# IntelliTools Math

## MathPad™ plus by InfoUse
### Fractions and Decimals

# Tutorial

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*MathPad Plus: Fractions and Decimals* was designed and developed by InfoUse in association with the Center for Accessible Technology and published and distributed by IntelliTools, Inc. Funds for this project were made available by the National Institute of Child Health and Human Development, Grant #1 R43 HD33310-02.

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# *MathPad™ Plus: Fractions and Decimals*
# Workshop Tutorial

## Introduction

*MathPad Plus: Fractions and Decimals* is an alternative and accessible tool for working with fractions, decimals, and whole numbers on a computer. This tool includes two modes, the Worksheet mode and the Manipulatives mode. The Worksheet mode allows you to solve arithmetic problems on-screen just as you would with pencil and paper. The Manipulatives mode provides access to fraction circles, fraction bars, and decimal grids to help you model fractions and decimals to solve problems. Answers can be checked and printed, and for clarity, only one problem is presented at a time. The National Council of Teachers of Mathematics (NCTM) promotes math computation and problem solving as a way of understanding how to construct number meanings from real life situations. *MathPad Plus: Fractions and Decimals* allows students to practice computations, enter math word problems, and solve them with manipulatives.

In this tutorial, you will explore the features that allow students to successfully use *MathPad Plus: Fractions and Decimals* to solve equations on the screen. You will start by working on one of the assignments included in the program. Next you will learn to use the program using an overlay and the IntelliKeys® keyboard. Finally, you will see how teachers can create and customize student assignments.

## Getting Started

When you launch *MathPad Plus: Fractions and Decimals*, the Welcome dialog will appear. This allows you log in as a particular user, a New Student, Guest or Teacher. Each student saves work into his or her individual portfolio folder. You will begin by entering your name as a student into a class and learn how to use *MathPad Plus: Fractions and Decimals* for solving computations and visualizing with manipulatives. Later in the tutorial you will explore the Teacher mode.

## Creating the Student File

1. Double-click the *MathPad Plus: Fractions and Decimals* icon.

2. Select **New Student**.

3. Type your name. Click **OK**.

4. In the **Student** list box, select the name you just entered and click **OK**.
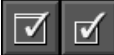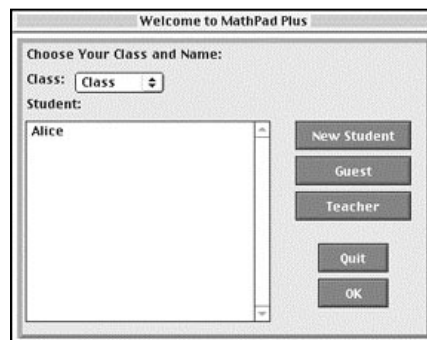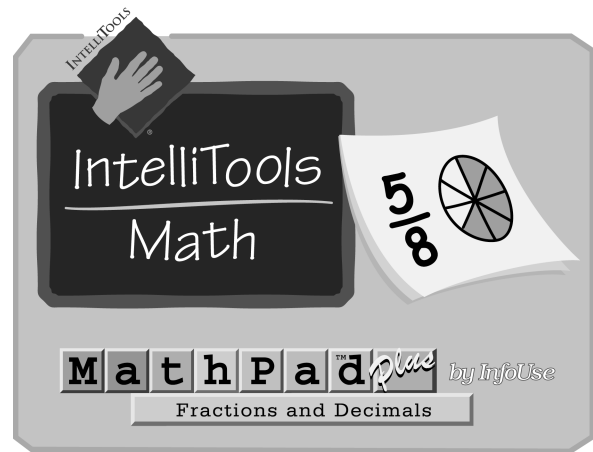
## Opening an Assignment

*MathPad Plus: Fractions and Decimals* includes 200 assignments, organized into 20 sample Problem Lists, including fractions, percents and word problems. Each Problem List contains 10 problems. You will start by solving one of these problems, found in the Assignments folder.

