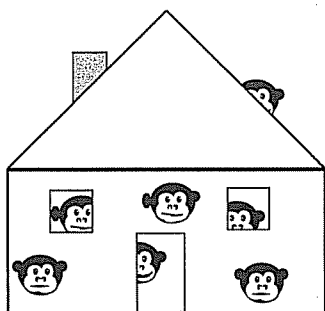# Patterns in Arithmetic
Division Placement PDF
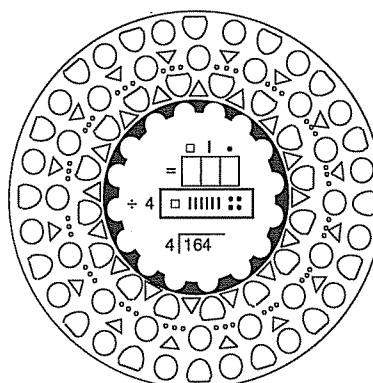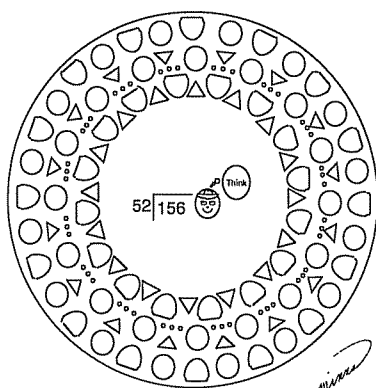# Parent/Teacher Guide
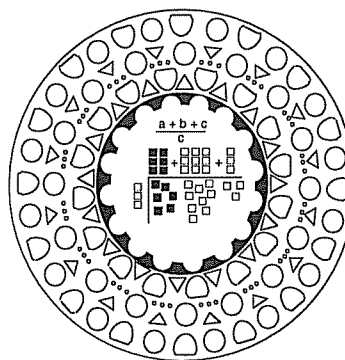
Booklet 1- Basic Concepts
Booklet 2 - Breaking Up Division
Booklet 3 - Working with Double Digit Division
Base Ten Division - Chrysalis Charter School

Glenn

By Alysia Krafel, Susan Carpenter, and Suki Glenn

Division Placement PDF

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

Page

Division: Booklet 1 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 a preview of the material presented in *Patterns in Arithmetic: Book 2* and is used to set the baseline for what the student already knows at the beginning of instruction. If your student is new to the *Patterns in Arithmetic* program Assessment: Part 1 is an appropriate starting place.

Assessment: Part 2 is a preview of the new material presented in this booklet. Workbook.

Prerequisites *Patterns in Arithmetic: Book 2, Patterns in Arithmetic:* Multiplication - Booklet 1

Materials   Assessment: Part 1, page 5, and Assessment: Part 2, pages 6 and 7
Score sheets, pages 3 and 4
Counters
Cuisenaire Rods

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 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.

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.

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. Scoring 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. How Many Stacks? (*Patterns in Arithmetic: Book 2*)
    A. divide a set amount of counters into equal groups?
    B. draw a picture of the solution?
    C. record the answers?

2. Word Problems (*Patterns in Arithmetic: Book 2*)
    A. give the correct answer to a basic division word problem?
    B. draw a picture of the problem?

3. Trains on Tracks (*Patterns in Arithmetic: Book 2*)
    A. divide twelve by circling equal groups?
    B. record the number of groups?
    C. record leftover rods as a remainder?

Assessment Criteria for Assessment: Part 2
Can the student:
1. Word Problems (Division: Booklet 1)
    A. give the correct answer to a basic division word problem?
    B. use a graphic to find the answer?

2. Number Sentence
    A. write the division number sentence for $12 \div 4 = 3$?

3. Number Sentence
    A. write 'How many groups of four are in twenty-four?'?
    B. give the correct answer 6?

4. Monkeys on the Roof (Basic division problem)
    A. draw the answer?
    B. write the division number sentence?

5. Recording (Basic division problem)
    A. give the correct answer on two of three problems?

6. Monkeys on the Roof (Basic division problem with remainders)
    A. draw the answer?
    B. write the division number sentence?

7. Remainders (Division problem with remainders)
    A. give the correct answer on two of three problems?

8. Number Sentence
    A. circle one correct representation of $20 \div 4 = 5$? The 5 can be either the number of groups as shown in c or the number in each group as shown in b.
    B. circle another correct representation of $20 \div 4 = 5$?

9. Family of Facts: Patterns
    A. fill in all the numbers in set a?
    B. fill in all the numbers in set b?

10. Missing Factors
    A. supply the missing number in two of three problems?

Assessment: Part 1 Score Sheet   Name _____ Date _____

Can the student:

1. How Many Stacks?
      Yes No   A. divide a set amount of counters into equal groups for three of four answers?
      Yes No   B. draw a picture of the solution?
      Yes No   C. record the answers for three of four answers?

2. Word Problems
      Yes No   A. give the correct answer to a basic division word problem?
      Yes No   B. draw a picture of the problem?

3. Trains on Tracks
      Yes No   A. divide twelve by circling equal groups in three of four problems?
      Yes No   B. record the number of groups in three of four problems?
      Yes No   C. record leftover rods as a remainder in one of two problems?

Items Correct = _____ = _____% 75% needed to begin Division: Booklet 1
Items Possible = 8

If the student scores 75% or better–this is six or more Yes items–proceed to Assessment - Part 2.

If the student scores less than 75%–this is five or less Yes items–proceed to review Division in *Patterns in Arithmetic: Book 2*.

Assessment: Part 2 Score Sheet   Name _____ Date _____

Can the student:

1. Word Problems (Monkey problem)
    Yes No   A. give the correct answer to a basic division word problem?
    Yes No   B. use a graphic to find the answer?

2. Number Sentence
    Yes No   A. write the division number sentence for $12 \div 4 = 3$?

3. Number Sentence
    Yes No   A. write 'How many groups of four are in twenty-four?'?
    Yes No   B. give the correct answer of 6?

4. Monkeys on the Roof (Basic division problem)
    Yes No   A. draw the answer?
    Yes No   B. write the division number sentence?

5. Recording (Basic division problem)
    Yes No   A. give the correct answer on two of three problems?

6. Monkeys on the Roof (Basic division problem with remainders)
    Yes No   A. draw the answer?
    Yes No   B. write the division number sentence?

7. Remainders (Division problem with remainders)
    Yes No   A. give the correct answer on two of three problems?

8. Number Sentence
    Yes No   A. circle one correct representation of $20 \div 4 = 5$?
    Yes No   B. circle another correct representation of $20 \div 4 = 5$?

9. Family of Facts: Patterns
    Yes No   A. fill in all the numbers in set a?
    Yes No   B. fill in all the numbers in set b?

10. Missing Factors
    Yes No   A. supply the missing number in two of three problems?

Items Correct = _____ = _____%   80% needed to begin Division: Booklet 2.
Items Possible =   16   This is 13 or more Yes items.

Put a question mark next to any question you don't know how to do.

1. Start with eight blocks. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐   Draw the blocks.
   a. How many groups of two can you make?   _____
   b. How many groups of four can you make?   _____
   c. How many groups of one can you make?   _____
   d. How many groups of eight can you make? _____

2. Gracie had six puppies and some big boxes. She put three puppies in each box.

   a. How many boxes did she use? _____

   b. Draw a picture.

3. Use Cuisenaire Rods to build if needed.
   This is a 12 white rod train. Record leftovers as remainders.
   Circle groups of: Example: Number of Groups

   2   ⬭⬭⬭⬭⬭⬭   ÷ 2 =   6

   a. 3   [_____]   ÷ 3 = ____

   b. 4   [_____]   ÷ 4 = ____

   c. 5   [_____]   ÷ 5 = ____

   d. 7   [_____]   ÷ 7 = ____
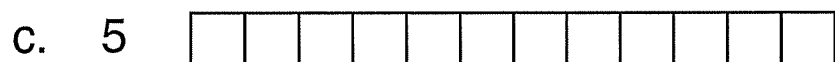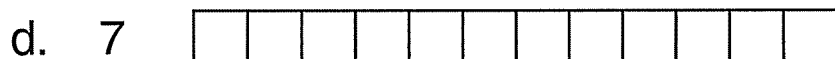
Put a question mark next to any question you don't know how to do.

1. Mr. Zoo had 12 monkeys and some cages.
   Each cage holds 4 monkeys.
   How many cages does Mr. Zoo need for his
   monkeys?
   _____
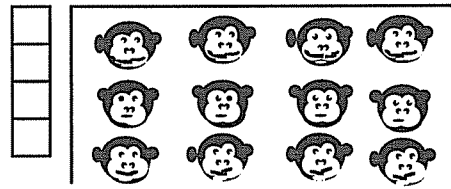
2. Write the division number sentence for problem one.

	÷	=

3. a. What question does this number sentence ask?

