Teacher's Manual

JUMP Math

Confidence Building Unit: Addition with Big Numbers Challenge — Level B

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This manual accompanies the
Addition with Big Numbers Challenge
(Level B)

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MULTIPLYING POTENTIAL.

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Introduction

The *Confidence Building Unit: Addition with Big Numbers Challenge* (Level B) is designed to help students become more confident about their mathematical abilities and to raise their level of enthusiasm for the subject. We recommend that teachers use the unit for several days before starting the curriculum-based lessons in the JUMP *Teacher Resources*. The unit is divided into three lessons: B-1, B-2, B-3; each lesson is subdivided into sections (B-1A, B-1B, etc.)

This unit does not teach addition in depth. To teach addition in depth, you can use the lesson plans in the regular JUMP *Teacher Resources*. The purpose of this unit is solely to convince your weaker students that they can meet difficult-looking challenges (so they will focus more and persevere in their work) and to allow all students to benefit from the excitement that can sweep through a class when all students feel they are capable of learning math.

Weaker students do not have to do all of the questions in each section. The code for each section ends with a letter that indicates the level of difficulty of the questions on that page (for instance: B1-A, B1-B, B1-C). When your weakest students have finished section A of a lesson, you may move on to the next lesson (unless they insist on doing the harder questions).

If some students are not able to do all of the questions in a lesson, you should still try to make them feel like they are doing advanced work. The best way to do this is to create special bonus questions for these students that look harder than the material they have been working on but do not introduce any new skills. For instance, if these students can only count in the twenties, and have added $25 + 1$, ask them if they can handle a bigger sum and let them try $27 + 1$. Students love to meet a sequence of harder and harder challenges and they begin to focus more and stay on task longer when they have an opportunity to do so.

Lesson B-1

Teach your students to add by counting on from the bigger number as follows:

Example: $7 + 3 =$

Step 1: Say the greater number (7) with your fist closed.

Step 2: Count up by ones raising first your thumb, then one finger at a time until you have the same number of fingers up as the lower number.

Step 3: The number you say when you have the second number of fingers up is the answer (in this case you say 10 when you have three fingers up, so 10 is the sum of 7 & 3)

8 9 10

A great bonus question would be to add a multi-digit number to a single-digit number (e.g. $165 + 3$). Just make sure your students can count high numbers.

Sometimes, when students try to add $7 + 3$, they will make the mistake of putting their thumbs up when they say the number 7. To help them avoid this mistake, you might try the following warm-up exercise: Tell your students that you are going to throw the bigger number in a sum to them. Throw the number “seven” and ask them to catch it from the air by closing their fists (with their thumbs

tucked under their fingers) while saying the number out loud. Raise the bar by throwing students bigger and bigger numbers to catch. I have found that young students get more and more excited as I increase the size of the numbers, first into the high two digits and then even into the hundreds. After your students have practiced saying the bigger number in a sum with their fists closed, let them add pairs of numbers, increasing the size of one of the numbers and letting your students know how impressed you are that they can handle such big numbers.

If students have trouble adding by counting on, only use 1 as the smaller number in the sum (for instance, $6 + 1$, $8 + 1$, $10 + 1$ and so on). Some students find it easier to count in the twenties than in the teens, (eleven, twelve and thirteen can be confusing) so you might go directly to the twenties with these students. I have taught some students who quickly learned to count to much higher numbers than they were familiar with, just because they got so excited about being able to add large numbers.

Eventually you should give students sums in which the bigger number is in the second position (for instance $2 + 25$). Point out to students that it is more efficient to count up starting with the bigger number; otherwise they may have to raise more fingers than they actually have.

Before students attempt any questions on the worksheets, you should give them lots of oral practice with questions that you write on the board.

Lesson B-2

Let your students know that addition statements are sometime written vertically:

$7 + 3$ can be written:

$$\begin{array}{r} 7 \\ +\,3 \\ \hline \end{array}$$

Allow students to practice adding one digit numbers vertically in cases in which the bigger number is on top. Then give them questions in which the bigger number is on the top or the bottom and ask them to identify the bigger number before they add.

