Alignment
of

Project Learning Tree Environmental Education

Pre K-8 Activity Guide

to

California Mathematics Content Standards

Introduction

The purpose of this document is to provide California educators who use Project Learning Tree materials with an easy reference guide as to how align PLT's activities to the California Mathematics Content Standards for grades K through 8. As part of the national movement to reform education, the California State Board of Education has adopted criteria to measure the knowledge and skills that all students should be able to master within mathematics.

Project Learning Tree is an interdisciplinary environmental education program. PLT activities supplement curriculum and can be used to organize instructional units in a variety of subjects. As this alignment demonstrates, educators can use PLT activities to teach mathematical concepts and skills as well as for assessing student's understanding of these. It is the goal of this document to help teachers cover the required mathematical standards while providing students with lessons that enable them to practice skills, solve problems, apply math to the real world, and develop thinking skills on how and when to apply mathematically skills.

The research and development for this document were prepared by Stefanie Brummel and Dr. Darleen Stoner, California State University, San Bernardino. The project was coordinated by the California Department of Forestry and Fire Protection.

For more information about Project Learning Tree in California, contact Kay Antunez, PLT Coordinator, California Department of Forestry and Fire Protection, P. O. Box 944246, Sacramento, California 94244-2460, or call (916) 653-7958.

A copy of the Mathematics Content Standards for Grades K-12 can be obtained at: http://www.cde.ca.gov/be/st/ss/mthmain.asp

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KINDERGARTEN

NUMBER SENSE

1.0 Students understand the relationship between numbers and quantities (i.e., that a set of objects has the same number of objects in different situations regardless of its position or arrangement):

1.1 Compare two or more sets of objects (up to ten objects in each group) and identify which set is equal to, more than, or less than the other.

Project Learning Tree Activity Guide
Birds and Worms (25)
Every Tree for Itself (27)

1.2 Count, recognize, represent, name, and order a number of objects (up to 30).

Project Learning Tree Activity Guide
Birds and Worms (25)
Every Tree for Itself (27)

ALGEBRA AND FUNCTIONS

1.0 Students sort and classify objects:

1.1 Identify, sort, and classify objects by attribute and identify objects that do not belong to a particular group (e.g., all these balls are green, those are red).

Project Learning Tree Activity Guide
The Shape of Things (1)
Picture This! (6)
Birds and Worms (25)
Pollution Search (36)
On the Move (53)
Soil Stories (70)

MEASUREMENT AND GEOMETRY

1.0 Students understand the concept of time and units to measure it; they understand that objects have properties, such as length, weight, and capacity, and that comparisons may be made by referring to those properties:

1.1 Compare the length, weight, and capacity of objects by making direct comparisons with reference objects (e.g., note which object is shorter, longer, taller, lighter, heavier, or holds more).

Project Learning Tree Activity Guide
How Plants Grow (41)

How Big Is Your Tree? (67)
Soil Stories (70)

2.0 Students identify common objects in their environment and describe the geometric features:

2.1 Identify and describe common geometric objects (e.g., circle, triangle, square, rectangle, cube, sphere, cone).

Project Learning Tree Activity Guide
The Shape of Things (1)

2.2 Compare familiar plane and solid objects by common attributes (e.g., position, shape, size, roundness, number of corners).

Project Learning Tree Activity Guide
The Shape of Things (1)

STATISTICS, DATA ANALYSIS AND PROBABILITY

1.0 Students collect information about objects and events in their environment:

1.1 Pose information questions; collect data; and record the results using objects, pictures, and picture graphs.

Project Learning Tree Activity Guide
The Shape of Things (1)
Sounds Around (4)
Birds and Worms (25)
How Plants Grow (41)
Bursting Buds (65)
How Big Is Your Tree? (67)
Soil Stories (70)

MATHEMATICAL REASONING

2.0 Students solve problems in reasonable ways and justify their reasoning:

2.1 Explain the reasoning used with concrete objects and/ or pictorial representations.

Project Learning Tree Activity Guide
Picture This! (6)
Soil Stories (70)

GRADE ONE

NUMBER SENSE

1.0 Students understand and use numbers up to 100:

1.1 Count, read, and write whole numbers to 100.

Project Learning Tree Activity Guide
Soil Stories (70)

3.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, and hundreds places:

3.1 Make reasonable estimates when comparing larger or smaller numbers.

Project Learning Tree Activity Guide
Sounds Around (4)
How Big Is Your Tree? (67)