24	÷	4	=

   _____

   _____

   b. What is the answer? _____

4. a. Draw the answer.
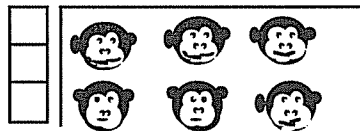
   b. Write the division number sentence.

5. a.   b.   c.

   $2\overline{)8}$ $5\overline{)15}$ $4\overline{)32}$

6. a. Draw the answer.

   R
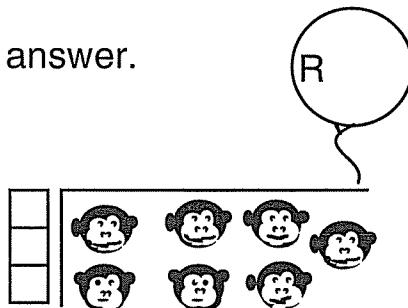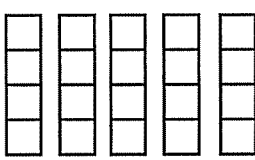
   b. Write the division number sentence.
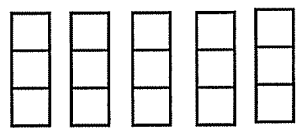
7.   a.

$$4\overline{)18}$$

   b.

$$5\overline{)32}$$

   c.

$$3\overline{)23}$$

8. In the problem 20 ÷ 4 = 5, 5 is the 'answer.'

   Draw a box around any drawings below that show what the 5 means.

a.

c.

d.

b.

9. Make a Family of Facts with these three numbers.

| 3 | 6 | 18 |

a. __3__ x __6__ = 18

   ____ x ____ =

   ____ ÷ ____ =

   ____ ÷ ____ =

b.

   $$\begin{array}{r} 3 \\ \times\ 6 \\ \hline 18 \end{array}$$
   $$\begin{array}{r} \underline{} \\ \times\ \underline{} \\ \hline \underline{} \end{array}$$

10. These are hard.

   Fill in the missing numbers.

a.   8 ÷ 2 = ☐

b.   15 ÷ ☐ = 3

c.   ☐ ÷ 4 = 5

Division: Booklet 2 Placement Assessment Guide

Purpose   The purpose of this guide is to determine if this booklet is the correct starting place. Assessment: Part 1 assesses 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*: Division - Booklet 1, Multiplication: Booklet 1, Multiplication: Booklet 2, and Subtraction: Booklet 3

Materials   Assessment: Part 1, page 14, Assessment: Part 2, pages 15 and 16
Score sheets, pages 12 - 14
Cuisenaire Rods
Unifix cubes

Instructions   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. Scoring 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. Number Sentence (Division: Booklet 1)
    A. place correctly the numbers from a word problem into a division number sentence?
    B. place the divisor, the dividend, and the quotient in the correct locations in the ⌐ notation?
    C. draw a correct picture of the word problem?

2. Families of Facts (Division: Booklet 1)

A. write four Families of Facts for the three given numbers?

B. place the division number sentences in the ⌐ correctly?

3. Family of Facts: Connections (Division: Booklet 1)

Does the student understand the relationship between dividends, divisors, and quotients? It is common for students to have difficulty with this concept on the pre-test. It is introduced in Division: Booklet 1 but generally not mastered. This concept is retaught in Division: Booklet 2.

A. fill in the correct numbers on items c and e?

Missing Quotient–These two items test comprehension of the basic division number sentence with the quotient missing.

B. fill in the correct numbers on items b and g?

Missing Divisor–These two items test comprehension of the relationship between the dividend and the quotient. Item g also tests understanding of the notation in division.

C. fill in the correct numbers on items a, d, and f?

Missing Dividend–These items test comprehension of the relationship of the divisor and the quotient. Many students will do the problem shown below incorrectly. If the number 2 is placed in the empty space on item f, but the number sentence in item a, ___ $\div$ 4 = 8, is done correctly, the student is confused about the notation. He is dividing the four into the eight instead of multiplying. This confusion is common.   4$\overline{)8}$

4. Subtraction with Regrouping (Subtraction: Booklet 3)

A. give correct answers in two of the three subtraction problems?

5. Expanded Multiplication and Short Notation (Multiplication: Booklet 2)

A. give correct answers in two of the three multiplication problems?

Booklet Selection Guide based on results of Assessment: Part 1

If the student receives a Yes on 1A, B, and C, 2B, 4A, and 5A, give Assessment: Part 2 and begin Division: Booklet 2. If the student received a No on 3A, B, or C, pay particular attention to this topic when you meet it again in Division: Booklet 2.

If the student receives a No on three or more items in problems 1 and 2, begin with Division: Booklet 1. Do not give Assessment: Part 2 of this assessment.

If the student receives a No on 4A, begin with Subtraction: Booklet 3 or Base Ten Subtraction. Subtraction is an important part of the division procedure. Do not give Assessment: Part 2 of this assessment. If the student receives a No on 5A, begin with Multiplication: Booklet 2. Single digit multiplication is an important part of the division procedure. Do not give Assessment: Part 2 of this assessment.

Assessment Criteria for Assessment: Part 2

All items in this section are taught in Division: Booklet 2. Students who have not completed Division: Booklet 2 will be unable to complete most of the sections of the assessment.

Can the student:

1. Breaking-Up: Manipulative

A. 2 points   identify the eight as standing for the number of groups of two in sixteen?

1 point   identify the eight as the answer?

B. draw correctly the missing blocks in problem b and record the quotient with numbers?

C. fill in the correct missing numbers to match the picture of the blocks in problem c?

These two items test to see if the student can recognize a representation for breaking up the dividend and put numbers to those representations.

D. 2 points "The answers are the same because it is the same problem all three times only broken up differently."

1 point "They all have the same answer."

Can the student explain that the quotients are the same even though dividends were broken up differently?

2. Breaking Up: Remainders

A. record correctly the quotients and remainders in problem a?

B. fill in correctly the numbers in the divisor and dividend for problem b? This problem has remainders in the break up, but the final quotient does not have a remainder.

C. fill in correctly the numbers in the divisor and dividend for problem c? This problem has remainders in the break up and in the final quotient.

D. use the break up procedure in problem d with no pictures or blocks used?

E. give the correct answer on problem d?

Students who have not completed Division: Booklet 2 may give the correct final quotient with the correct remainder to the simple problem but not break up the dividend or show the remainders in the parts of the broken up dividend. This will tell you that they can work with remainders but do not know how to work with them when breaking up a dividend.

3. Breaking Up Recording

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

B. demonstrate that he can do two of the three problems two different ways? Give a Yes here even if there are arithmetic errors. It is the process you are looking for. Does he know to break up the dividend two different ways and divide each section by the divisor?

C. give evidence of strategies to make the work easier by using multiples of the divisor or tens and ones?

If he can give only the correct answer on the short notation problem and is unable to demonstrate two different ways to do the problem, understanding of the use of the Distributive Property applied to division is lacking.

4. Averaging

A. calculate a simple average by giving the correct number in item c?

5. Breaking Up

A. give the correct answer on one of the two problems using any notation?

B. break up the numbers into three parts and divide each part by the divisor? Give a Yes if the procedure is correct even if there are arithmetic errors.

C. use multiples of the divisor in the break up?

6. Discovering Easier Ways

A. do both problems correctly?

B. 2 points Problem a is easier because it uses multiples of the divisor, or multiples of three to break up the dividend. Problem b uses numbers not in the three times table and so has remainders.

   1 Point Problem a is easier because it uses the three times table and problem b does not. The second part of this sentence can be missing to get a Yes, but not the first.

7. Discovering Easier Ways
   A. fill in the correct missing dividends by using the quotient at the top in both problems?

8. Breaking Up: Tens and Ones
   A. break up the dividend to create quotients that come out in tens and ones in two of the three problems?
   B. give the correct quotient in two of the three problems?

9. Expanded Division and Short Notation
   A. show the correct expansion in three of the four problems?
   B. show the correct notation for the short procedure in three of the four problems?
   C. give the correct quotient in three of the four problems?

Booklet Selection Guide based on results of Assessment: Part 2
   If a student scores 21 or more points on the Assessment, this booklet is not needed. Proceed to Multiplication: Booklet 4 and Division: Booklet 3.

   If a student scores a Yes on 1A, 2E, 4A, 5A, 8B, 9B, and 9C and No on the other items it indicates that he knows how to divide using the standard short procedure. He may not understand why his procedure works. Most students memorize the procedure with no understanding of what is physically happening to the numbers. He probably does not understand how the Distributive Property applies to division. This is an important concept to understand for success in algebra. You can use Base Ten Division to help him understand why the standard procedure works the way it does. The Distributive Property is used but not explicitly taught. The Base Ten Division Booklet is a good choice for students who struggle with division or for average and above-average students who do not understand why the procedure works the way it does and time is a constraint. It is better to use this booklet, Division: Booklet 2, quickly, doing only the parts on Breaking Up, Discovering Easier Ways and Expanded Division. This is the best choice for average and above-average students if time is not a constraint.

