Breaking Up is NOT Hard to Do!

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PROFESSIONAL LEARNING
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Definitions

Composing numbers
To combine parts or smaller values to form a greater number.

Decomposing numbers
To break a greater number into parts or smaller values.

Standard form
4,752

Expanded form and expanded notation
4,000 + 700 + 50 + 2
(4 x 1,000) + (7 x 100) + (5 x 10) + (2 x 1)

Common Core State Standards – Composing and Decomposing (Numeration)	
K.NBT.1	Compose and decompose numbers from 11 to 19 into tens and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
K.OA.2	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).
1.NBT.2	Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: a. 10 can be thought of as a bundle of ten ones — called a “ten.” b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones. c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
2.NBT.1	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a “hundred.” b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
2.NBT.3	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
4.NBT.2	Read and write multi-digit whole number using base-ten numerals number names, and expanded form. Compare two multi-digit numbers based on meaning of the digits in each place, using >, =, and < symbols to record the results of comparisons.
4.NF.3b	Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*
4.NF.4a	Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*
4.MD.7	Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
5.NBT.3a	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000)

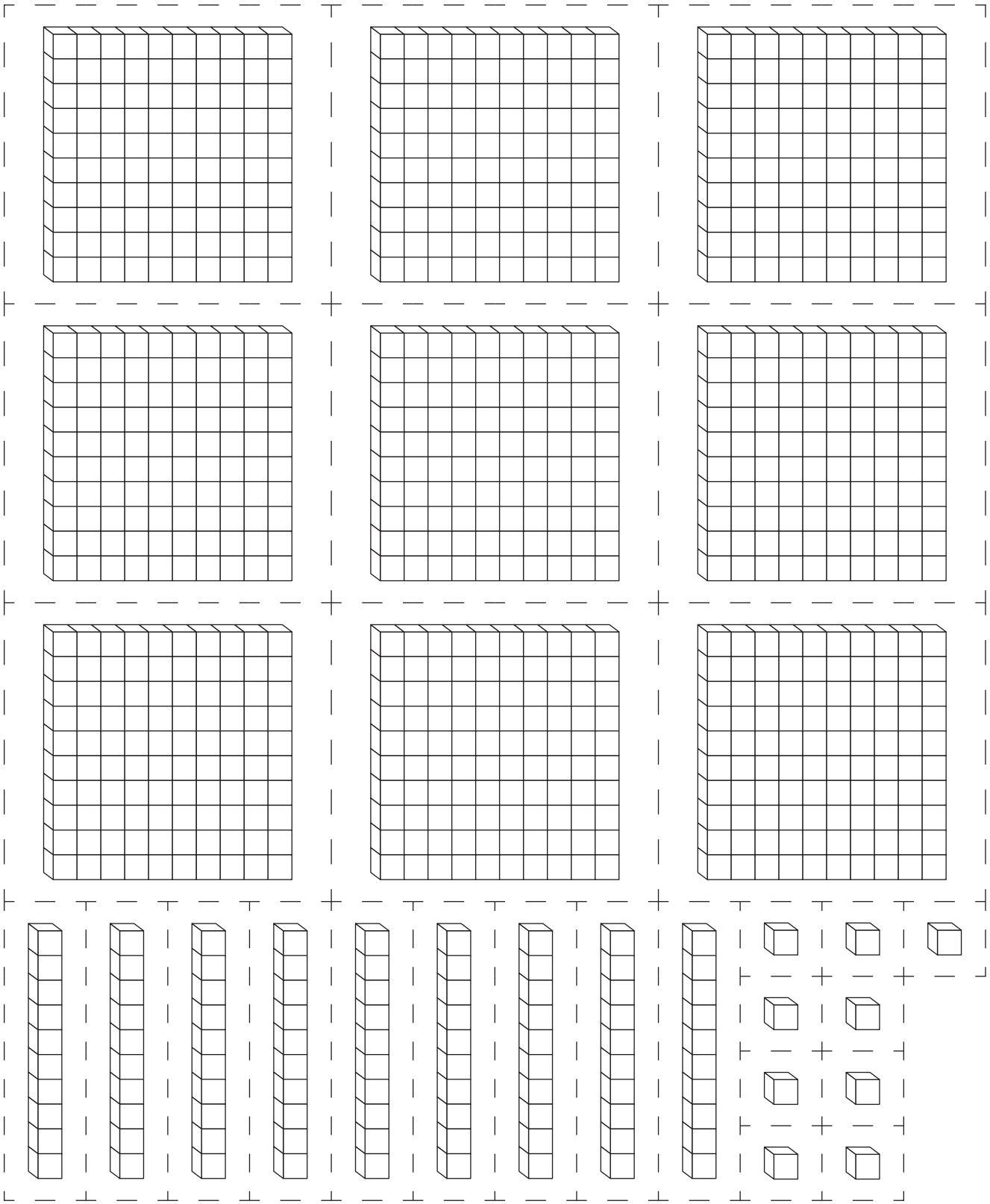
Common Core State Standards – Composing and Decomposing (Operation)	
K.OA.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
1.OA.3	Apply properties of operations as strategies to add and subtract. Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. *(Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)*
1.OA.6.	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
1.NBT.4	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
2.NBT.7	Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
3.OA.5	Apply properties of operations as strategies to multiply and divide. *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3.MD.7c	Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

