Vermont Comprehensive Assessment Program (VTCAP)

VERMONT AGENCY OF EDUCATION

Practice Test Alignment Document

Mathematics | Grade 7

Sequence Number	Standard	Learning Target
Session 1		
1	07.G.02.04 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	Calculate the circumference to solve a real-world problem.
2	07.NS.01.02.b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.	Identify an expression that represents a real-world situation.
3	07.EE.02.04.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	Describe the method for checking a solution of a linear relationship within the context it describes.
4	07.RP.01.02.a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	Determine a proportional relationship from a given table.
5	07.SP.03.05 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	Identify the probability of an event within the context it describes.

Sequence Number	Standard	Learning Target
6	07.SP.03.08.a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.	Determine whether an expression represents a probability.
7	07.RP.01.01 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 ÷ 1/4 miles per hour, equivalently 2 miles per hour.*	Compare unit rates given a real-world situation.
8	07.EE.01.02 Demonstrate that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*	Identify an expression that represents a real-world situation.
9*	07.SP.03.07.a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*	Find the probability of an event using information displayed on a bar graph.
10	07.RP.01.01 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 ÷ 1/4 miles per hour, equivalently 2 miles per hour.*	Find the unit rate given a verbal description of a relationship.
11	07.NS.01.02.c Apply properties of operations as strategies to multiply and divide rational numbers.	Divide a negative fraction by a positive fraction.
12	07.G.02.05 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	Find the measurement of an angle from a diagram by using angle relationships.

Sequence Number	Standard	Learning Target
13	07.RP.01.02 Recognize and represent proportional relationships between quantities.	Identify a proportional relationship based on a verbal description.
14	07.NS.01.03 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	Solve a real-world problem involving fractions.
15*	07.EE.02.04.a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*	Create and solve an equation that represents the perimeter of a rectangle.
16	07.EE.01.02 Demonstrate that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."*	Identify equivalent expressions that represent a percent of decrease.
17	07.G.01.01 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	Determine the units needed to represent actual area based on a scale drawing.
18	07.G.02.06 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Analyze an expression to determine if it best represents the volume of a given situation.
19	07.EE.01.01 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	Simplify an expression to create an equivalent expression.

Sequence Number	Standard	Learning Target
20	07.RP.01.02.b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	Interpret the parameters of the graph of a linear relationship within the context it describes.
Session 2		
1	07.EE.02.04.b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	Identify an inequality based on a verbal description within the context it describes.
2	07.SP.02.04 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book*.	Compare the data of two box plots.
3	07.SP.03.08.c Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*	Identify an expression used to find the probability of a compound event.
4	07.NS.01.01.c Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	Identify an expression that finds the distance between two integers on a number line.

Sequence Number	Standard	Learning Target
5	07.EE.02.04.b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*	Identify the number line that represents an inequality within the context it describes.
6	07.SP.01.01 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.	Choose a survey that produces the most representative sample of data.
7	07.EE.02.03 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	Solve a problem involving decimals and percents within the context it describes.
8	07.G.01.02 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	Plot the location of two points on a coordinate grid based on descriptions of two right triangles.

Sequence Number	Standard	Learning Target
9*	07.G.02.04 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	Use the area of a circle to solve problems within the context it describes.
10	07.NS.01.03 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	Determine the information needed to solve a problem.
11	07.NS.01.03 Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	Determine if the solution to an equation is correct.
12	07.SP.01.02 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.	Use sample data represented by a table to find an expected outcome.
13	07.SP.03.08.b Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.	Find a probability of a situation given a tree diagram.
14	07.RP.01.02.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	Identify a point that represents the unit rate based on a graph of a real-world problem.

Sequence Number	Standard	Learning Target
15*	07.EE.02.03 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	Solve a multi-step problem involving fractions within the context it describes.
16	07.RP.01.03 Use proportional relationships to solve multistep ratio and percent problems. *Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.*	Calculate the unit rate given a verbal description of a real-world situation.
17	07.SP.02.04 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*	Compare the data of two box plots.