If the student passes Assessment: Part 1 of the assessment and gets No on most of Assessment: Part 2, this is the correct booklet for this student.

Assessment: Part 1 Score Sheet   Name _____ Date _____

Can the student:

1. Number Sentence (Division: Booklet 1)

        Yes No A. place the correct numbers from a word problem into a division number
                         sentence?

        Yes No B. place the divisor, the dividend, and the quotient in the correct locations in
                         the ⌐ (querel)?

        Yes No C. draw a correct picture of the word problem?

2. Families of Facts (Division: Booklet 1)

        Yes No A. write four Families of Facts for the three given numbers?

        Yes No B. place the division number sentences in the ⌐ (querel) correctly?

3. Families of Facts: Connections (Division: Booklet 1)

        Yes No A. fill in the correct numbers on items c and e? Missing Quotient

        Yes No B. fill in the correct numbers on items b and g? Missing Divisor

        Yes No C. fill in the correct numbers on items a, d, and f? Missing Dividend

4. Subtraction with Regrouping (Subtraction: Booklet 3)

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

5. Expanded Multiplication and Short Notation (Multiplication: Booklet 2)

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

Items Correct = _____ = _____%

Items Possible =   10

Assessment: Part 2 Score Sheet   Name _____ Date _____

Can the student:

1. Breaking Up: Manipulative
    2, 1, 0   A.   identify the eight as standing for the number of groups of two in sixteen? 2 points
       points   identify the eight as the answer? 1 point
    Yes No   B.   draw in the correct missing blocks in item b and record the quotient with numbers?
    Yes No   C.   fill in the correct missing numbers to match the picture of the blocks in problem c?
    2, 1, 0   D.   clearly explain why the problems have the same answer?
       points

2. Breaking Up: Remainders
    Yes No   A. record the correct quotients and remainders in problem a?
    Yes No   B. fill in the correct numbers for problem b?
    Yes No   C. fill in the correct numbers for problem c?
    Yes No   D. use the break up procedure in problem d with no pictures?
    Yes No   E. give the correct answer on problem d?

3. Breaking Up: Recording
    Yes No   A. give the correct answer on two of the three problems in this set?
    Yes No   B. demonstrate that he can do two of the three problems two different ways?
                      Give a Yes here even if there are arithmetic errors.
    Yes No   C. give evidence of strategies to make the work easier by using multiples of the
                      divisor or tens and ones?

4. Averaging
    Yes No   A. calculate a simple average by giving the correct number in item c?

5. Breaking Up
    Yes No   A. give the correct answer on one of the two problems using any notation?
    Yes No   B. break up the numbers into three parts and divide each part by the divisor?
                      Give a Yes if the procedure is correct even if there are arithmetic errors.
    Yes No   C. use multiples of the divisor in the break up?

6. Discovering Easier Ways
    Yes No   A. do both problems correctly?
    2, 1, 0   B. give a clear explanation of why problem a is easier to do?
       points

7. Discovering Easier Ways
    Yes No   A. fill in the correct missing dividends by using the quotient at the top in both problems?

8. Breaking Up: Tens and Ones
    Yes No   A. break up the dividend to create quotients that come out in tens and ones in
                      two of the three problems?
    Yes No   B. give the correct quotient in two of the three problems?

9. Expanded Division and Short Notation
    Yes No   A. show the correct expansion in three of the four problems?
    Yes No   B. show the correct notation for the short procedure in three of the four problems?
    Yes No   C. give the correct quotient in three of the four problems?

Items Correct = _____ = _____%
Items Possible =   27

Assessment - Part 1　　　　　Name＿＿＿＿＿＿ Date ＿＿＿＿＿＿

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

1. Susan has eight chocolate chip cookies.　　b. Write the number sentence　　c. Record.
   She put two cookies on each plate.　　　　　　that goes with the story.
   How many plates did she need? ＿＿＿＿

a. Draw a picture of the problem.

＿＿ ÷ ＿＿ = ＿＿

2. Use only the three numbers 4, 7, and 28 to make four Families of Facts number sentences.

a. ◯ ✕ ◯ = ◯　　　◯ ÷ ◯ = ◯　　b.　X ＿＿＿ ⌐

◯ ✕ ◯ = ◯　　　◯ ÷ ◯ = ◯　　　　X ＿＿＿ ⌐

3. Fill in the missing numbers.

a. ◯ ÷ (4) = (8)　　b. (15) ÷ ◯ = (3)　　c. (35) ÷ (5) = ◯

d. ◯ ÷ (10) = (2)　　e. 6⟌48 ▢　　f. 4⟌▢ 8　　g. ▢⟌10 2

4. Solve.

a.　　86　　　　　b.　　347　　　　　c.　　435
　　− 39　　　　　　　− 156　　　　　　　− 279
　　――――　　　　　　――――　　　　　　――――

5. Solve.

a.　　138　　　　　b.　2,375　　　　　c.　6,598
　　✕　6　　　　　　✕　4　　　　　　✕　4
　　――――　　　　　　――――　　　　　　――――
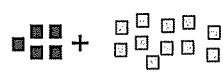
Assessment: Part 2 - Worksheet 1 Name_____ Date _____

1.

a. $\longrightarrow$ $2\overline{)16}\;^{8}$ Study this picture. What does this 8 mean?_____

_____

_____

b. Draw the blocks. Fill in the blanks.

 $\longrightarrow$ $2\overline{)\;4\;+\;12\;}^{\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$ ← Final answer.

c. Fill in the blanks.

 $\longrightarrow$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

d. What do you notice about the answers in a, b, and c? _____

_____

2.

a. Build 16 this way. Record the number sentence.
   Arrange the blocks in each set into groups of 2. $2\overline{)\;5\;+\;11\;}^{\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

b. Build 20 this way. Record the number sentence. Arrange the blocks in each set into groups of 4. $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

c. Build 19 this way. Record the number sentence. $4\overline{)\;6\;+\;8\;+\;5\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

d. Break the 38 into three numbers and divide by 5. $5\overline{)38}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

3. Solve each problem two different ways.

a.

$4\overline{)46}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

b.

$4\overline{)38}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

c.

$4\overline{)56}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$ $\underline{\;\;}\overline{)\;\underline{\;\;}+\underline{\;\;}+\underline{\;\;}\;}^{\underline{\;\;}+\underline{\;\;}+\underline{\;\;}=\underline{\;\;}}$

Name_____ Date _____

4. Tony was shooting baskets every day. Here is a table of the number of baskets he made each day.

   a. How many baskets were made in all? _____

   b. How many days were there? _____

   c. What was the average number of baskets per day?_____

Monday	12 baskets made
Tuesday	6 baskets made
Wednesday	9 baskets made
Thursday	14 baskets made
Friday	14 baskets made

5. Solve. Show your work on how you break up each number.

   a. ___ + ___ + ___ = ___

   $8\overline{)94}$ ___| ___ + ___ + ___

   b. ___ + ___ + ___ = ___

   $9\overline{)117}$ ___| ___ + ___ + ___

6. Solve these two problems.

   a. _____ + _____ + _____ = ___

   $3\overline{)\,30\ +\ 30\ +\ 12}$

   b. ___ + ___ + ___ + ___ = ___

   $3\overline{)\,18\ +\ 36\ +\ 10\ +\ 8}$

   c. Which problem was easier to solve? _____ d. Explain why. _____

   _____

7. Fill in the missing numbers.

   a.
   10 + 7 = ___

   $3\overline{)51}$ $3\overline{)\,\_\_\ +\ \_\_}$

   b.
   20 + 3 = ___

   $4\overline{)92}$ $4\overline{)\,\_\_\ +\ \_\_}$

8. Make the answers come out in tens and ones with remainders in the ones place only.

   a. 0 + ___ = ___

   $3\overline{)96}$ = $3\overline{)\,\_\_\ +\ \_\_}$

   b. 0 + ___ = ___

   $4\overline{)184}$ = $4\overline{)\,\_\_\ +\ \_\_}$

   c. 0 + ___ = ___

   $5\overline{)385}$ = $5\overline{)\,\_\_\ +\ \_\_}$

9. Solve each problem the long way, showing how the problem is broken up to get the answer to come out in hundreds, tens, and ones. Then do each problem the short way.

   a. ___ + ___ + ___ = ___

   $3\overline{)3{,}609}$ = $3\overline{)\,\_\_\ +\ \_\_\ +\ \_\_}$

   b. ___ + ___ + ___ = ___

   $3\overline{)477}$ = $3\overline{)\,\_\_\ +\ \_\_\ +\ \_\_}$

   c. ___ + ___ + ___ = ___

   $3\overline{)2{,}124}$ = $3\overline{)\,\_\_\ +\ \_\_\ +\ \_\_}$

   d. ___ + ___ + ___ = ___

   $4\overline{)3{,}625}$ = $4\overline{)\,\_\_\ +\ \_\_\ +\ \_\_}$

Division: 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*: Division - Booklet 2 or *Chrysalis Charter School*: Base Ten Division, or other previous successful instruction in the basic division concept with and without remainders, how to calculate the quotient with a single digit divisor and a dividend into the thousands. Example: $3456 \div 6 =$ _____
Patterns in Arithmetic: Multiplication - Booklet 4 or similar instruction on problems such as $23 \times 58 =$ _____
Patterns in Arithmetic: Fractons - Booklet 2 or other basic instruction in fractional units
Key to Decimals: Book 1 - Decimal Place Value or similar instruction

Materials   Division: Booklet 3 - Assessment: Part 1 and Part 2, pages 23 and 24

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.