4.NBT.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
4.NBT.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NBT.6	Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
4.NF.3c	Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
5.NBT.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
5.NBT.6	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
5.NBT.7	Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Composing Teen Numbers

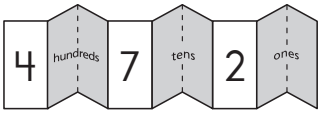
11	12	13
14	15	16
17	18	19
eleven	twelve	thirteen
fourteen	fifteen	sixteen
seventeen	eighteen	nineteen

Composing Whole Numbers

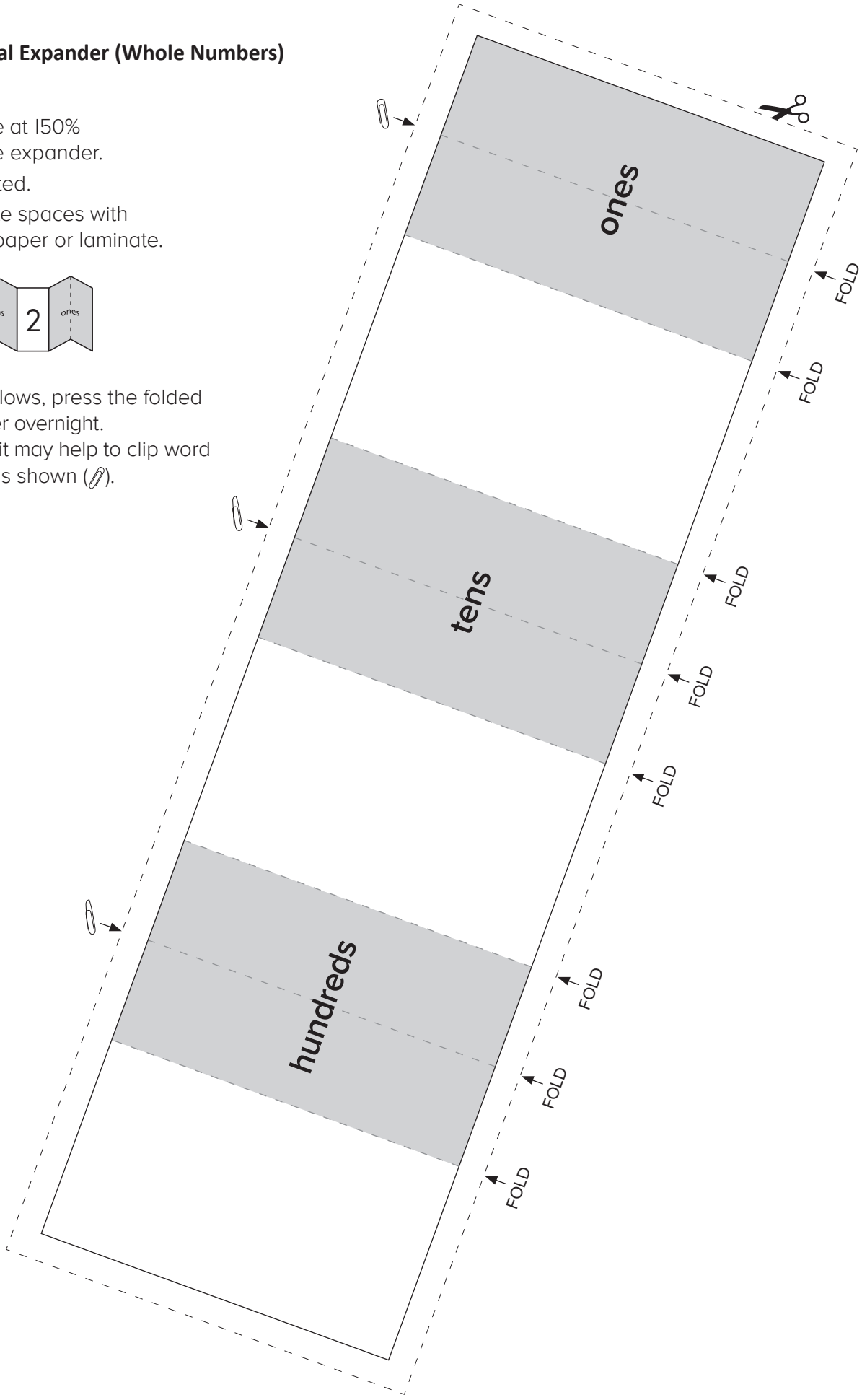


Three-Digit Numeral Expander (Whole Numbers)

1. Copy this page at 150% and cut out the expander.
2. Fold as indicated.
3. Cover the white spaces with clear contact paper or laminate.



Note: If time allows, press the folded expander overnight.
In class, it may help to clip word panels as shown (📎).



Composing Three-Digit Numbers (Non Conventional Forms)

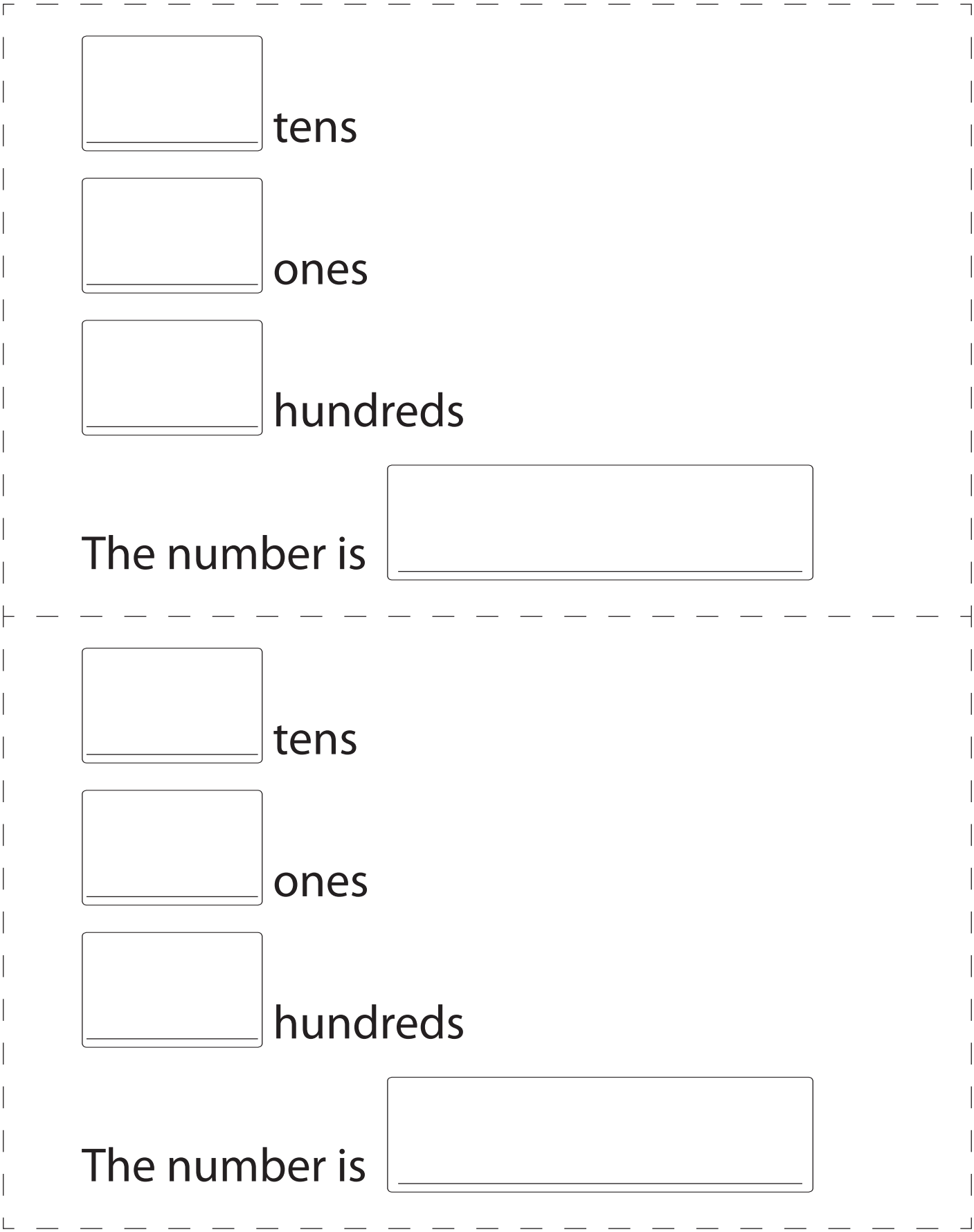
Cut out the cards, then place them facedown on the table.