MEASUREMENT AND GEOMETRY

1.0 Students use direct comparison and nonstandard units to describe the measurements of objects:

1.1 Compare the length, weight, and volume of two or more objects by using direct comparison or a nonstandard unit.

Project Learning Tree Activity Guide
How Plants Grow (41)
Bursting Buds (65)
How Big Is Your Tree? (67)
Soil Stories (70)

2.0 Students identify common geometric figures, classify them by common attributes, and describe their relative position or their location in space:

2.1 Identify, describe, and compare triangles, rectangles, squares, and circles, including the faces of three-dimensional objects.

Project Learning Tree Activity Guide
The Shape of Things (1)

2.2 Classify familiar plane and solid objects by common attributes, such as color, position, shape, size, roundness, or number of corners, and explain which attributes are being used for classification.

Project Learning Tree Activity Guide
The Shape of Things (1)

2.3 Give and follow directions about location.

Project Learning Tree Activity Guide
Sounds Around (4)

2.4 Arrange and describe objects in space by proximity, position, and direction (e.g., near, far, below, above, up, down, behind, in front of, next to, left or right of).

Project Learning Tree Activity Guide
Sounds Around (4)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students organize, represent, and compare data by category on simple graphs and charts:

1.1 Sort objects and data by common attributes and describe the categories.

Project Learning Tree Activity Guide
The Shape of Things (1)
Picture This! (6)
Birds and Worms (25)
Every Tree for Itself (27)
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1.2 Represent and compare data (e.g., largest, smallest, most often, least often) by using pictures, bar graphs, tally charts, and picture graphs.

Project Learning Tree Activity Guide
The Shape of Things (1)
Birds and Worms (25)
Every Tree for Itself (27)
How Plants Grow (41)
Field, Forest, and Stream (48)
How Big Is Your Tree? (67)

MATHEMATICAL REASONING

2.0 Students solve problems and justify their reasoning:

2.1 Explain the reasoning used and justify the procedures selected.

Project Learning Tree Activity Guide
Picture This! (6)
Field, Forest, and Stream (48)

GRADE TWO

NUMBER SENSE

6.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, hundreds, and thousands places:

6.1 Recognize when an estimate is reasonable in measurements (e.g., closest inch).

Project Learning Tree Activity Guide
Sounds Around (4)
Adopt a Tree (21)
How Big Is Your Tree? (67)

MEASUREMENT AND GEOMETRY

1.0 Students understand that measurement is accomplished by identifying a unit of measure, iterating (repeating) that unit, and comparing it to the item to be measured:

1.1 Measure the length of objects by iterating (repeating) a nonstandard or standard unit.

Project Learning Tree Activity Guide
Adopt a Tree (21)
Every Tree for Itself (27)
How Plants Grow (41)
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How Big Is Your Tree? (67)
Soil Stories (70)

1.3 Measure the length of an object to the nearest inch and/ or centimeter.

Project Learning Tree Activity Guide
Adopt a Tree (21)
Every Tree for Itself (27)
How Plants Grow (41)
Bursting Buds (65)
How Big Is Your Tree? (67)
Soil Stories (70)

2.0 Students identify and describe the attributes of common figures in the plane and of common objects in space:

2.1 Describe and classify plane and solid geometric shapes (e.g., circle, triangle, square, rectangle, sphere, pyramid, cube, rectangular prism) according to the number and shape of faces, edges, and vertices.

Project Learning Tree Activity Guide
The Shape of Things (1)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations:

1.1 Record numerical data in systematic ways, keeping track of what has been counted.

Project Learning Tree Activity Guide
The Shape of Things (1)
Sounds Around (4)
Birds and Worms (25)
Every Tree for Itself (27)
Pollution Search (36)

1.2 Represent the same data set in more than one way (e.g., bar graphs and charts with tallies).

Project Learning Tree Activity Guide
Birds and Worms (25)
Every Tree for Itself (27)
Pollution Search (36)

1.4 Ask and answer simple questions related to data representations.

Project Learning Tree Activity Guide
Birds and Worms (25)
Every Tree for Itself (27)
Field, Forest, and Stream (48)
How Big Is Your Tree? (67)

MATHEMATICAL REASONING

2.0 Students solve problems and justify their reasoning:

2.1 Defend the reasoning used and justify the procedures selected.

Project Learning Tree Activity Guide
Picture This! (6)
Field, Forest, and Stream (48)

GRADE THREE

MEASUREMENT AND GEOMETRY

1.0 Students choose and use appropriate units and measurement tools to quantify the properties of objects:

1.1 Choose the appropriate tools and units (metric and U.S.) and estimate and measure the length, liquid volume, and weight/mass of given objects.

