

Patterns in Arithmetic

Fractions Placement PDF

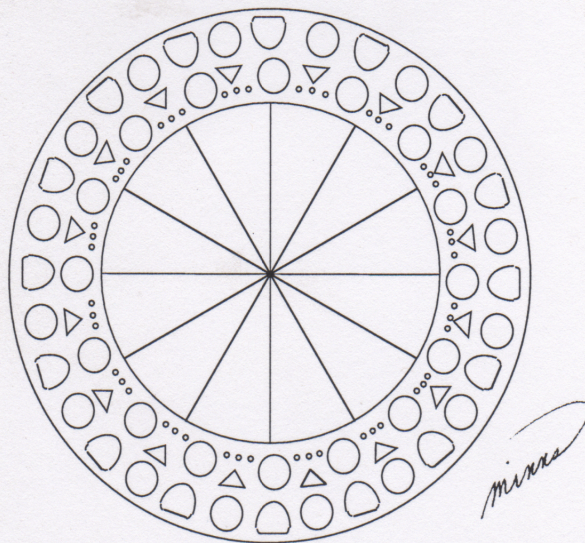
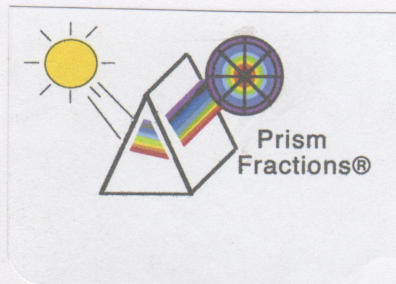
Booklets 3, 4, and 5

Parent/Teacher Guide

Booklet 3 - Mixed Numbers and Improper Fractions

Booklet 4 - Equivalent Fractions

Booklet 5 - Simplifying Fractions



By Alysia Krafel, Susan Carpenter, and Suki Glenn

Based on methods developed by Prof. Michael Butler at the
UCI Farm Elementary School
University of California, Irvine

Fractions Placement PDF - Booklets 3, 4, and 5

Student Placement Assessment worksheets are located at the end of each Assessment Guide

Booklet 3 - Mixed Numbers and Improper Fractions

This booklet is designed for eight to ten-year-old students (fourth grade).

Prerequisite: Booklets 1 and 2

This booklet:

- works with concrete models to teach what an improper fraction is and what its relationship is to a mixed number.
- teaches how to convert a fraction to a mixed number and back again.

Booklet 4 - Equivalent Fractions

This booklet is designed for nine to eleven-year-old students (fourth grade).

Prerequisite: Booklets 1, 2, and 3

This booklet:

- develops the concept of equivalent fractions.
- teaches how equivalent fractions are created, and their relationship to the multiplication tables.
- begins with manipulatives, moves to drawings, and then to calculation.

Very important groundwork concepts are laid for later work in fractions.

Booklet 5 - Simplifying Fractions

This booklet is designed for ten and eleven-year-old students (fifth grade).

Prerequisite: Booklets 1, 2, 3, and 4

This booklet:

- works to further develop the concept of equivalent fractions
- teaches how fractions are simplified to lowest terms.
- begins with manipulatives, moves to drawings, and then to calculation.

Very important groundwork concepts are laid for later work in fractions.

Answer Keys for Fractions: Booklet 3, 4, and 5 Placement Assessments are at the end of the Assessment Guides.

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Booklets 3,4, and 5
Parent/Teacher Guide
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Fractions: Booklet 3 Placement Assessment Guide

Purpose The purpose of this guide is to assess the fundamental knowledge necessary for success in this booklet. Assessment: Part 1 is review material from the last booklet and is used to determine student readiness for this booklet. Assessment: Part 2 is a preview of the new material presented in this booklet and is used to set the baseline for what the student already knows at the beginning of instruction.

Prerequisites *Patterns in Arithmetic*: Fractions - Booklets 1 and 2

Materials Assessment: Parts 1 and 2, pages 7 and 8
Score sheets, pages 5 and 6
Fraction pieces - Prism Fractions or fraction circles
Pattern blocks and counters of any kind

Instructions Instruct the student to attempt all the problems. If he does not know how to do a problem, he should put a question mark by it. This will let you know he looked at the item and decided he could not do it.

It is acceptable to read the items to a student. We are assessing math, not reading. Do not explain any items to him. If he does not know what the question means, tell him to put a question mark on that item. Answers are in the Answer Key. Place the manipulatives within his reach, but do not show him how to use them at this time.

As always, note how the student is solving the problem to guide your teaching. Possible stages are using manipulatives; figuring out and building understanding; making pictures; just using numbers abstractly in his head; or practicing.

Do the assessment in two parts. Give Assessment: Part 1 and check it for readiness for this booklet. If the student is not ready for this booklet, there is no point in giving Assessment: Part 2. If he passes all the readiness items, then give Assessment: Part 2.

After scoring Assessment: Part 2, use the Booklet Selection Guide to determine the correct booklet for your student based on the results of the assessment.

Assessment Guide This Assessment Guide explains what concept each item on the test is assessing. The item numbers match the item numbers on the student test page. The title of the lesson and Booklet number tell you where the concept is taught. In the Assessment Guide, under each lesson title are several assessment criteria. Each criterion is labeled with capital letters 'A,' 'B,' etc. These criteria tell you what to look for in the student work. On the student test, sometimes multiple problems are used to test a concept. These multiple problems are labeled with small letters 'a,' 'b,' etc. Score sheets that match the Assessment Guide for both Assessment: Part 1 and Part 2 follow.

Assessment Criteria for Assessment: Part 1

This is review material from the previous booklets and is used to do Assessment: Part 1.

Can the student:

1. Numerators Greater Than One (Fractions: Booklet 1)

A. divide the rectangle into roughly four equal sections? This demonstrates that he knows the denominator, four, to indicate that the whole is divided into four parts.

B. shade in three of the four sections indicating that he knows that the numerator, three tells him how many of the four parts are being discussed?

2. Fractions as Ratios (Fractions: Booklet 2)

A. answer correctly both problems a and b?

B. add correctly the two fractions to get $\frac{5}{6}$ in problem c and subtract the two fractions to get $\frac{1}{6}$ in problem d?

C. write the correct number sentences for problems c and d?

Does the student use the denominator six in all the problems? This shows he understands that this is the number of pieces the whole is divided into. Also, we want to know if he understands that fractions can be used in number sentences just as whole numbers can be.

3. Changing Wholes (Fractions: Booklet 2)

A. state that the blue is equal to $\frac{2}{3}$?

In Items 4 - 7, let the student know that we need to know how he is solving the problems. He can use the manipulative if he wants to. Observe if he is doing the problem without manipulatives and make a note of it by circling those items during the test. If manipulatives are used, it's a good idea to note the type of manipulative, e.g., pattern blocks, fraction pieces, or if a drawing was made.

If you are working in a large group, instruct the students to circle those items they do without using manipulatives. Tell them it is fine to use manipulatives, but we need to know if they are able to do the problems in their head or not. We are trying to decide how best to teach them, so we need good data.

4. Equivalence: Manipulative (Fractions: Booklets 1 and 2)

A. write in the correct missing number in two of the three problems?

B. No score but note: Does he do two of the three problems without the use of the fraction pieces as indicated by circled problems?

5. Greater Than, Less Than, or Equal To (Fractions: Booklet 2)

A. use the correct sign in two of the three problems?

B. No score but note: Does he do two of the three problems without the use of the fraction pieces as indicated by circled problems?

6. Addition and Subtraction of Like Fractions (Fractions: Booklet 2)

A. give the correct answer in two of the three problems?

Simplification of the answer in problem c not required.

7. Parts of Wholes (Fractions: Booklet 2)

A. give the correct answer to both problems a and b?

B. give the correct answer to problem c?

C. No score but note: Does he do two of the three problems without the use of counters as indicated by circled problems?

Extra Items (extra point for not using a manipulative)

A. give the correct answers on two of three problems in each set without the use of any manipulatives on Items 4, 5, 6, and 7? If so, he gets a total of one point.

Booklet Selection Guide based on results of Assessment: Part 1

If the student has a No on Items 1A, 1B, and 2A, begin with Fractions: Booklet 1. Do not give Assessment: Part 2 of this assessment. There is much to lose by not developing basic concepts.

If the student has less than 6 points or a Yes on Items 1A, 1B, and 2A, 2B, but a No on three of the four items 4A, 5A, 6A, and 7A, even with the manipulatives available, begin with Fractions: Booklet 2.

Critical concepts for Fractions: Booklet 3 are concepts 2A, 4A,* and 6A. If your student has 7 or more points but missed any of the above items (2A, 4A, and 6A), remediate these using manipulatives before moving on with this booklet. These items test the understanding of the denominator. The denominator is the driving concept behind the equivalence of improper and mixed numbers. After you have finished reteaching any of the above concepts, retest and then give Part 2 of this assessment.