In turn, choose one card and figure out the total value of the blocks.

Use the picture cards of blocks or write number sentences to help your thinking.

6 hundreds 6 ones 14 tens	17 ones 6 tens 4 hundreds	11 ones 16 tens 5 hundreds
6 hundreds 6 ones 14 tens	7 hundreds 13 ones 11 tens	6 hundreds 6 ones 14 tens
12 tens 12 ones 5 hundreds	19 ones 0 tens 3 hundreds	7 tens 17 ones 7 hundreds

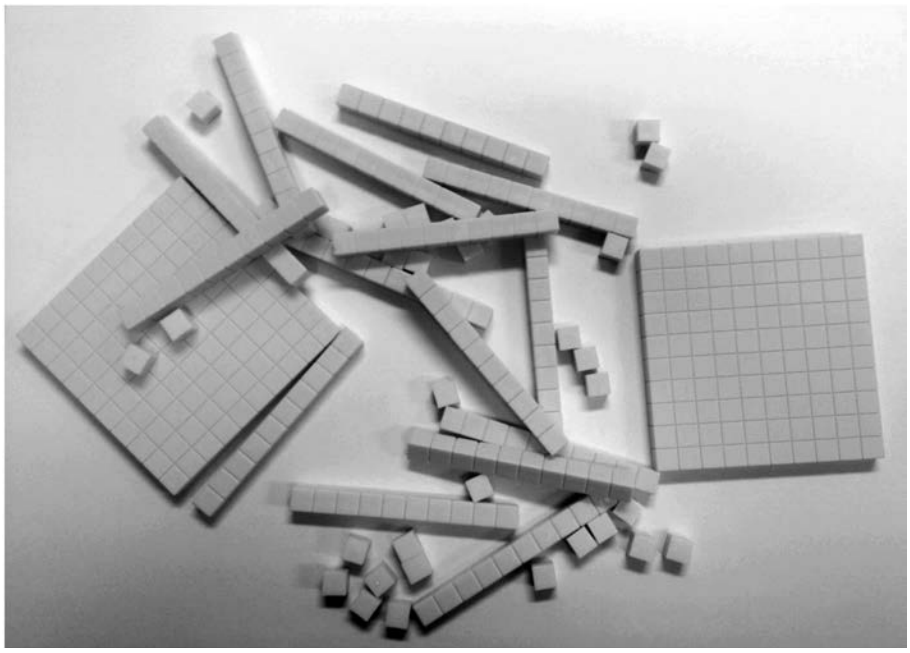
Snowball



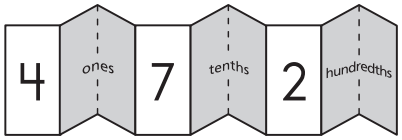
Decomposing Whole Numbers in Nonconventional Forms