Project Learning Tree Activity Guide
Sounds Around (4)
Adopt a Tree (21)
Every Tree for Itself (27)
Bursting Buds (65)
How Big Is Your Tree? (67)
Soil Stories (70)

2.0 Students describe and compare the attributes of plane and solid geometric figures and use their understanding to show relationships and solve problems:

2.1 Identify, describe, and classify polygons (including pentagons, hexagons, and octagons).

Project Learning Tree Activity Guide
The Shape of Things (1)

MATHEMATICAL REASONING

2.0 Students use strategies, skills, and concepts in finding solutions:

2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

GRADE FOUR

NUMBER SENSE

1.0 Students understand the place value of whole numbers and decimals to two decimal places and how whole numbers and decimals relate to simple fractions. Students use the concepts of negative numbers:

1.1 Read and write whole numbers in the millions.

Project Learning Tree Activity Guide
Picture This! (6)

1.2 Order and compare whole numbers and decimals to two decimal places.

Project Learning Tree Activity Guide
Picture This! (6)
Air Plants (28)
On the Move (53)

1.5 Explain different interpretations of fractions, for example, parts of a whole, parts of a set, and division of whole numbers by whole numbers; explain equivalents of fractions (see Standard 4.0).

Project Learning Tree Activity Guide
Trees in Trouble (77)

1.6 Write tenths and hundredths in decimal and fraction notations and know the fraction and decimal equivalents for halves and fourths (e.g., 1/2 = 0.5 or .50; 7/4 = 1 3/4 = 1.75).

Project Learning Tree Activity Guide
Air Plants (28)
Every Drop Counts (38)
On the Move (53)

1.9 Identify on a number line the relative position of positive fractions, positive mixed numbers, and positive decimals to two decimal places.

Project Learning Tree Activity Guide
Trees in Trouble (77)

2.0 Students extend their use and understanding of whole numbers to the addition and subtraction of simple decimals:

2.1 Estimate and compute the sum or difference of whole numbers and positive decimals to two places.

Project Learning Tree Activity Guide
Air Plants (28)
Every Drop Counts (38)
On the Move (53)

3.0 Students solve problems involving addition, subtraction, multiplication, and division of whole numbers and understand the relationships among the operations:

3.1 Demonstrate an understanding of, and the ability to use, standard algorithms for the addition and subtraction of multidigit numbers.

Project Learning Tree Activity Guide
Waste Watchers (73)

3.2 Demonstrate an understanding of, and the ability to use, standard algorithms for multiplying a multidigit number by a two-digit number and for dividing a multidigit number by a one-digit number; use relationships between them to simplify computations and to check results.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

3.3 Solve problems involving multiplication of multidigit numbers by two-digit numbers.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

ALGEBRA AND FUNCTIONS

1.0 Students use and interpret variables, mathematical symbols, and properties to write and simplify expressions and sentences:

1.2 Interpret and evaluate mathematical expressions that now use parentheses.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

1.3 Use parentheses to indicate which operation to perform first when writing expressions containing more than two terms and different operations.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

1.4 Use and interpret formulas (e.g., area = length x width or $A = lw$) to answer questions about quantities and their relationships.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

MEASUREMENT AND GEOMETRY

1.0 Students understand perimeter and area:

1.1 Measure the area of rectangular shapes by using appropriate units, such as square centimeter (cm^2), square meter (m^2), square kilometer (km^2), square inch (in^2), square yard (yd^2), or square mile (mi^2).

Project Learning Tree Activity Guide
Are Vacant Lots Vacant (47)
Nothing Succeeds Like Succession (80)

3.0 Students demonstrate an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems:

3.2 Identify the radius and diameter of a circle.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)
Trees in Trouble (77)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings:

1.1 Formulate survey questions; systematically collect and represent data on a number line; and coordinate graphs, tables, and charts.

