

Math Fact Families

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Lesson Focus: Math and Technology Relating addition and subtraction facts

Grade Level: Late Grade 1, Early Grade 2

Duration of Lesson: 60 minutes

LEARNERS AND CONTEXTS

DESCRIPTION OF LEARNERS:

Entry Behaviors:

Students will already be familiar with the concepts of addition and subtraction. Students will already have a basic knowledge of computers and how to access the Internet.

Prior Knowledge: Students' texts discuss fact families using dominoes, addition tables, and triangle fact cards.

Attitudes Toward Content: The learners enjoy working on computers to learn about math as well as other topics.

Academic Motivation: It is important for students to develop automaticity with basic addition facts and the related subtraction facts in order to be able to work with two and three digit addition and subtraction problems with regrouping.

Education and Ability: Early in second grade students will have already learned about addition and subtraction. The object of using fact families is to systematize the facts so that students will be more able to memorize them and make connections between the inverse operations of addition and subtraction.

Learning Preferences: There will be a full range of skills and learning preferences.

Group Characteristics: Students will be all second grade students from two schools. In addition to regular classrooms of mixed abilities, including some students with moderate special needs, there is a district-wide self-contained basic skills class. This class, as well as several other classes, will have paraprofessionals accompanying.

CONTEXT ANALYSIS – ANALYSIS OF PERFORMANCE SETTING:

Social Aspects: This lesson is being given in a technology class, which students have for an hour every other week.

Physical Aspects: This lesson will be completed in a computer lab with a computer with Internet access for each student. Each computer has a set of headphones. There are a projector and speakers attached to the teacher's computer. There is also a screen. A SMART Board would improve the demonstration because of its interactive nature, but there is not one in the lab.

Relevance: Addition and subtraction are skills that students will frequently use in their daily lives.

Adaptability and Accessibility:

The needs of kinesthetic learners are addressed in the introductory activity in which students roleplay with the number sentences.

I have added sound files to the web pages for auditory learners or students who are visually impaired. In addition, there are alt tags for text readers.

I am not aware of any physically handicapped students, but the district has a special needs technology consultant to provide support for this.

The graphics I have created are multicultural.

There are three levels of assessment for different ability levels.

GOALS AND STANDARDS

Essential Question:

What patterns are found in numbers?

How are addition and subtraction related?

Goals:

Students will develop quick recall of addition facts and related subtraction facts.

Students will develop an understanding of the inverse operations of addition and subtraction.

Alignment with Standards/Frameworks:

From the NCTM Curriculum Focal Points for Grade 2:

Number and Operations and Algebra: Developing quick recall of addition facts and related subtraction facts and fluency with multidigit addition and subtraction.

Children use their understanding of addition to develop quick recall of basic addition facts and related subtraction facts. They solve arithmetic problems by applying their understanding of models of addition and subtraction (such as combining or separating sets or using number lines), relationships and properties of number (such as place value), and properties of addition (commutativity and associativity). Children develop, discuss, and use efficient, accurate, and generalizable methods to add and subtract multidigit whole numbers. They select and apply appropriate methods to estimate sums and differences or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including standard algorithms, for adding and subtracting whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.

<http://www.nctm.org/standards/focalpoints.aspx?id=326>

Strand: Number Sense and Operations

Grade Span: 1-2

Standard: *Understand meanings of operations and how they relate to one another*

B2. Understand and use the inverse relationship between addition and subtraction (e.g., $8 + 6 = 14$ is equivalent to $14 - 6 = 8$ and is also equivalent to $14 - 8 = 6$) to solve problems and check solutions.

Standard: *Compute fluently and make reasonable estimates*

C1. Know addition facts (addends to ten) and related subtraction facts, and use them to solve problems.

Strand: Instructional Technology

Grade Span: PK-4

Standard: *Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software, and connectivity.*

1.7 Collaborate with classmates to use teacher-selected Websites.

PERFORMANCE OBJECTIVES

Using a teacher-created website about families of facts, students will explore the relationship of addition and subtraction facts to 10 and the commutative property of addition and will demonstrate their knowledge by completing a worksheet on which they will list a fact family, determine whether sets of facts are a fact family, and fill in missing members of a fact family with 80% accuracy.

INSTRUCTIONAL ACTIVITIES and ASSESSMENT METHODS

Introduction/Pre-Instruction:

A few students will wear number and symbol tags and come to the front of the class.

Example: 3, 4, 7

Teacher will ask students to use + or - and = to create a true number sentence.

Teacher will then ask another student if they could create a different sentence using the same numbers.

Record each sentence on the board.

Repeat until all four facts are found.

Move students into an incorrect sentence and ask students if this belongs in the fact family (e.g. $3-4=7$)

Repeat this process with another fact family.

Informal assessment will be observation of students in this process.

Instructional Activities:

Teacher will demonstrate the website, <http://www.teachthechildrenwell.com/factfamilies>, using a projector, screen, and speakers.

Students will access the website on their own computers, clicking on links to view streets, houses, and families. Each street is named with an ordinal number from Zero to Tenth. On each street are houses with the fact families with that number as their sum. Each house is labeled with a set of three numbers from 0-10. When students click on the

houses, they will see either two or four children whose t-shirts have the addition and subtraction facts for that fact family written on them. Students will then click on the remaining houses on that street and the remaining streets in the village.

Related Literature: Anno, Mitsumasa: *Anno's Counting House*. Philomel.1982.

<http://www.librarything.com/work/417745>

In this wordless picture book, 10 children move, one at a time, from one house to another. Both houses are shown on facing pages. This book illustrates the fact families for the sum of ten.

ASSESSIBLE END PRODUCT/ACTIVITY

Students will use an outline sheet of a house and another of children to record one of the fact families. These sheets can be put together as a class book. This could either be used by all students or just by the children in the basic skills class or others with learning disabilities in math.

Students will complete a worksheet on which they will list a family of facts, evaluate whether fact families are correct, and fill in missing numbers in addition and subtraction sentences.

Advanced learners will complete an extension worksheet for fact families between 10 and 20.

See attached documents on the Information page of the website.

THE VALUE OF TECHNOLOGY

The technology being used for this lesson includes a teacher-created website, computers with Internet access and headphones for each student, and a teacher computer with speakers, projector, and screen.

The use of a hyperlinked website allows students to easily access the sets of fact families and the associated number sentences in a colored format which would be very costly and cumbersome to reproduce on paper. Technology is also highly motivating to students. Another advantage is that this lesson can be shared easily with all of its resources as well as links to other related activities.

IMPLEMENTING YOUR UNIT

The lab is already set up and is my usual teaching space. Classes are regularly scheduled to come to the lab. I will check with the second grade teachers at the beginning of the year to find out when they expect to be teaching about fact families in class.

IMPLEMENTATION REFLECTION TOOL

I expect that the students will like the graphics of the website and will enjoy exploring. One thing I am concerned about is the actual time it will take them. I am also a little concerned that some of them will end up with too many windows open since each street as well as each house will open in a new window. I will explain that they should close the window after looking at all of the houses and families, but some will not follow those directions.

I chose to do this lesson on families of facts because mastering of addition and subtraction facts is a curriculum focal point for second grade. As such, it is not something that can be achieved in a single lesson.

Since my position is that of technology integration specialist, I will only have each group of students for their allotted hour for the lab and will not see them again for two weeks.

If the Internet is down, I have the files on my own computer, which we could use whole-class. If we are without power so none of the computers work, I will probably continue the role playing activity. My laptop also runs on battery power, so it is possible, though far from ideal, to gather around it or take turns. Students could also work on creating pages of fact families for a class book using the outline pages or drawings of their own.