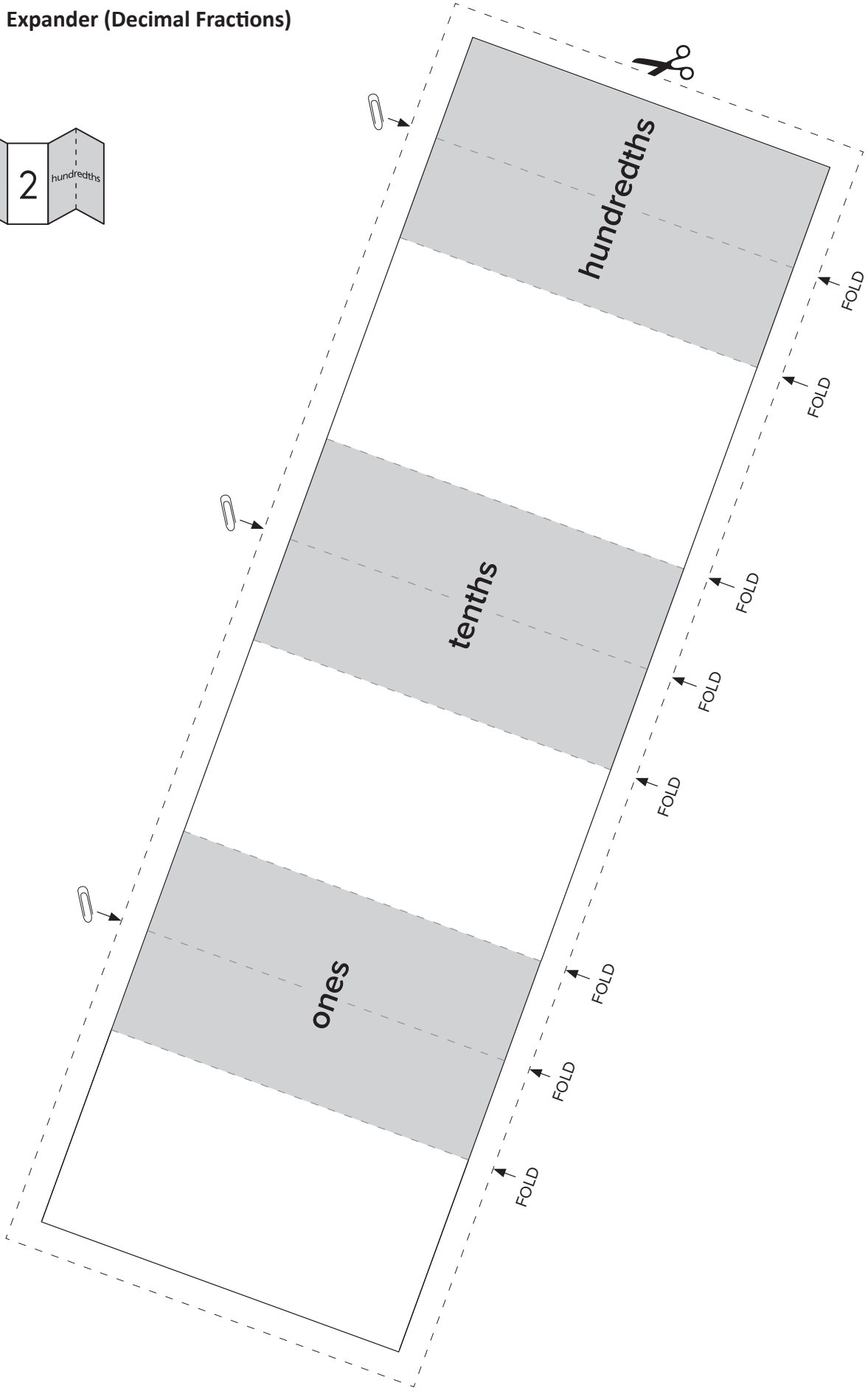
Some base-ten blocks fall off a table.
The total value of the blocks is 345.
How many of each type of block might there be?