*It is not necessary for a student to be able to calculate equivalence at this point. If he can build it with the manipulatives, that is sufficient. Calculating equivalence is taught in Fractions: Booklet 4.

If you are working with a class, students with weak areas can be remediated concurrently with this booklet while reteaching from Fractions: Booklet 2 as long as the student's total score is at least 6. A score lower than 6 indicates that basic concepts are not in place.

A score of 9 or more points indicates good background knowledge in concepts presented up to this point. Proceed with Part 2 of this assessment.

Assessment Criteria for Assessment: Part 2

Do not use manipulatives for this part of the test. He can use drawings to help if needed.

Can the student:

1. Mixed Numbers to Improper Fractions and Improper Fractions to Mixed Numbers
 - A. place a box around both improper fractions in the list?
 - B. place a circle around both mixed numbers in the list?
2. Mixed Numbers to Improper Fractions
 - A. change correctly two of the three mixed numbers to improper fractions?
 - B. obtain the correct answers without the use of a drawing?
3. Improper Fractions to Mixed Numbers
 - A. change correctly two of the three improper fractions to mixed numbers?
 - B. obtain the correct answers without the use of a drawing?
4. Mixed Numbers and Improper Fractions on Number Lines
 - A. locate correctly the mixed number $1\frac{1}{4}$ on the number line?
5. Mixed Numbers and Improper Fractions on Number Lines
 - A. locate correctly $\frac{11}{4}$ on the number line?

6. Addition of Mixed Numbers with Like Denominators

- A. add correctly the fractions in two out of the three problems?

This is to see if the student knows to add only the numerators and not the denominators.

B. regroup the improper fractions to create whole numbers and combine them with the sum of the whole numbers in the problem? Give a Yes if he attempted this even if he made an arithmetic error.

- C. obtain the correct final sum in two of the three problems?

7. Mixed Numbers Meet Subtraction

- A. get the correct answer on both problems a and b?

- B. get the correct answer on problem c?

- C. get the correct answer on problem d?

In the first two problems, the denominators are the same. The student only has to regroup the fraction and the whole number which increases the size of the top fraction so subtraction can take place. A few students will use negative numbers to solve these and not regroup. This is acceptable.

Booklet Selection Guide based on results of Assessment: Part 2

A student who scores 11 Yes points or more can move to Fractions: Booklet 4. Reteach any weak areas.

If a student scores Yes on Items 1 - 5, and scores No on Items 6 and 7, you can skip the early part of this booklet and begin with the Addition of Mixed Numbers with Like Denominators, or Mixed Numbers Meet Subtraction. A score of 8 or less indicates that this booklet is just right.

Whenever remediation is needed, rely upon the following process, which is used throughout the *Patterns in Arithmetic* series to develop understanding of a concept.

1. Introduce the concept with a manipulative. Orally discuss it. Build it. Verify it. Practice it. Repeat the experience with a different manipulative (oral manipulative).
2. Use manipulatives to explore the concept again. This time record it with pictures (pictorial/representation). Practice it. Use worksheets.
3. Record the problem with numbers (abstract/symbolic), which links the pictorial with the abstract.
4. Practice fluency.
5. Practice for speed.

Ask questions or make statements, such as: “**Are you sure?**” or “**Build it.**” or “**What gave you the clue?**” or “**Show me how you got that.**” or “**Prove it.**” even when a student is correct. This is important to do often. Many students will ask an adult, “Am I right?” rather than answering definitively. Confidence in a student’s response must come from within. A student needs to self-check and have confidence in his or her ability and knowledge. Asking the student if he or she is right, even when correct, will encourage self-confidence and the ability to self-check.

Please note that the dialogues in most lessons are idealized, with a student giving all the correct answers. The dialogue you have with your student will be unique. What’s most important is to listen to the student and figure out the model of the world she is presenting. From your understanding of what she says, continue to ask probing questions or statements, such as: “**How did you get that?**” “**Show me what you mean.**” “**Build a model of that.**” “**Tell me more so I can understand what you are saying.**”

Can the student:

1. Numerators Greater Than One (Fractions: Booklet 1)

Yes No A. break the rectangle into roughly four equal sections?

Yes No B. shade in three of the four sections?

2. Fractions as Ratios (Fractions: Booklet 2)

Yes No A. answer correctly both problems a and b?

Yes No B. supply the correct answer for both problems c and d?

Yes No C. write the correct number sentences for problems c and d?

3. Changing Wholes (Fractions: Booklet 2)

Yes No A. state that the blue is equal to $\frac{2}{3}$?

4. Equivalence: Manipulative (Fractions: Booklets 1 and 2)

Yes No A. write the correct missing number in two of the three problems?

No score: Yes No B. correctly do two of the three problems without the use of the fractions pieces?

5. Greater Than, Less Than, or Equal To (Fractions: Booklet 2)

Yes No A. use the correct sign in two of the three problems?

No score: Yes No B. correctly do two of the three problems without the use of the fractions pieces?

6. Addition and Subtraction of Like Fractions (Fractions: Booklet 2)

Yes No A. give the correct answer in two of the three problems?

No score: Yes No B. correctly do two of the three problems without the use of the fractions pieces?

7. Parts of Wholes (Fractions: Booklet 2)

Yes No A. give the correct answer to both problems a and b?

Yes No B. give the correct answer to problem c?

No score: Yes No C. correctly do two of the three problems without the use of the counters?

Extra Item (extra point for not using a manipulative)

Yes No A. give the correct answers on two of three problems in each set without the use of any manipulative on Items 4, 5, 6, and 7? If so, he gets a total of one point.

Items Correct = _____ = _____%

Items Possible = 12

Can the student:

1. Mixed Numbers to Improper Fractions and Improper Fractions to Mixed Numbers
 - Yes No A. place a box around both improper fractions in the list?
 - Yes No B. place a circle around both mixed numbers in the list?

2. Mixed Numbers to Improper Fractions
 - Yes No A. change correctly two of the three mixed numbers to improper fractions?
 - Yes No B. obtain the correct answers without the use of a drawing?

3. Improper Fractions to Mixed Numbers
 - Yes No A. change correctly two of the three improper fractions to mixed numbers?
 - Yes No B. obtain the correct answers without the use of a drawing?

4. Mixed Numbers and Improper Fractions on Number Lines
 - Yes No A. locate correctly the mixed number $1\frac{1}{4}$ on the number line?

5. Mixed Numbers and Improper Fractions on Number Lines
 - Yes No A. locate correctly $\frac{11}{4}$ on the number line?

6. Addition of Mixed Numbers with Like Denominators
 - Yes No A. add the fractions correctly in two of the three problems?
 - Yes No B. regroup the improper fractions to create whole numbers?
 - Yes No C. obtain the correct final sum in two of the three problems?

7. Mixed Numbers Meet Subtraction
 - Yes No A. get the correct answer on both problems a and b?
 - Yes No B. get the correct answer on problem c?
 - Yes No C. get the correct answer on problem d?

Items Correct = _____ = _____%
 Items Possible = 14

Score of 11 needed to pass to the next booklet.
 Less than 72% (10 or under) - review items in
 Fractions: Booklet 1 or 2, do additional practice in
 the areas missed, and retest with a pass on Part 1. A
 score of 8 or less indicates this is the right booklet.

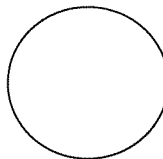
Put a question mark next to anything you do not know yet.

The student may use a manipulative for the test.

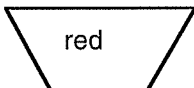
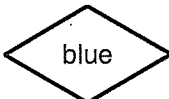
1. Shade in $\frac{3}{4}$ of this rectangle.



2. Gail cut a pizza into six slices.



- Natalia ate 1 slice. What fraction of the pizza did she eat? a. _____
 Frank ate 4 slices. What fraction of the pizza did he eat? b. _____
 How much of the pizza has been eaten? Number sentence. c. _____
 How much of the pizza is left for Gail? Number sentence. d. _____

3. If  equals 1, what does  equal? _____

On the problems below, you may use fraction pieces. Circle any problem that you can do without using fraction pieces.

