## SKILLSTபTロR



## BASIC

MATHEMATICS
Classroom Guide

## TABLE aF CONTENTS

Getting Started ..... 1
Basic Skills Lessons ..... 2
Quizzes .....  2
Thinking Skills Lessons ..... 2
Tests ..... 3
Worksheets ..... 3
Basic Skills Lesson Summaries ..... 5
Number Concepts ..... 7
Computation .....  8
Word Problems ..... 10
Measurement and Geometry ..... 12
Thinking Skills Lesson Summaries ..... 13
About Thinking Skills. ..... 13
Lesson Content ..... 13
Lesson Summaries ..... 14
Thinking Skills Worksheets ..... 17
Assignment Sheet ..... 25

## GETTING STARTED

This product is a comprehensive resource for diagnosing and remediating students' basic Basic Mathematics skills.

The SkillsTutor management system (OTS) provides several important features:

- Tests students' skills, providing both pretests and posttests to make initial assessments and gauge student progress
- Makes assignments, based on students' pretest results
- Monitors student scores and completion of activities
- Produces reports for individual students
- Provides online documentation

This guide outlines the content and activities of Basic Mathematics. Information on the management system (OTS) is provided under separate cover in the SkillsTutor User's Guide.

## BASIC SKILLS LESSロNS

Each lesson begins with one or more screens that review a concept. Lessons continue with a number of multiple-choice questions to reinforce the student's understanding of the topic, as illustrated below.

These instructions will help the student take full advantage of the features of SkillsTutor lessons:

- Use the mouse to answer questions: click on the correct answer.
- Click Hint for help in answering a question.
- If a question is missed, the student will be told why the answer is wrong. The student should read the response carefully, and try again. The student cannot move to the next question until the current question is answered correctly, so reading and answering carefully will save time.
- The student may review the instructional material at any time during the lesson by clicking Review. After going through the review screens, the student returns to the question that was being answered before the review. The student may return to the question before completing the review by clicking Resume.
- There may be times when the student needs to exit the program before completing an activity. To end an activity, close the activity window.
- When the student finishes answering all of the questions in an activity, a score is displayed. The score, expressed as a percent, is the number of questions answered correctly out of all the questions attempted.


## QuIzzes

Quizzes operate similarly to lessons. However, quizzes have no introductory instructional material, and they do not require you to answer each question correctly before moving to the next question. Detailed feedback is provided for all questions.

## THINKING SKILLS LESSロNS

Each Thinking Skills lesson begins with a scenario or story that presents a problem to solve. This is the theme that is carried through the entire lesson, and the problem is solved as the lesson progresses.

The opening scenario or story is followed by a discussion of the thinking skill needed to solve the problem. Step-by-step instructions and examples for using the thinking skill are provided on screen.

The problem is solved through a series of questions which require the student to use the steps
involved in the thinking skill. Some of the questions have only one right answer. Other questions have more than one correct answer.

For a question of this type, read carefully and select as many of the answers as seem appropriate. To select an answer, click the box next to it to place an $\mathbf{X}$ in the box. If a box is marked by mistake, click again to remove the $\mathbf{X}$. Click the Hint button for help in answering a question. Click the Check button to see feedback for answers.

At the conclusion of the lesson, a summary screen highlights the thinking skill that was used and the problem that was solved in the lesson. Then the score for the lesson is presented. The score is based on points accumulated, rather than the number of questions answered.

## Tests

SkillsTutor offers content-area pretests and posttests modeled on standardized tests. Pretests and posttests have no introductory instructional material. Like the questions for quizzes, the test questions are presented in multiple-choice format to give students practice in answering standardized-test questions. After each test, students have the opportunity to review the questions they missed. Feedback is provided for each missed question.

## Warksheets

SkillsTutor contains reproducible worksheets for each Thinking Skills lesson. The worksheets may be used to extend the computer activity or as a homework assignment. They are provided in this documentation and may be printed from the online version of the documentation, or photocopied from the printed version.
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## BASIC SKILLS <br> LESSロN SUMMARIES

Basic Mathematics contains 74 lessons, 9 quizzes, and 8 tests in a hierarchical arrangement designed to continually reinforce the concepts presented. On the following pages, there is a description and example for each basic skills lesson. The lessons are arranged in the following content areas:

