

**Lesson Plan**  
**ETAP 524**  
**Spring 2014**

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Module: 4

**Lesson Plan Title**

Adding fractions with sum between 1 & 2 by making like units pictorially.

**Discipline and Topic**

This lesson continues the introduction of fractions using visuals to find common denominators for the 5<sup>th</sup> grade mathematics class.

**Target Population**

This lesson is for 20 5<sup>th</sup> grade students. The class consists of 11 boys and 9 girls. The class is mostly Caucasian, with 3 students who are African-American and 1 who is Asian. The students are expected to know the NYS Common Core Learning Standards (CCLS) curriculum from 4<sup>th</sup> grade, but due to poor implementation by the state, I will review some foundational skills, such as decomposing a fraction. Ten of the students are visual learners, 8 are kinesthetic, and two are logical/mathematical. This lesson attempts to take their learning styles into consideration so that all students can excel. One student has a 504 plan and gets extra time and a separate location for testing due to her ELA skills and testing anxiety.

**Curriculum Alignment and Standards**

This lesson focuses on adding fractions, which are now a major focus for the curriculum. This lesson follows the NYS CCLS and utilizes the NYS Modules. This lesson incorporates adding fractions using a visual model. Fractions are a major cluster in the 5<sup>th</sup> grade CCLS.

The following are the NYS standards begin utilized:

5.NF.1 & 5.NF.2

**Use equivalent fractions as a strategy to add and subtract fractions.**

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. For example,  $\frac{2}{3} + \frac{5}{4} = \frac{8}{12} + \frac{15}{12} = \frac{23}{12}$ . (In general,  $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$ .)

2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. For example, recognize an incorrect result  $\frac{2}{5} + \frac{1}{2} = \frac{3}{7}$ , by observing that  $\frac{3}{7} < \frac{1}{2}$ .

4.NF.3.b

**Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.**

3. Understand a fraction  $\frac{a}{b}$  with  $a > 1$  as a sum of fractions  $\frac{1}{b}$ .

b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions,

e.g., by using a visual fraction model. Examples:  $3/8 = 1/8 + 1/8 + 1/8$  ;  $3/8 = 1/8 + 2/8$  ;  $2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$ .

\*This standard is a review of the 4<sup>th</sup> grade material needed for this lesson.\*

### **NYS Mathematical Practices**

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically

### **ISTE NETS Standards**

Teacher:

#### **Facilitate and inspire student learning and creativity**

- Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

#### **Design and develop digital age learning experiences and assessments**

- Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the Standards•S.

Students:

#### **Creativity and innovation**

- Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

#### **Critical thinking, problem solving, and decision making**

- Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

### **Goals**

The students will add and subtract fractions with like and unlike denominators.

### **Objectives (State)**

- Given a worksheet with fractions, the student will sketch a representation of that fraction and use it to construct an equivalent fraction, with 90 % accuracy.
- Given a worksheet with fractions, the student will find common denominators by using the visual fraction model and find the sum, with 85% accuracy.
- Given several word problems involving fractions, the student will use the visual fraction model to add the fractions to find the correct solution, with 80% accuracy.

## Underlying Educational Theory

This lesson utilizes Constructivist learning and Cooperative learning. The students will be doing a hands-on approach to finding common denominators by paper folding. With the teacher as a facilitator, the students will try to discover how to fold the paper to show how to get like units. Direct instruction will be used during the presentation. Later, the students will be working in pairs (their choice-chosen previously) to work on problems. This way students can help each other while the teacher circulates the room to both assess and help the students.

## Materials Description and Timing

There is only one computer in the classroom for teacher use. There is a projector and an ELMO camera to help display work. The following is a breakdown of the 90 minute block period:

DO NOW (5 Minutes)

Paper folding to find like units (10 minutes)

PowerPoint Presentation (20 minutes)

Modeling and Guided practice (10 minutes)

Practice problems in pairs (30 minutes)

Closer (15 minutes)

The visual fraction model is crucial for this lesson. I have a PowerPoint presentation to model adding fractions this way. The students already learned in previous lessons how to make equivalent fractions using the fraction model. The school district is using the NYS modules instead of textbooks, so this lesson will rely on that material. The modules can be found at [www.engageny.org](http://www.engageny.org) if there is a need to access them. I have the documents saved on the computer so they can be displayed during the modeling and guided practice. My rationale for using a PowerPoint presentation is the clear use of visuals that the students will better understand than by just drawing them on the whiteboard. This also allows me to save time, since drawing them by hand can be time-consuming. Also, if a student is absent, they can view the presentation or can print out slides so that they have some material to work with.