4. Fill in the missing numbers.

a. $\frac{1}{2} = \frac{\quad}{4}$

b. $\frac{1}{3} = \frac{\quad}{12}$

c. $\frac{3}{4} = \frac{\quad}{8}$

5. Write a $>$, $<$, or $=$ sign (Greater Than, Less Than, or Equal To) between these pairs of fractions.

a. $\frac{1}{2}$ $\frac{1}{3}$

b. $\frac{2}{6}$ $\frac{1}{3}$

c. $\frac{3}{4}$ $\frac{2}{3}$

6. Solve.

a. $\frac{1}{4} + \frac{2}{4} = \underline{\quad}$

b. $\frac{7}{8} - \frac{3}{8} = \underline{\quad}$

c. $7\frac{3}{4} - 3\frac{1}{4} = \underline{\quad}$

7. Solve.

a. $\frac{1}{4}$ of 12 = _____

b. $\frac{2}{3}$ of 18 = _____

c. $\frac{3}{5} \times 25 = \underline{\quad}$

Put a question mark next to anything you do not know yet.

1. Put a box around the improper fractions. Put a circle around the mixed numbers.

$$2 \frac{2}{3} = \quad \frac{1}{2} = \quad \frac{3}{2} = \quad \frac{3}{4} = \quad \frac{5}{4} = \quad 3 \frac{3}{4} =$$

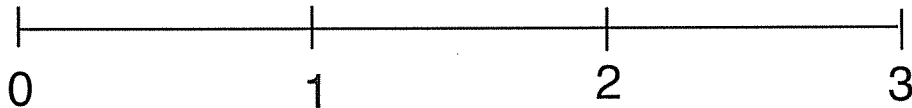
2. Change these mixed numbers to improper fractions.

a. $3 \frac{1}{2} =$ — b. $2 \frac{3}{4} =$ — c. $4 \frac{5}{6} =$ —

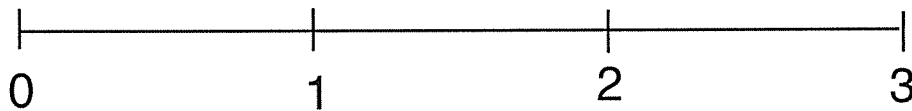
3. Change these improper fractions to mixed numbers.

a. $\frac{7}{3} =$ b. _____ $= \frac{3}{2}$ c. $\frac{10}{4} =$

4. Put $1 \frac{1}{4}$ on this number line.



5. Put $\frac{11}{4}$ on this number line.



6. Solve.

a.
$$\begin{array}{r} 1 \frac{1}{3} \\ + 2 \frac{2}{3} \\ \hline \end{array}$$
 b.
$$\begin{array}{r} 2 \frac{2}{5} \\ + 1 \frac{4}{5} \\ \hline \end{array}$$
 c.
$$\begin{array}{r} 11 \frac{8}{9} \\ + 19 \frac{8}{9} \\ \hline \end{array}$$

7. Solve.

a.
$$4 - \frac{2}{3} =$$
 b.
$$\begin{array}{r} 5 \frac{2}{3} \\ - 2 \frac{1}{3} \\ \hline \end{array}$$
 c.
$$\begin{array}{r} 5 \frac{1}{4} \\ - 1 \frac{2}{4} \\ \hline \end{array}$$
 d.
$$\begin{array}{r} 20 \frac{1}{10} \\ - 6 \frac{7}{10} \\ \hline \end{array}$$

Fractions: Booklet 4 Placement Assessment Guide

- Purpose** The purpose of this guide is to assess the fundamental knowledge necessary for success in this booklet. Assessment: Part 1 is review material from the last booklet and is used to determine student readiness for this booklet. Assessment: Part 2 is a preview of the new material presented in this booklet and is used to set the baseline for what the student already knows at the beginning of instruction.
- Prerequisites** Fractions: Booklet 2 - Beginning Operations With Fractions, Fractions: Booklet 3 - Mixed Numbers and Improper Fractions
- Materials** Assessment: Part 1 - Worksheets 1 and 2, pages 9 and 10, Assessment: Part 2, page 11
Score sheets: Assessment: Part 1, pages 6 and 7; Assessment: Part 2, page 8
Prism Fractions Circles
Pattern blocks
- Instructions** Instruct the student to attempt all the problems. If he does not know how to do a problem, he should put a question mark by it. This will let you know he looked at the item and decided he could not do it.
- Do the assessment in two parts. Give Assessment: Part 1 and check it for readiness for this booklet. If the student is not ready for this booklet, there is no point in giving Assessment: Part 2. If he passes all the readiness Items, then give Assessment: Part 2.
- After scoring Assessment: Part 2, use the Booklet Selection Guide to determine the correct booklet for your student based on the results of the assessment.
- Note** This particular assessment assumes the student is beginning fractions instruction in Grade 5 after many months of having not worked on fractions. Assessment: Part 1 serves as a warm-up as well as a placement assessment. If you have just completed Fractions: Booklet 3, you can skip Assessment: Part 1 and move directly to Assessment: Part 2.
- Important** If he is new to this program and has never used fraction circles or pattern blocks, give him time to explore these manipulatives before trying to use them in the assessment. After scoring Assessment: Part 2, use the Booklet Selection guide to determine the correct booklet for your student based on the results of the assessment.
- Assessment Guide** This Assessment Guide explains what concept each item on the test is assessing. The item numbers match the item numbers on the student test page. The title of the lesson and Booklet number tell you where the concept is taught. In the Assessment Guide, under each lesson title are several assessment criteria. Each criterion is labeled with capital letters 'A,' 'B,' etc. These criteria tell you what to look for in the student work. On the student test, sometimes multiple problems are used to test a concept. These multiple problems are labeled with small letters 'a,' 'b,' etc.

Score sheets that match the Assessment Guide for both Assessment: Part 1 and Part 2 follow.

Assessment Criteria for Assessment: Part 1

Can the student:

1. Numerators Greater Than One (Fractions: Booklet 1)
 - A. divide the rectangle into three roughly equal sections and shade in two sections to indicate that he knows what $\frac{2}{3}$ is?
2. Numerators Greater Than One (Fractions: Booklet 1)
 - A. write the correct denominator of the fraction to show that he knows to count the total number of squares to obtain this number?
 - B. write the correct numerator of the fraction to show that he knows to count the shaded squares to obtain this number?
3. Numerators Greater Than One (Fractions: Booklet 1)
 - A. recognize the language of fractions '3 out of 4 parts' are shaded?
4. My Fractions Book (Fractions: Booklet 1)
 - A. write the correct name of a given fraction with no picture given?
5. My Fractions: Equivalence (Fractions: Booklets 1 and 2)
 - A. select the correct fraction pieces for each problem?
 - B. fill in two of the three missing numbers correctly?

We want to see if he can select the correct fractional units, halves and fourths, and use the correct number of fourths to cover the half.

If he correctly fills in the missing numbers without using the fraction pieces, check to see if he can prove his answers are correct by using the pieces. If he can not, he may have memorized a procedure he does not understand.
6. My Fractions Book: Equivalence (Fractions: Booklet 1)
 - A. select the correct fraction pieces to use in the problems?
 - B. find and record a second fraction that covers the same area as the given fraction?

Does he know that two equal fractions cover the same area, or the same amount of space? Students who are taught the rote procedure for 'reducing fractions' often do not know this.

7. Greater Than, Less Than, or Equal To (Fractions: Booklet 2)
 - A. use the pieces to put the fractions in order from least to greatest?
 - B. write the fractions in the correct sequence?
8. Equivalence: Recording (Fractions: Booklet 1)
 - A. use the manipulative to find equal fractions and fill in the missing numerators for sixths and twelfths?
 - B. use the number pattern to fill in the ones he does not have pieces for?
9. Equivalence: Manipulative (Fractions: Booklet 1)
 - A. draw in fourths after having been given the definition of the whole?
 - B. draw in sixths after having been given the definition of the whole?

C. find the numerator of the equivalent fraction?

Getting a Yes on Item C and not on Items A or B indicates a possible memorized procedure.

10. Changing Wholes (Fractions: Booklet 2)

A. figure out the fractional value of two smaller blocks when given a different definition of the whole than was given on the previous problem?

B. label the yellow block as having a value of two if the red block is one?

In Items 9 and 10, the definition of the whole has been changed three times using the same manipulative, the pattern blocks. Does he understand that the fractional value of a block is relative to the definition of what the whole is? In fractions, the whole can be defined as anything you like: a yellow block or a hamburger.