Project Learning Tree Activity Guide
Pass the Plants, Please (16)
Trees as Habitats (22)
Birds and Worms (25)
Every Tree for Itself (27)

Pollution Search (36)
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Nothing Succeeds Like Succession (80)

1.3 Interpret one-and two-variable data graphs to answer questions about a situation.

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Trees as Habitats (22)
Birds and Worms (25)
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How Plants Grow (41)
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Waste Watchers (73)
Trees in Trouble (77)
Nothing Succeeds Like Succession (80)

MATHEMATICAL REASONING

1.0 Students make decisions about how to approach problems:

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.

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Air Plants (28)
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How Plants Grow (41)
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Nothing Succeeds Like Succession (80)

2.0 Students use strategies, skills, and concepts in finding solutions:

2.1 Use estimation to verify the reasonableness of calculated results.

Project Learning Tree Activity Guide

How Big Is Your Tree? (67)

2.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

Project Learning Tree Activity Guide
Air Plants (28)
Every Drop Counts (38)
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2.4 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

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Air Plants (28)
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2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.6 Make precise calculations and check the validity of the results from the context of the problem.

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Air Plants (28)
Every Drop Counts (38)
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Germinating Giants (66)
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3.0 Students move beyond a particular problem by generalizing to other situations:

3.1 Evaluate the reasonableness of the solution in the context of the original situation.

Project Learning Tree Activity Guide
Air Plants (28)
Every Drop Counts (38)

GRADE FIVE

NUMBER SENSE

1.0 Students compute with very large and very small numbers, positive integers, decimals, and fractions and understand the relationship between decimals, fractions, and percents. They understand the relative magnitudes of numbers:

1.2 Interpret percents as a part of a hundred; find decimal and percent equivalents for common fractions and explain why they represent the same value; compute a given percent of a whole number.

Project Learning Tree Activity Guide
Picture This! (6)
Reduce, Reuse, Recycle (37)
Every Drop Counts (38)

1.5 Identify and represent on a number line decimals, fractions, mixed numbers, and positive and negative integers.

Project Learning Tree Activity Guide
Trees in Trouble (77)

2.0 Students perform calculations and solve problems involving addition, subtraction, and simple multiplication and division of fractions and decimals:

2.1 Add, subtract, multiply, and divide with decimals; add with negative integers; subtract positive integers from negative integers; and verify the reasonableness of the results.

Project Learning Tree Activity Guide
Air Plants (28)
Every Drop Counts (38)
On the Move (53)

2.2 Demonstrate proficiency with division, including division with positive decimals and long division with multidigit divisors.

Project Learning Tree Activity Guide
Air Plants (28)

2.3 Solve simple problems, including ones arising in concrete situations, involving the addition and subtraction of fractions and mixed numbers (like and unlike denominators of 20 or less), and express answers in the simplest form.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.4 Understand the concept of multiplication and division of fractions.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.5 Compute and perform simple multiplication and division of fractions and apply these procedures to solving problems.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

MEASUREMENT AND GEOMETRY

1.0 Students understand and compute the volumes and areas of simple objects:

1.4 Differentiate between, and use appropriate units of measures for, two-and three-dimensional objects (i.e., find the perimeter, area, volume).

Project Learning Tree Activity Guide
Nothing Succeeds Like Succession (80)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students display, analyze, compare, and interpret different data sets, including data sets of different sizes:

1.1 Know the concepts of mean, median, and mode; compute and compare simple examples to show that they may differ.

Project Learning Tree Activity Guide
Reduce, Reuse, Recycle (37)
In the Driver's Seat (85)

1.2 Organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.

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Nothing Succeeds Like Succession (80)

MATHEMATICAL REASONING

1.0 Students make decisions about how to approach problems:

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.

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In the Driver's Seat (85)

1.2 Determine when and how to break a problem into simpler parts.

Project Learning Tree Activity Guide
Invasive Species (12)

2.0 Students use strategies, skills, and concepts in finding solutions:

2.1 Use estimation to verify the reasonableness of calculated results.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.2 Apply strategies and results from simpler problems to more complex problems.

Project Learning Tree Activity Guide
Invasive Species (12)

2.3 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

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Air Plants (28)
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2.4 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

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2.5 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.6 Make precise calculations and check the validity of the results from the context of the problem.

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3.0 Students move beyond a particular problem by generalizing to other situations:

3.1 Evaluate the reasonableness of the solution in the context of the original situation.

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In the Driver's Seat (85)

3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.