The program opens in Worksheet Mode, a blank worksheet that allows you to solve arithmetic problems on-screen just as you would with pencil and paper. Worksheet mode and Manipulatives mode are always available. Work can be copied from the Manipulatives mode into the Worksheet.

1. From the **File** menu, select **Open**.

2. Choose **Assignments**.

3. Select **Fractions Add Level 2**.

4. Click **Open**.

## The Worksheet Mode

Let's assume you know how to add fractions but do not understand how to simplify an answer. You will use the Worksheet mode to solve the first part of the problem and then use the Manipulatives mode to better understand how to simplify your solution.

1. Click the **Fraction** button. A fraction line will appear with an I-beam cursor above. Enter "4" in the numerator. To move the insertion point to the denominator, click the **Fraction** button again or use the down arrow. Enter "6" in the denominator.

2. On the **Command Toolbar** at the top of the screen, there are two buttons with check marks. **Select Answer**, the larger button on the left, allows students to see if they have the correct solution to the Original Problem. **Check Selection**, the smaller button on the right, allows students to check scratch work calculations they may make elsewhere on the worksheet as they work on the problem. It also enables them to check the calculations they make in various steps of solving a problem.

3. With the insertion point on 4/6, first click **Check Selection**; then click **Select Answer**. Check Selection reports that 4/6 is the correct addition of the fractions, but Select Answer reports that 4/6 is not acceptable as the final solution. You must simplify
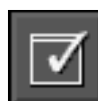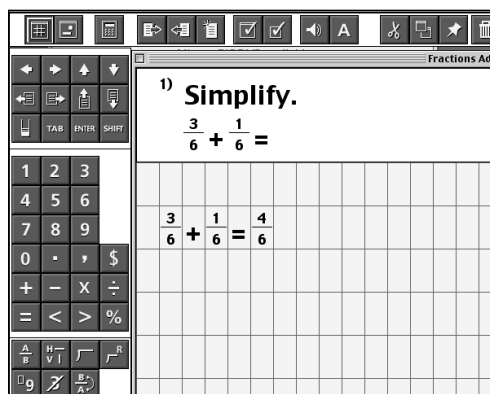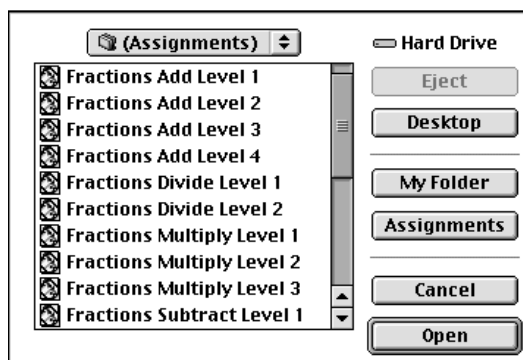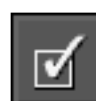
Select Answer    Check Selection

the answer. The Manipulatives mode offers a way for students to visualize the process of simplifying fractions.

## The Manipulatives Mode

*MathPad Plus: Fractions and Decimals* provides a Manipulatives mode, with electronic access to the kinds of hands-on learning tools typically used in a classroom. Fraction Circles, Fraction Bars, and Decimal Grids help students model and solve problems. Manipulatives can also be pasted into the Worksheet.

1. To change to Manipulatives mode, click the **Manipulatives** button, which is the second item in the upper left corner of the **Command Toolbar**. Or, click **[Command]+2** (Windows: **[Ctrl]+2**).

2. Click **Fraction Circles** to access the manipulatives.

3. Click the **1/6** button three times. 3/6 will appear, surrounded by an outline of a complete circle.

4. Click **Empty Circle** to get another circle.

5. Press the **1/6** button once.

6. Using the mouse, drag the 1/6 piece from the circle on the right to the circle on the left. This will illustrate 4/6.
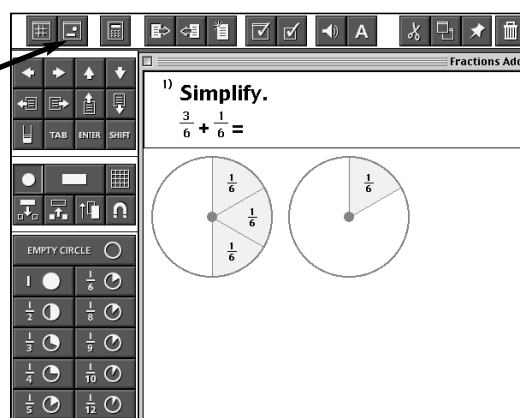
## Trading Up