11. Equivalence: Recording (without a manipulative) (Fractions: Booklet 1)

A. use the multiplication number pattern to fill in the missing numbers?

12. Parts of Wholes as Multiplication of Fractions (Fractions: Booklet 2)

A. find the correct answer to a basic fraction word problem?

13. Addition and Subtraction of Like Fractions (Fractions: Booklet 2)

A. give the correct answer to two of three addition of fractions problems?

B. give the correct answer to two of three subtraction of fractions problems?

14. Mixed Numbers to Improper Fractions (Fractions: Booklet 3)

A. write an improper fraction?

15. Mixed Numbers to Improper Fractions (Fractions: Booklet 3)

A. convert a mixed number to an improper fraction in problem a, which gives a picture assist?

B. convert a mixed number to an improper fraction with no manipulative or picture?

16. Improper Fractions to Mixed Numbers (Fractions: Booklet 3)

A. convert an improper fraction to a mixed number in problem a, which gives a picture assist?

B. convert an improper fraction to a mixed number in both problems b and c?

17. Manipulative

A. complete Items 15 and 16 with a manipulative if he was unable to do it without a manipulative?

18. Number Lines (Fractions: Booklet 3)

A. locate a mixed number on a number line?

19. Number Lines (Fractions: Booklet 3)

A. locate an improper fraction on a number line?

Examine the student work while reading the criteria listed above. Use the score sheet to answer all the questions Yes or No. Evaluate those results using the next section.

Booklet Selection is based on results of scoring on Assessment: Part 1

Students six - nine years old

If Items 1 - 6 are marked No on the score sheet in 6 or more criteria, begin with Fractions: Booklet 1. Do not give Part 2 of this assessment.

If Items 1 - 6 are Yes, but Items 7 - 13 have 8 or more criteria marked No, begin with Fractions: Booklet 2. Do not give Part 2 of this assessment.

If Items 1 - 13 are Yes, but Items 14, 15B, and 16B have a No, begin with Fractions: Booklet 3.

Students ten and up

If Items 1 - 8 are marked No on the score sheet on more than 8 of the criteria, begin with Fractions: Booklet 1 with the 'My Fraction Booklet' in the middle of the book. Some ten-year-olds will consider it 'baby stuff' and resist. Try it and see what happens. If the student complains too much or if he is in a class, after having him make a chart of all the fraction pieces and their values and giving free exploration time with the manipulatives, start with Fractions: Booklet 2.

If Items 1 - 13 are Yes, but Items 14, 15B, 16B have a No, begin with Fractions: Booklet 3. Fractions: Booklet 3 can be taught concurrently with Fractions: Booklet 4.

If, on all of Part 1, he has scored 20 or more, he is ready for Fractions: Booklet 4 - Equivalent Fractions.

All areas of weakness should be remediated as instruction on this book moves forward. Either redo sections of previous books or use other resources in the Fractions Tool Chest. Students new to this program may be able to calculate answers but may not understand what they are doing. This will be revealed by the inability to draw or prove answers, or with an answer of "I don't know, that's how I was taught."

It is not expected that students know this material on Assessment: Part 2. He may use pattern blocks for Items 1, 2a, and 2b.

Assessment Criteria for Assessment: Part 2

Can the student:

1. Changing Wholes Meets Manipulative Equivalence

- A. correctly identify three out of four of the fractional units of the smaller blocks once the whole has been identified as three yellow blocks?

2. Representational Equivalence: Cutting Up Fractions

- A. draw how thirds change to twelfths?
- B. give the correct numerator to form an equivalent fraction?
- C. draw how fourths change to sixteenths?
- D. give the correct numerator to form an equivalent fraction?

The drawing shows a graphic representation of the multiplier. To change thirds to twelfths, each third must be cut up into four smaller sections. The multiplier then is four.

3. Equivalence: Calculating

- A. show the correct multiplier in two of three problems? See problems a, c, and e.
- B. supply the correct missing number to form equivalent fractions in two of three problems? See problems b, d, and f.
- C. explain in words how he knows what the multiplier is?

One Point - Divide the three into the nine.

Two points - Find the relationship between the two denominators and use that same number in the numerator.

4. Equivalence: Calculating

- A. place the correct multiplier in the dotted 1 in problems a and c?
- B. supply the correct numerators to create equivalent fractions b and d?

5. Equivalence: Calculating

- A. explain what the Mighty One is?
One point: You have to do the same on the top and bottom.
Two points: It is the multiplier over the multiplier.
- B. explain how the Mighty One is used to calculate equivalent fractions?
One point: You have to multiply by one to get an equivalent number.
Two points: Multiplying by one changes the form of the fraction, or changes the denominator but keeps the value of the two fractions the same.

6. Equivalence: Calculating

- A. explain where the multiplier comes from physically?
One point: Because three times two is six.
Two points: There are two-sixths for every one-third. When multiplying by 2 over 2, the area is kept the same, but it is changed from one large piece to two smaller pieces.

Booklet Selection after Assessment: Part 2

If a student scores 13 or more on this part of the assessment, this whole booklet is not needed. Remediate weak areas and move on. If the weak areas are in 2A or C, 3C, 5, and 6, do the section on Representational Equivalence and Calculating Equivalence to strengthen understanding. Then move on to Fractions: Booklet 5 on Simplification.

Whenever remediation is needed, rely upon the following process, which is used throughout the *Patterns in Arithmetic* series to develop understanding of a concept.

1. Introduce the concept with a manipulative. Orally discuss it. Build it. Verify it. Practice it.
Repeat the experience with a different manipulative (oral manipulative).
2. Use manipulatives to explore the concept again. This time record it with pictures (pictorial/representation). Practice it. Use worksheets.
3. Record the problem with numbers (abstract/symbolic), which links the pictorial with the abstract.
4. Practice fluency.
5. Practice for speed.

Begin each lesson with a warm-up and review. Always end a lesson with a success before the student is tired. It is best to end while the student is still enjoying the lesson.

Ask questions or make statements, such as: “**Are you sure?**” or “**Build it.**” or “**What gave you the clue?**” or “**Show me how you got that.**” or “**Prove it.**” even when a student is correct. This is important to do often. Many students will ask an adult, “Am I right?” rather than answering definitively. Confidence in a student’s response must come from within. A student needs to self-check and have confidence in his or her ability and knowledge. Asking the student if he or she is right, even when correct, will encourage self-confidence and the ability to self-check.

Make copies of this sheet before you score.

Can the student:

1. Numerators Greater Than One (Fractions: Booklet 1)
Yes No A. divide the rectangle into three roughly equal sections and shade in two sections?
2. Numerators Greater Than One (Fractions: Booklet 1)
Yes No A. write the correct numerator of the fraction?
Yes No B. write the correct denominator of the fraction?
3. Numerators Greater Than One (Fractions: Booklet 1)
Yes No A. recognize the language of fractions '3 out of 4 parts'?
4. My Fractions Book (Fractions: Booklet 1)
Yes No A. write the correct name of a given fraction with no picture?
5. My Fractions: Equivalence (Fractions: Booklets 1 and 2)
Yes No A. select the correct fraction pieces for each problem?
Yes No B. fill in two of the three missing numbers correctly?
6. My Fractions Book: Equivalence (Fractions: Booklet 1)
Yes No A. select the correct fraction pieces?
Yes No B. find and record a second fraction equal to the first?
7. Greater Than, Less Than, or Equal To (Fractions: Booklet 2)
Yes No A. use pieces to put the fractions in order from least to greatest?
Yes No B. write the fractions in the correct sequence?
8. Equivalence: Recording (Fractions: Booklet 1)
Yes No A. use the manipulative to find equal fractions and fill in the missing numerators for sixths and twelfths?
Yes No B. use the number pattern to fill in the fractions he does not have pieces for?
9. Equivalence: Manipulative (Fractions: Booklet 1)
Yes No A. draw in fourths after being given the definition of the whole?
Yes No B. draw in sixths after being given the definition of the whole?
Yes No C. find the missing numerator of the equivalent fraction?
10. Changing Wholes (Fractions: Booklet 2)
Yes No A. figure out the fractional value of two smaller blocks when given a different definition of the whole than was given on the previous problem?
Yes No B. label the yellow block as having a value of 2?
11. Equivalence: Recording (without a manipulative) (Fractions: Booklet 1)
Yes No A. use the multiplication number pattern to fill in the missing numbers?

12. Parts of Wholes as Multiplication of Fractions (Fractions: Booklet 2)
 Yes No A. find the correct answer to a basic fraction word problem?
13. Addition and Subtraction of Like Fractions (Fractions: Booklet 2)
 Yes No A. give the correct answer to two of three addition of fractions problems?
 Yes No B. give the correct answer to two of three subtraction of fractions problems?
14. Mixed Numbers to Improper Fractions (Fractions: Booklet 3)
 Yes No A. write an improper fraction?
15. Mixed Numbers to Improper Fractions (Fractions: Booklet 3)
 Yes No A. convert a mixed number to an improper fraction in problem a, which gives a picture assist?
 Yes No B. convert a mixed number to an improper fraction with no manipulative or picture?
16. Improper Fractions to Mixed Numbers (Fractions: Booklet 3)
 Yes No A. convert an improper fraction to a mixed number in problem a, which gives a picture assist?
 Yes No B. convert an improper fraction to a mixed number in both problems b and c?
17. Manipulative
 NA* Yes No A. complete Items 15 and 16 with a manipulative if he was unable to do it without a manipulative? *Score NA (not applicable) if Items 15 and 16 were a Yes.
18. Number Lines (Fractions: Booklet 3)
 Yes No A. locate a mixed number on a number line?
19. Number Lines (Fractions: Booklet 3)
 Yes No A. locate an improper fraction on a number line?

