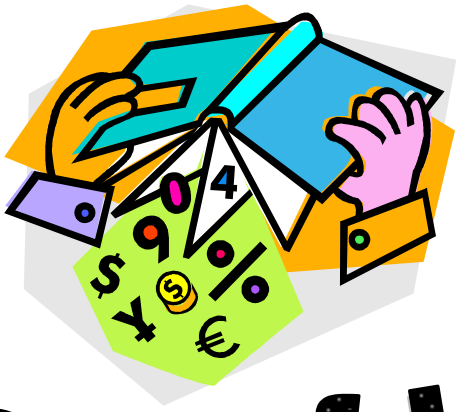
Mathematics:



'A Story of Units'

Parent Handbook

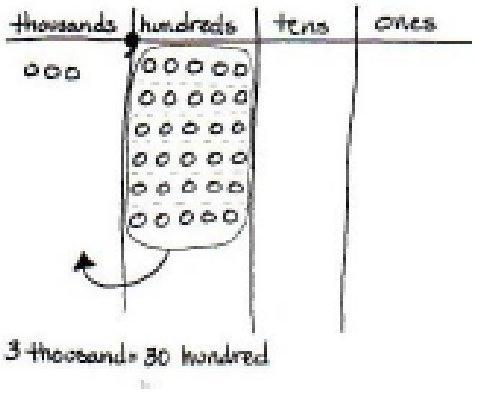
Grade 4
Module 1

Grade 4• Module 1

Place Value, Rounding, and Algorithms for Addition and Subtraction

OVERVIEW

In this 25-day module of Grade 4, students extend their work with whole numbers. They begin with large numbers using familiar units (hundreds and thousands) and develop their understanding of millions by building knowledge of the pattern of *times ten* in the base ten system on the place value chart. They recognize that each sequence of three digits is read as hundreds, tens, and ones followed by the naming of the corresponding base thousand unit (thousand, million, billion).



The place value chart will be fundamental in Topic A. Building upon their previous knowledge of *bundling,* students learn that 10 hundreds can be composed into 1 thousand and, therefore, 30 hundreds can be composed into 3 thousands because a digit's value is ten times what it would be one place to its right. Conversely, students learn to recognize that in a number such as 7,777 each 7 has a value that is 10 times the value of its neighbor to the immediate right. 1 thousand can be decomposed into 10 hundreds, therefore 7 thousands can be decomposed into 70 hundreds.

Similarly, multiplying by 10 will shift digits one place to the left, and dividing by 10 will shift digits one place to the right.

$$3{,}000 = 300 \times 10 \quad 3{,}000 \div 10 = 300$$

In Topic B, students use place value as a basis for comparison of whole numbers. Although this is not a new topic, it becomes more complex because the numbers are larger. For example, it becomes clear that 34,156 is 3 thousand greater than 31,156.

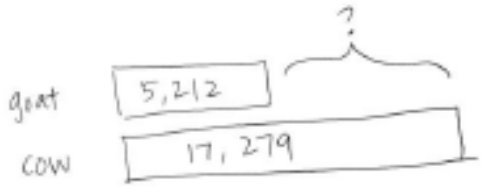
$$34{,}156 > 31{,}156$$

Comparison leads directly into rounding, where their skill with isolating units is applied and extended. Rounding to the nearest ten and hundred was mastered with 3 digit numbers in Grade 3. Now Grade 4 students moving into Topic C learn to round to any place value initially using the vertical number line though ultimately moving away from the visual model altogether. Topic C also includes word problems where students apply rounding to real life situations.

In Grade 4, students become fluent with the standard algorithms for addition and subtraction. In Topics D and E students focus on single like-unit calculations (ones with ones, thousands with thousands, etc.) at times requiring the composition of greater units when adding (10 hundreds are composed into 1 thousand) and decomposition into smaller units when subtracting (1 thousand is decomposed into 10 hundreds). Throughout these topics, students will apply their algorithmic knowledge to solve word problems. Also, students use a variable to represent the unknown quantity.