Manipulatives can be divided and combined. In *MathPad Plus: Fractions and Decimals* this process is called Trading Down and Trading Up. This feature helps students find a common denominator or simplify a fraction. First select (highlight) the pieces you wish to change. Then click Trade Up or Trade Down on the Manipulatives Function Toolbar. Trading Up combines selected pieces into an equivalent fraction with the next biggest fraction pieces. To simplify 4/6, Trade Up.

1. With the mouse, click 1/6 of the circle. Hold down **[Shift]** and click on each of the 1/6 fraction pieces. They will all be selected (highlighted in black).

Trade Down   Trade Up
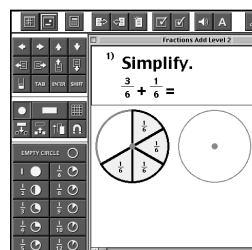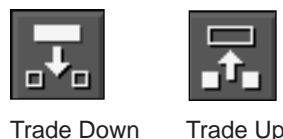
2. Click the **Trade Up** button. The 4/6 that are selected will become 2/3.

3. The manipulatives graphically illustrate that 4/6 = 2/3.

4. It can be helpful to the student to copy this new graphic of 2/3 and paste it into the Worksheet. To copy the graphic, click it with the mouse so the perimeter of the circle is black.

5. Next, click the **Copy** button on the **Command Toolbar**, or from the **Edit** menu select **Copy**. This will copy the graphic to the clipboard.



## Returning to the Worksheet

Next, you will paste the graphic into the Worksheet. Then you will enter the final answer on the Worksheet as a fraction. Once the final answer is entered and selected, use the Select Answer button to self-check your work. Self-check is a feature that can be turned off for testing purposes, using the special Teacher mode that will be explained later in this tutorial.

1. Select the **Worksheet** button or press **[Command]+1** (Windows: **[Ctrl]+1**).

2. Click the grid below the equation. Select **Paste**.

3. Click the grid just to the right of 4/6. Select the **Equal** sign button.

4. Select the **Fraction** button. Enter "2/3" as the answer.

5. Click the **Select Answer** button. If you have the correct number, you will see a small OK in the answer space at the top right of the Problem View portion of the Worksheet. Auditory feedback can also be heard.

6. From the **File** menu, select **Save As**. Name the file "Fractions Level 2". Your file is now saved in your individual portfolio folder. The original assignment is not altered and is always available for another student.
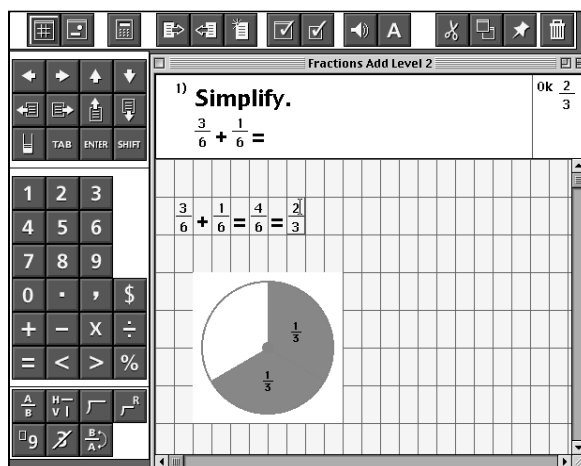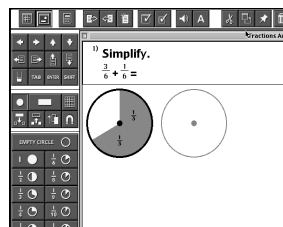
## Solving Problems Using an Overlay

*MathPad Plus: Fractions and Decimals* ships with two double-sided overlays. The Standard Numbers Overlay has the keys necessary to access the Worksheet and the Standard Manipulatives Overlay provides access to the Manipulatives mode. The Advanced Overlay provides access to the entire program. The All Keys Overlay contains all the keys, ready to copy and paste into any custom overlays you might create.