- Number Concepts
- Computation
- Word Problems
- Measurement and Geometry
$363$

| $\begin{gathered} \text { Lesson } \\ \text { \# } \end{gathered}$ | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| Basic Mathematics: Number Concepts |  |  |  |
| 1 | Place Values of Digits | Students learn about the place values of digits in relation to place value charts for (a) numbers one and greater, and (b) numbers less than one. | In 23.5, the values of the digits are $2 \times 10=20,3 \times 1=3$, and $5 \times 0.1=0.5$. |
| 2 | Expanded Notation | Students learn to write numbers in expanded notation. Forms of expanded notation include place value, powers of ten, and word names. | $\begin{aligned} & 145=100+40+5 \\ & =(1 \times 100)+(4 \times 10)+(5 \times 1) \\ & =\left(1 \times 10^{2}\right)+\left(4 \times 10^{1}\right)+\left(5 \times 10^{0}\right) \\ & =1 \text { hundred }+4 \text { tens }+5 \text { ones } \\ & =\text { one hundred forty-five } \end{aligned}$ |
| 3 | Number Lines | Students learn to read and use number lines. Number lines are included for whole numbers, fractional values, and integers. Number lines are also used to show the operations of addition and subtraction. | A point is shown on a number line. What is the number for point P ? |
| 4 | Rounding | Students learn that they can reduce the complexity of numbers by rounding them, rounding down if the next digit to the right is less than 5 , and rounding up if the next digit to the right is 5 or more. | Round 627 to the nearest hundred. |
| 5 | Estimating | Students estimate answers to addition, subtraction, multiplication, and division problems by rounding. | Estimate the product of $53 \times 287$ by rounding the factors. |
| 6 | Multiples and Factors | Students learn to identify multiples and factors of given numbers and also how to find all the factors of a given number. | Find all the factors of 9. |
| 7 | Even, Odd, and Prime Numbers | Students learn to identify even, odd, and prime numbers. | Which of these is prime? [9, 19, 39, 99] |
| 8 | Prime Factorization | Students learn that all composite numbers can be written as the product of prime factors. | $\begin{aligned} 300 & =10 \times 30 \\ & =2 \times 5 \times 5 \times 6 \\ & =2 \times 5 \times 5 \times 2 \times 3 \\ 300 & =2 \times 2 \times 3 \times 5 \times 5 \end{aligned}$ |
| 9 | The Greatest Common Factor | Students find the greatest common factor (GCF) of two and three numbers. | The factors of 8 are $1,2,4,8$. <br> The factors of 12 are 1, 2, 3, 4, 6, 12 . <br> The largest factor that appears in both lists is 4 . <br> Therefore, 4 is the GCF of 8 and 12 . |
| 10 | Least Common Multiple and Denominator | Students find the least common multiple (LCM) and least common denominator (LCD) of two and three numbers. | Multiples of 3 are 3, 6, 9, 12, ... <br> Multiples of 2 are 2, 4, 6, $8, \ldots$ <br> The smallest multiple that appears in both lists is 6 . <br> Therefore, 6 is the LCM of 2 and 3 . |


| Lesson \# | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| 11 | Simplifying Fractions | Students simplify both proper and improper fractions. They learn to identify two fractions as equivalent if they have the same value in simplest form. | To simplify $\frac{3}{12}$, divide both the numerator and the denominator by 3 . $\frac{3}{12} \div \frac{3}{3}=\frac{1}{4}$ <br> $\frac{1}{4}$ is the simplest form of $\frac{3}{12}$. $\frac{1}{4}$ and $\frac{3}{12}$ are equivalent fractions. |
| 12 | Equations and Inequalities | Students learn about number sentences as equations and inequalities. They review the symbols for equality and inequality: $=,<,>, \leq$, $\geq$, and $\neq$. | What symbol belongs in the box? $8-3 \square 7-4$ |
| 13 | Finding the Missing Operations | Students find the missing sign of operation to make a number sentence true. | What symbol belongs in the box? $2+3 \square 1=4$ |
| 14 | Finding the Missing Numbers in Equations | Students find the missing number in a simple equation. The equations are basic number facts or other easily recognizable combinations. | What number belongs in the box? $7-\square=4$ |
| 15 | Finding the Missing Numbers in Inequalities | Students review the symbols for inequality: $=$, $<,>, \leq, \geq$, and $\neq$. They find the missing number in a simple inequality. | What number belongs in the box? $4+\square<6$ |
| 16 | Missing Numbers in Related Number Sentences | Students learn about inverse operations and related number sentences. | The number sentence $4 \times 2=8$ can be written as $8 \div 2=4$, and as $8 \div 4=2$. |
| 17 | The Commutative Property | Students learn that changing the order of the addends in addition, or the factors in multiplication, does not change the result. | What number belongs in the box? $14+\square=37+14$ |
| 18 | The Associative Property | Students learn that regrouping the addends in addition, or the factors in multiplication, does not change the result. | What number belongs in the box? $(2 \times 3) \times 5=\square \times(3 \times 5)$ |
| 19 | The Distributive Property | Students learn that the product of a number and a sum can be written as the sum of two products. | What number belongs in the box? $3 \times(14+17)=(3 \times 14)+(3 \times \square)$ |
| 20 | Identity Elements and Inverses | Students learn about the additive identity element (0), the multiplicative identity element (1), the additive inverse (opposite), the multiplicative inverse (reciprocal), and the zero property in multiplication. | What number belongs in the box? $3 \times \square=1$ |

## Basic Mathematics: Computation

| 1 | Addition of Whole Numbers | Students learn the terms "addend" and "sum." <br> They see addition in both vertical and horizontal <br> form and learn to align addends by place value <br> before adding. | Find the sum: <br> $25+64+7=-$ |
| :---: | :--- | :--- | :--- |