The module culminates with multi-step word problems in Topic F. Tape diagrams are used throughout the topic to model additive compare problems like the one exemplified below. These diagrams facilitate deeper comprehension and serve as a way to support the reasonableness of an answer.

A goat produces 5,212 gallons of milk a year. The cow produces 17,279 gallons a year. How much more milk does the goat need to produce to make the same amount of milk as a cow?



$17{,}279 - 5{,}212 =$ ____

The goat needs to produce _____ more gallons of milk a year.

**The sample questions/responses contained in this manual are straight from http://www.engageny.org/. They are provided to give some insight into the kinds of skills expected of students as the lesson is taught.

Terminology

New or Recently Introduced Terms

- Ten thousands, hundred thousands (as places on the place value chart)
- One millions, ten millions, hundred millions (as places on the place value chart)
- Algorithm
- Variable

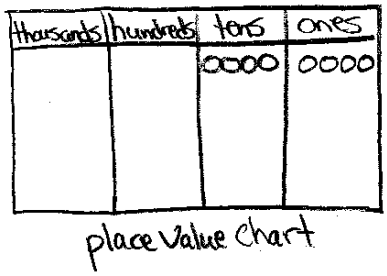
Familiar Terms and Symbols

- Sum (answer to an addition problem)
- Difference (answer to a subtraction problem)
- Rounding (approximating the value of a given number)
- Place value (the numerical value that a digit has by virtue of its position in a number)
- Digit (a numeral between 0 and 9)
- Standard form (a number written in the format: 135)
- Expanded form (e.g., 100 + 30 + 5 = 135)
- Word form (e.g., one hundred thirty-five)
- Tape diagram (bar diagram)
- Number line (a line marked with numbers at evenly spaced intervals)
- Bundling, making, renaming, changing, exchanging, regrouping, trading (e.g. exchanging 10 ones for 1 ten)
- Unbundling, breaking, renaming, changing, regrouping, trading (e.g. exchanging 1 ten for 10 ones)
- =, <, > (equal, less than, greater than)
- Number sentence (e.g., 4 + 3 = 7)

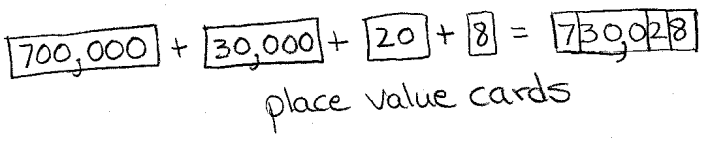
Suggested Tools and Representations

- Place value charts
- Place value cards (including 7 place values)
- Number lines

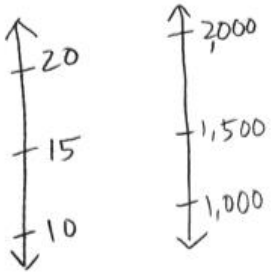
Place value charts: Place value charts allow for students to determine the value of each digit of a number (ones, tens, hundreds, etc.) by relating its position to its value. Place value charts may also be used with number disks/dots to address the same idea.



Place value cards: Place value cards allow for students to determine the value of each digit of a number (ones, tens, hundreds, etc.) by writing out its value in standard form (ie: 700 or 6). The cards may be proportionately sized to allow for the cards to be place on top of one another to show that the value of each individual digit builds up to the value of the whole number (ie: 700 or 7 hundreds + 6 or 6 ones = 706).



Number Line: The number line is used to develop a deeper understanding of whole number units, fraction units, measurement units, decimals, and negative numbers. Throughout Grades K-5, the number line models measuring units. Vertical number lines are used to aid in rounding/estimation.



Tape Diagram: Tape diagrams, also called bar models, are pictorial representations of relationships between quantities used to solve word problems. At the heart of a tape diagram is the idea of *forming units*. In fact, forming units to solve word problems is one of the most powerful examples of the unit theme and is particularly helpful for understanding fraction arithmetic.

The tape diagram provides an essential bridge to algebra and is often called "pictorial algebra." There are two basic forms of the tape diagram model. The first form is sometimes called the part-whole model; it uses bar segments placed end-to-end (Grade 3 Example), while the second form, sometimes called the comparison model, uses two or more bars stacked in rows that are typically left justified. (Grade 5 Example).