Write the sum:

$$\begin{array}{r} 21 \\ +33 \\ \hline \end{array}$$

Make a model of the numbers in the sum using dimes and pennies. Show your students the model for 21 (two dimes and one penny) and for 33 (three dimes and three pennies). Tell students that they can find the answer to the sum by combining the two amounts. ASK: If I combine my pennies, how many pennies will I have (four). If I combine my dimes, how many dimes will I have (five). How much money will I have altogether? (five dimes and four pennies, which is fifty four cents). Point out to students that they could have found the answer without the coins by adding the numbers in the ones column ($1 + 3$) and writing the answer in the same column and then adding the numbers in the tens column ($2 + 3$):

$$\begin{array}{r} 21 \\ +33 \\ \hline 54 \end{array}$$

Allow your students to practice this with other sums before they try the handout pages.

Note: Section B2-C contains numbers in the thousands. Students who are not familiar with higher place values can still get excited about adding longer and longer numbers. (I have never met students who didn't want to add bigger numbers vertically just because they didn't know their place value names.) You can tell students the higher place value names, as they like to hear that they are adding numbers in the thousands, but I wouldn't recommend that you teach place value in any depth during this unit, as learning place value is harder than the actual addition. (Place value is taught in-depth in the JUMP *Teachers Resources*.)

If you would like to do a more advanced confidence builder using place value, you can use the two-page handout on building confidence with big numbers that I gave out in the training session.

Lesson B-3

This lesson is a continuation of the last lesson with larger numbers and some more advanced problems in section B3-C. If you run out of problems for your faster students, you can make some up and write them on the board. Students can answer these questions in a notebook or on the blank page at the back of the unit.

Teacher's Manual

JUMP Math

Confidence Building Unit: Fractions Challenge — Level B

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Fractions Challenge
(Level B)

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Introduction

The *Confidence Building Unit: Fractions Challenge* (Level B) is designed to help students become more confident about their mathematical abilities and to raise their level of enthusiasm for the subject. We recommend that teachers use the unit for several days before starting the curriculum based lessons in the JUMP *Teacher Resources*. The unit is divided into five lessons (F-1–F-5); each lesson is divided into sections (F-1A, F-1B, F-2A, etc.).

This unit does not teach fractions in depth. To teach fractions in depth, you can use the lesson plans in the regular JUMP *Teacher Resources*. The purpose of this unit is solely to convince your weaker students that they can meet difficult-looking challenges (so they will focus more and persevere in their work) and to allow all students to benefit from the excitement that can sweep through a class when all students feel they are capable of learning math.

Weaker students do not have to do all of the questions in each section. The code for each section ends with a letter that indicates the level of difficulty of the questions on that page (for instance: F1-A, F1-B, F2-A). When your weakest students have finished section A of a lesson, you may move on to the next lesson (unless they insist on doing the harder questions).

If students are not able to do all of the questions in a lesson, you should still try to make them feel like they are doing advanced work. The best way to do this is to create special bonus questions for students that look harder than the material they have been working on but do not introduce any new skills. For instance, if students can only name fractions by counting shaded pieces in very simple shapes, increase the number of shaded pieces without changing the shape and be impressed when your students meet your challenge. Students love to meet a sequence of harder and harder challenges; they begin to focus more and stay on task longer when they have an opportunity to do so.

Lessons F-1 and F-2

Explain how to represent a fraction.

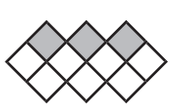
$\frac{3}{8}$ ← **Step 1:** Count the number of shaded regions.

$\frac{3}{8}$ ← **Step 2:** Count the number of pieces the pie is cut into.

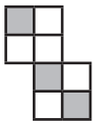
The top number in the fraction gives the number of pieces you have selected and the bottom number is the total number of pieces. The top number is called the numerator and the bottom number is called the denominator. (Students do not need to know these terms for the purpose of this unit; they will learn them, along with other models of fractions, in the regular JUMP program.)

Here are some questions your students can try.

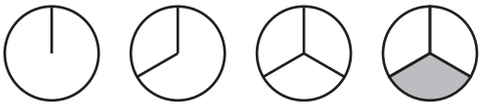
What fraction of each figure is shaded?



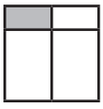
Raise the bar by drawing more complex shapes on the board:



Teach them how to draw 1/3 as follows:



Ask your students how they would draw 1/2 and 1/4 in a square box. Make sure they know that in drawing a fraction, you have to make all the pieces the same size. For instance, the following is **not** a good example of 1/4:



Lesson F-2 is a continuation of F-1, with more complex shapes.

Lesson F-3

Your students will need to be able to add single-digit numbers for this lesson. You can teach them to add by counting on from the bigger number as follows:

Example: $7 + 3 =$

Step 1: Say the greater number (7) with your fist closed.