Assessment Guide   Do the assessment in two parts. Give Assessment: Part 1 and check it for readiness for this booklet. 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.

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. Scoring 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. Single Digit Divisor (Division: Booklet 2)

      A. calculate correctly the quotient of five of six single digit division problems? If No, then go to Item B.

      B. calculate correctly the quotient of four of six single digit division problems?

2. Standard Procedure (Multiplication: Booklet 4)

      A. calculate correctly the product of two of three double digit multiplication problems?

Booklet Selection Guide based on results of Assessment: Part 1

If Yes on Items 1A and 2A, proceed to Assessment: Part 2.

If Item 1A is a No, but Item 1B is a Yes, proceed to Assessment: Part 2 of the assessment. Give additional practice. The first ten pages of Division - Booklet 3 use only single digit divisors. This review may be enough to rekindle previous knowledge. If not, reteach before going on.

If Items 1A and 1B are No, the student is not ready for this booklet. Reteach single digit division before going on. If your student is new to *Patterns in Arithmetic* but has had previous instruction in division, consider beginning with *Chrysalis Charter School*: Base Ten Division to build concrete understanding of this difficult procedure. If your student has never had instruction in division and knows the multiplication table, begin with Division: Booklet 2.

If Item 2 is left blank, go to Multiplication: Booklet 4 before continuing with this booklet.

If Item 2 is a No, but you can see the student knows how to do the procedure, give more practice. Consider testing for understanding using the assessment for Multiplication: Booklet 4. Understanding of double digit multiplication is critical for algebra as well as for doing division.

Assessment Criteria for Assessment: Part 2

Can the student:

1. Remainders as Fractions (Division: Booklet 3)

      A. correctly show the remainder as a fraction in two of the three problems?

2. Remainders as Decimals (Division: Booklet 3)

      A. insert a decimal point after the whole number and add zeros?

      B. give correct decimal remainder in problem a; decimal comes out even?

      C. give correct decimal remainder in problem b; the decimal repeats/uses a bar?

      D. give correct decimal remainder in problem c; the answer must be taken to the thousandths place and rounded off to the nearest hundredth.

3. Missing Factors Puzzles (Division: Booklet 3)

      A. show the correct missing number in both problems a and b?

      B. show the tens factor tree used to prove the answer to problem b?

      C. show the correct missing number in problem d?

If the student gets a Yes on Items A and C and a No on Item B, it indicates possible lack of understanding of how the place value of the missing factor is determined. The student may be counting zeros with no understanding of why that pattern works. Review/teach in Multiplication: Booklet 4.

4. Double Digit: Beginning (Division: Booklet 3)

    A. use place value patterns to determine the place value of the quotient in problem b using the correct answer from problem a?

    B. prove the answer to problem b with the missing factor in problem c?

    C. use place value patterns to determine the place value of the quotient in problem e using the correct answer from problem d?

    D. prove the answer to problem e with the missing factor in problem f?

5. Double Digit: Beginning (Division: Booklet 3)

    A. give the correct answer in three of the four problems with division with a two digit divisor that is a factor of ten? This requires the student to be able to use the standard division procedure and make place value adjustments to the quotient.

6. Sequences (Division: Booklet 3)

    A. answer that if the divisor goes up a little bit, the quotient will go down a little bit? If the student is able to do one or two of the problems correctly on the assessment, begin with the Double Digit section of the booklet to achieve mastery.

7. Double Digit Division - Single Digit Quotients (Division: Booklet 3)

    A. use the correct procedure to do this kind of problem?

    B. find a single digit quotient with a double digit divisor and get the correct answer two out of three times?

8. Practice (Division: Booklet 3)

    A. use the correct procedure to do this kind of problem?

    B. find a double or triple digit quotient with a double digit divisor and get the correct answer two out of three times?

Booklet Selection Guide based on results of Assessment: Part 2

Students who score 80% or more do not need this booklet. Remediate any weak areas and move on to your next topic: *Keys to Decimals:* Book 3 - Division with Decimals.

Students who get Yes on Items 1 - 6, 7A, and 8A but No on Items 7B and 8B need only practice to gain accuracy. This booklet is not needed.

Students who score Yes on Items 1, 2, 3A, 3C, 5, 7A, 7B, 8A, and 8B but No on Items 3B, 4, and 6 are showing you they can do the problems but lack understanding of the concepts the procedure is based on. Begin with lessons on Place Value Patterns, Missing Factors Puzzles, and Sequences and retest.

Students who score less than 50% overall should start at the beginning of this booklet.

Assessment: Part 1 Score Sheet   Name _____ Date _____

Can the student:

Part 1

1. Single Digit Divisors (Division: Booklet 2)

        Yes No   A. answer correctly five of six problems?

        Yes No   B. get four of six problems correct?

        Circle any items that were missed: a   b   c   d   e   f

2. Double Digit Multiplication (Multiplication: Booklet 4)

        Yes No   A. answer correctly two of three problems?

Items Correct = _____ = _____%

Items Possible =   2

Assessment: Part 2 Score Sheet

Can the student:

1. Remainders as Fractions (Division: Booklet 3)

        Yes No   A. show the remainder as a fraction correctly in two of the three problems?

2. Remainders as Decimals (Division: Booklet 3)

        Yes No   A. insert a decimal point after the whole number and add zeros?

        Yes No   B. give correct decimal remainder in problem a; decimal comes out even?

        Yes No   C. give correct decimal remainder in problem b; the decimal repeats/uses a bar?

        Yes No   D. give correct decimal remainder in problem c; the decimal taken to the
thousandths place and rounded off to the nearest hundredth?

3. Missing Factors Puzzles (Division: Booklet 3)

        Yes No A. show the correct missing number in both problems a and b?

        Yes No B. show the tens factor tree used to prove the answer to problem b?

        Yes No C. show the correct missing number in problem d?

4. Double Digit: Beginning (Division: Booklet 3)

        Yes No A. use place value patterns to determine the place value of the quotient in problem
b using the correct answer from problem a?

        Yes No B. prove the answer to problem b using problem c?

        Yes No C. use place value patterns to determine the place value of the quotient in problem
e using the correct answer from problem d?

        Yes No D. prove the answer to problem e using problem f?

5. Double Digit: Beginning (Division: Booklet 3)

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

6. Sequences (Division: Booklet 3)

        Yes No   A. answer that if the divisor goes up a little bit, the quotient will go down a
little bit?

7. Double Digit Division - Single Digit Quotients

        Yes No A. use the correct procedure to do this kind of problem?

        Yes No B. find a single digit quotient with a double digit divisor and get the correct answer two out of three times?

8. Practice (Division: Booklet 3)

        Yes No A. use the correct procedure to do this kind of problem?

        Yes No B. find a double or triple digit quotient with a double digit divisor and get the correct answer two out of three times?

Items Correct = _____ = _____%

Items Possible =   18

Assessment: Part 1 and Part 2   Name _____   Date _____

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

Part 1

1. a.

$$5\overline{)965}$$

b.

$$8\overline{)4,096}$$

c.

$$9\overline{)1,377}$$

d.

$$4\overline{)384}$$

e.

$$5\overline{)728}$$

f.

$$4\overline{)349}$$

2. a.   34
        x 18

b.   72
     x 84

c. 354
   x 67

Part 2

1. Show the remainders as fractions.

   a.

   $$4\overline{)15}$$

   b.

   $$5\overline{)16}$$

   c.

   $$6\overline{)16}$$

2. Show the remainders as decimals. Round off to the nearest hundredth if needed.

   a.

   $$6\overline{)213}$$

   b.

   $$9\overline{)165}$$

   c.

   $$7\overline{)109}$$

3. Find and record the missing number.

a.
```
    ( )
  x     4
  1,600
```

b.
```
          80
  ( )
  x
  5,600
```

c. Prove your answer is true in problem b by showing a factoring by tens factor tree.