| Lesson \# | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| 2 | Subtraction of Whole Numbers | Students learn that subtraction is the opposite of addition. They see subtraction in both vertical and horizontal form and learn to align numbers by place value before subtracting. | Find the difference: $57-29=$ |
| 3 | Multiplication of Whole Numbers | Students learn the terms "factor" and "product." They multiply by one-digit and two-digit multipliers. | Find the product: $12 \times 43=$ |
| 4 | Division of Whole Numbers | Students learn the terms divisor, dividend, and quotient. They divide by one-digit and two-digit divisors. Some quotients include a remainder. | Find the quotient: $156 \div 12=$ |
| 5 | Addition of Decimals | Students learn that adding decimals is similar to adding whole numbers. They see addition in both vertical and horizontal form and learn to align addends by place value before adding. | Find the sum: $7.146+0.32+4=$ |
| 6 | Subtraction of Decimals | Students learn that subtracting decimals is very similar to subtracting whole numbers. They see subtraction in both vertical and horizontal form and learn to align numbers by place value before subtracting. | Find the difference: $82.1-5.07=$ |
| 7 | Multiplication of Decimals | Students apply what they have learned about multiplying whole numbers to multiplying decimals. They learn that the number of decimal places in the product must be the same as the total number of decimal places in the factors. | Find the product: $1.22 \times 0.03=$ $\qquad$ |
| 8 | Division of Decimals | Students apply what they have learned about dividing whole numbers to dividing decimals. They divide by both whole number and decimal divisors. If the divisor is a decimal, they create an equivalent problem with a whole number divisor. | Find the quotient: $50.6 \div 0.11=$ $\qquad$ |
| 9 | Addition of Like Fractions | Students learn the terms "numerator" and "denominator," and the meaning of like fractions. They learn to add like fractions by adding their numerators, and to simplify the sum if possible. | Find the sum: $\frac{3}{7}+\frac{1}{7}=$ |
| 10 | Addition of Unlike Fractions | Students learn the meaning of "unlike fractions" and how to rewrite the fractions with a common denominator. | Find the sum: $\frac{1}{3}+\frac{1}{4}=$ $\qquad$ |
| 11 | Addition of Mixed Numerals | Students learn the meaning of "mixed numerals." They learn to add the fractions first, then the whole numbers, and to simplify the sum if possible. | Find the sum: $4 \frac{5}{8}+2 \frac{1}{4}=$ |
| 12 | Subtraction of Like Fractions | Students learn to subtract like fractions by subtracting their numerators. They learn to simplify the difference if possible. | Find the difference: $\frac{3}{5}-\frac{2}{5}=$ |
| 13 | Subtraction of Unlike Fractions | Students learn to rewrite fractions with a common denominator and then subtract. | Find the difference: $\frac{5}{8}-\frac{1}{4}=$ |


| Lesson \# | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| 14 | Subtraction of Mixed Numerals | Students learn to rewrite fractions with a common denominator, rename the top number if necessary, and then subtract and simplify. | Find the difference: $3 \frac{1}{2}-2 \frac{2}{3}=$ |
| 15 | Multiplication of Fractions | Students learn to multiply the numerators and multiply the denominators. They are encouraged to find common factors before multiplying. | Find the product: $\frac{2}{3} \times \frac{3}{5}=$ |
| 16 | Multiplication of Mixed Numerals | Students learn to change mixed numerals to improper fractions and then multiply the resulting fractions. They are encouraged to find common factors before multiplying. | Find the product: $1 \frac{3}{8} \times 1 \frac{1}{3}=$ $\qquad$ |
| 17 | Division of Fractions | Students learn to use the reciprocal of the divisor and multiply. They are encouraged to find common factors before multiplying. | Find the quotient: $\frac{1}{5} \div \frac{4}{5}=$ |
| 18 | Division of Mixed Numerals | Students learn to change mixed numerals to improper fractions and then multiply by the reciprocal of the divisor. They are encouraged to find common factors before multiplying. | Find the quotient: $1 \frac{1}{3} \div 4=$ |
| 19 | Introduction to Ratio and Percent | Students learn the terms and ways of expressing ratios and percents. | The ratio 50 to $100=\frac{50}{100}=50 \%$ |
| 20 | Interchanging Fractions and Decimals | Students learn to write fractions and mixed numerals in their decimal form by dividing the numerator of the fraction by the denominator. | $3 \frac{2}{5}=3+(2.0 \div 5)=3+0.4=3.4$ |
| 21 | Interchanging Percents and Decimals | Students learn to write a percent in its decimal form by dividing the percent by $100 \%$. They learn that this does not change the value of the number since dividing by $100 \%$ is the same as dividing by 1 . | $240 \%=240 \% \div 100 \%=2.4$ |
| 22 | Interchanging <br> Fractions and Percents | Students learn to change fractions to percents by multiplying by $100 \%$. They learn to change percents to fractions by dividing by $100 \%$. | $\begin{aligned} & \frac{1}{5}=\frac{1}{5} \times 100 \%=20 \% \\ & 35 \%=35 \% \div 100 \%=\frac{35}{100}=\frac{7}{20} \end{aligned}$ |
| 23 | Finding the Percent of a Number | Students learn to find the percent of a number by changing the percent to a decimal and multiplying. | Find $20 \%$ of 12. $0.20 \times 12=2.4$ |