Project Learning Tree Activity Guide
Invasive Species (12)

GRADE SIX

NUMBER SENSE

1.0 Students compare and order positive and negative fractions, decimals, and mixed numbers. Students solve problems involving fractions, ratios, proportions, and percentages:

1.1 Compare and order positive and negative fractions, decimals, and mixed numbers and place them on a number line.

Project Learning Tree Activity Guide
Trees in Trouble (77)

1.2 Interpret and use ratios in different contexts (e.g., batting averages, miles per hour) to show the relative sizes of two quantities, using appropriate notations (*a/b, a* to *b, a:b*).

Project Learning Tree Activity Guide
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On the Move (53)
Germinating Giants (66)
How Big Is Your Tree? (67)
The Global Climate (84)
In the Driver's Seat (85)

1.3 Use proportions to solve problems (e.g., determine the value of *N* if 4/7 = *N*/ 21, find the length of a side of a polygon similar to a known polygon). Use cross-multiplication as a method for solving such problems, understanding it as the multiplication of both sides of an equation by a multiplicative inverse.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

1.4 Calculate given percentages of quantities and solve problems involving discounts at sales, interest earned, and tips.

Project Learning Tree Activity Guide
Reduce, Reuse, Recycle (37)
Every Drop Counts (38)

2.0 Students calculate and solve problems involving addition, subtraction, multiplication, and division:

2.2 Explain the meaning of multiplication and division of positive fractions and perform the calculations (e.g., 5/8 ÷ 15/16 = 5/8 x 16/15 = 2/3).

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.3 Solve addition, subtraction, multiplication, and division problems, including those arising in concrete situations, that use positive and negative integers and combinations of these operations.

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ALGEBRA AND FUNCTIONS

1.0 Students write verbal expressions and sentences as algebraic expressions and equations; they evaluate algebraic expressions, solve simple linear equations, and graph and interpret their results:

1.2 Write and evaluate an algebraic expression for a given situation, using up to three variables.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

1.3 Apply algebraic order of operations and the commutative, associative, and distributive properties to evaluate expressions; and justify each step in the process.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

1.4 Solve problems manually by using the correct order of operations or by using a scientific calculator.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.0 Students analyze and use tables, graphs, and rules to solve problems involving rates and proportions:

2.2 Demonstrate an understanding that *rate* is a measure of one quantity per unit value of another quantity.

Project Learning Tree Activity Guide
Every Drop Counts (38)
On the Move (53)
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In the Driver's Seat (85)

2.3 Solve problems involving rates, average speed, distance, and time.

Project Learning Tree Activity Guide
Every Drop Counts (38)
On the Move (53)
In the Driver's Seat (85)

3.0 Students investigate geometric patterns and describe them algebraically:

3.1 Use variables in expressions describing geometric quantities (e.g., $P = 2w + 2l$, $A = 1/2bh$, $C = \pi d$ - the formulas for the perimeter of a rectangle, the area of a triangle, and the circumference of a circle, respectively).

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

MEASUREMENT AND GEOMETRY

1.0 Students deepen their understanding of the measurement of plane and solid shapes and use this understanding to solve problems:

1.1 Understand the concept of a constant such as π; know the formulas for the circumference and area of a circle.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

1.2 Know common estimates of π (3.14; 22/7) and use these values to estimate and calculate the circumference and the area of circles; compare with actual measurements.

Project Learning Tree Activity Guide
Germinating Giants (66)
How Big Is Your Tree? (67)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students compute and analyze statistical measurements for data sets:

1.1 Compute the range, mean, median, and mode of data sets.

Project Learning Tree Activity Guide
Reduce, Reuse, Recycle (37)
In the Driver's Seat (85)

2.0 Students use data samples of a population and describe the characteristics and limitations of the samples:

2.2 Identify different ways of selecting a sample (e.g., convenience sampling, responses to a survey, random sampling) and which method makes a sample more representative for a population.

Project Learning Tree Activity Guide
In the Driver's Seat (85)

2.3 Analyze data displays and explain why the way in which the question was asked might have influenced the results obtained and why the way in which the results were displayed might have influenced the conclusions reached.

Project Learning Tree Activity Guide
Rain Reasons (29)

MATHEMATICAL REASONING

1.0 Students make decisions about how to approach problems:

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

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1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.

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1.3 Determine when and how to break a problem into simpler parts.