End of Pre-Assessment: Part 1

29 points possible Each Yes counts as 1 point

Items Correct = _____ = _____%

Items Possible = 29

Notes:

Place in Booklet _____. Continue to Assessment: Part 2 Yes No

Assessment: Part 2 Score Sheet

Name _____ Date _____

Student may use pattern blocks for Items 1, 2a, and 2b.

Can the student:

1. Changing Wholes Meets Manipulative Equivalence

Yes No A. identify correctly three out of four of the fractional units of the smaller blocks?

2. Representational Equivalence: Cutting Up Fractions

Yes No A. draw how thirds change to twelfths?
Yes No B. give the correct numerator to form an equivalent fraction?
Yes No C. draw how fourths change to sixteenths?
Yes No D. give the correct numerator to form an equivalent fraction?

3. Equivalence: Calculating

Yes No A. show the correct multiplier in two of three problems?
Yes No B. supply the correct missing number in two of three problems?
0 1 2 C. explain in words how he knows what the multiplier is?

4. Equivalence: Calculating

Yes No A. place the correct multiplier in the dotted one in both problems?
Yes No B. supply the correct numerators to create equivalent fractions?

5. Equivalence: Calculating

0 1 2 A. explain what the Mighty One is?
0 1 2 B. explain how the Mighty One is used to calculate equivalent fractions?

6. Equivalence: Calculating

0 1 2 A. explain where the multiplier comes from physically?

End of Part 2 Each Yes counts as 1 point; short answer scores are 0, 1, or 2 points

Items Correct = _____ = _____%

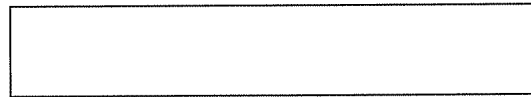
Items Possible = 17

Notes:

Put a question mark next to any problem you do not know how to do.

The student may use a manipulative.

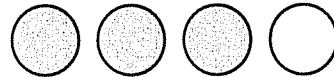
1. Shade in $\frac{2}{3}$ of this rectangle.



2. What fraction of this rectangle is shaded? _____



3. _____ out of _____ of the circles are shaded.



4. Write the name of this fraction. $\frac{2}{5}$ _____

Use fraction pieces or fraction circles. Fill in the missing numbers.

5. a. $\frac{1}{2} = \frac{\quad}{4}$

b. $\frac{1}{3} = \frac{\quad}{12}$

c. $\frac{3}{4} = \frac{\quad}{8}$

6. a. $\frac{4}{6} = \frac{\quad}{\quad}$

b. $\frac{9}{12} = \frac{\quad}{\quad}$

c. $\frac{8}{10} = \frac{\quad}{\quad}$

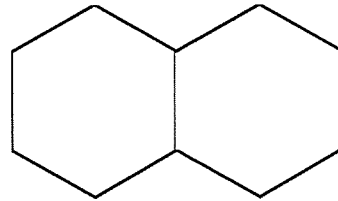
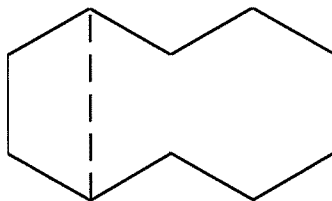
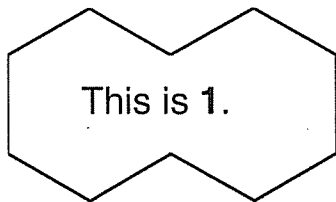
7. Put these fractions in order from the least to the greatest.

$\frac{7}{8}$	$\frac{1}{2}$	$\frac{2}{6}$	$\frac{3}{5}$	$\frac{3}{4}$
_____	_____	_____	_____	_____

8. Fill in this sequence. $\frac{1}{3} = \frac{\quad}{6} = \frac{3}{\quad} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$

Use pattern blocks for the ones you can't do with fraction pieces.

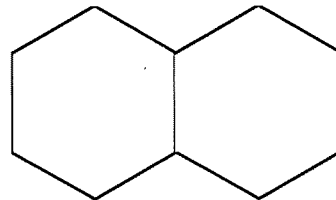
9. Use pattern blocks.



Draw in sixths.

Draw in fourths, shade in 2.

Use your drawings to find the equivalent fraction.



$\frac{2}{4} = \frac{\quad}{6}$

Draw the equivalent fraction here.

10. If the red block is equal to 1, what is the green block equal to? _____
 What is the blue block equal to? _____
 What is the yellow block equal to? _____

Do not use fraction pieces or pattern blocks for this set of problems.

11. Fill in this sequence. $\frac{2}{3} = \frac{\quad}{6} = \frac{6}{\quad} = \frac{\quad}{12}$

12. If 25¢ is a third of what you need to buy a ribbon, how much does the ribbon cost? _____

13. Solve.

a. $\frac{1}{2} + \frac{1}{2} =$

b. $\frac{3}{5} + \frac{1}{5} =$

c. $\frac{6}{10} + \frac{2}{10} =$

d. $\frac{7}{8} - \frac{1}{8} =$

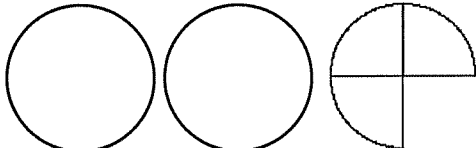
e. $\frac{2}{3} - \frac{1}{3} =$

f. $\frac{5}{5} - \frac{1}{5} =$

Do not use fraction pieces or pattern blocks for this set of problems.


14. Write an improper fraction. _____

15. Change these mixed numbers to improper fractions.

a. $2\frac{3}{4} =$ —  b. $4\frac{1}{6} =$ —

16. Change these improper fractions to mixed numbers.

a. $\frac{11}{3} =$ b. $\frac{8}{5} =$ c. $\frac{10}{4} =$



17. If you couldn't do problems 15 and 16 without blocks or pictures, can you do them with the blocks? _____ If yes, do them; if no, put a question mark.

18. Put $1\frac{3}{4}$ on this number line.



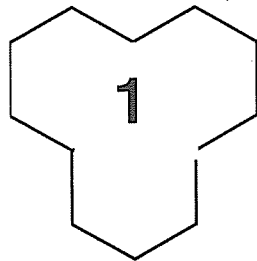
19. Put $\frac{5}{3}$ on this number line.



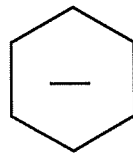
Assessment - Part 2

Name _____ Date _____

1. Identify each block. If this is 1,



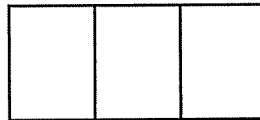
then these are:



Draw it.

2. Change $\frac{2}{3}$ into twelfths.

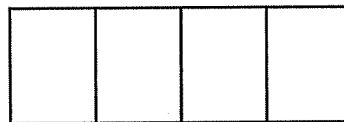
a.



b. $\frac{2}{3} = \frac{\quad}{12}$

Change $\frac{3}{4}$ into sixteenths.

c.



d. $\frac{3}{4} = \frac{\quad}{16}$

3. Fill in the missing numbers.

a.

b.

c.

d.

e.

f.

$\frac{2}{3} \times \frac{\quad}{\quad} = \frac{\quad}{9}$

$\frac{4}{5} \times \frac{\quad}{\quad} = \frac{8}{\quad}$

$\frac{5}{8} \times \frac{\quad}{\quad} = \frac{15}{\quad}$

g. How do you know what this number is? _____

4. Fill in the missing numbers.

a.

b.

c.

d.

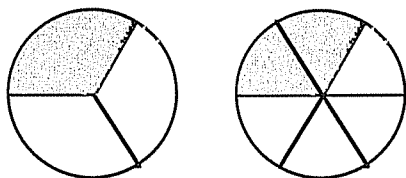
$\frac{3}{4} \times \frac{\quad}{\quad} = \frac{\quad}{12}$

$\frac{3}{5} \times \frac{\quad}{\quad} = \frac{\quad}{20}$

5. a. Explain what the "Mighty One" is. _____

b. Explain how the "Mighty One" is used to calculate equivalent fractions.

6.