Grade 3 Example:

Sarah baked 256 cookies. She sold some of them. 187 were left. How many did she sell?

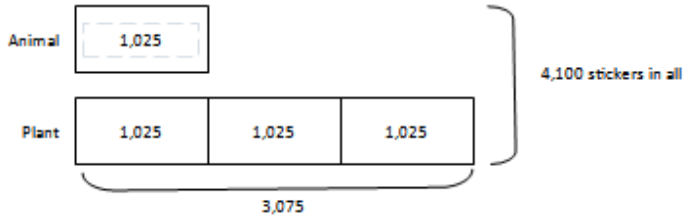
256 – 187 = _____

256 –187 = 69

Sarah sold 69 cookies.

Grade 5 Example:

Sam has 1,025 animal stickers. He has 3 times as many plant stickers as animal stickers. How many plant stickers does Sam have? How many stickers does Sam have altogether?



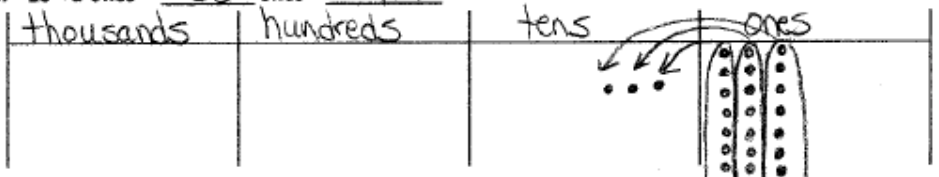
1. He has 3,075 plant stickers.
2. He has 4,100 stickers altogether.

Lesson 1

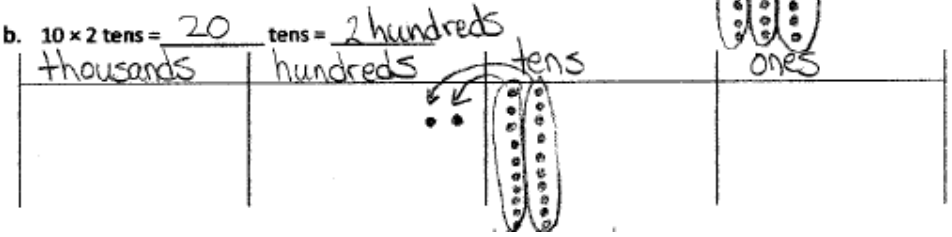
Objective: Interpret a multiplication equation as a comparison.

Label the place value charts. Fill in the blanks to make the following statements true. Draw disks in the place value chart to show how you got your answer, using arrows to show any bundling.

a. **10 × 3 ones =** 30 **ones =** 3 tens



b. **10 × 2 tens =** 20 **tens =** 2 hundreds



Complete the following statements using your knowledge of place value:

a. **10 times as many as 1 ten is** 10 **tens.**

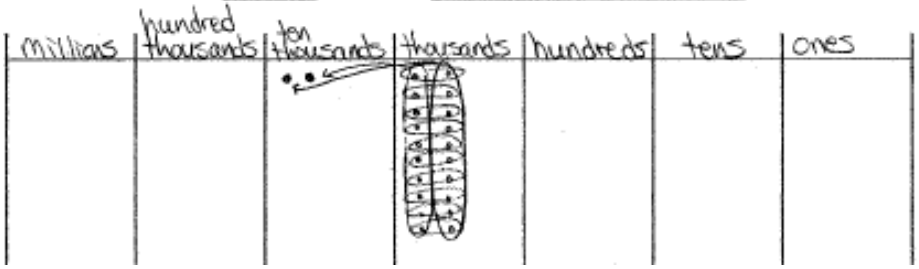
b. **10 times as many as** 3 **tens is 30 tens or** 3 **hundreds.**

Lesson 2

Objective: Recognize a digit represents 10 times the value of what it represents in the place to its right.

