one, the one who get the most answer correct will be the winner Link: https://www.memozor.com/memory-games/for-kids/cute-animals-gifs	Ipad
10 mins	Understand of equivalent fraction	**Musical pizza**	● Students make a complete pizza with the pizza slice they made in the second lesson. ● Teacher asks: "How to represent the fraction of [2 quarter music notes equals a half music note?]" ● Students：「2/4=½] ● Teacher explains 2/4 and ½ are equivalent fractions.	Pizza slice

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10 mins	Make an equivalent fraction	**Build a rhythm block**	● According to the teacher's instructions， Ss label different size Lego first, respectively marked as whole note, half note, quarter note, eight note, and sixteen note. ● Students have to stack them together; all the Legos should be connected to make the same Lego length. ● Students can see how many of that fractions make a whole. ● Write down the note value on each Lego and find an equivalent fraction.	Lego
5 mins	Consolidate	Test	Write down the equivalent fraction on the worksheet.	Worksheet

Reflection:

Students still do not have a complete understanding of equivalent fraction, they have difficulties to evaluate whether the fractions are equivalent fraction without the help from Lego. Hence, we will further discuss this topic in the next lesson. Finally, the questions on the worksheet can be more concrete so that the students understand how to finish it.

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Session 4

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Teaching rhythm as fraction and recognize equivalent fraction (II)				
Objective: Students are able to make equivalent fractions.				
Duration	Learning Outcome	Activity	Procedures	Materials
3 mins	Review	Questions and answers	● Teacher shows the musical notes pictures, asks “what is the name of this notes?” 、“what is the value of this notes?” ● Students answer “half note, it represents 1/2” ● Ask students to draw musical notes, revisit the relationship between notes and mathematics with students.	Picture
5 mins	Recognize the rhythms of musical note	**Reading notation** **Singing and clapping**	● Play the video, students learn the rhythm of musical notes Link: https://www.youtube.com/watch?v=4vZ5mlfZlgk ● Teacher shows the notation and demonstrate the rhythm of a quarter note is Ta, and the rhythm of two eighth notes is Ti-Ti. ● Students sing and clap the rhythms one by one	Video, notation
5 mins	Recognize the rhythms of musical note	**Percussion instruments**	● Students are given a musical instrument.	Musical instrument

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			• Teacher teach them to read and play rhythms on a drum or rhythm instruments. • Teacher writes the musical notation on blackboard. • Students take turns using their instruments to clap these symbols.	
15 mins	Understand of equivalent fraction	**Making fractions strips**	• Teacher gives some standard size papers, students fold it and cut it into equal strips • Students fold the strips to make two equal pieces, four equal pieces, eight equal pieces, and sixteen equal pieces respectively. • Each piece represents 1, 1/2, 1/4, ⅛ • Students can compare the fractions by laying them on top of each other and finding the equivalent fraction. Eg: 1/2=2/4	Strips
2 mins	Consolidate	Test	Students are required to finish the worksheet.	worksheet

Reflection:

Overall, the students are engaged in the class and the students are very interested in percussion instruments. Students still confuse the names of the musical notes, maybe I need to revisit the musical notes with the students before each class. Besides, instead of asking questions or writing on the blackboard, I can post the poster on the blackboard in order to save more money. Finally, Kiki does not want to do the worksheet because she was tired, so I will implement a reward plan in the follow class to encourage students who is performance well.

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Session 5：

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Comparing fraction				
Objective: Students are able to compare fraction with same and different denominators.				
Duration	Learning Outcome	Activity	Procedures	Materials
2 mins	Represent the fractions	Quiz	Students are required to finish the quiz.	worksheet
12 mins	Compare note value	**Identify note duration**	● Play the video, let the students identify the length of the music notes. Link: https://www.youtube.com/watch?v=YjFIlLKjmkI&t=90s ● Teacher explains each of these different musical notes represents a different amount of time. E.g. the whole note is 4 beats, the half note is 2 beat, the quarter note is one beat and the eighth note is 1/2 beat. ● According to different beats, ask students to complete worksheet.	YouTube, worksheet
12 mins	Compare fraction with same and different denominators	**Comparing musical pizza fractions** 	● Using the note pizza which is made in session2, ask students “Is 2/4 greater than 1/4?” ● Students hold up the corresponding slice of pizza and compare the size. ● Guide students in finding ways to compare fractions with the same denominator.	Pizza slices

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			● Teacher asks, “Is 1/2 greater than 1/4?” ● Using the same method, students hold up the corresponding slice of pizza and compare the size, write the answer on blackboard. ● Teacher summarizes the method of comparing fractions with different denominator.	
4 mins	Review	Test	Students are required to complete the worksheet.	worksheet

Reflection:

It is difficult for students to distinguish the musical notes according to the length of the notes. The effect of comparing the size of the notes through beats is obvious. Besides, using pizza to compare the size of fractions also has a significant effect. Finally, students can summarize the method of comparing fraction with same and different denominators.