The Standard overlays have many of the keys necessary for navigating through the Worksheet and Manipulatives screen respectively. To be successful with the overlays, it is especially important to learn the function of the Tab, Enter, Shift, and arrow keys on the overlay.

The **Tab** key moves the cursor from object to object on the screen.

The **Enter** key allows you to select items within an object, such as segments in a fraction circle or an equation in the Worksheet.

Once within an object, select the **Shift** key followed by the **right arrow** key to group objects for trading or copying and pasting.

1. Place the *MathPad Plus: Fractions and Decimals* **Standard Numbers** Overlay on IntelliKeys.

2. You will use this overlay for the next part of the tutorial.

## Solving a Word Problem

Word problems and math equations or algorithms can be entered into the program from either the Student or Teacher log in. Teachers who use the Teacher mode and Assignment Builder can choose whether or not to show the equation for a word problem. You will now explore a word problem that requires the student to enter the appropriate equation for him or herself.
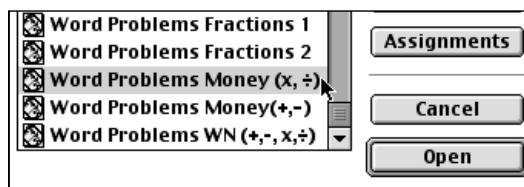
1. From the **File** menu, select **Open**.

2. Choose **Assignments**.

3. Select **Word Problems Money (X,÷)**. Click **Open**.

4. Using the **Next** key on the Standard Numbers overlay, go to problem #6.



Standard Manipulatives Overlay
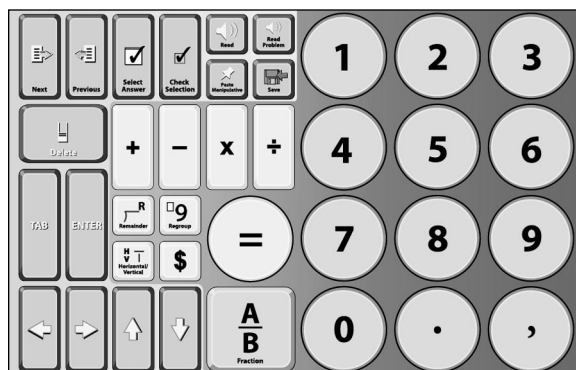


Standard Numbers Overlay

5. Press the **Read Problem** key on the overlay to hear the problem read out loud.

6. Using the overlay, enter the equation needed to solve the problem "$72.50 x 8".

7. A special key easily changes a problem from horizontal to vertical format. Press the **Horizontal/Vertical** layout key on the overlay to align the problem vertically. This feature helps students realize that the same equation can be presented in two different ways.

## Using Auto-Navigation

The auto-navigation feature of *MathPad Plus: Fractions and Decimals* moves the Entry Box to the "best guess" position, thereby requiring fewer keystrokes to solve the problem. It also allows students to move through a problem more easily. The student must still decide when to use regrouping.

1. Multiply 8 x 0 and enter "0" in the hundredths column. The Entry Box will guess the next position and move to the left.

2. 8 times 5 equals 40. In the tenths column, press the **Decimal** key to enter the decimal point and then place the "0".

3. Press the **Regroup** key on the overlay. The Entry Box moves to the left of the 2 at the top of the next column. Press "4" and it will be placed inside the small box; the Entry Box will return to the bottom line.

4. Complete the problem. Be sure that you include the dollar sign (use the arrow keys to navigate to the correct location if necessary).

5. With the insertion point to the right of your answer, press **Select Answer** on the overlay to check your work.

## Teacher Mode

Teacher mode provides access to additional program features. Using Teacher mode you can create class rosters, design assignments, and set preferences for students.