$\frac{1}{3} = \frac{2}{6}$

Explain why multiplying $\frac{1}{3}$ by $\frac{2}{2}$ changes it to two sixths. _____

Fractions: Booklet 5 Placement Assessment Guide

Purpose The purpose of this guide is to assess the fundamental knowledge necessary for success in this booklet. Assessment: Part 1 is review material from the last booklet and is used to determine student readiness for this booklet. Assessment: Part 2 is a preview of the new material presented in this booklet and is used to set the baseline for what the student already knows at the beginning of instruction.

Prerequisites *Patterns in Arithmetic*: Multiplication - Booklet 3, Fractions: Booklet 4 - Equivalent Fractions, or proficiency in factoring and equivalence

Materials Assessment: Part 1, page 7 and Assessment: Part 2, page 8
Score sheets, pages 5 and 6
Fraction manipulatives

Instructions Instruct the student to attempt all the problems. If he does not know how to do a problem, he should put a question mark by it. This will let you know he looked at the item and decided he could not do it.

It is acceptable to read the items to a student. We are assessing math, not reading. Do not explain any items to him. If he does not know what the question means, tell him to put a question mark on that item.

Do the assessment in two parts. Give Assessment: Part 1 and check it for readiness for this booklet. The answers are in the Answer Key. If he is not ready for this booklet, there is no point in giving Assessment: Part 2. If he passes all the readiness items, then give Assessment: Part 2.

After scoring Assessment: Part 2, use the Booklet Selection Guide to determine the correct booklet for your student based on the results of the assessment.

Assessment Guide This Assessment Guide explains what concept each item on the test is assessing. The item numbers match the item numbers on the student test page. The title of the lesson and Booklet number tell you where the concept is taught. In the Assessment Guide, under each lesson title are several assessment criteria. Each criterion is labeled with capital letters 'A,' 'B,' etc. These criteria tell you what to look for in the student work. On the student test, sometimes multiple problems are used to test a concept. These multiple problems are labeled with small letters 'a,' 'b,' etc. Score sheets that match the Assessment Guide for both Assessment: Part 1 and Part 2 follow.

Assessment Criteria for Assessment: Part 1

Can the student:

1. Multiplication Trains/Prime Factoring (Multiplication: Booklets 2 and 3)
 - A. list all the factors in two of the three problems?
2. Changing Wholes Meet Manipulative Equivalence (Fractions: Booklet 4)

Will the student use the twelfths in the top row to exactly draw the fractions asked for? We are testing his ability to do a manipulative equivalence using Cuisenaire Rod pictures. A sloppy drawing of the correct number of sections in the whole will not do. For example, when drawing the sixths, it needs to be clear that he understands that each sixth should be the same size as two of the twelfths drawn above.

A. draw in the fractions needed with exact correctness on two of the three problems?

3. Equivalence: Calculating (Fractions: Booklet 4)

This item tests whether the student knows multiplying or dividing by one will leave the number unchanged in value. This is called the Identity Property. That term is not used at this level, but the concept is a major tool for calculating equivalence and for simplification.

A. indicate on both problems a and b that the value of the number will be unchanged?

4. Representational Equivalence: Cutting Up Fractions (Fractions: Booklet 4)

A. use four horizontal lines on the second graphic to show how the fifths are turned into twenty-fifths?

B. write the correct number of parts, the numerator, in item b? It is acceptable if he writes the number as an equivalent fraction of $\frac{15}{25}$.

5. Equivalence: Representational (Fractions: Booklet 4)

A. identify the multiplier in the graphic shown in problem 4a?

6. Equivalence: Calculating (Fractions: Booklet 4)

A. fill in the correct numerator?

B. show the multiplier as $\frac{5}{5}$?

7. Equivalence: Calculating (Fractions: Booklet 4)

A. circle the Mighty One, the $\frac{5}{5}$?

8. Equivalence: Calculating (Fractions: Booklet 4)

A. write in the correct multiplier as the Mighty One in two of the three problems?

B. fill in the correct missing numerator or denominator in two of the three problems?

Readiness Guide based on results of Assessment: Part 1

If the student scores 9 Yes scores or better on this section, he is ready to move into Booklet 5 with no remediation. Give Assessment: Part 2 of the assessment.

If the student scores 6 - 8, go to Fractions: Booklet 4 to remediate. Then retest and give Assessment: Part 2 of this assessment and move into Fractions: Booklet 5.

If the student scores 5 or less, do or redo Fractions: Booklet 4.

Assessment Criteria for Assessment: Part 2

All criteria in Assessment: Part 2 are taught in Fractions: Booklet 5.

Can the student:

1. Simplification: Manipulative

A. explain what simplification is?

Rubric:

Score 1 point - to make the numbers (in the fraction) smaller.

2 points - to decrease the number of pieces in the fraction, making the numbers in the fraction smaller.

2. Simplification: Manipulative

- A. use the pieces to give the simplified fraction in two of the three problems?

3. Simplification: Cutting Up Fractions

This is to test if the student understands that both the numerator, the shaded pieces, and the denominator, the total number of pieces, are both grouped into groups of two. This changes the fraction from ten-twelfths to five-sixths. The source of the equality is the fact that both the numerator and the denominator are divided by two. The division of the $\frac{10}{12}$ by $\frac{2}{2}$ shows the division by one. Any number divided by one will keep its identity, or remain itself. A Yes on Item B and a No on Item A may indicate the student knows the procedure but does not understand what it means.

- A. make groups of two of both the shaded and unshaded boxes in problem a?
B. give the correct simplified fraction in problem b?

4. Simplification: Calculating

The Mighty One is the Identity Property of Multiplication, which states any number times one equals itself.

- A. give the correct simplified fraction after the equal sign in two of the three problems?
B. fill in the Mighty One in two of the three problems?
C. draw the Mighty One sign around the division by one in at least one problem?

5. Simplification: Calculating

- A. explain where the divisor comes from when simplifying a fraction?

Rubric:

- 1 point - find the biggest number that will go into both numbers.
2 points - find the greatest common factor and use that number to divide both numbers.
3 points - find the greatest common factor and use that number as the Mighty One to divide both numbers.

6. Simplification: Calculating

- A. circle the Mighty One in one of the problems in problem 4?

7. Simplification: Calculating

- A. list all the common factors of twelve and sixteen?
B. circle the greatest common factor on the list, the four?
C. explain the choice of the GCF?

Rubric:

- 1 point - because it is the biggest one.
2 points - because it is the greatest common factor and will give the fraction in lowest terms.

8. Simplification: Calculating

A. explain the relationship between equivalence and simplification in problem a?

Rubric:

1 point - use nine both times.

2 points - because the Mighty One, $\frac{9}{9}$, is used both times.

B. explain how they are different?

Rubric:

1 point - in one you multiply and the other you divide.

2 points - in the first you multiply by 1, or $\frac{9}{9}$, and in the second, you divide by 1, or $\frac{9}{9}$.

Booklet Selection Guide based on results of Assessment: Part 2

If the student scores 16 or more on Assessment: Part 2 of this assessment, move on to Fractions: Booklet 6 - Multiplication of Fractions.

If the student scores 12 - 15 or more on Assessment: Part 2 of this assessment, use this booklet to reteach any areas of weakness. The student may not need to do the entire booklet. Retest and move on to Fractions: Booklet 6 - Multiplication of Fractions.

If the student scores 11 or less, this is the perfect booklet for him.

Whenever remediation is needed, rely upon the following process, which is used throughout the *Patterns in Arithmetic* series to develop understanding of a concept.

1. Introduce the concept with a manipulative. Orally discuss it. Build it. Verify it. Practice it. Repeat the experience with a different manipulative (oral manipulative).
2. Use manipulatives to explore the concept again. This time record it with pictures (pictorial/representation). Practice it. Use worksheets.
3. Record the problem with numbers (abstract/symbolic), which links the pictorial with the abstract.
4. Practice fluency.
5. Practice for speed.

Begin each lesson with a warm up and review. Always end a lesson with a success before the student is tired. It is best to end while the student is still enjoying the lesson.

Ask questions or make statements, such as: “**Are you sure?**” or “**Build it.**” or “**What gave you the clue?**” or “**Show me how you got that.**” or “**Prove it.**” even when a student is correct. This is important to do often. Many students will ask an adult, “Am I right?” rather than answering definitively. Confidence in a student’s response must come from within. A student needs to self-check and have confidence in his or her ability and knowledge. Asking the student if he or she is right, even when correct, will encourage self-confidence and the ability to self-check.

Please note that the dialogues in most lessons are idealized, with a student giving all the correct answers. The dialogue you have with your student will be unique. What’s most important is to listen to the student and figure out the model of the world she is presenting. From your understanding of what she says, continue to ask probing questions or statements, such as: “**How did you get that?**” “**Show me what you mean.**” “**Build a model of that.**” “**Tell me more so I can understand what you are saying.**”

Assessment: Part 1 Score Sheet

Name _____ Date _____

Can the student:

1. Multiplication Trains/Prime Factoring (Multiplication: Booklets 2 and 3)
Yes No A. list all the factors in two of the three problems?