5,600

d.
```
    ( )
  x      60
  180,000
```

4. a.
```
  3⟌150
```

b.
```
  30⟌150
```

c. 30 x _____ = 150

d.
```
  3⟌1,500
```

e.
```
  30⟌1,500
```

f. 30 x _____ = 1,500

5. a. 700 ÷ 20 = _____

b. 1,260 ÷ 30 = _____

c. 1,380 ÷ 60 = _____

d. 4,860 ÷ 90 = _____

6. If the dividend stays the same, and the divisor goes up a little, I expect the quotient to go _____ a little.

```
  50⟌2,950
```

↓   or   ↑
down   up

a.
```
7.  49⟌343
```

b.
```
  47⟌282
```

c.
```
  62⟌310
```

a.
```
8.  52⟌1,248
```

b.
```
  54⟌972
```

c.
```
  46⟌4,922
```

Base Ten Division Placement Assessment Guide

Purpose   The purpose of this guide is to assess the fundamental knowledge necessary for success in this booklet. The Assessment is used to determine the student's readiness for this booklet. The first two items on the Assessment are review problems from previous books. The titles listed in this guide match the titles of the sections in the books. The last ten items are previews to the material in this booklet.

Prerequisites   Multiplication tables up to the fives and previous instruction in basic division facts

Materials   Assessment - Worksheets 1 - 4, pages 29 - 31
Score sheets, pages 27 and 28
Base Ten Blocks

Be sure the student has access to Base Ten Blocks. Make a note if he uses them and on which problems. On the Assessment, if the student does not understand the question, it is acceptable to explain the question. For example, the student might not know the dark vertical lines stand for tens and the dots for ones. He may not understand he is supposed to share the tens and ones on the plates as if they were cookies and candy. It is acceptable to tell him this but not to tell him to share them equally or uniformly on the plates. If he asks what the *used* and *left* mean, tell him to just do the problem the way he would normally do it. He may do the problem his normal way off to the side if the formats confuse him.

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. Give Assessment and check it for readiness for this booklet. The answers are in the Answer Key.

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. A score sheet for the Assessment follows.

Assessment Criteria
Can the student:
1. Number Sentence: Divvy-up Method* Divvy-up means to share equally among groups like sharing cookies among friends.
   A. place the numbers from a division word problem into a number sentence?
   B. place the numbers from a division word problem into the 'house'**?

C. get the correct answer both times?

*Divvy-up Method defines the divisor as the number of groups being made and the answer as the number in each group. **The 'house' refers to this symbol ⌐ .

2. Sharing Cookies in the House–require him to draw the cookies on each plate.
    A. solve correctly two of three division problems placing the correct number in the circle?
    B. place correctly the quotient, the answer, above the line in the house format?

If he can't do Items 1 and 2, we would suggest more work on these basics before going on.

3. Missing Numbers
    A. place the missing number in two of three number sentences?
    B. place the missing number in four of six problems in house format?

These problems will tell you if the student understands the relationships between the divisor, dividend, and quotient. Many students get confused on these problems and will always divide the smaller number into the larger one regardless of the position of the numbers in the number sentence.

4. Sharing with Base Ten Blocks
    A. use blocks or a picture to do a simple division problem that shows multiples of the divisor and no remainders and get both problems right?
    B. solve a simple division problem with multiples of the divisor in the house?

5. Two Digit Sharing with Trades
    A. divvy-up the blocks and trade the extra tens for ones to finish the division?

6. Two Digit Recording with Trades
    These problems all have the number in the tens place larger than the divisor so that regrouping of tens into ones is not needed. Some students will be able to get the correct answer but be unable to show the correct place value of the numbers used and left. This may indicate that these students have memorized a procedure they do not really understand. If this is the case, it will be revealed in later questions.
    A. get the correct answer for one of two problems?
    B. show the correct place value for numbers used and left in one of two problems?

7. Three Digit Recording with Trades
These problems all have the first number in the dividend the same or larger than that of the divisor so that the issue of needing to regroup the one hundred into tens is not present. There are zeros in the quotient that require the student to pay attention to the place value of the dividend in the last step.
    A. get the correct answer for two of three problems?
    B. show the correct place value for numbers used and left for two of three problems?

8. Three Digit Recording with Trades (and regrouping needed)
    These problems require the first number, the hundreds, in the dividend to be regrouped into tens before division can be performed. This is because the number in the hundreds place is less than the divisor.
    A. get the correct answer in two of three problems?
    B. show the correct place value for numbers used and left in two of three problems?

9a. Explanation

On the calculation of the problems in section 8, note if the student underlined the first two numbers. It is important to find out if the student understands why the first two numbers are underlined. If all they know is that "four does not go into two, so I have to underline the first two numbers and divide into the twenty-five," then the student probably does not understand why the division procedure works the way it does.

A. did the student underline the first two numbers in the dividend?

B. did the student answer Yes to question 9a?

9b.   A. explain that even though the two is two hundred, the two can not easily be divided into four groups, so it is regrouped into twenty tens and that is why the first two numbers are taken together as twenty-five tens?

10. Explaining the Procedure

There are several ways a student who understands the procedure could answer this question correctly. Give a Yes for any of the following answers:

A. "I look for the closest multiple of the divisor that is less than the dividend. In this problem the closest multiple is two hundred forty. Four times sixty is two hundred forty, so sixty goes in the quotient, and I subtract two hundred forty from the two hundred fifty-two to get the next number which is twelve." (This response is most common in students who have done *Patterns in Arithmetic:* Division - Booklet 2.)

B. "I could divide the four into the two hundred and get fifty and then divide it into the fifty and get ten. If I were doing it the long way, that would not be a problem. But, if I want to use the short way I need to have the fifty and the ten together. To do that I need to divide four into twenty-five tens together." (This answer is unlikely but correct.)

C. "I can not divide two hundreds into four groups, so I trade the two hundreds for twenty tens and add that to the five tens I already have. When I divide the twenty-five tens into four groups, I get six tens in each group with one ten left over."

11. Four Digit Recording with Trades

If the student can get the correct answers to these four problems but not correctly answer the why questions in Item 9, then begin instruction with Three Digit Recording with the blocks. The student will, after some experience, be able to connect the why of what is going on with the memorized procedure.

A. get the correct answer in three of four problems?

B. show the correct place value for numbers used and left in three of four problems?

12. Word Problems

A. get the correct answer to problem a, which is a straight division problem?

B. get the correct answer to problem b, which is a two-step problem requiring both multiplication and division. If you get a No on this item, give more practice. There are many places to find practice problems of this type. *Spectrum Math* has many problems, as do sites on the Internet.

Assessment Score Sheet Name _____ Date _____

Can the student:

1. Number Sentence: Divvy-up Method
   - Yes   No   a. place the numbers from a division word problem into a number sentence?
   - Yes   No   b. place the numbers from a division word problem into the house?
   - Yes   No   c. get the correct answer both times?

2. Sharing Cookies in the House
   - Yes   No   a. solve correctly two of three division problems placing the correct number in the circle?
   - Yes   No   b. place correctly the quotient, the answer, above the line in the house format?

3. Missing Numbers
   - Yes   No   a. place the missing number in two of three number sentences?
   - Yes   No   b. place the missing number in four of six problems in house format?

4. Sharing with Base Ten Blocks
   - Yes   No   a. use blocks or a picture to do a simple division problem that shows multiples of the divisor and no remainders and get both problems right?
   - Yes   No   b. solve a simple division problem with multiples of the divisor in the house?

5. Two Digit Sharing with Trades
   - Yes   No   a. divvy-up the blocks and trade the extra tens for ones to finish the division?

6. Two Digit Recording with Trades
   - Yes   No   a. get the correct answer for one of two problems?
   - Yes   No   b. show the correct place value for numbers used and left in one of two problems?

7. Three Digit Recording with Trades
   - Yes   No   a. get the correct answer for two of three problems?
   - Yes   No   b. show the correct place value for numbers used and left for two of three problems?

8. Three Digit Recording with Trades (and regrouping needed)
   - Yes   No   a. get the correct answer in two of three problems?
   - Yes   No   b. show the correct place value for numbers used and left in two of three problems?

9a. Explanation   No score on this item.
   - Yes   No   a. did the student underline the first two numbers in the dividend?
   - Yes   No   b. did the student answer Yes to question 9a? If No, go to question 10.

9b. Explanation
   - Yes   No   a. give a reasonable explanation if the answer to 9a is Yes? No score if the student answers question 10.

10. Explaining the Procedure
> Yes   No   a. give a reasonable explanation if answer to 9a is No? No score if student answers question 9b.

11. Four Digit Recording with Trades
> Yes   No   a. get the correct answer in three of four problems?
>
> Yes   No   b. show the correct place value for numbers used and left in three of four problems?