As you did during the lesson, label and represent the product or quotient drawing disks on the place value chart.

a. **10 × 2 thousands =** 20 **thousands =** 2 ten thousands



Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit form	Standard Form
10 × 6 tens	60 tens	600
7 hundreds × 10	70 hundreds	7,000

Lesson 3

Objective: Name numbers within 1 million by building understanding of the place value chart and placement of commas for naming base thousand units.

Expression	Standard Form
5 tens + 5 tens	100
3 hundreds + 7 hundreds	1,000

Use the place value chart to represent the following equations with numbers or disks. Write the product in standard form.

a. 10 x 3 thousands = 30,000

How many thousands are in the answer? 30

millions	hundred thousands	ten thousands	thousands	Hundreds	Tens	ones
		•••	••• ×10			

Lesson 4

Objective: Read and write multi-digit numbers using base ten numerals, number names, and expanded form.

Complete the following chart:

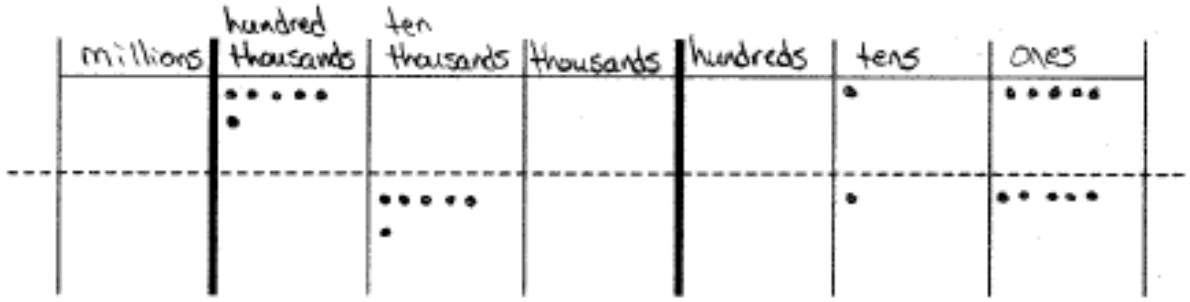
Number	Word Form	Expanded Form
2,480	two thousand, four hundred eighty	2,000 + 400 + 80
20,482	twenty thousand, four hundred eighty-two	20,000 + 400 + 80 + 2
64,106	sixty-four thousand, one hundred six	60,000 + 4,000 + 100 + 6

Lesson 5

Objective: Compare numbers based on meanings of the digits, using >,<, or = to record the comparison.

Label the units in the place value chart. Draw place value disks to represent each number in the place value chart. Use <, >, or = to compare the two numbers. Write the correct symbol in the circle.

a. 600,015 (>) 60,015

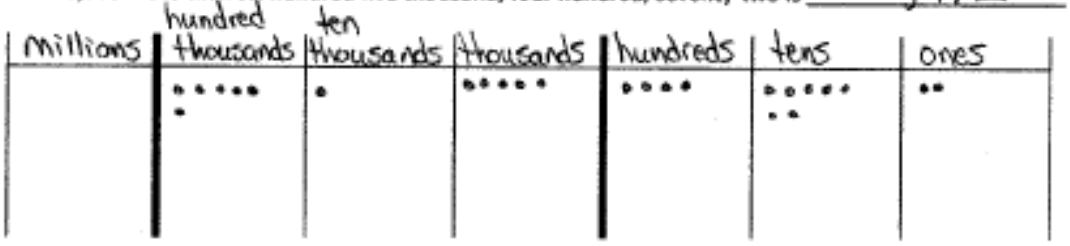


Lesson 6

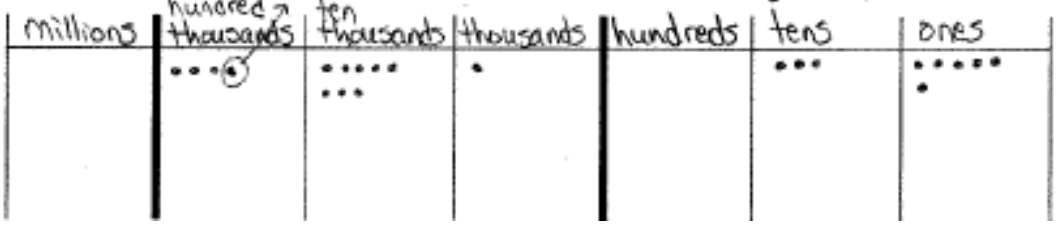
Objective: Find 1, 10, and 100 thousand more and less than a given number.