Some non-obvious choices:
3 hundreds, 3 tens, 15 ones
2 hundreds, 145 ones

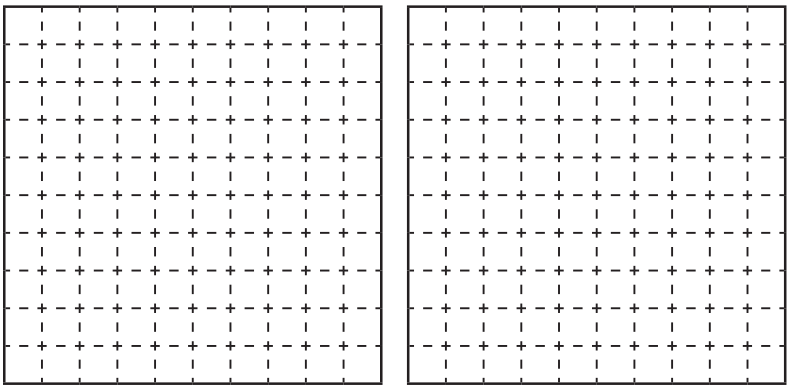


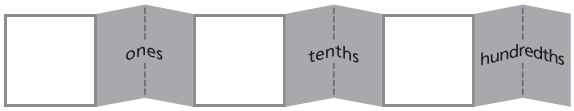
Three-Digit Numeral Expander (Decimal Fractions)

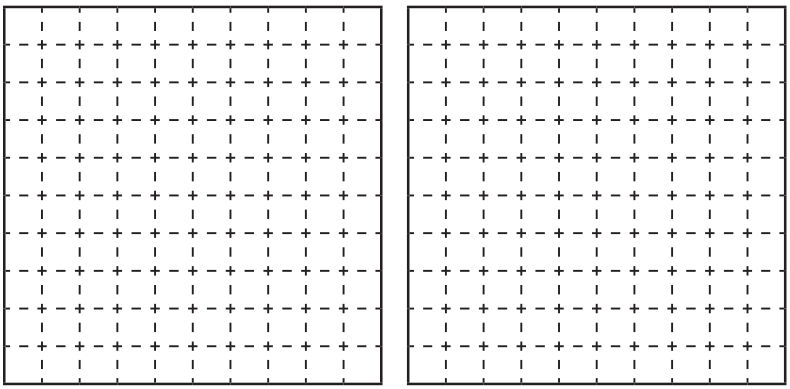


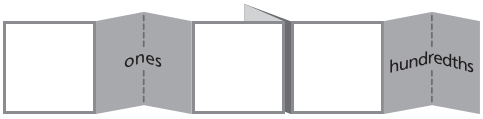


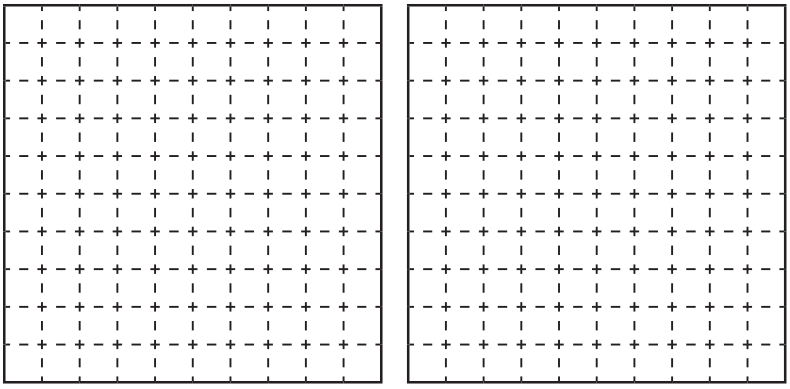
Representing Decimal Fractions in Nonconventional Forms – Place Value Only