2. Changing Wholes Meet Manipulative Equivalence (Fractions: Booklet 4)
Yes No A. draw in the fractions needed with exact correctness on two of the three problems?

3. Equivalence: Calculating (Fractions: Booklet 4)
Yes No A. indicate on both problems a and b that the value of the number will be unchanged?

4. Representational Equivalence: Cutting Up Fractions (Fractions: Booklet 4)
Yes No A. show how the fifths are turned into twenty-fifths?
Yes No B. write the correct number of parts, the numerator, in item b?

5. Equivalence: Representational (Fractions: Booklet 4)
Yes No A. identify the multiplier in the graphic shown in problem 4a?

6. Equivalence: Calculating (Fractions: Booklet 4)
Yes No A. fill in the correct numerator?
Yes No B. show the multiplier as $\frac{5}{5}$?

7. Equivalence: Calculating (Fractions: Booklet 4)
Yes No A. circle the Mighty One, the $\frac{5}{5}$?

8. Equivalence: Calculating (Fractions: Booklet 4)
Yes No A. write in the correct multiplier as the Mighty One in two of the three problems?
Yes No B. fill in the correct missing numerator or denominator in two of the three problems?

Items Correct = _____ = _____%

Items Possible = 11

Assessment: Part 2 Score Sheet

Name _____ Date _____

Can the student:

1. Simplification: Manipulative

Opt. 1pt. 2pts. A. explain what simplification is?

2. Simplification: Manipulative

Yes No A. use the pieces to give the simplified fraction in two of the three problems?

3. Simplification: Cutting Up Fractions

Yes No A. make groups of two of both the shaded and unshaded boxes in problem a?

Yes No B. give the correct simplified fraction in problem b?

4. Simplification: Calculating

Yes No A. give the correct simplified fraction after the = sign in two of the three problems?

Yes No B. fill in the Mighty One in two of the three problems?

Yes No C. draw the Mighty One sign around the division by one in at least one problem?

5. Simplification: Calculating

Opt. 1pt. 2pts. 3 pts.

A. explain where the divisor comes from when simplifying a fraction?

6. Simplification: Calculating

Yes No A. circle the Mighty One in one of the problems in problem 4?

7. Simplification: Calculating

Yes No A. list all the common factors of twelve and sixteen?

Yes No B. circle the greatest common factor on the list, the four?

Opt. 1pt. 2pts. C. explain the choice of the GCF?

8. Simplification: Calculating

Opt. 1pt. 2pts. A. explain the relationship between equivalence and simplification in problem a?

Opt. 1pt. 2pts. B. explain how they are different?

Items Correct = _____ = _____%

Items Possible = 20

Assessment - Part 1

Name _____ Date _____

Put a question mark next to anything you do not know how to do.

1. Find all the factors of:

a. 6 ___ x ___, ___ x ___

b. 12 ___ x ___, ___ x ___, ___ x ___

c. 30 ___ x ___, ___ x ___, ___ x ___, ___ x ___

2.

 $\frac{12}{12}$
 $\frac{2}{2}$

a. Draw in $\frac{6}{6}$.

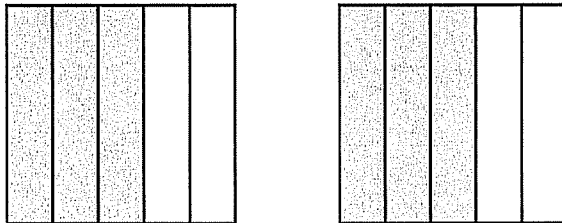
b. Draw in $\frac{4}{4}$.

c. Draw in $\frac{3}{3}$.

3. a. What happens if you multiply a number by 1? _____

b. What happens if you divide a number by 1? _____

4. a. Show the change of $\frac{3}{5}$ to 25ths.



b. How many 25ths are in $\frac{3}{5}$? _____

5. What is the multiplier in problem 4? _____

a. b.

6. Fill in the blanks: $\frac{3}{5} \times \text{---} = \frac{\text{---}}{25}$

7. Circle the Mighty One in problem 6.

8. Solve. a. $\frac{3}{4} \times \text{---} = \text{---}$ b. $\frac{2}{3} \times \text{---} = \frac{8}{\text{---}}$ c. $\frac{\text{---}}{5} \times \text{---} = \frac{18}{45}$

Put a question mark next to anything you do not know how to do.

1. What does it mean to "simplify fractions"? _____

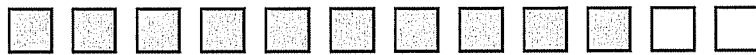
2. Simplify these fractions. You may use fraction pieces.

a. $\frac{9}{12} = \underline{\hspace{2cm}}$

b. $\frac{8}{12} = \underline{\hspace{2cm}}$

c. $\frac{8}{10} = \underline{\hspace{2cm}}$

3. a. Show how $\frac{10}{12}$ is simplified.



b. $\frac{10}{12} = \underline{\hspace{2cm}}$

4. Simplify these fractions. Show the Mighty One.

a. $\frac{8}{18} \div \frac{\square}{\square} = \underline{\hspace{2cm}}$

↑

b. $\frac{15}{20} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

c. $\frac{42}{49} \div \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

5. Where does this number come from? _____

6. Circle the Mighty One in one of the problems in problem 4.

7. a. List the common factors of 12 and 16. _____

b. Circle the number you would use to simplify $\frac{12}{16}$.

c. Why did you choose that number? _____

8. a. How is the process of making equivalent fractions such as $\frac{2}{3} = \frac{18}{27}$

and the process of simplifying $\frac{18}{27} = \frac{2}{3}$ the same? _____

b. How are these two processes different? _____

Fractions - Booklet 3

Assessment - Part 1

The student may use a manipulative for the test.

1. Shade in $\frac{3}{4}$ of this rectangle.

2. Gail cut a pizza into six slices.

Natalia ate 1 slice. What fraction of the pizza did she eat? a. $\frac{1}{6}$
 Frank ate 4 slices. What fraction of the pizza did he eat? b. $\frac{4}{6} = \frac{2}{3}$
 How much of the pizza has been eaten? Number sentence. c. $\frac{1}{6} + \frac{4}{6} = \frac{5}{6}$
 How much of the pizza is left for Gail? Number sentence. d. $\frac{6}{6} - \frac{5}{6} = \frac{1}{6}$

3. If equals 1, what does equal? $\frac{2}{3}$

On the problems below you may use fraction pieces. Circle any problem you can do without using fraction pieces.

4. Fill in the missing numbers.
 a. $\frac{1}{2} = \frac{2}{4}$ b. $\frac{1}{3} = \frac{4}{12}$ c. $\frac{3}{4} = \frac{6}{8}$

5. Write a <, >, or = sign (Greater Than, Less Than, or Equal To) between these pairs of fractions.

a. $\frac{1}{2} > \frac{1}{3}$ b. $\frac{2}{6} = \frac{1}{3}$ c. $\frac{3}{4} > \frac{2}{3}$

6. Solve.

a. $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$ b. $\frac{7}{8} - \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$ c. $7\frac{3}{4} - 3\frac{1}{4} = 3\frac{2}{4} = 3\frac{1}{2}$

7. Solve.

a. $\frac{1}{4}$ of 12 = 3 b. $\frac{2}{3}$ of 18 = 12 c. $\frac{3}{5} \times 25 = 15$

Fractions - Booklet 4

Assessment - Part 1 - Worksheet 1

The student may use a manipulative.

1. Shade in $\frac{2}{3}$ of this rectangle.

2. What fraction of this rectangle is shaded? $\frac{5}{7}$

3. 3 out of 4 of the circles are shaded.

4. Write the name of this fraction. $\frac{2}{5}$ two-fifths

Use Fraction pieces or Fraction Circles. Fill in the missing numbers.

5. a. $\frac{1}{2} = \frac{2}{4}$ b. $\frac{1}{3} = \frac{4}{12}$ c. $\frac{3}{4} = \frac{6}{8}$

6. a. $\frac{4}{6} = \frac{2}{3}$ or $\frac{8}{12}$ b. $\frac{9}{12} = \frac{3}{4}$ c. $\frac{8}{10} = \frac{4}{5}$

7. Put these fractions in order from the least to the greatest.

$\frac{7}{8}$ $\frac{1}{2}$ $\frac{2}{6}$ $\frac{3}{5}$ $\frac{3}{4}$
 $\frac{1}{2}$ $\frac{2}{6}$ $\frac{3}{5}$ $\frac{3}{4}$ $\frac{7}{8}$

8. Fill in this sequence. $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15}$
 Use Pattern Blocks for the ones you can't do with Fraction pieces.