Label the place value chart. Use number disks to find the sum or difference. Write the answer in standard form on the line.

a. 10,000 more than six hundred five thousand, four hundred, seventy-two is 615,472



b. 100 thousand less than 400,000 + 80,000 + 1000 + 30 + 6 is 381,036

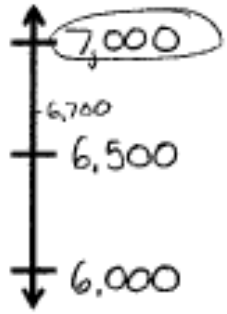


Lesson 7

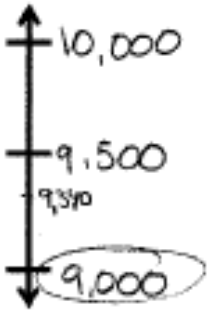
Objective: Round multi-digit numbers to the thousands place using the vertical number line.

Round to the nearest thousand. Use the number line to model your thinking.

a. 6,700 ≈ 7,000



b. 9,340 ≈ 9,000

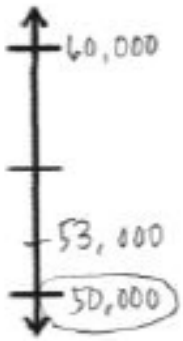


Lesson 8

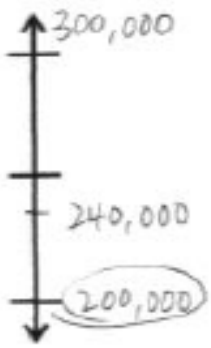
Objective: Round multi-digit numbers to any place using the vertical number line.

Directions: Complete each statement by rounding the number to the given place value. Use the number line to show your work.

1a. 53,000 rounded to the nearest ten thousand is 50,000.



2a. 240,000 rounded to the nearest hundred thousand is 200,000.



Lesson 9

Objective: Use place value understanding to round multi-digit numbers to any place value.

1. Round to the nearest thousand.

   a. 5,300 = 5,000

   b. 4,589 = 5,000

   c. 42,099 = 42,000

   d. 801,504 = 802,000

   e. Explain how you found your answer for letter d.

   For letter d I looked at the thousands place which was a 1. Then I looked to the hundreds place and saw that it was five hundred so I knew to round the thousands place up to 2 thousand.

2. Round to the nearest ten thousand.

   a. 26,000 = 30,000

   b. 34,920 = 30,000

   c. 789,091 = 790,000

   d. 706,286 = 710,000

Lesson 10

Objective: Use place value understanding to round multi-digit numbers to any place value using real world applications.

Round 543,982 to the nearest:

a. **thousand:** 544,000

b. **ten thousand:** 540,000

c. **hundred thousand:** 500,000

Complete each statement by rounding the number to the given place value.

a. **2,841 rounded to the nearest hundred is** 2,800.

b. **32,851 rounded to the nearest hundred is** 32,900.

Lesson 11

Objective: Use place value understanding to fluently add multi-digit whole numbers using the standard addition algorithm and apply the algorithm to solve word problems using tape diagrams.

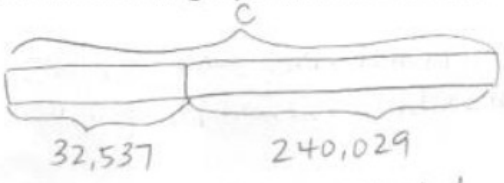
Solve the addition problems below using the standard algorithm.

a. 6, 3 1 1 + 2 6 8 = 6,579

b. 6, 3 1 1 + 1, 2 6 8 = 7,579

In September, Liberty Elementary School collected 32,537 cans for a fundraiser. In October, they collected 207,492 cans. How many cans were collected during September and October?