## Basic Mathematics: Word Problems

| 1 | One-Step Addition Problems | Students learn a five-step procedure for solving <br> word problems. They solve word problems <br> involving addition of whole numbers, some of <br> which have extraneous information. | Bob and John are each 8 years old. Susan <br> is 9 years old. What is the sum of the ages <br> of Bob and John? |
| :---: | :--- | :--- | :--- |
| 2 | One-Step Subtraction Problems | Students reinforce the five-step procedure <br> learned in the previous lesson. They solve word <br> problems involving subtraction of whole num- <br> bers, some of which have extraneous informa- <br> tion. | Last fall, Sandy found 82 shrubs and 16 <br> trees in the park. If a winter freeze killed 20 <br> shrubs, how many shrubs were left in the <br> spring? |


| $\begin{gathered} \text { Lesson } \\ \text { \# } \end{gathered}$ | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| 3 | One-Step Multiplication Problems | Students reinforce the five-step procedure learned in the previous lessons. They solve word problems involving multiplication of whole numbers, some of which have extraneous information. | Derek and Terry each worked 5 days. Terry earned $\$ 8.00$ per day, and Derek earned $\$ 8.50$ per day. How much did Terry earn in 5 days? |
| 4 | One-Step Division Problems | Students reinforce the five-step procedure learned in the previous lessons. They solve word problems involving division of whole numbers, some of which have extraneous information. | Tori has 72 insects to put in a scrapbook. How many pages of the scrapbook will she need if each page holds 6 insects? |
| 5 | Two-Step Problems for Addition and Subtraction | Students reinforce the five-step procedure learned in the previous lessons. They solve word problems involving both addition and subtraction of whole numbers. | Neil had 10 baseball cards. He gave 4 away and got 8 more. How many did he have then? |
| 6 | Two-Step Problems Using Multiplication | Students reinforce the five-step procedure learned in the previous lessons. They solve word problems involving multiplication, along with addition or subtraction of whole numbers. | Matt had 4 boxes with 10 tennis balls in each box. He found 2 more tennis balls on the floor. How many did he have in all? |
| 7 | Two-Step Problems Using Division | Students reinforce the five-step procedure learned in the previous lessons. They solve word problems involving division, along with addition or subtraction of whole numbers. | A hotel manager bought 79 new chairs, but 4 of them were broken. If the manager divided the remaining chairs evenly among 5 rooms, how many chairs would be in each room? |
| 8 | Needed Operations | Students identify the operation needed to solve a word problem. | Wesley had 4 basketballs and 3 soccer balls. How can you find the total number of balls? |
| 9 | Needed Information | Students identify information that is missing from word problems. | Eric is 3 years older than his sister Jane. What more do you need to know to find Eric's age? |
| 10 | Word Problems About Money | Students solve word problems involving money. There is special emphasis on the use of cents and dollars combined. | Kim bought 8 cookies at $15 \phi$ each, and 2 hot dogs at $\$ 1$ each. How much did she spend? |
| 11 | Menus and Price Lists | Students solve everyday problems that require interpreting the information on menus and price lists. | (A menu shows the prices of main courses and side dishes.) Based on the menu, how much will a hot dog and fries cost at lunchtime? |
| 12 | Averages | Students solve word problems that require the calculation of an average. | The ages of three children are 6, 2, and 4 years old. What is their average age? |
| 13 | Decimals and Fractions | Students solve word problems that require computation with fractions and decimals. | Channing has 15 pieces of candy. She gave her sister one-third of the pieces. How many pieces of candy did Channing give to her sister? |
| 14 | Standard Units of Measure | Students solve word problems that require computation with measurements. There is special emphasis on problems that require conversion between units. | Zach is 6 feet 2 inches tall. His sister is 5 feet 4 inches tall. How much taller is Zach than his sister? |


| $\begin{gathered} \text { Lesson } \\ \text { \# } \end{gathered}$ | Lesson Title | Lesson Description | Example |
| :---: | :---: | :---: | :---: |
| Basic Mathematics: Measurement and Geometry |  |  |  |
| 1 | Reading a Ruler | Students read rulers marked in inches and centimeters. They identify the location of points marked on a ruler and determine the length of line segments shown above a ruler. | (Diagram of a ruler is shown with a line segment from 1 cm to 4.5 cm .) How long is the line segment above this ruler? |
| 2 | Appropriate Units of Measure | Students use pictorial memory aids to help them develop a basic concept of the size of common English and metric units of length, weight, and capacity. | What is a reasonable height for a bookshelf? ( $6 \mathrm{ft} ., 6 \mathrm{mi} ., 6 \mathrm{~cm}, 6 \mathrm{in}$.) |
| 3 | Time and the Calendar | Students solve problems relating to time, including elapsed time, and the calendar. | If April 4 is a Tuesday, what day of the week is April 25? |
| 4 | Temperature | Students read thermometers marked in Celsius and Fahrenheit. Some of the thermometers show marks in one-degree units. Others show marks at intervals greater than or less than $1^{\circ}$. | (A thermometer is shown with a bar indicating the temperature.) What temperature is this thermometer showing? |
| 5 | Money | Students solve problems relating to money and the value of coins. | What coins total 45 ? <br> 1 quarter +2 dimes $=\$ 0.45$ or $45 \phi$ |
| 6 | Roman Numerals | Students learn the values of the Roman numeral symbols. They also learn to convert between Arabic and Roman numerals. | What is the standard numeral for CCCXLII? |
| 7 | Fractional Part of a Set | Students learn the terms "numerator" and "denominator." They represent the shaded or indicated parts of a figure as a simple fraction, decimal, or percent. | (Diagram of a region divided into 12 sections with 8 of the sections shaded.) What fraction of the blocks are shaded? |
| 8 | Terms in Geometry | Students learn the definitions of geometric terms such as point, line, line segment, ray, angle, plane, parallel lines, intersecting lines, polygon, triangle, quadriateral, pentagon, and hexagon. | (Diagram of a polygon with 5 sides.) Which term best describes this figure? |
| 9 | Plane and Solid Figures | Students learn about plane and solid figures and the principle figures within each of these two classifications. | (Diagram of a parallelogram) <br> Which term best describes this figure? |
| 10 | Perimeter of a Polygon | Students learn to calculate the perimeter of a polygon by adding the lengths of all the sides. | What is the perimeter of a rectangle that is 13 cm wide and 40 cm long? |
| 11 | Area and Volume | Students learn that area is the number of square units that fit inside a plane figure, and volume is the number of cubic units that fit inside a solid figure. They find the area of rectangles and squares and the volume of rectangular prisms. | What is the area of a rectangle that is 9 inches long and 2 inches wide? |