Step 2: Count up by ones raising first your thumb, then one finger at a time until you have the same number of fingers up as the lower number.

Step 3: The number you say when you have the second number of fingers up is the answer (in this case you say 10 when you have three fingers up, so 10 is the sum of 7 & 3)

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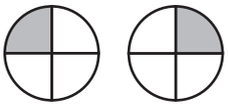
If students have trouble adding by counting on, only use 1 as the smaller number in the sum (for instance, $6 + 1$, $8 + 1$, $10 + 1$ and so on).

For the purposes of this unit students will only need to add fairly small numbers. If you think your students will enjoy a confidence-building unit that is based on adding larger numbers, see the *Confidence Building Unit: Addition with Big Numbers Challenge* (Level B).

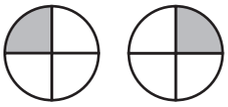
Eventually you should give students sums in which the bigger number is in the second position (for instance $2 + 25$). Point out to students that it is more efficient to count up starting with the bigger number; otherwise they may have to count on more fingers than they actually have.

Adding Fractions with the Same Denominator

Ask your students to imagine that they are at a party and they want to eat the amount of pizza shown in the diagram below:

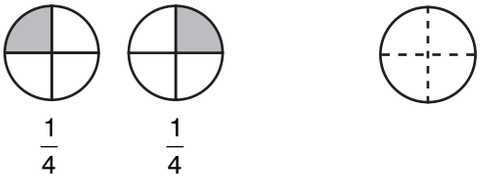


Ask students to name each of the two fractions. Write their answers under the fractions:



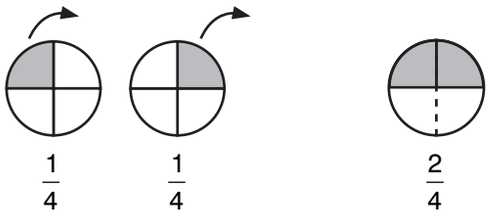
$\frac{1}{4}$ $\frac{1}{4}$

Now draw an empty plate cut into quarters beside the two pizzas:



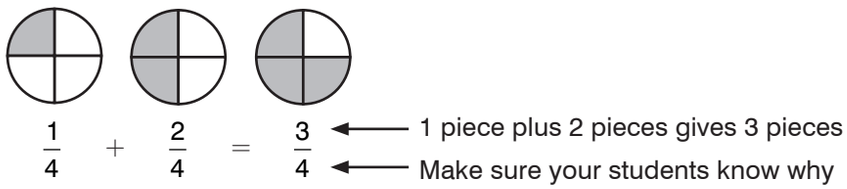
$\frac{1}{4}$ $\frac{1}{4}$

Ask students to imagine what the plate would look like if you moved the pieces that they want to eat onto the plate. How many pieces of the diagram should you shade? What fraction of the pizza would be on the plate? Challenge students to make a prediction before you shade in the pieces. There will be two pieces on the plate; the plate is divided into four parts. So the name of the fraction is 2/4:



Ask students if they can tell you a rule for finding the answer: How did you get the top number (the numerator) of the fraction (2)? You add the top numbers of the two fractions you started with ($1 + 1$) because this tells you how many pieces you have altogether. You keep the bottom number (the denominator) the same because it tells you how many pieces are in one pizza (or the size of the piece) and this doesn't change.

Here is another example:



Lessons F-4 and F-5

Tell your students that now they can use the law they discovered for adding fractions in cases where there is no picture. Write some simple sums on the board and allow students to answer:

$\frac{1}{5} + \frac{1}{5} =$ $\qquad\qquad$ $\frac{1}{7} + \frac{2}{7} =$

Raise the bar by increasing the size of the denominator:

$\frac{1}{25} + \frac{1}{25} =$ $\qquad$ $\frac{1}{63} + \frac{1}{63} =$ $\qquad$ $\frac{1}{127} + \frac{1}{127} =$

Whenever possible, you should allow students to figure out how to extend a concept to a case they haven't seen. This is easy to do with the addition of fractions. Ask your students what they might do if:

There were three fractions with the same denominator?

$$\frac{1}{7} + \frac{2}{7} + \frac{4}{7} = ?$$

If students complete all of the sections for this lesson and need extra work, you might ask them to add some fractions where the numerators are two or three digit numbers (with no regrouping). Your students will likely find this challenge easier if they complete the *Addition with Big Numbers Challenge* (Level B) first.