32,537 + 207,492 = 240,029



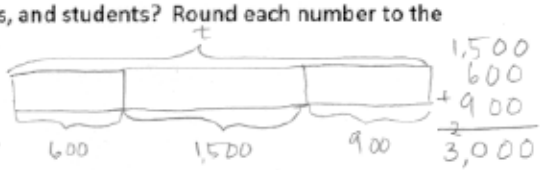
240,029 cans were collected during September and October.

Lesson 12 Objective: Solve multi-step word problems using the standard addition algorithm modeled with tape diagrams and assess the reasonableness of answers using rounding.

Raffle tickets were sold for a school fundraiser to parents, teachers and students. 563 tickets were sold to teachers. 888 more tickets were sold to students than to teachers. 904 tickets were sold to parents. How many tickets were sold to parents, teachers, and students?

a. About how many tickets were sold to parents, teachers, and students? Round each number to the nearest hundred to find your estimate.

563 ≈ 600 to teachers
888 ≈ 900 + 600 = 1500 to students
904 ≈ 900 to parents



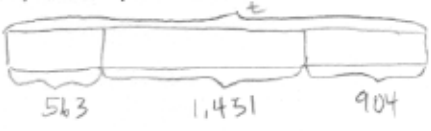
1,500 + 600 + 900 = 3,000

About 3,000 tickets were sold to parents, teachers, and students.

b. Exactly how many tickets were sold to parents, teachers, and students?

563 + 888 = 1,451

1,451 + 904 = 2,918



2,918 tickets were sold to parents, teachers, and students.

Lesson 13

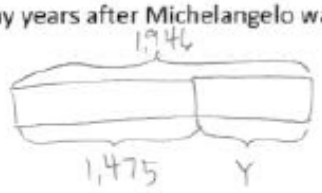
Objective: Use place value understanding to decompose to smaller units once using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams.

Use the standard algorithm to solve the following subtraction problems.

a.
$$\begin{array}{r} 7,525 \\ -3,502 \\ \hline 4,023 \end{array}$$

b.
$$\begin{array}{r} 17,525 \\ -13,502 \\ \hline 4,023 \end{array}$$

Artist Michelangelo was born on March 6, 1475. Author Mem Fox was born on March 6, 1946. How many years after Michelangelo was born was Mem born?



$$\begin{array}{r} {}^{8}{}^{14} \\ 1946 \\ -1,475 \\ \hline 471 \end{array}$$

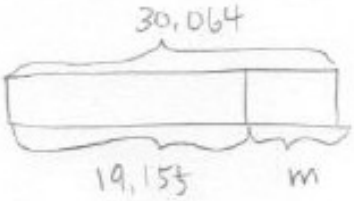
Check
1475
+ 471
1946 ✓

Mem was born 471 years after Michelangelo.

Lesson 14

Objective: Use place value understanding to decompose to smaller units up to 3 times using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams.

Chuck's mom spent $19,155 on a new car. She had $30,064 in her bank account. How much money does Chuck's mom have after buying the car?



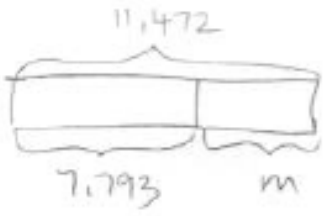
$$\begin{array}{r} {}^{2}{}^{9}{}^{10}{}^{5}{}^{14} \\ \cancel{3}\cancel{0},\cancel{0}\cancel{6}\cancel{4} \\ -19,155 \\ \hline 10,909 \end{array}$$

check
19,155
+ 10,909
30,064 ✓

Chuck's mom has $10,909 after buying the car.

Lesson 15 Objective: Use place value understanding to fluently decompose to smaller units multiple times in any place using the standard subtraction algorithm, and apply the algorithm to solve word problems using tape diagrams.

David is flying from Hong Kong to Buenos Aires. The total flight distance is 11,472 miles. If the plane has 7,793 miles left to travel, how far has it already traveled?



11,472 − 7,793 = 3,679

check: 7,793 + 3,679 = 11,472 ✓

The plane has already traveled 3,679 miles.