## THINKING SKILLS LESSロN SUMMARIES

## Abati Thinking Skills

To complement the efforts of teachers and programs focused on incorporating thinking skills (or skills labeled as "higher order thinking," "critical thinking," "creative thinking," "reasoning," or "problem-solving"), Basic Mathematics includes thinking skills lessons as an integral part of its instruction. Each Thinking Skills lesson provides students with direct instruction in a specific thinking skill. Several different thinking skills are addressed and are repeated across different content areas. The lessons instruct students in a step-by-step thinking process they can use each time they are faced with a problem that requires them to use that thinking skill. We have chosen to group the Basic Mathematics thinking skills in two broad categories:

## 1. Extending Knowledge

Comparison
Classification

## 2. Drawing Conclusions <br> Induction <br> Error Analysis <br> Problem Solving <br> Decision Making

## LESSON CINTENT

Each lesson begins by placing one of the thinking skills in the context of a problem or scenario that ties the lesson together. After instruction in the thinking skill, students answer questions related to the opening scenario that combine the targeted thinking skill as well as basic skills learned in previous lessons. By the end of each lesson, students have practiced basic skills content and a thinking skill while solving a "real life" problem.

As you introduce your students to these lessons, you might find it helpful to point out the following features:

1. After the title screen, a problem or scenario is presented. This is the theme of the entire lesson and is solved as the lesson progresses.
2. The opening problem is followed by direct instruction in a specific thinking skill. A step-bystep process is presented to help students focus on the thinking skill that will be used to respond to the opening problem. If students wish to reread any part of the scenario or steps, they can return to these screens from any of the questions by selecting Review.
3. A set of questions walks the students through the steps of the thinking process introduced in the instruction. Through this sequence of questions, students apply their basic skills knowledge to solve the opening problem. Unlike the rest of the SkillsTutor lessons, many of the questions in these lessons have more than one correct response to a multiple-choice question. Students should read carefully and mark as many of the boxes as seem appropriate to answer each question.
4. At the conclusion of the questions, a summary screen highlights again the thinking skill that was used and the problem that was solved in the lesson. Students then see their score for the lesson, based on points accumulated rather than just the number of questions answered. This scoring procedure tallies a point for each correct response given to a single question.

## LESSON SUMMARIES

On the following pages you will find a lesson summary and strategy or example for each of the Basic Mathematics Thinking Skills lessons. For teachers who want to focus on a particular thinking skill with one or more students, this chart makes it easy to locate related lessons. Group discussion is always encouraged as a means of improving metacognition, or getting students to think about their thinking processes.

You will find a reproducible worksheet for each Thinking Skills lesson. The worksheet may be used by students at the completion of the computer lesson or as a homework assignment. Each worksheet concludes with a "Write Idea" which is a suggested writing activity that should help students think through the process learned in the lesson and apply it to a new situation. Answer keys are not provided for the worksheets since many of the activities are open-ended and do not lend themselves to single "correct" answers. Encourage students to verbalize the thinking processes they use on these worksheet questions. You might also have students discuss their worksheet answers in small groups and correct each other's papers.

| Topic | Lesson Title | Lesson Summary | Example/Strategy |
| :---: | :---: | :---: | :---: |
| Comparison | Students determine similarities and differences among items. |  |  |
| Proportion \& Percent | Movie House Management | Students compare costs and profit for operating a movie theater with varying ticket prices and crowd sizes. | Students create a table to organize the information and compare the profits. |
| Classification | Students determine the attributes of items and then group them into categories according to these attributes. |  |  |
| Number Concepts | A Trip to Numberland | Students take an imaginary trip to Numberland where they look for common features in groups of numbers and determine appropriate rules for membership in various groups. | Students use Venn diagrams to group and classify numbers. |
| Prediction | Students determine patterns in known information and apply those patterns to predict what might happen in a new situation. |  |  |
| Introduction to Algebra | Number Sequence Puzzles | Students help Max the Magician analyze the patterns in number sequences to predict missing information. | Students make general statements to describe patterns they observe in number sequences. $\left[-15^{\circ} \mathrm{C},-11^{\circ} \mathrm{C},-7^{\circ} \mathrm{C},-3^{\circ} \mathrm{C},+1^{\circ} \mathrm{C}\right]$ |
| Problem Solving | Students identify a goal and limiting conditions. Then they identify and evaluate possible solutions to the problem. |  |  |
| Computation | Planning a Pizza Party | Students modify a pizza recipe from 8 servings to 12 servings, identifying revised amounts and deciding whether or not they need to buy more ingredients. | Students construct a table to organize the recipe ingredients and calculate the amounts needed for the revised recipe. |
| Measurement and Geometry | Designing a <br> Playground | Students compare the areas of various designs for a playground to find one that gives the largest area and meets the playground specifications. | Students construct a table to organize and calculate information about the perimeters and areas of various squares and rectangles. |
| Decision Making | Students identify the choices related to an unresolved issue. They evaluate their choices and reach an appropriate decision. |  |  |
| Computation | A Job at the Ballpark | Students compare the total earnings generated by a fixed weekly salary, an hourly wage plus overtime, and a straight $5 \%$ commission in order to decide which method of payment will provide the most income. | Students use decimal and percent computation skills to decide which of three payment methods generate the most income. |