1. From the **File** menu, select **Change User**.

2. Select **Teacher**.

3. The default password is **teacher**. You can change the password at a later time using the Teacher menu.

**Note:** Decimals attach themselves to the left of a numeral. Commas attach themselves to the right of a numeral. The decimal and comma keys toggle on and off. To remove a decimal without erasing the numeral to which it is attached, move the Entry Box to that number and press period again to make it disappear.

## Creating a New Class Roster

From the Teacher menu, you can create Class Rosters and set Student Preferences. One of the items in the Teacher menu, Assignment Builder, allows you to create assignments and assign them to students.

Teachers can create a separate folder for each class and individual folders for students within a class. You will create a new roster for 1st Period math class and add several students to this class.

1. From the **Teacher** menu, select **Class Rosters**.

2. Select **Add Class**.

3. Type "1st Period" as the class name. Click **Done**.

4. Select **1st Period** in the **Classes** list box.

5. Click **Add Student**. Add the following four student names to the class: "David", "Adam", "Jose", and "Miranda". Add one more student and use your own name.

6. Click **Done**.

7. Click **OK**.

## Changing Student Preferences

Next you will learn to customize the access for specific students and to create a problem list. Then you will return to the program to solve some equations using the Advanced overlay.

1. From the **Teacher** menu, select **Student Preferences**. The Student Preferences dialog enables you to customize the screen and features of the program for any individual student.

2. Select the **Worksheet** button. This dialog controls the appearance of the Worksheet and student access to the Calculator or Answer Checking. When Answer Checking is disabled, perhaps for testing purposes, students can still highlight their answers to copy and paste, but they will not receive any feedback on whether the answer is correct or incorrect.
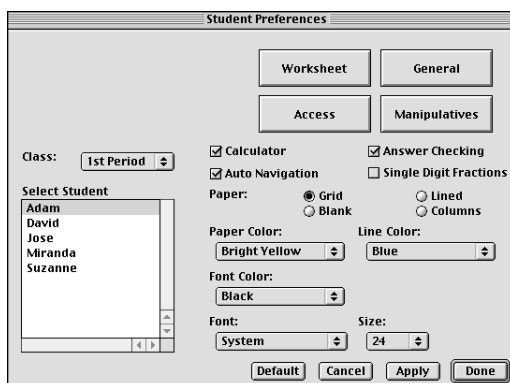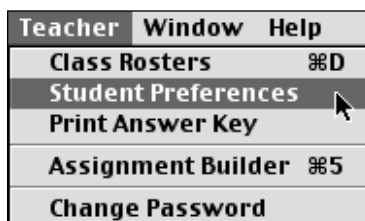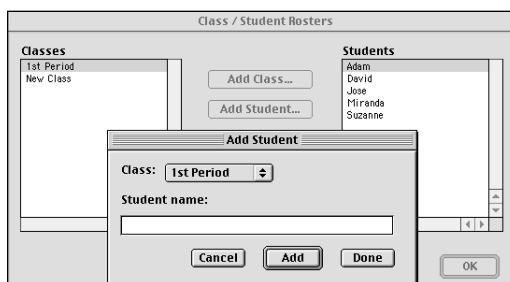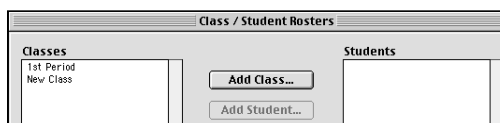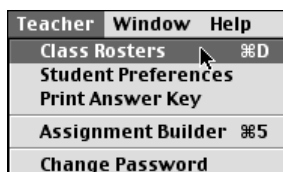
3. In the **Select Student(s)** dialog box, select your name. Now change the paper to **Lined** and the Font Size to **32**. Click **Apply**. (You will not see the changes until you log back in as this student.)
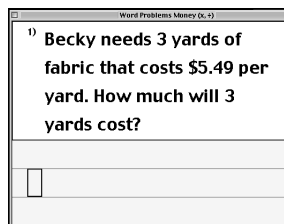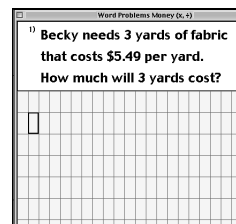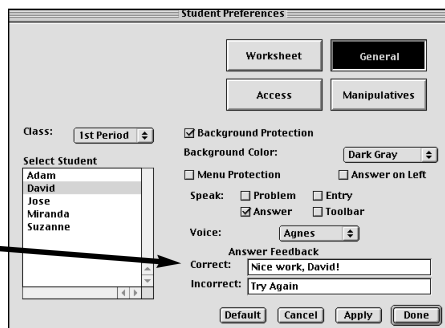


