Vermont Comprehensive Assessment Program (VTCAP)

VERMONT AGENCY OF EDUCATION

Practice Test Alignment Document

Mathematics | Grade 5

Sequence Number	Standard	Learning Target
Session 1		
1	05.NF.01.02 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2*.	Solve a word problem involving subtraction of fractions with unlike denominators.
2	05.NBT.01.03.b Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	Compare two decimals to the thousandths place.
3	05.MD.01.01 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	Use conversions to solve a multi-step real world problem.
4	05.MD.03.05.b Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.	Find the volume of a right rectangular prism with whole number edge lengths.

Sequence Number	Standard	Learning Target
5	05.OA.02.03 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	Identify the relationship between corresponding terms in two numerical patterns.
6	05.G.02.03 Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*	Evaluate a claim about the shared attributes of shapes within categories and subcategories.
7	05.NF.02.03 Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*	Solve a word problem involving division of whole numbers leading to an answer in the form of a mixed number.
8	05.NBT.02.06 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Illustrate the relationship between multiplication and division using equations.

Sequence Number	Standard	Learning Target
9*	05.OA.01.02 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	Write expressions that record calculations with numbers and explain their equivalence.
10	05.NF.02.07 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.	Determine expressions that can be used to solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.
11	05.MD.03.05.a Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.	Use the relationships of the edge lengths of a right rectangular prism to evaluate statements about volume.
12	05.NF.02.06 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	Write an equation involving multiplication of fractions that can be used to solve a real world problem.
13	05.G.01.01 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	Explain direction of travel along an axis as indicated by the first number in an ordered pair.

Sequence Number	Standard	Learning Target
14*	05.MD.03.05.c Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	Find volume of a figure composed of non-overlapping right rectangular prisms.
15	05.OA.01.02 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product*.	Choose the situation represented by a numerical expression.
16	05.NF.02.07.c Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*	Determine an expression involving division of a whole number by a unit fraction that can be used to solve a real world problem.
17	05.OA.02.03 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*	Form an ordered pair consisting of corresponding terms from two numerical patterns.
18	05.NBT.02.07 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	Evaluate claims about how to solve a problem using operations with decimals to the hundredths place.

Sequence Number	Standard	Learning Target
19	05.NF.02.04.b Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	Find the area of a rectangle with fractional side lengths.
Session 2		
1	05.NBT.02.07 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	Write an expression using decimals to the tenths based on a concrete model.
2	05.OA.01.01 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	Evaluate expressions with parentheses.
3	05.OA.01.01 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	Explain whether a given evaluation of an expression with parentheses is correct.
4	05.NBT.01.02 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Use whole-number exponents to denote powers of 10.
5	05.NF.01.01 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*	Add fractions with unlike denominators.

Sequence Number	Standard	Learning Target
6	05.G.02.03 Explain that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*	Compare the properties of shapes within categories and subcategories.
7	05.G.01.02 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	Graph a point representing a real world situation in the first quadrant of the coordinate plane.
8	05.NF.02.06 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	Solve a real world problem involving multiplication of fractions.
9*	05.NBT.01.03 Read, write, and compare decimals to thousandths.	Write and compare decimals to the thousandths.
10	05.MD.02.02 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	Use operations on fractions to solve problems involving information presented in line plots.
11	05.MD.03.05.b Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.	Find the volume of a right rectangular prism with whole number edge lengths.

Sequence Number	Standard	Learning Target
12	05.G.01.01 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	Locate a specific point in the first quadrant of the coordinate plane.
13	05.MD.02.02 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	Use operations on fractions to solve problems involving information presented in line plots.
14*	05.NF.01.02 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*	Solve word problems involving addition and subtraction of fractions with unlike denominators.
15	05.NBT.01.02 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Use whole-number exponents to denote powers of 10.

Sequence Number	Standard	Learning Target
16	05.NF.01.02 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*	Solve word problems involving subtraction of fractions with unlike denominators and represent the solution with a visual fraction model.
17	05.NBT.01.02 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.	Explain patterns in the placement of the decimal point when a number is multiplied by a power of 10.
18	05.MD.01.01 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.	Use conversions to solve a multi-step real world problem.

*This is a hand-scored question. The scoring rubric can be found at the end of this document for reference.

Scoring Rubrics

Session 1

Question 9

Concepts and Procedures Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

2 points for two correct expressions, (12 − 4) × 6 and 6 × (12 − 4), or equivalent

OR

1 point for one correct expression

Mathematical Practices Scoring Rubric

Score	Description
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Mathematical Practices Training Notes:

1 point for using mathematical properties of numbers, operations, and equality to explain and analyze mathematical problems (explains why both expressions represent the same calculation)

Exemplary Response:

(12 − 4) × 6 and 6 × (12 − 4)

These expressions both subtract 4 from 12 and then are multiplied by 6. Since order does not matter when you multiply, these expressions will give the same value.