12. Word Problems
> Yes   No   a. get the correct answer to problem a, which is a straight division problem?
>
> Yes   No   b. get the correct answer to problem b, which is a two-step problem requiring both multiplication and division?
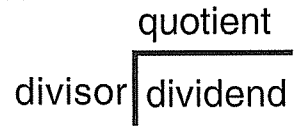
Items Correct = _____ = _____%

Items Possible =   21

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

dividend	divisor	quotient
The number you start with	÷ The number of groups	= The number in each of the groups

1. In the boxes below, write the number sentence that goes with the story.

quotient

divisor⌐dividend

Susan has twelve chocolate chip cookies. She has two plates. How many cookies will go on each plate?

a. [÷ =]

b. ⌐

Suki has forty-five bees. She has five bee cages. How many bees will go in each cage?

c. [÷ =]

d. ⌐

2. Share. Give each plate the same amount. Draw the chocolate chip cookies on the plates. You may use counters.

a. (12) ÷ (4) = ( )   4⌐12

b. (14) ÷ (7) = ( )   7⌐14

c. (12) ÷ (6) = ( )   6⌐12

Date_____

3. Fill in the missing number.

a. $12 \div 4 = \bigcirc$ b. $15 \div \bigcirc = 5$ c. $\bigcirc \div 2 = 5$

d. $4\overline{\smash{\big)}}\;5$ e. $\overline{\smash{\big)}21}\;7$ f. $5\overline{\smash{\big)}35}$ g. $3\overline{\smash{\big)}}\;15$ h. $\overline{\smash{\big)}32}\;8$ i. $7\overline{\smash{\big)}49}$

4. Share in base ten. You may use blocks.

| = tens ● = ones
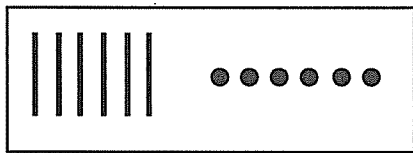
a. Start With Make Groups ÷ 3 Groups = | ● in Each Group 3
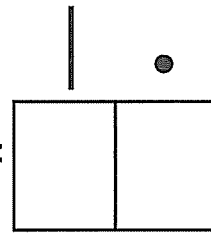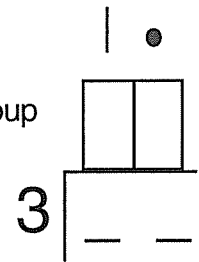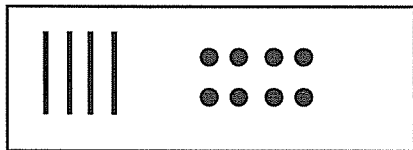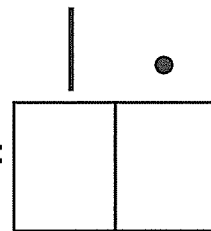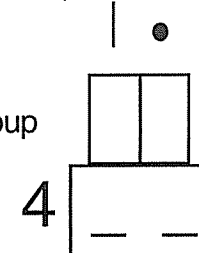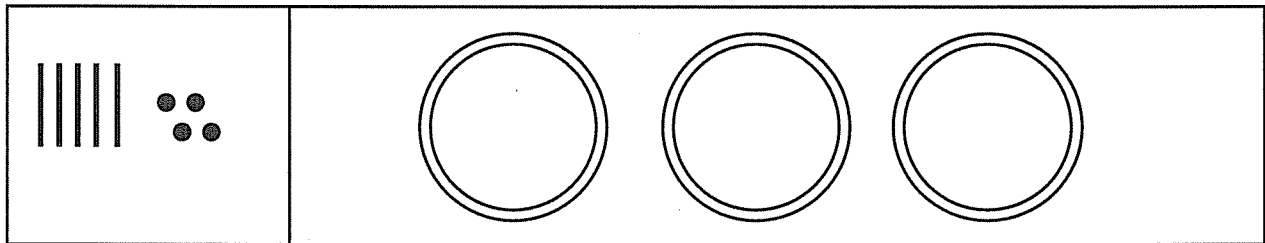
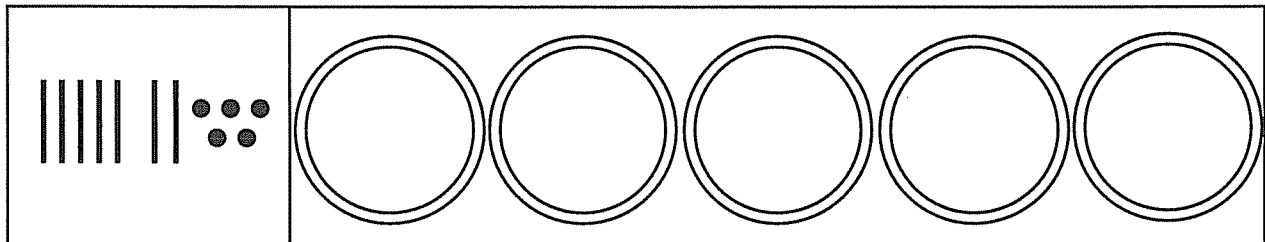b. ÷ 4 Groups = | ● in Each Group 4

5. Share. Give each plate the same amount. Trade if needed.

a.

b.

Assessment - Worksheet 3

Date_____

6. Divide. Some of these problems will have remainders.   Example:

$$24\,^{R\,2}$$

a.

$$3\,|\,7\,2$$ Start with
___ ___ used
___ ___ left
___ ___ used
___ left

b.

$$7\,|\,9\,2$$ Start with
___ ___ used
___ ___ left
___ ___ used
___ left

$$4\,|\,98$$ Start with
-80 used
18 left
-16 used
2 left

7. Divide. Use Base Ten Blocks if needed but record as you go.

a. □ | ●

$$4\,|\,8\,1\,6$$
_____ used
_____ left
_____ used
_____ left
_____ used
____ left

b. □ | ●

$$5\,|\,5\,2\,0$$
_____ used
_____ left
_____ used
_____ left
_____ used
____ left

c. □ | ●

$$2\,|\,6\,3\,8$$
_____ used
_____ left
_____ used
_____ left
_____ used
____ left

8. Divide. Use Base Ten Blocks if needed but record as you go.

a. □ | ●

$$4\,|\,2\,5\,2$$
_____ used
_____ left
_____ used
_____ left

b. □ | ●

$$6\,|\,1\,5\,6$$
_____ used
_____ left
_____ used
_____ left

c. □ | ●

$$5\,|\,4\,6\,5$$
_____ used
_____ left
_____ used
_____ left

9a. In problem 8a, 4‾252‾ , you may have thought, "Four does not go into two, so I have to underline the first two numbers and divide into the twenty-five." Did you think about this problem this way? _____ If you answered Yes, go on to 9b. If you answered No, go on to problem 10.

9b. Thinking again about problem 8a, 4‾252‾ , the place value of the first '2' is two hundred. Four can easily divide into two hundred. So if this is true, why do you think in your head, "Four does not go into two, so I have to underline the first two numbers and divide into the twenty-five?"

_____

_____

_____

10. In the problem 4‾252‾ , please explain your thinking on how to solve this problem. Explain the steps you use and why you use them.

_____

_____

_____

11. Solve. Show your work.

a. 7‾5 4 6 8‾   b. 8‾3 6 4 6‾   c. 5‾7 1 2 5‾   d. 4‾3 6 8 5‾

12a. At Prairie Song Farm, there are thirty-five heritage cherry trees. There were 9,248 jars of jam made from the cherries. Each box holds 8 jars.
How many boxes will be filled? _____
How many jars will be left over? _____

12b. There are twenty-five heritage apple trees. Each tree produces 235 pounds of apples.
How many pounds of apples are produced? _____ The apples are put in bags that weigh 9 pounds each.
How many bags will be needed? _____
How many pounds of apples will be left over? _____

Division 1
Assessment - Part 1

1. Start with eight blocks. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Draw the blocks.
   a. How many groups of two can you make? __4__ ☐☐ ☐☐ ☐☐ ☐☐
   b. How many groups of four can you make? __2__ ☐☐☐☐ ☐☐☐☐
   c. How many groups of one can you make? __1__ ☐☐ ☐☐☐☐☐☐
   d. How many groups of eight can you make? __8__ ☐☐☐☐☐☐☐

2. Gracie had six puppies and some big boxes. She put three puppies in each box.

   a. How many boxes did she use? __2__

   b. Draw a picture.

3. Use Cuisenaire Rods to build if needed.
   This is a 12 white rod train. Record left overs as remainders.

   Circle groups of: Example: Number of Groups
   2   ÷ 2 = 6
   a. 3   ÷ 3 = __4__
   b. 4   ÷ 4 = __3__
   c. 5   ÷ 5 = __2^{R2}__
   d. 7   ÷ 7 = __1^{R5}__

Assessment - Part 2 - Worksheet 1

1. Mr. Zoo had 12 monkeys and some cages.
   Each cage holds 4 monkeys.
   How many cages does Mr. Zoo need for his monkeys? __3__

2. Write the division number sentence for problem one. | 12 | ÷4 | =3 |

3. a. What question does this number sentence ask? | 24 | ÷ 4 | = |

   __How many groups of 4 are in 24?__

   b. What is the answer? __6__

4. a. Draw the answer.

   b. Write the division number sentence. $\frac{2}{3\,|\,6}$

5. a. __4__
      $2\,|\,8$

   b. __3__
      $5\,|\,15$

   c. __8__
      $4\,|\,32$

6. a. Draw the answer. (R 7)

   b. Write the division number sentence. $\frac{2^{R1}}{3\,|\,7}$

Assessment - Part 2 - Worksheet 2

7. a. $\frac{4^{R2}}{4\,|\,18}$ b. $\frac{6^{R2}}{5\,|\,32}$ c. $\frac{7^{R2}}{3\,|\,23}$

8. In the problem 20 ÷ 4 = 5, 5 is the 'answer.'
   Draw a box around any drawings below that show what the 5 means.

   a. ☐ ☐ ☐ ☐ ☐
   b. (0 0 0 0 0) (0 0 0 0 0) (0 0 0 0 0) (0 0 0 0 0)
   c.
   d.