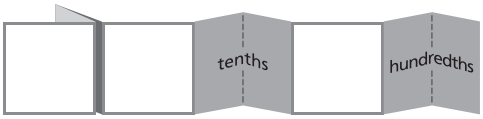


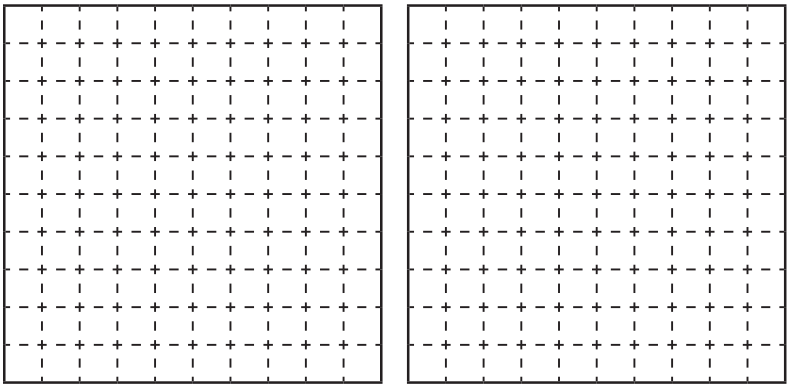


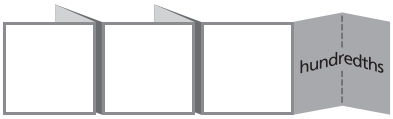






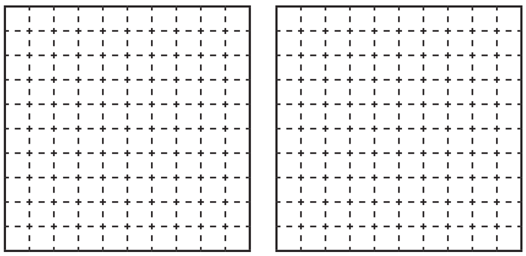




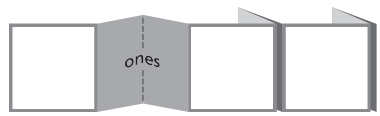


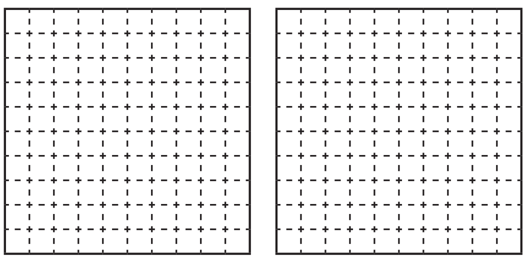
Decomposing Whole Numbers in Nonconventional Forms

- Label 3 cubes from 1 to 6.
- Cube A represents tenths.
- Cubes B and C represent hundredths.
- Roll the cubes.
- Record the number of tenths and hundredths that you roll.
- The total value is then written on the expander.
- The player with the greater number wins.