## Supplemental Materials/Links

DO NOW

Paper for folding

PowerPoint Presentation

Student Module worksheets for classwork and homework

Exit ticket

Mid-module assessment

End of module assessment

## Lesson

The teacher will greet the students at the door. The students will be directed to pick up a DO NOW to work on. This will involve decomposing fractions and will be a review and assessment of previous knowledge. This skill will be utilized in changing a fraction into a mixed number, which is required in the standards. Emphasize that drawing equivalent fractions using the visual fraction model is the same as multiplying the fraction by a fraction

equivalent to 1. By multiplying by 1, such as  $\frac{2}{2}$ , the value of the fraction remains the same. This is a previously learned topic. If the students are having trouble visualizing how to turn an “improper” fraction into a mixed number, then visit <http://illuminations.nctm.org/Activity.aspx?id=3519> and spend a few minutes on this website activity. It shows great visuals and will clarify most misconceptions.

After the DO NOW warm-up, the students will be given two pieces of paper and asked to fold one paper in half to represent  $\frac{1}{2}$  and another paper into thirds, to represent  $\frac{1}{3}$ . Explain to the students that they cannot add the two fractions because they do not have like units, aka common denominators. Have them shade in one of the two and one of the thirds, so that they can clearly see the fractions. Explain that fractions are just numbers on a number line. This may clarify some of the students view on fractions. Have them try to fold the paper to discover how they can get both to look the same, and thus have like units. Students have to see that if they turn one of the papers and fold them to look like the other, they will find like units. This is the same strategy they will use when drawing the fractions so that they can add the fractions. This will be part of the PowerPoint presentation. By folding, the students will see that the common unit is  $\frac{1}{6}$ . They can then “rename”  $\frac{1}{2}$  into  $\frac{3}{6}$  and  $\frac{1}{3}$  into  $\frac{2}{6}$ . By using their knowledge of previous lessons, they will add the fractions and get  $\frac{5}{6}$ . Stress the importance of adding the numerator (top) and keeping the denominator (bottom), our like unit. If students have trouble with this, they can cut out the  $\frac{2}{6}$  and place it on the  $\frac{3}{6}$ , so they can see that they will have, all together,  $\frac{5}{6}$ . Again, their answer need to be simplified as a mixed number.

The visual fraction model will be show using the PowerPoint presentation. Go over each slide in the PowerPoint to solidify the students understanding of adding fractions using the visual fraction model. Have the students follow along and ask questions if they are not sure about anything. After the presentation, the students will take out their module workbooks and turn to lesson 4. The teacher will model the first problem and guide the next two. Then, students will work in pair that they choose the day before to work on the remaining problems. The most difficult part will be the word problems. Many students have trouble interpreting them, so the teacher may need to help some of them interpret them. The teacher will go around the room and assess how well the students learned the material by checking on their work. The nice thing about group work is that the students can help each other before asking the teacher.

To close the lesson, the teacher will briefly go over the key points of the lesson or have the students explain what they learned. The students will display their work to the class using the document camera. This will allow them to take ownership of their work and be more of a student-centered environment. Before they leave, the students will take an exit ticket to show what they learned. Homework will be assigned as independent practice (the homework is in the module workbook-lesson 4) and give them a chance to show the teacher that they understand the material. There will be a mid and end of module test as a summative assessment. Extra credit will be given for students who create a poster demonstrating each lesson of this module.

### **Assessment of Students**

This lesson will utilize the material provided in the NYS 5<sup>th</sup> grade Module 3. This material can be accessed from [www.engageny.org](http://www.engageny.org) and either printed out or saved as a word or pdf document.

The students will be assessed by prior knowledge of decomposing fractions by using a DO NOW as a class warm-up. The teacher will assess the students by circulating the room and checking their understanding while they work in pairs. An exit ticket will be given to assess the students' learning of the material for this lesson. Homework will be given and checked as another assessment. There will also be a mid-module and end of module test to assess the students' mastery of the objectives. These last two assessments will be graded using a rubric, to be fair and in line with the NYS scoring of math state exam. As a bonus, students will be asked to make posters of adding and subtracting fractions with the visual fraction model to be displayed around the room. This will demonstrate their skills as well as allow other students to solidify their understanding of the material.

### **Evaluation of Students and Lesson**

The lesson went well. 70% of the students meet the objectives while 25% mastered them. 5% of the students are still working towards meeting the standards. Overall, the lesson was a success. This is shown by the percentage of students who met or exceeded the objectives. The hands-on approach engaged most of the students. Some of the students who struggle at finding common denominator the "regular" way in the later unit found using the visual fraction model very helpful. Others now have a better understanding of equivalent fractions due to the visual method. 80% of the students did well on the exit ticket. 85% of the students at least met the standards for the two summative assessment pieces.

In the future I think I will have some of the students create a PowerPoint instead of a poster, so that they can utilize and develop their technology skills. I may try doing small stations next time so that the students are moving around more. This is important for this grade level. I will use this lesson again and continue to tweak it in order for all students to excel.

### **Low Tech Modification**

If the PowerPoint, computer, or projector does not work, I will draw the visual fraction models by hand. The lesson can still be completed, but more time will be need to draw them. In this case, I may eliminate the paper folding activity to save time. If the document camera is not working, I will have students demonstrate their answer by drawing on the whiteboard. Since this will also take longer, I will only have two pairs put up answers on the board. I will simply state to the class the answers to the other problems.