9. Make a Family of Facts with these three numbers. | 3 | 6 | 18 |

   a. __3__ x __6__ = 18
      __6__ x __3__ = 18
      __18__ ÷ __3__ = __6__
      __18__ ÷ __6__ = __3__

   b. $\begin{array}{r} 3 \\ \times 6 \\ \hline 18 \end{array}$ $\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$ $\frac{6}{3\,|\,18}$ $\frac{3}{6\,|\,18}$

10. These are hard.
    Fill in the missing numbers.

    a. 8 ÷ 2 = |4|
    b. 15 ÷ |5| = 3
    c. |20| ÷ 4 = 5

Division: Booklet 2
Assessment - Part 1

1. Susan has eight chocolate chip cookies. She put two cookies on each plate. How many plates did she need? __4__

   b. Write the number sentence that goes with the story.

   $$8 \div 2 = 4$$

   c. Record.
   $$2\overline{)8} = 4$$

   a. Draw a picture of the problem.
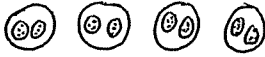
2. Use only the three numbers 4, 7, and 28 to make four Families of Facts number sentences.

   a. $4 \times 7 = 28$ $\quad 28 \div 4 = 7$

   $7 \times 4 = 28$ $\quad 28 \div 7 = 4$

   b. $\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$ $\quad 4\overline{)28}$

   $\begin{array}{r} 4 \\ \times 7 \\ \hline 28 \end{array}$ $\quad 7\overline{)28}$

3. Fill in the missing numbers.

   a. $32 \div 4 = 8$ b. $15 \div 5 = 3$ c. $35 \div 5 = 7$

   d. $20 \div 10 = 2$ e. $6\overline{)48} = 8$ f. $4\overline{)32} = 8$ g. $5\overline{)10} = 2$

4. Solve.

   a. $\begin{array}{r} 86 \\ -39 \\ \hline 47 \end{array}$ b. $\begin{array}{r} 347 \\ -156 \\ \hline 191 \end{array}$ c. $\begin{array}{r} 435 \\ -279 \\ \hline 156 \end{array}$

5. Solve.

   a. $\begin{array}{r} 138 \\ \times 6 \\ \hline 828 \end{array}$ b. $\begin{array}{r} 2,375 \\ \times 4 \\ \hline 9,500 \end{array}$ c. $\begin{array}{r} 6,598 \\ \times 4 \\ \hline 26,392 \end{array}$

Assessment - Part 2 - Worksheet 1

1. a. $\rightarrow 2\overline{)16} = 8$ Study this picture. What does this 8 mean? _There are 8 groups of 2._

   b. Draw the blocks. Fill in the blanks.
   $$2\overline{)4 + 12} = \frac{2 + 6}{} = 8 \leftarrow \text{Final answer.}$$

   c. Fill in the blanks.
   $$2\overline{)4 + 8 + 4} = \frac{2 + 4 + 2}{} = 8$$

   d. What do you notice about the answers in a, b, and c? _They are all the same._

2. a. Build 16 this way. Record the number sentence. Arrange the blocks in each set into groups of 2.
   $$2\overline{)5 + 11} = \frac{2^{R1} + 5^{R1}}{} = 7^{R2} = 8$$

   b. Build 20 this way. Record the number sentence. Arrange the blocks in each set into groups of 4.
   $$4\overline{)6 + 9 + 4} = \frac{1^{R2} + 2^{R2} + 1}{} = 4^{R4} = 5$$

   c. Build 19 this way. Record the number sentence.
   $$4\overline{)6 + 8 + 5} = \frac{1^{R2} + 2 + 1^{R1}}{} = 4^{R3}$$

   d. Break the 38 into three numbers and divide by 5. $5\overline{)38}$
   $$5\overline{)} = \frac{+ \ +}{} = 7^{R3}$$
   BUWV = Break up will vary

3. Solve each problem two different ways.

   a. $4\overline{)46} = 11^{R2}$ $\quad 4\overline{)\frac{+\ +}{}} = 11^{R2}$ $\quad 4\overline{)\frac{+\ +\ +}{}} = 11^{R2}$

   b. $4\overline{)38} = 9^{R2}$ $\quad 4\overline{)\frac{+\ +}{}} = 9^{R2}$ $\quad 4\overline{)\frac{+\ +\ +}{}} = 9^{R2}$

   c. $4\overline{)56} = 14$ $\quad 4\overline{)\frac{+\ +}{}} = 14$ $\quad 4\overline{)\frac{+\ +\ +}{}} = 14$

Assessment - Part 2 - Worksheet 2

4. Tony was shooting baskets every day. Here is a table of the number of baskets he made each day.

Day	Baskets made
Monday	12 baskets made
Tuesday	6 baskets made
Wednesday	9 baskets made
Thursday	14 baskets made
Friday	14 baskets made

   a. How many baskets were made in all? __55__
   b. How many days were there? __5__
   c. What was the average number of baskets per day? __11__

5. Solve. Show your work on how you break up each number.

   a. $8\overline{)94} = 11^{R6}$ $\quad 8\overline{)\frac{+\ +}{}} = 11^{R6}$ BUWV

   b. $9\overline{)117} = 13$ $\quad 9\overline{)\frac{+\ +}{}} = 13$

6. Solve these two problems.

   a. $3\overline{)30 + 30 + 12} = \frac{10 + 10 + 4}{} = 24$

   b. $3\overline{)18 + 36 + 10 + 8} = \frac{6 + 12 + 3^{R1} + 2^{R2}}{} = 23 = 24$

   c. Which problem was easier to solve? __a__ d. Explain why. _The addition was easier in the quotient, no remainders._

7. Fill in the missing numbers.

   a. $3\overline{)51} = 17$ $\quad 3\overline{)30 + 21} = \frac{10 + 7}{} = 17$

   b. $4\overline{)92} = 23$ $\quad 4\overline{)80 + 12} = \frac{20 + 3}{} = 23$

8. Make the answers come out in tens and ones with remainders in the ones place only.

   a. $3\overline{)96} = 32$ $\quad 3\overline{)90 + 6} = \frac{30 + 2}{} = 32$

   b. $4\overline{)184} = 44$ $\quad 4\overline{)160 + 24} = \frac{40 + 6}{} = 46$

   c. $5\overline{)385} = 77$ $\quad 5\overline{)350 + 35} = \frac{70 + 7}{} = 77$

9. Solve each problem the long way, showing how the problem is broken up to get the answer to come out in hundreds, tens, and ones. Then do each problem the short way.

   a. $3\overline{)3,609} = 1,203$ $\quad 3\overline{)3,000 + 600 + 9} = \frac{1,000 + 200 + 3}{} = 1,203$

   b. $3\overline{)477} = 159$ $\quad 3\overline{)300 + 150 + 27} = \frac{100 + 50 + 9}{} = 159$

   c. $3\overline{)2,124} = 708$ $\quad 3\overline{)2,100 + 0 + 24} = \frac{700 + 0 + 8}{} = 708$

   d. $4\overline{)3,625} = 906^{R1}$ $\quad 4\overline{)3,600 + 400 + 25} = \frac{800 + 100 + 6^{R1}}{} = 906^{R1}$

Division: Booklet 3

Assessment - Part 1

Part 1

1. a. $\dfrac{193}{5\overline{)965}}$ b. $\dfrac{512}{8\overline{)4,096}}$ c. $\dfrac{153}{9\overline{)1,377}}$

d. $\dfrac{96}{4\overline{)384}}$ e. $\dfrac{145\,R3}{5\overline{)728}}$ f. $\dfrac{87\,R1}{4\overline{)349}}$

2. a. $\begin{array}{r}34\\ \times\,18\\ \hline 612\end{array}$ b. $\begin{array}{r}72\\ \times\,84\\ \hline 6,048\end{array}$ c. $\begin{array}{r}354\\ \times\,67\\ \hline 23,713\end{array}$

Part 2

1. Show the remainders as fractions.
   a. $3\frac{3}{4}$ $4\overline{)15}$ b. $3\frac{2}{10}$ or $3\frac{1}{5}$ $5\overline{)16}$ c. $2\frac{4}{6}$ or $2\frac{2}{3}$ $6\overline{)16}$

2. Show the remainders as decimals. Round to the nearest hundredth if needed.
   a. 35.5 $6\overline{)213}$ b. 18.33 $9\overline{)165}$ c. 15.57 $7\overline{)109}$

Assessment - Part 2 continued

3. Find and record the missing number.
   a. $\begin{array}{r}\boxed{400}\\ \times\quad 4\\ \hline 1,600\end{array}$ b. $\begin{array}{r}80\\ \times\,\boxed{70}\\ \hline 5,600\end{array}$ c. Prove your answer is true in problem b by showing a factoring by tens factor tree.