Lined Paper    Grid Paper

4. Select the **General** button. This dialog box adjusts the program background (Background Protection) so that the student will not inadvertently exit the program by clicking on the background screen. The four Speak settings control the kind of auditory feedback. Select each box under Speak.

5. In the **Select Student** dialog box, select **David**. You want to personalize the Answer Feedback for David. For the correct response, change the word "correct" to "Nice Work, David!" Click **Apply**.



6. Select the **Access** button. This dialog box provides options for switch and IntelliKeys users. From this dialog box you can select custom overlays and attach them. *MathPad Plus* comes with built-in scanning capabilities for all palettes and speech feedback options. The program is designed to be accessible from the mouse, keyboard, IntelliKeys, and switch. This makes it a wonderful tool for any classroom.
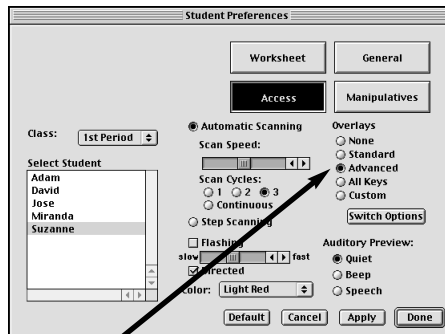


7. Select your name in the **Select Student** window. You will set up the program to send the Advanced overlay when you sign in as a user. This overlay provides access to both the Worksheet and the Manipulatives modes without having to change the overlay. Select **Advanced** from the Overlays choices. Click **Apply**.

8. Select the **Manipulatives** button. You can choose to display labels associated with the manipulatives. You can Restrict Access to Manipulatives, perhaps for a testing situation. You can also set the Background Color of the page for more visual contrast.
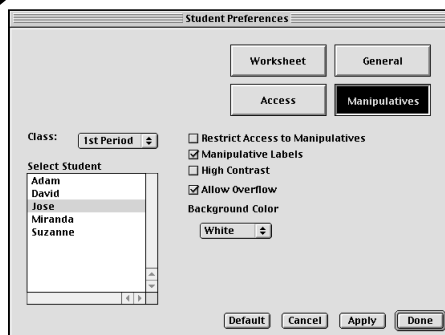


9. Select **Done** to leave Student Preferences. You are ready to create an assignment for these students.
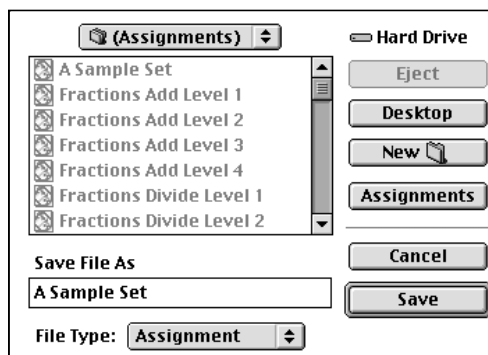
# Creating New Assignments

The Assignment Builder in Teacher mode allows you to create assignments. You can enter, delete, and edit the problems students will use in the Worksheet. You can also add text or directions to problems, configure formats for answers, and customize access. Any graphic or chart that can be pasted onto the computer's clipboard can also be pasted into an assignment.

1. From the **Teacher** menu, select **Assignment Builder**.

2. Type the following problem into the **Problem Text** dialog box: "Adam and David had pizza for lunch. Adam ate 1/4 of the pizza. David ate 1/3 of the pizza. How much of the pizza did they eat?"