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## Date:

Number Concepts: Thinking Skills Lesson 1
Student Activity

## Classification: A Trip to Numberland

STEPS: 1. Identify the items you want to classify.
2. Look for common features and group items that are alike.
3. State the rule that determines membership in the group.
4. Place items in the group. If necessary, repeat steps 2 and 3 to form new groups until all items are classified.

## Here is the problem that appeared in the lesson:

Your job in Numberland was to put numbers together that belong to the same family. This lesson taught you how to use classification skills to organize each number family.

Directions: If you were in another region of Numberland, you might see these numbers gathered together. Look for common features among the numbers. Decide on rules for classification. Then pick the numbers that belong together, according to your rules. Draw Venn Fences to show your classification.

| $\frac{1}{4}$ |  | $50 \%$ |
| :---: | :---: | :---: |
|  |  |  |
|  | 0.25 | $\frac{1}{2}$ |
| $\frac{1}{3}$ | $\frac{3}{12}$ |  |
|  |  | $25 \%$ |

Write Idea: Libraries often use numbers to classify books. Imagine that you have a job at the library. Part of your job is to return books to the shelves. How would you use your classification skills to help you do this? Write two paragraphs.

## Date:

## Number Concepts: Thinking Skills Lesson 2

Student Activity

## Induction: A Treasure Hunt

STEPS: 1. Examine the available information.
2. Look for patterns in the information you examined.
3. Make a general statement or conclusion that explains patterns you observed.
4. Make more observations to see if your conclusion holds up.

In this lesson, you used induction to apply number properties to clues. The clues helped you unlock hidden treasures.

Directions: Use your inductive thinking skills to solve this number puzzle.

1. Examine the first few equations.
2. Find a pattern to the equations.
3. Find the missing numbers.
4. Use the pattern to show at least four more equations at the end of the series.
5. Do you think the pattern you observe will be repeated indefinitely?
6. Create a general statement that describes the pattern in these statements.

$$
\begin{array}{ll}
1 & =1 \times 1 \\
1+3 & =2 \times 2 \\
1+3+5 & =3 \times 3 \\
1+3+5+7 & =\square \times \square \\
1+3+5+7+\square & =\square \times \square
\end{array}
$$

Write Idea: You just used induction to apply number properties to clues. Mathematicians use induction to discover mathematical properties. Choose one of the properties that you just leaned about: commutative, associative, distributive, or inverse operations. Think about the steps of induction. Write a paragraph about how a mathematician might have used induction to discover that property.

## Computation: Thinking Skills Lesson 1

Student Activity

## Comparison: Renting a Car

STEPS: 1. Identify the items you will compare.
2. List features of the items you are comparing.
3. Decide how the items are similar or different for each feature.
4. Summarize what you have learned. State your decision about the items compared.

## Here is the problem that appeared in the lesson:

You need to rent cars for two trips. In order to get the best rates, you compare the rates from Agency A with those from Agency B. To make your comparison, you look at each agency's mileage charges, plus its daily rental fee.
Directions: Add Agency C to your comparison. Complete the Agency C column in the table below using the following information:

Agency C offers a daily rate of $\$ 19.95$ and charges $\$ 0.15$ a mile for every mile above 100. (If you drive 100 miles or fewer there is no mileage charge.)

Trip 1: You will be driving a total of 450 miles and will need a car for three days.
Trip 2: You need a car for a one-day meeting in a town just 24 miles away.

| Features | Agency A | Agency B | Agency C |
| :---: | :---: | :---: | :---: |
| Daily rental fee | $\$ 16.95$ | $\$ 27.95$ |  |
| Fee per mile | $\$ 0.17$ | $\$ 0.00$ |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Among the three agencies, which should you now use for each of your two trips? Provide statements to support your decisions.

Write Idea: You probably have been in situations where you had to make a choice between two or more things. Maybe you had to choose which class to take or which jacket to buy. Think of a situation where you have to make a choice between two or more things. Build a table to compare their features. Then state your decision about them.

## Date:

## Computation: Thinking Skills Lesson 2

Student Activity

# Problem Solving: Planning a Pizza Party 

STEPS: 1. Identify your goal.
2. Identify limiting conditions.
3. Identify ways to meet the limiting conditions.
4. Identify and try possible solutions.
5. Evaluate your possible solutions.