Session 6:

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Ordering fraction				
Objective: Students are able to order fraction on a number line.				
Duration	Learning Outcome	Activity	Procedures	Materials
3 mins	Review	Quick response questions	● Teacher tells a note, students write the note value on the blackboard.	
2min	Recognize number line	Video	● Teacher plays the video to introduce the topic Link:	YouTube

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			https://www.youtube.com/watch?v=SZaXtOHNh6s	
10 mins	Find out the position of fractions on the number line	**Take a guess**	● Each student will obtain a stick. ● They need to write the number 0 and 1 at the head and tail correspondingly, and draw an arrow on the clip ● Students guess the position of fraction what the teacher tells on the number line and clip it on the stick	Sticks, clip
10 mins	Put the fraction on the proper position	**Place note values on a number line**	● Students obtain a drinking straw and iron wire. ● They obtain the following fraction cards: 0，⅕，⅖，⅗，⅘ ，5/5，6/5，7/5，8/5，9/5，10/5 ● They need to hang the fraction cards on the drinking straw on the corresponding position ● After finishing, teacher explains how to distinguish the proper fraction and improper fraction.	Drinking straw, iron wire, fraction card
5 mins	Consolidation	Test	Students complete the worksheet.	

Reflection:

Time management has improved. Students can put the fraction in the proper position. I think the second activity should be to design a worksheet so that the students can record the results in real-time and find out proper fraction and improper fraction.

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Session 7：

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Creating music with fraction				
Objective: Students are able to add the fraction to fill each glass and make music with test tube.				
Duration	Learning Outcome	Activity	Procedures	Materials
2 mins	review the rhythm of notes	Clapping	● Teacher demonstrates the rhythm, and clap with students to review the notes	
3 mins	Understanding how to make music with water glass	Watching video	● Play the video Link: https://www.youtube.com/watch?v=sIO-JhMvu6M	YouTube
20 mins	Show different fractions	**Musical water xylophone**	● Students do the activity together. ● Fill each test tube with the following measurements: 14/8,12/8,10/8,8/8,6/8,4/8,2/8 ● Label the test tube from 1 to 7 ● Add the food coloring to each glass to make the colors ● Students can identify the different pitches when they hit the test tube with a spoon ● Teacher explains why each test tube makes a different sound.	Test tube, double-sided tape, cards, stick
5 mins	Create different songs using test tube	Play a song	● Teacher gives a list of songs with simple tunes and Students figure out how to play them on the test tube. Eg. Twinkle Twinkle Little Star, Happy Birthday and Jingle Bells.	

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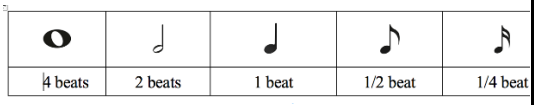
			• Students also can create their own songs.	

Reflection:

Students like these activities, they can use fractions to represent different parts of the test tube. If there is more time, I think students should do it independently next time, so that I can assess their ability. Besides, I should prepare more songs for students to create different songs, so as to improve the learning motivation.

Session 8:

Title: Facilitating fraction teaching in children with dyslexia using music intervention

Introduction: Adding and subtracting fractions				
Objective: Students are able to add/subtract fractions and solve word problems.				
Duration	Learning Outcome	Activity	Procedures	Materials
5 mins	Adding and subtracting fractions with same denominators	Go fish	• In each round, students draw 2 fraction cards. If the sum of 2 cards is 1, the student can take away 2 cards. • The student who obtains the most of cards will win, and teacher gives the sticker as prize	Fraction cards
10 mins	Adding the beats	Music math	• Review the beats, eg:  • Teacher demonstrates how to get the value from adding up 2 notes. • Tell the students complete the worksheets.	worksheet

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15 mins	Adding and subtracting fractions with different denominators	Paper plate pizza fraction	• Demonstrate how to add and subtract fraction with different denominators using fraction pizza • Students complete the worksheet in the lesson.	slice
5 mins	Review music note	Color by rhythm	Students are required to finish the worksheet.	worksheet
6 mins	Decrease anxiety to math	**Play background music**	● Play background music such as classical music, piano music, guitar ● Invite the student comes to the blackboard to do calculation ● Students will get a sticker if they answer correctly ● Observe students' response, and evaluate whether the background music can decrease their anxiety to math	Background music
7 mins	Solve word problem	Do exercise	● The teacher demonstrates how to solve the problem. E.g. "how many notes are there of a half note and 2 quarter notes" ● Teacher changes the notes to numbers, and ask the question again: "we get the value 1 after adding up one ½ and two ¼ ● Distribute the worksheets and teach the students how to solve word problems. ● Replace the fractions by integers, and then calculate the fraction after finding out the solution.	Worksheet
12 mins	Test	Post-test	Students are required to finish the post-test.	Post-test

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