3. Type the formula into the **Problem Formula** box: "1/3+1/4="

4. Click the **Worksheet** window. Notice the formula appears along with the word problem on the screen. Click the **Assignment Builder** window to make it the active window.

5. Deselect the **Show Formula** check box. Showing the formula is a cue that may be needed by some students and not by others. Reselect this box so that the formula again appears on the screen.

6. Verify that the answer 7/12 appears on the Answer box. Note that you do not have to solve the equation, but after you enter the equation in the Problem Formula box, you can verify the answer and specify the Answer Type.

7. From the **File** menu, select **Save**. The default is to save into the Assignments Folder. However, you can save to any location, including to a student folder.

8. In the File Type drop-down list, you have the option of saving as an Assignment or a Worksheet. An Assignment is locked and can not be edited. Each time an Assignment is opened, the work must be saved with a new name or to another location. A Worksheet will allow saving without renaming the file. Select **Assignment**.

9. Name the file "A Sample Set".
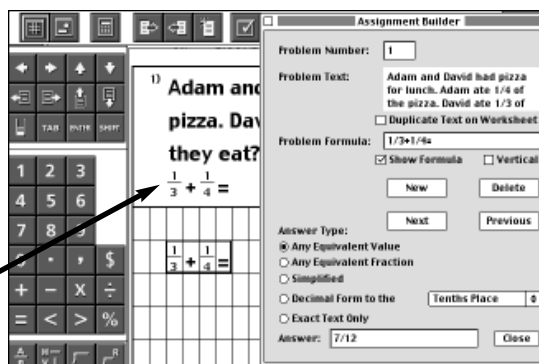
Notice the variety of Answer Type options. You can also choose to have more than one acceptable answer by selecting the Any Equivalent Value or Any Equivalent Fraction options.

## Creating a Decimal Problem

A problem set may contain a variety of problems. You will now add a decimal problem.

1. In the **Assignment Builder** window, click the **New** button.

2. Type the following word problem: "Mike ran 1.5 miles on Monday and 0.8 miles on Tuesday. How much more did he run on Monday?"

3. In the **Problem Formula** box, enter "1.5-0.8=". Select **Show Formula** and **Vertical**. The formula will now appear on the screen in a vertical format.

4. Under **Answer Type** select: **Decimal Form to the Tenths Place**.

5. Verify that the answer 0.7 appears in the Answer box. Select **Close** to leave Assignment Builder.

6. From the **File** menu, select **Save** to add this problem the file titled: A Sample Set.

## Solving with the Advanced Overlay

Now you will try out the two assignments you have created in the Assignmet Builder, using the Advanced Overlay. This overlay has been designed for students who can use a more complex overlay. It allows the user to shift from Worksheet to Manipulatives mode without changing the overlay. This section of the tutorial will teach you how to take advantage of the keys on the Advanced Overlay.

1. From the **File** menu, select **Change User**.

2. Select **1st Period**. Highlight your name. Click **OK**.

3. From the **File** menu, select **Open**. Click **Assignments** and select **A Sample Set**.

4. Place the **Advanced Overlay** on IntelliKeys. Because you assigned the Advanced Overlay to your name in the Student Preferences area of the Teacher menu, it was sent to IntelliKeys when you changed the user to your name.

5. You will solve the first problem using Manipulatives mode.

6. Press the blue **Manipulatives** key, located near the upper left corner of the overlay.





Advanced Overlay

7. Begin by creating a virtual pizza. Press the **Circle** key and then the **Empty** key to get the pizza pan.

8. Press the circles representing **1/3** and **1/4**.

9. You will now select both of these fractions and trade down until they have a common denominator.

10 Press the **Tab** key to select the entire shape.

11. Press the **Enter** key to select one section.

12. Press the **Shift** key to begin the group.

13. Press the **right arrow** key to highlight each of the fraction segments. This will group them.

14. Press the **Trade Down** key until the items have a common denominator, demonstrating that 1/3 plus 1/4 is the same as 7/12.