## Here is the problem that appeared in the lesson:

You've decided to have a party. Eleven people will be coming, so you look through the cookbook for a recipe. The recipe you find is for two large pizzas that serve eight people. In order to serve twelve people, you need three pizzas. In the lesson, you revised the quantities in the recipe so that you could serve pizza to twelve people.

Directions: In addition to pizza, you have decided to make a cake for dessert. The recipe is for 10 servings. Use the following chart to modify the recipe and identify what you need to buy at the store. Remember that you want to serve 12 people.

| Ingredients | Original <br> Recipe | Revised <br> Amount | Have in <br> Kitchen | Need <br> to Buy |
| :--- | :--- | :--- | :--- | :--- |
| flour | $3 \frac{1}{2}$ cups |  | 3 cups |  |
| baking powder | 1 tablespoon |  | none |  |
| eggs | 4 medium |  | 6 medium |  |
| milk | $\frac{3}{4}$ cup |  | 1 cup |  |
| chocolate | 3 squares |  | 2 squares |  |
| sugar | $\frac{1}{2}$ cup |  | $\frac{1}{3}$ stick |  |
| butter | $\frac{1}{4}$ stick |  |  |  |

Write Idea: Think of a project you've been wanting to start. It could be painting a room, building a shelf, or working on a science experiment. What limiting conditions does your project have? Write three possible solutions. Explain the steps you would use to solve the problem.

# Decision Making: A Job at the Ballpark 

STEPS: 1. Identify the decision to be made.
2. Identify the choices available to you.
3. Identify the important information that you must consider when making your decision.
4. Determine the outcome of each choice.
5. Evaluate your choices and summarize what you have learned. Then, make your decision.

## Here is the problem that appeared in the lesson:

You have an important decision to make. You have been offered a job selling hot dogs at Hank's Hot Franks at the ballpark next summer. Hank will let you decide how you would like to be paid: a fixed weekly salary, an hourly wage, or a straight $5 \%$ commission.

This summer, Hank had three employees. Each decided on a different method of pay. Here's how each was paid:

- Kirby decided to be paid a fixed weekly salary of $\$ 50$ for 12 weeks.
- Lena decided to be paid an hourly wage of $\$ 5.50$, for 108 regular hours, plus $1 \frac{1}{2}$ times her hourly wage for overtime of 11 hours.
- Joel decided to be paid $5 \%$ commission on each hot dog he sold. His sales totaled \$17,100.

You know that your goal is to make the most money possible. Now you must decide how you want Hank to pay you next summer so you can meet your goal.

Directions: Use the additional information about another employee to re-evaluate your decision:

## Additional Information

Marcus, another one of Hank's employees, chose to be paid a base salary of $\$ 35.00$ per week plus $2 \%$ commission. Marcus had hot dog sales of $\$ 16,300$ during the 12 -week summer season that he worked.

What do you need to know to find Marcus's total earnings? Do the calculations.

Who earned the most money: Kirby, Lena, Joel, or Marcus?

Now that you have another choice, do you want to change your decision about how you want to be paid next summer? Why or why not?

Write Idea: You have $\$ 500$ and want to open a checking account. There are two kinds of accounts to choose from: $2 \%$ interest and no per check charge, or $4 \%$ interest plus a $50 \propto$ per check charge. You usually write 15 checks per month. Using the decision-making process you have just learned, which type of account will you open?

## Name:

## Date:

## Word Problems: Thinking Skills Lesson 2

Student Activity

## Comparison: Pondering Puddings

STEPS: 1. Identify the items you are comparing.
2. List the features of the items you are comparing.
3. See how the items are similar or different for each feature.
4. Summarize what you have learned.

## Here is the problem that appeared in the lesson:

Wanda and Noah Moore are two senior citizens you are helping. They are planning a special meal to celebrate their 49th wedding anniversary. Both of them enjoy chocolate pudding very much. Noah is limited to 150 calories and 85 mg (milligrams) of sodium in his pudding. Wanda can have 175 calories. In the lesson, you compared two puddings and picked the one that came closest to meeting the needs of both Wanda and Noah. Wanda and Noah now want to consider two other puddings. The new puddings are the following:

Grandma's Creamy Pudding. When milk is added to the mix, the pudding has 1120 calories and 650 mg of sodium. One package makes eight servings.
Kiwi Chocolate Pudding. When milk is added to the mix, the pudding has 840 calories and 630 mg of sodium. One package makes six servings.

Directions: Create a table to compare the two new puddings. Which one would be best for BOTH Wanda and Noah?

| Features |  |  |
| :---: | :--- | :--- |
|  |  |  |
|  |  |  |
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Write Idea: Describe a situation where you must choose between two or more similar items (e.g., telephones, cars, bicycles, CD players, classes to take, movies to see, job possibilities). List the features that are most important to you. Complete a table of the items to be compared and their important features. Then select the one that is best for you. In a paragraph, explain the reasons for your decision.

Measurement and Geometry: Thinking Skills Lesson 2

Student Activity

## Problem Solving: Designing a Playground

STEPS: 1. Identify your goal.
2. Identify limiting conditions.
3. Identify ways to meet the limiting conditions.
4. Identify and try possible solutions.
5. Evaluate your possible solutions.