   5,600
   /\
   560 × 10
   /\
   56 × 10

   d. $\begin{array}{r}\boxed{3,000}\\ \times\quad 60\\ \hline 180,000\end{array}$

4. a. $\dfrac{50}{3\overline{)150}}$ b. $\dfrac{5}{30\overline{)150}}$ c. $30 \times \underline{5} = 150$

   d. $\dfrac{500}{3\overline{)1,500}}$ e. $\dfrac{50}{30\overline{)1,500}}$ f. $30 \times \underline{50} = 1,500$

5. a. $700 \div 20 = \underline{35}$ b. $1,260 \div 30 = \underline{42}$

   c. $1,380 \div 60 = \underline{23}$ d. $4,860 \div 90 = \underline{54}$

6. If the dividend, stays the same, $50\overline{)2,950}$

   and the divisor goes up a little, $51\overline{)2,950}$

   I expect the quotient to go _down_ a little.
   ↓ or ↑
   down up

7. a. $\dfrac{7}{49\overline{)343}}$ b. $\dfrac{6}{47\overline{)282}}$ c. $\dfrac{5}{62\overline{)310}}$

8. a. $\dfrac{24}{52\overline{)1,248}}$ b. $\dfrac{18}{54\overline{)972}}$ c. $\dfrac{107}{46\overline{)4,922}}$

Base Ten Division

Assessment - Worksheet 1

dividend	divisor	quotient
The number you start with	÷ The number of groups	= The number in each of the groups

1. In the boxes below, write the number sentence that goes with the story.

quotient
divisor ⟌ dividend

Susan has twelve chocolate chip cookies. She has two plates. How many cookies will go on each plate?

a. $12 \div 2 = 6$

b. $2\overline{)12}$ → 6

Suki has forty-five bees. She has five bee cages. How many bees will go in each cage?

c. $45 \div 5 = 9$

d. $5\overline{)45}$ → 9

2. Share. Give each plate the same amount. Draw the cookies on the plates. You may use counters.

a. $(12) \div (4) = \bigcirc$ $4\overline{)12}$ → 3 4

b. $(14) \div (7) = \bigcirc$ $7\overline{)14}$ → 2 7

c. $(12) \div (6) = \bigcirc$ $6\overline{)12}$ → 2 6

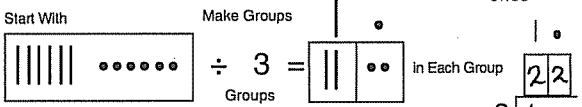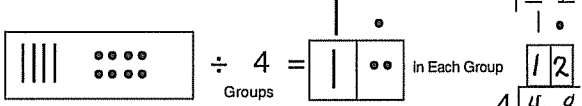AWV = Answer will vary

Assessment - Worksheet 2

3. Fill in the missing number.

a. $(12) \div (4) = (3)$ b. $(15) \div (3) = (5)$ c. $(10) \div (2) = (5)$

d. $4\overline{)21}$ → 5   e. $3\overline{)21}$ → 7   f. $5\overline{)35}$ → 7   g. $3\overline{)45}$ → 15   h. $4\overline{)32}$ → 8   i. $7\overline{)49}$ → 7
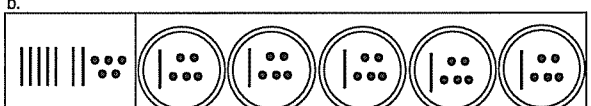
4. Share in base ten. You may use blocks. | = tens ● = ones

a. Start With | | | | | | ●●●●●● ÷ 3 = | | ●● in Each Group

$3\overline{)66}$ → 22

b. | | | | ●●●● ÷ 4 = | ●● in Each Group

$4\overline{)48}$ → 12

5. Share. Give each plate the same amount. Trade if needed.

a.

b.

Assessment - Worksheet 3

6. Divide. Some of these problems will have remainders.

a.
```
      24
  3 ⟌ 72   Start with
    - 60    used
      1 2   left
    - 1 2   used
       0    left
```

b.
```
      13  R1
  7 ⟌ 92   Start with
    - 70    used
      2 2   left
    - 2 1   used
        1   left
```

Example:
```
       24  R 2
  4 ⟌ 98   Start with
    - 80    used
      18    left
    - 16    used
       2    left
```

7. Divide. Use Base Ten Blocks if needed but record as you go.

a.
```
      | 2 0 4
  4 ⟌ 8 1 6
    - 8 0 0  used
        1 6  left
    -   1 6  used
          0  left
    -        used
             left
```

b.
```
      | 1 0 4
  5 ⟌ 5 2 0
    - 5 0 0  used
        2 0  left
    -   2 0  used
          0  left
    -        used
             left
```

c.
```
      | 3 1 9
  2 ⟌ 6 3 8
    - 6 0 0  used
        3 8  left
    -   2 0  used
          1 8  left
    -     1 8  used
            0  left
```

8. Divide. Use Base Ten Blocks if needed but record as you go.

a.
```
      | 6 3
  4 ⟌ 2 5 2
    - 2 4 0  used
        1 2  left
    -   1 2  used
          0  left
```

b.
```
      | 2 6
  6 ⟌ 1 5 6
    - 1 2 0  used
        3 6  left
    -   3 6  used
          0  left
```

c.
```
      | 9 3
  5 ⟌ 4 6 5
    - 4 5 0  used
        1 5  left
    -   1 5  used
          0  left
```

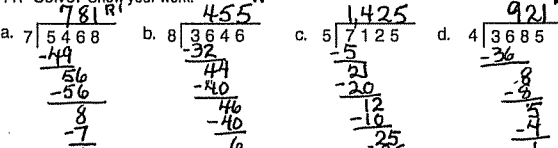## Assessment - Worksheet 4

9a. In problem 8a, $4\overline{)252}$, you may have thought, "Four does not go into two, I have to underline the first two numbers and divide into the twenty-five." Did think about this problem this way? **AWV** If you answered Yes, go on to 9b. If you answered No, go on to problem 10.
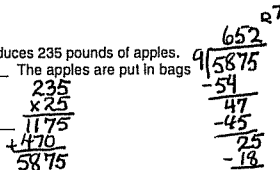
9b. Thinking again about problem 8a, $4\overline{)252}$, the place value of the first '2' is two hundred. Four can easily divide into two hundred. So if this is true, why do you think in your head, "Four does not go into two, so I have to underline the first numbers and divide into the twenty-five?"
Answer will be unique.

10. In the problem $4\overline{)252}$, please explain your thinking on how to solve this problem. Explain the steps you use and why you use them. _Even though the first two is two hundred, the two can't easily be divided into four groups, so it is regrouped into twenty tens, this is why the first two numbers are taken together as twenty-five tens._

11. Solve. Show your work.

a.
```
      781  R1
  7 ⟌ 5468
    - 49
      56
    - 56
       8
    -  7
       1
```

b.
```
      455  R6
  8 ⟌ 3646
    - 32
      44
    - 40
       46
    -  40
        6
```

c.
```
      1,425
  5 ⟌ 7125
    - 5
      21
    - 20
       12
    -  10
        25
    -   25
         0
```

d.
```
      921  R1
  4 ⟌ 3685
    - 36
       8
    -  8
        5
    -   4
        1
```
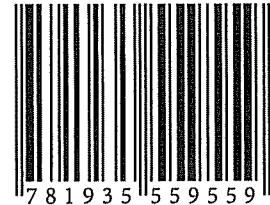
12a. At Prairies Song Farm, there are thirty-five heritage cherry trees. There were 9,248 jars of jam made from the cherries. Each box holds 8 jars.
How many boxes will be filled? __1,156__
How many jars will be left over? __0__

12b. There are twenty-five heritage apple trees. Each tree produces 235 pounds of apples. How many pounds of apples are produced? __5,875__   The apples are put in bags that weigh 9 pounds each.
How many bags will be needed? __652__
How many pounds of apples will be left over? __7__

```
   235
  ×25
  1175
 +470
  5875
```

```
      652  R7
  9 ⟌ 5875
    - 54
       47
    -  45
        25
    -   18
         7
```

Answer Key: Base Ten Division Placement

Patterns in Arithmetic: Division Placement PDF

Parent/Teacher Guide