9. Use Pattern Blocks. Draw in fourths, shade in 2.

Use your drawings to find the equivalent fraction. $\frac{2}{4} = \frac{3}{6}$

Draw the equivalent fraction here.

10. If the red block is equal to 1, what is the green block equal to? 2
 What is the blue block equal to? $1\frac{1}{2}$ or $1\frac{2}{6}$
 What is the yellow block equal to? 2

Assessment - Part 2

8. Put a box around the improper fractions. Put a circle around the mixed numbers.

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

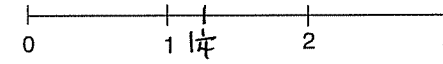
9. Change these mixed numbers to improper fractions.

a. $3\frac{1}{2} = \frac{7}{2}$ b. $2\frac{3}{4} = \frac{11}{4}$ c. $4\frac{5}{6} = \frac{29}{6}$

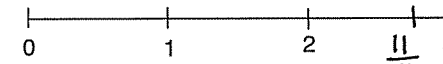
10. Change these improper fractions to mixed numbers.

a. $\frac{7}{3} = 2\frac{1}{3}$ b. $\frac{1}{2} = \frac{3}{2}$ c. $\frac{10}{4} = 2\frac{2}{4} = 2\frac{1}{2}$

11. Put $1\frac{1}{4}$ on this number



12. Put $\frac{11}{4}$ on this number



13. Solve.

a. $1\frac{1}{3} + 2\frac{2}{3} = 3\frac{3}{3} = 4$ b. $2\frac{2}{5} + 1\frac{4}{5} = 3\frac{6}{5} = 4\frac{1}{5}$ c. $11\frac{8}{9} + 19\frac{8}{9} = 30\frac{16}{9} = 34\frac{2}{9}$

14. Solve.

a. $4 - \frac{2}{3} = 3\frac{1}{3}$ b. $5\frac{2}{3} - 2\frac{1}{3} = 3\frac{1}{3}$ c. $5\frac{4}{4} - 1\frac{2}{4} = 4\frac{2}{4} = 4\frac{1}{2}$ d. $20\frac{19}{10} - 6\frac{7}{10} = 14\frac{12}{10} = 14\frac{6}{5} = 15\frac{1}{5}$

AWV= Answer will vary

Assessment - Part 1 - Worksheet 2

11. Fill in this sequence. $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12}$

12. If 25¢ is a third of what you need to buy a ribbon, how much does the ribbon cost? 75¢

13. Solve.

a. $\frac{1}{2} + \frac{1}{2} = \frac{2}{2}$ b. $\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$ c. $\frac{6}{10} + \frac{2}{10} = \frac{8}{10}$
 d. $\frac{7}{8} - \frac{1}{8} = \frac{6}{8}$ e. $\frac{2}{3} - \frac{1}{3} = \frac{1}{3}$ f. $\frac{5}{5} - \frac{1}{5} = \frac{4}{5}$

Do not use Fraction pieces or Pattern Blocks for this set of problems.

14. Write an improper fraction. $\frac{4}{4}, \frac{18}{5}$, AWV

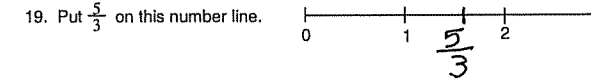
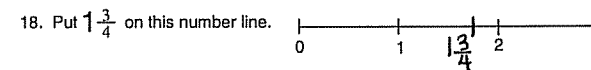
15. Change these mixed numbers to improper fractions.

a. $2\frac{3}{4} = \frac{11}{4}$ b. $4\frac{1}{6} = \frac{25}{6}$

16. Change these improper fractions to mixed numbers.

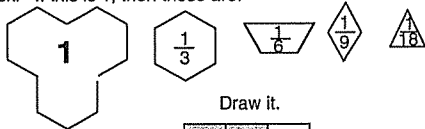
a. $\frac{11}{3} = 3\frac{2}{3}$ b. $\frac{8}{5} = 1\frac{3}{5}$ c. $\frac{10}{4} = 2\frac{2}{4}$

17. If you couldn't do problems 15 and 16 without blocks or pictures, can you do them with the blocks? AWV. If yes, do them, if no, put a question mark.



Assessment - Part 2

1. Identify each block. If this is 1, then these are:



Draw it.

2. Change $\frac{2}{3}$ into twelfths.



b. $\frac{2}{3} = \frac{8}{12}$

Change $\frac{3}{4}$ into sixteenths.



d. $\frac{3}{4} = \frac{12}{16}$

3. Fill in the missing numbers.

a. $\frac{2}{3} \times \frac{3}{3} = \frac{6}{9}$ b. $\frac{4}{5} \times \frac{2}{2} = \frac{8}{10}$ c. $\frac{5}{8} \times \frac{3}{3} = \frac{15}{24}$

g. How do you know what this number is? Divide the 3 into the 9 to find the multiplier. The top and bottom numbers are the same.

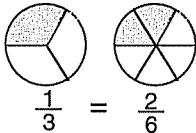
4. Fill in the missing numbers.

a. $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$ b. $\frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$

5. a. Explain what the "Mighty One" is. It is the fractional equivalent to one that changes a number to a more useful form.

b. Explain how the "Mighty One" is used to calculate equivalent fractions. Any number can be multiplied by 1 in a fractional form to create an equivalent fraction.

6. Explain why multiplying $\frac{1}{3}$ by $\frac{2}{2}$ changes it to two sixths. $\frac{2}{2}$ is equal to 1 so the value doesn't change. Since it takes $\frac{2}{2}$ to make a third, multiplying by 2 doubles the



number of pieces. Multiplying by $\frac{2}{2}$ doubles the number of pieces but halves the size.

Assessment - Part 2

1. What does it mean to "Simplify Fractions"? To reduce the number of pieces from more pieces to the least number possible. To make the numbers in a fraction smaller.

2. Simplify these fractions. You may use Fraction pieces.

a. $\frac{9}{12} = \frac{3}{4}$ b. $\frac{8}{12} = \frac{2}{3}$ c. $\frac{8}{10} = \frac{4}{5}$

3. a. Show how $\frac{10}{12}$ is simplified.



b. $\frac{10}{12} = \frac{5}{6}$

4. Simplify these fractions. Show the Mighty One.

a. $\frac{8}{18} \div \frac{2}{2} = \frac{4}{9}$ b. $\frac{15}{20} \div \frac{5}{5} = \frac{3}{4}$ c. $\frac{42}{49} \div \frac{7}{7} = \frac{6}{7}$

5. Where does this number come from? It is the Mighty One. It's number equals one, which divides evenly into the fraction being simplified.

6. Circle the "Mighty One" in problem 4.

7. a. List the Common Factors of 12 and 16. 1, 2, 4

b. Circle the number you would use to simplify $\frac{12}{16}$.

c. Why did you choose that number? It's the greatest common factor and gives the fraction the lowest term.

8. a. How is the process of making equivalent fractions, such as, $\frac{2}{3} = \frac{18}{27}$ and the process of simplifying $\frac{18}{27} = \frac{2}{3}$ the same? Because both use the Mighty One or Identity Property.

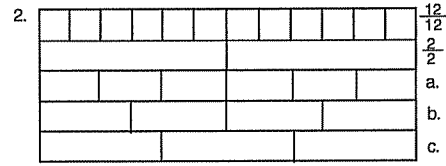
b. How are these two process different? One uses multiplication and the other uses division (simplify).

Fractions - Booklet 5

Assessment - Part 1

1. Find all the factors

a. 6 $1 \times 6, 2 \times 3$
 b. 12 $1 \times 12, 2 \times 6, 3 \times 4$
 c. 30 $1 \times 30, 2 \times 15, 3 \times 10, 5 \times 6$

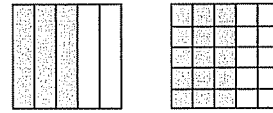


a. Draw in $\frac{6}{6}$.
 b. Draw in $\frac{4}{4}$.
 c. Draw in $\frac{3}{3}$.

3. a. What happens if you multiply a number by 1? stays the same

b. What happens if you divide a number by 1? doesn't change

4. a. Show the change of $\frac{3}{5}$ to 25ths.



b. How many 25ths are in $\frac{3}{5}$? 15

5. What is the multiplier in problem 4? 5

6. Fill in the blanks: $\frac{3}{5} \times \frac{5}{5} = \frac{15}{25}$

7. Circle the "Mighty One" in problem 6.

8. Solve. a. $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$ b. $\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$ c. $\frac{2}{5} \times \frac{9}{9} = \frac{18}{45}$

Patterns in Arithmetic: Fractions Placement PDF
Booklets 3, 4, and 5

Parent/Teacher Guide

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