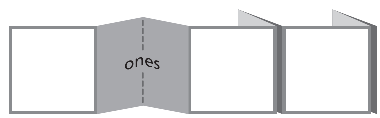


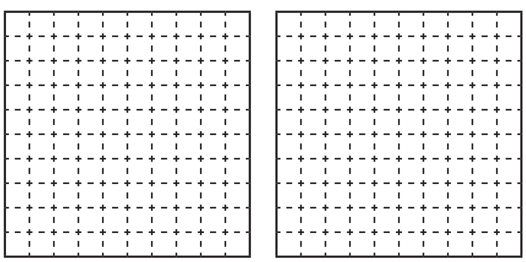
______ tenths ______ hundredths



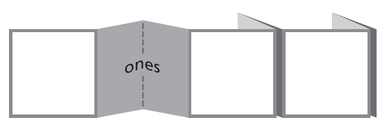


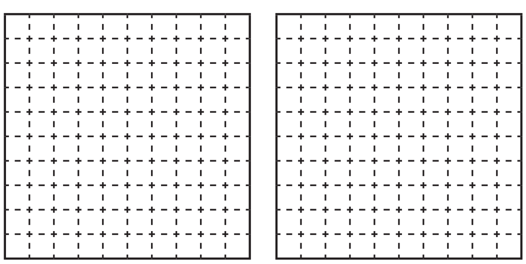
______ tenths ______ hundredths



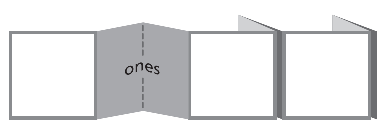


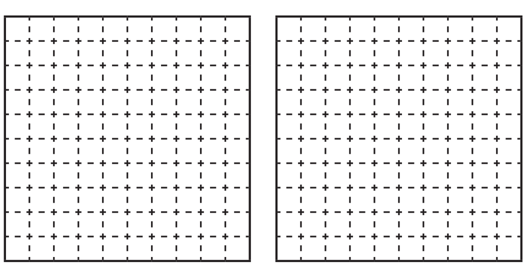
______ tenths ______ hundredths



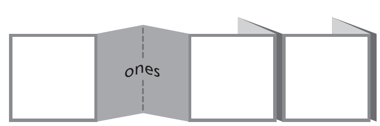


______ tenths ______ hundredths





______ tenths ______ hundredths



Solving Everyday Problems

How could you figure out the total cost of the two items?

1. Figure out each partial product. Then add to figure out the total.

6 × 354

6 × _____ = _____

6 × _____ = _____

6 × _____ = _____

Total _____

2. Use the same type of strategy to solve these.

a. 4 x 289 = _____

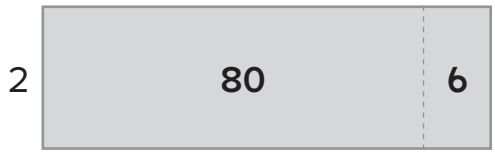
b. 3 x 1,795 = _____

c. 35 x 46 = _____

1. These rectangles have been split into parts to make it easier to divide. Write the missing numbers. Then complete the equation.

a.

86 ÷ 2 = _____



40 + _____

b.

69 ÷ 3 = _____

_____ + _____

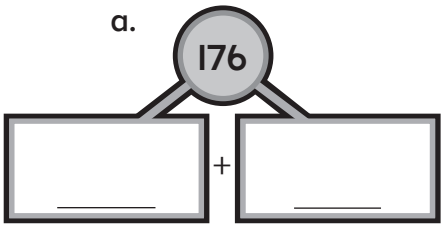
2. Use the same type of strategy to solve these.

a. 786 ÷ 6 = _____

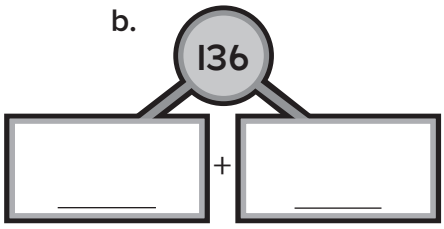
b. 3,236 ÷ 4 = _____

3. Break each number into parts that you can easily **divide by 4**.

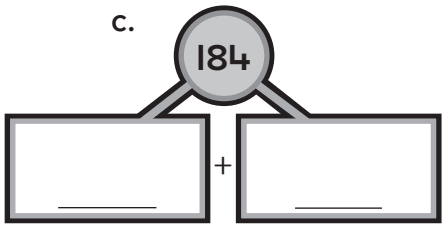
a.



b.



c.



4. Use the same type of strategy to solve these.

a. 847 ÷ 7 = _____

b. 3,236 ÷ 4 = _____

Multiplication and Division – Decimal Fractions

1. Use the partial products strategy to solve these.

a. 7 × 3.8 = _____

b. 4 × 5.63 = _____

2. Use the partial quotients strategy to solve these.

a. 8.7 ÷ 3 = _____

b. 9.24 ÷ 6 = _____