15. You can copy this graphic and paste it onto the worksheet. Press the **Copy** key to copy the graphic to the clipboard. You will now return to the Worksheet and paste the manipulative into the Worksheet.

16. Press the yellow **Worksheet** key in the upper left corner to return to the Worksheet. Using the arrow keys, locate a clear area on the screen for the graphic. Press the **Paste** key.

17. Move the insertion point to the right of the equal sign. Press the **Fraction** key to enter your answer. First, enter the numerator. Then press the **Fraction** key again and enter the denominator.

18. Use **Select Answer** to check your work.

## Solving the Decimal Problem

1. Press **Next** to go to the next problem you created in the Assignment Builder.

2. Press the blue **Manipulatives** key in the upper left corner to go to the Manipulatives mode.

3. Press the **Decimal** grid 1.0 to represent 1 mile.

4. Press the **Empty** grid.

5. Press the **0.1** grid five times for the 0.5 miles.

6. These grids represent the 1.5 miles that Mike ran on Monday.

---

1) **Adam and David had pizza for lunch. Adam ate 1/4 of the pizza. David ate 1/3 of the pizza. How much of the pizza did they eat?**

$$\frac{1}{3} + \frac{1}{4} =$$

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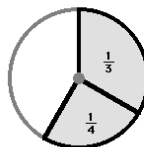
1) **Adam and David had pizza for lunch. Adam ate 1/4 of the pizza. David ate 1/3 of the pizza. How much of the pizza did they eat?**

$$\frac{1}{3} + \frac{1}{4} =$$

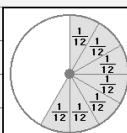$$\frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

Ok $\frac{7}{12}$

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2) **Mike ran 1.5 miles on Monday and 0.8 miles on Tuesday. How much more did he run on Monday?**
**Decimal Form, Tenths Place.**

$$\begin{array}{r} 1.5 \\ -\,0.8 \\ \hline \end{array}$$
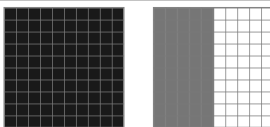
One strategy for solving this problem is to just delete the 8 tenths. Another strategy is to separate, or set aside, the .8 of a mile he ran on Tuesday and visually representing the difference.

For this example you will use the second strategy. You will Trade Down to convert the left grid to 10 tenths.

7. Press the **Tab** key until you have a highlighted just the grid on the left.

8. Press the **Enter** key to select this grid.

9. Press **Trade Down** to convert this grid to 10 tenths.

10. Press the **Enter** key to select one column of tenths in this grid.

11. Press the **Shift** key, which will enable you to select more than one column of tenths at a time.

12. Press the **right arrow** two more times to select a total of three tenths.

13. Press the **Cut** key to remove the three tenths and copy them onto the clipboard.

14. Using the **Tab** key, select just the grid on the right (which has five columns of tenths).

15. Press the **Paste** key to copy the 3 tenths from the clipboard. You have now represented the 0.8 miles that Mile ran on Tuesday.

16. The remaining 0.7 of a mile in the grid on the left represents the difference, and it is the answer.

16. Select the **Worksheet** key in the upper left corner to return to the Worksheet mode. Enter "0.7" and check your answer.

## Congratulations!

You have successfully completed the *MathPad Plus: Fractions and Decimals* Tutorial. InfoUse developed this program in association with The Center for Accessible Technology and in collaboration with IntelliTools, Inc. Funding for this project was made available from The National Institute of Child Health and Human Development. *MathPad Plus: Fractions and Decimals* is available for both Macintosh and Windows.



2) Mike ran 1.5 miles on Monday and 0.8 miles on Tuesday. How much more did he run on Monday?
Decimal Form, Tenths Place.
1.5
− 0.8



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2) Mike ran 1.5 miles on Monday and 0.8 miles on Tuesday. How much more did he run on Monday?
Decimal Form, Tenths Place.
1.5
− 0.8
1.5
− 0.8
0.7