Scoring Rubrics

Session 1

Question 14

Concepts and Procedures Scoring Rubric

Score	Description
4	The student earns 6 points.
3	The student earns 4 or 5 points.
2	The student earns 2 or 3 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

Part a

2 points for correct answer, **3,456 (cubic inches),** with sufficient work or explanation to indicate understanding of finding the volume of a solid figure

OR

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that shows understanding of finding the volume of a solid figure, with incorrect or no answer

Part b

2 points for correct answer, **6,480 (cubic inches),** with sufficient work or explanation to indicate understanding of finding the volume of a solid figure composed of non-overlapping right rectangular prisms

OR

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that shows understanding of finding the volume of a solid figure composed of non-overlapping right rectangular prisms, with incorrect or no answer

Part c

2 points for correct answer, **1,232 (cubic inches)**, with sufficient work or explanation to indicate understanding of finding the difference between the total volumes of two solid figures, each composed of non-overlapping right rectangular prisms

OR

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that shows understanding of finding the difference between the total volumes of two solid figures, each composed of non-overlapping right rectangular prisms, with incorrect or no answer

Scoring Rubrics

Mathematical Practices Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Mathematical Practices Training Notes:

1 point for abstracting a given situation (correctly determines the volume of the largest layer and the 3-layer cake)

1 point for using quantitative reasoning (correctly determines the difference between the total volumes of two 3-layer cakes)

Exemplary Response:

a. 3,456 (cubic inches); $24 \times 24 \times 6 = 3{,}456$

b. 6,480 (cubic inches); $24 \times 24 \times 6 = 3{,}456$; $20 \times 20 \times 5 = 2{,}000$; $16 \times 16 \times 4 = 1{,}024$

$3{,}456 + 2{,}000 + 1{,}024 = 6{,}480$

c. 1,232 (cubic inches); $24 \times 24 \times 5 = 2{,}880$; $20 \times 20 \times 4 = 1{,}600$; $16 \times 16 \times 3 = 768$

$2{,}880 + 1{,}600 + 768 = 5{,}248$

$6{,}480 - 5{,}248 = 1{,}232$

Scoring Rubrics

Session 2

Question 9

Concepts and Procedures Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

Part a

1 point for correct answer, **41.709**

Part b

1 point for correct answer, **41.709 > 41.097** (or equivalent); or for correct answer to part b based on an incorrect answer in part a

Mathematical Practices Scoring Rubric

Score	Description
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Mathematical Practices Training Notes:

1 point for making use of structure (explaining how place value can be used to compare two numbers)

Exemplary Response:

a. 41.709

b. 41.709 > 41.097 OR 41.097 < 41.709.

41.709 has a 7 in the tenths place and 41.097 has a 0 in the tenths place. Since they both have 41 in the whole number places, I compared 7 tenths to 0 tenths and know that 7 tenths is greater.

Scoring Rubrics

Session 2

Question 14

Concepts and Procedures Scoring Rubric

Score	Description
4	The student earns 4 points.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Concepts and Procedures Training Notes:

Part a

2 points for correct answer $1\frac{1}{8}$ (gallons), or equivalent, with sufficient work to show understanding of adding fractions with unlike denominators

OR

1 point for correct answer with insufficient or no work; or for appropriate strategy to show understanding of adding fractions with unlike denominators with incorrect or no answer

Part b

1 point for sufficient explanation to show understanding of adding and subtracting fractions with unlike denominators to support answer

Part c

1 point for sufficient explanation to show understanding of adding and subtracting fractions with unlike denominators to support answer

Mathematical Practices Scoring Rubric

Score	Description
2	The student earns 2 points.
1	The student earns 1 point.
0	The student earns 0 points.
Blank	No response.

Scoring Rubrics

Mathematical Practices Training Notes:

1 point for making a valid argument (sufficient explanation to show why Ken used more paint)

1 point for evaluating an argument (sufficient explanation to show why Maureen is incorrect)

Exemplary Response:

a. $1\frac{1}{8}$ (gallons), $\frac{3}{4}+\frac{3}{8}=\frac{6}{8}+\frac{3}{8}=\frac{9}{8}=1\frac{1}{8}$

b. Ken used more paint. Maureen used $\frac{15}{16}$ gallon of paint. $\frac{11}{16}+\frac{1}{4}=\frac{11}{16}+\frac{4}{16}=\frac{15}{16}$

$\frac{15}{16}$ is less than a gallon of paint.

Ken used more than a gallon so he used more.

c. Maureen is not correct. They used the same amount.

Ken used $1\frac{5}{16}$ (gallons), $1\frac{1}{8}+\frac{3}{16}=1\frac{2}{16}+\frac{3}{16}=1\frac{5}{16}$

Maureen used $1\frac{5}{16}$ (gallons), $\frac{15}{16}+\frac{3}{8}=\frac{15}{15}+\frac{6}{16}=\frac{21}{16}=1\frac{5}{16}$