## Here is the problem that appeared in the lesson:

Your neighbors have asked you to design a fenced-in playground for the kids in your community. A local hardware company has donated 424 feet of fencing for the playground. You must come up with a design that has 4 sides, 4 right angles, uses all the fencing, and provides the largest possible area for the playground.

Directions: If you had been able to use any shape, you might have chosen an L-shaped design with 6 sides. So, based on what you learned in the lesson, evaluate the two designs below. (Your goal is to find the shape with the largest area.) You have only two limitations. You must use all 424 feet of fencing and have a shape with all right angles. Is either of these shapes a better solution than the one you found in the lesson (a square)? Why? Or why not?

Hint: Divide the shapes into rectangles. Then compute the areas.


Write Idea: Choose a problem you have or one that involves everyone. You might consider air pollution, nuclear waste disposal, or world hunger. Use the problem-solving steps. Identify the goal, the limitations, and possible solutions for the problem you selected. Which is the best solution? Why?
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## ASSIGNMENT SHEET

This appendix contains an assignment sheet for all the activities in Basic Mathematics. The assignment sheet lists the available lessons and tests. The SkillsTutor management system will track the lessons and tests your students complete. However, it may be helpful to photocopy an assignment sheet to help you plan lesson assignments or to help your students keep track of the lessons and tests they complete.

## Assignment Sheets: Basic Mathematics Series

| Number Concepts |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | $\bullet$ | Pretest on Number Concepts |  |  |
|  | 1 | Place Values of Digits |  |  |
|  | 2 | Expanded Notation |  |  |
|  | 3 | Number Lines |  |  |
|  | 4 | Rounding |  |  |
|  | 5 | Estimating |  |  |
|  | 6 | Multiples and Factors |  |  |
|  | 7 | Even, Odd, and Prime Numbers |  |  |
|  | 8 | Prime Factorization |  |  |
|  | 9 | The Greatest Common Factor |  |  |
|  | 10 | Least Common Multiple and Denominator |  |  |
|  | 11 | Simplifying Fractions |  |  |
|  | Q1 | Quiz on Lessons 1 through 11 |  |  |
|  | IS | Classification: A Trip to Numberland |  |  |
|  | 12 | Equations and Inequalities |  |  |
|  | 13 | Finding the Missing Operations |  |  |
|  | 14 | Finding the Missing Numbers in Equations |  |  |
|  | 15 | Finding the Missing Numbers in Inequalities |  |  |
|  | 16 | Missing Numbers in Related Number Sentences |  |  |
|  | 17 | The Commutative Property |  |  |
|  | 18 | The Associative Property |  |  |
|  | 19 | The Distributive Property |  |  |
|  | 20 | Identity Elements and Inverses |  |  |
|  | Q2 | Quiz on Lessons 12 through 20 |  |  |
|  | TS | Induction: A Treasure Hunt |  |  |
|  | $\bullet$ | Posttest on Number Concepts |  |  |

## Assignment Sheets: Basic Mathematics Series

## Computation



## Assignment Sheets: Basic Mathematics Series

| Word Problems |  |  |  |
| :---: | :---: | :---: | :---: |
| $\bullet$ | Pretest on Word Problems |  |  |
| 1 | One-Step Addition Problems |  |  |
| 2 | One-Step Subtraction Problems |  |  |
| 3 | One-Step Multiplication Problems |  |  |
| 4 | One-Step Division Problems |  |  |
| 5 | Two-Step Problems for Addition and Subtraction |  |  |
| 6 | Two-Step Problems Using Multiplication |  |  |
| 7 | Two-Step Problems Using Division |  |  |
| 8 | Needed Operations |  |  |
| 9 | Needed Information |  |  |
| Q1 | Quiz on Lessons 1 through 9 |  |  |
| 10 | Word Problems About Money |  |  |
| 11 | Menus und Price Lists |  |  |
| 12 | Averages |  |  |
| 13 | Decimals and Fractions |  |  |
| 14 | Standard Units of Measurement |  |  |
| Q2 | Quiz on Lessons 10 through 14 |  |  |
| TS | Comparison: Pondering Puddings |  |  |
| - | Posttest on Word Problems |  |  |

## Assignment Sheets: Basic Mathematics Series

Activity $\quad$ Date Assigned $\quad$ Date Completed Score/Progress

| Measurement and Geometry |  |  |  |  |  |
| :---: | :---: | :--- | :--- | :--- | :--- |
|  | $\bullet$ | Pretest on Measurement and Geometry |  |  |  |
|  | 1 | Reading a Ruler |  |  |  |
|  | 2 | Appropriate Units of Measure |  |  |  |
|  | 3 | Time and the Calendar |  |  |  |
|  | 4 | Temperature |  |  |  |
|  | 5 | Money |  |  |  |
|  | 6 | Roman Numerals |  |  |  |
|  | 7 | Fractional Part of a Set |  |  |  |
|  | Q1 | Quiz on Lessons 1 through 7 |  |  |  |
|  | 9 | Terms in Geometry | Plane and Solid Figures |  |  |
|  | 10 | Perimeter of a Polygon |  |  |  |
|  | 11 | Area and Volume |  |  |  |
|  | Q2 | Quiz on Lessons 8 through 11 |  |  |  |
|  | TS | Problem Solving: Designing a Playground |  |  |  |
|  | $\bullet$ | Postest on Measurement and Geomerry |  |  |  |