Project Learning Tree Activity Guide
Invasive Species (12)

2.0 Students use strategies, skills, and concepts in finding solutions:

2.1 Use estimation to verify the reasonableness of calculated results.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

2.2 Apply strategies and results from simpler problems to more complex problems.

Project Learning Tree Activity Guide
Invasive Species (12)

2.4 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

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2.5 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

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How Big Is Your Tree? (67)
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2.6 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

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2.7 Make precise calculations and check the validity of the results from the context of the problem.

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3.0 Students move beyond a particular problem by generalizing to other situations:

3.1 Evaluate the reasonableness of the solution in the context of the original situation.

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3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.

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Invasive Species (12)

GRADE SEVEN

NUMBER SENSE

1.0 Students know the properties of, and compute with, rational numbers expressed in a variety of forms:

1.2 Add, subtract, multiply, and divide rational numbers (integers, fractions, and terminating decimals) and take positive rational numbers to whole-number powers.

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1.7 Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.

Project Learning Tree Activity Guide
400-Acre Wood (50)

ALGEBRA AND FUNCTIONS

1.0 Students express quantitative relationships by using algebraic terminology, expressions, equations, inequalities, and graphs:

1.2 Use the correct order of operations to evaluate algebraic expressions such as $3(2x + 5)^2$.

Project Learning Tree Activity Guide
How Big Is Your Tree? (67)

4.0 Students solve simple linear equations and inequalities over the rational numbers:

4.2 Solve multistep problems involving rate, average speed, distance, and time or a direct variation.

Project Learning Tree Activity Guide
The Global Climate (84)

MEASUREMENT AND GEOMETRY

1.0 Students choose appropriate units of measure and use ratios to convert within and between measurement systems to solve problems:

1.1 Compare weights, capacities, geometric measures, times, and temperatures within and between measurement systems (e.g., miles per hour and feet per second, cubic inches to cubic centimeters).

Project Learning Tree Activity Guide
400-Acre Wood (50)

1.2 Construct and read drawings and models made to scale.

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400-Acre Wood (50)
On the Move (53)

1.3 Use measures expressed as rates (e.g., speed, density) and measures expressed as products (e.g., person-days) to solve problems; check the units of the solutions; and use dimensional analysis to check the reasonableness of the answer.

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2.0 Students compute the perimeter, area, and volume of common geometric objects and use the results to find measures of less common objects. They know how perimeter, area, and volume are affected by changes of scale:

2.1 Use formulas routinely for finding the perimeter and area of basic two-dimensional figures and the surface area and volume of basic three-dimensional figures, including rectangles, parallelograms, trapezoids, squares, triangles, circles, prisms, and cylinders.

Project Learning Tree Activity Guide
How Plants Grow (41)

STATISTICS, DATA ANALYSIS, AND PROBABILITY

1.0 Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set by hand and through the use of an electronic spreadsheet software program:

1.1 Know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.

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Trees as Habitats (22)
Every Tree for Itself (27)
Rain Reasons (29)
Loving It Too Much (35)
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1.2 Represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).

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1.3 Understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.

Project Learning Tree Activity Guide
In the Driver's Seat (85)

MATHEMATICAL REASONING

1.0 Students make decisions about how to approach problems:

1.1 Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

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1.2 Formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.

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1.3 Determine when and how to break a problem into simpler parts.

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2.0 Students use strategies, skills, and concepts in finding solutions:

2.1 Use estimation to verify the reasonableness of calculated results.

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2.2 Apply strategies and results from simpler problems to more complex problems.

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2.5 Use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.

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2.6 Express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

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2.7 Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

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2.8 Make precise calculations and check the validity of the results from the context of the problem.

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3.0 Students determine a solution is complete and move beyond a particular problem by generalizing to other situations:

3.1 Evaluate the reasonableness of the solution in the context of the original situation.

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3.2 Note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.

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GRADE EIGHT

ALGEBRA I

13.0 Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.

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GEOMETRY

8.0 Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.

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ALGEBRA II

22.0 Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.

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23.0 Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.

Project Learning Tree Activity Guide
Invasive Species (12)

PROBABILITY AND STATISTICS

6.0 Students know the definitions of the *mean, median,* and *mode* of a distribution of data and can compute each in particular situations.

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8.0 Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.

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ADVANCED PLACEMENT PROBABILITY AND STATISTICS

10.0 Students know the definitions of the *mean, median,* and *mode of distribution* of data and can compute each of them in particular situations.

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14.0 Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line graphs and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.

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