Lesson 16 Objective: Solve two-step word problems using the standard subtraction algorithm fluently modeled with tape diagrams and assess the reasonableness of answers using rounding.

Martin's car had 86,456 miles on it. Of that distance, Martin's wife drove 24,901 miles, and his son drove 7,997 miles. Martin drove the rest.

a. About how many miles did Martin drive? Round each value to estimate.

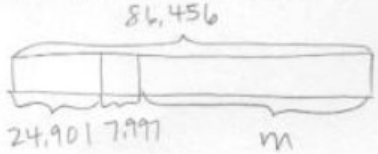
86,456 ≈ 86,000
24,901 ≈ 25,000
7,997 ≈ 8,000

25,000 + 8,000 = 33,000

86,000 − 33,000 = 53,000

Martin drove about 53,000 miles.

b. Exactly how many miles did Martin drive?



24,901 + 7,997 = 32,898

86,456 − 32,898 = 53,558

Martin drove 53,558 miles

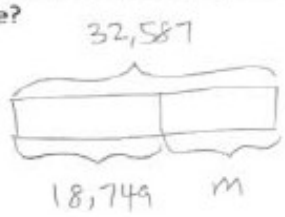
c. Assess the reasonableness of your answer in (b). Use your estimate from (a) to explain.

My answer of 53,558 miles is reasonable because it is close to my estimate of 53,000.

Lesson 17

Objective: Solve additive compare word problems modeled with tape diagrams.

Sean's school raised $32,587. Leslie's school raised $18,749. How much more money did Sean's school raise?



$$\begin{array}{r} 32,587 \\ -\ 18,749 \\ \hline 13,838 \end{array}$$

Sean's school raised $13,838 more money than Leslie's school.

At a parade, 97,853 people sat in bleachers. 388,547 people stood along the street. How many fewer people were in the bleachers than standing on the street?

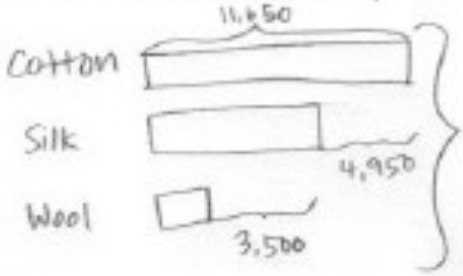
$$\begin{array}{r} 388,547 \\ -\ 97,853 \\ \hline 290,694 \end{array}$$

There were 290,694 fewer people in the bleachers.

Lesson 18

Objective: Solve multi-step word problems modeled with tape diagrams and assess the reasonableness of answers using rounding.

In one year the factory used 11,650 m of cotton, 4,950 fewer meters of silk than cotton, and 3,500 fewer meters of wool than silk. How many meters in all were used of the three fabrics?



$$\begin{array}{r} 11,650 \\ -\ 4,950 \\ \hline 6,700 \text{ (silk)} \end{array}$$

$$\begin{array}{r} 6,700 \\ -\ 3,500 \\ \hline 3,200 \text{ (wool)} \end{array}$$

$$\begin{array}{r} 11,650 \\ 6,700 \\ +\ 3,200 \\ \hline 21,550 \end{array}$$

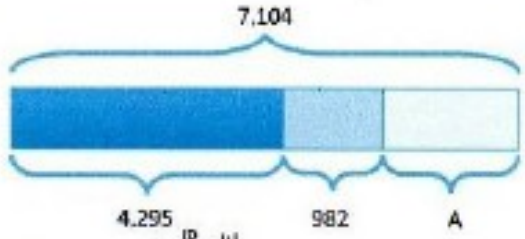
21,550 m of fabric was used.

Lesson 19

Objective: Create and solve multi-step word problems from given tape diagrams and equations.

Directions: Using the diagrams below, create your own word problem and solve for the missing variable.

1.



There were 7,104 people who attended a football game. 4,295 were men, 982 were children, and the rest were women. How many women attended the football game?

4,295 + 982 = 5,277

7,104 − 5,277 = 1,827

A = 1,827

1,829 women attended the game.