Sequence Number	Standard	Learning Target
18	07.EE.02.03 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	Solve a multi-step problem involving positive and negative rational numbers within a context.
19	07.RP.01.02.d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	Interpret the meaning of a point on the graph of a proportional relationship within the context it describes.
20	07.G.02.06 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	Calculate the surface area of a triangular prism.

*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 correct answer, $\frac{36}{120}$ or equivalent, with sufficient work or explanation to indicate understanding of developing a uniform probability model by assigning equal probability to all outcomes, and using the model to determine probabilities of events

OR

1 point for correct answer with insufficient work or explanation; or for sufficient work or explanation to indicate understanding of developing a uniform probability model by assigning equal probability to all outcomes, and using the model to determine probabilities of events with incorrect or no answer

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 interpreting and analyzing a model (demonstrates understanding and using information from the model)

Exemplary Response:

The seventh grade has 36 students and there are a total of 120 students at the school. Therefore, the probability that the student chosen is a seventh-grade student is $\frac{20+16}{20+24+20+16+24+16} = \frac{36}{120}$.

Scoring Rubrics

Session 1

Question 15

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

1 point for correct answer, **8*w* + 8**, or equivalent

Part b

2 points for correct answer, **88** (units), or equivalent with sufficient work or explanation that indicates an understanding of how to solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$

1 point for correct answer with insufficient or no work or explanation shown; or for appropriate strategy that indicates an understanding of how to solve word problems with incorrect or no answer

Part c

1 point for correct answer, **17** (units), or equivalent

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 abstracting a given situation and representing it symbolically (simplifying the equation to represent the perimeter of the rectangle in terms of its width in part [a])

1 point for knowing and flexibly using different properties of operations (showing correct work or explanation in part [c])

Exemplary Response:

a. $8w + 8$; The perimeter of any rectangle can be found using the equation $P = 2(l + W)$. Since the length of the rectangle is 4 more than 3 times its width, we can replace l with the expression $4 + 3w$, resulting in the equation $P = 2(4 + 3w + w)$. Simplifying this equation gives $P = 2(4 + 4w)$ or $P = 8 + 8w$.

b. 88 units; If the width of the rectangle is 10 units, then the perimeter can be found by solving the equation, $P = 8 + 8(10)$ and solving for P.

c. 17 units; I can use the equation $P = 2(l + w)$ and substitute 64 for P and 15 for l to get: $64 = 2(15 + w)$. Solving for w: $32 = 15 + w$, and $w = 17$.

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

See Mathematical Practices scoring rubric and training notes.

Part b

2 points for correct answer, **251.2 or 80π**, or equivalent with sufficient work or explanation to indicate understanding or knowing the formulas for the area and circumference of a circle

OR

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that indicates understanding or knowing the formulas for the area and circumference of a circle with incorrect or no answer

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 responding to the arguments of others (explaining the error that was made involves subtracting the radii of both circles and then squaring the result in part [a])

Exemplary Response:

a. Paul used the difference of the radii to find the area when he needed to find the area of each circle separately and then find the difference.

b. The correct answer is the difference of the areas of the circles. The greater area minus the lesser area will yield the area between the circles: $A=\pi(12)2-\pi(8)2=144\pi-64\pi=80\pi$ or 3.14(80) = 251.2 square centimeters.

Scoring Rubrics

Session 2

Question 15

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, $\frac{3}{30}$, or equivalent, with sufficient work or explanation to indicate understanding of solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically

OR

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that shows understanding of solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically with incorrect or no answer

Part b

2 points for correct answer, **$85,200**, or a correct answer based on an incorrect answer in part (a) with sufficient work or explanation that shows understanding of solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically

OR

1 point for correct answer or a correct answer based on an incorrect answer in part (a) with insufficient or no work or explanation; or for appropriate strategy that shows understanding of solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically with incorrect or no answer

Part c

2 points for correct answer, **$18,750**, with sufficient work or explanation that shows understanding solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically

OR

Scoring Rubrics

1 point for correct answer with insufficient or no work or explanation; or for appropriate strategy that shows understanding of solving multistep real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically with incorrect or no 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.

Mathematical Practices Training Notes:

1 point for making sense of quantities (demonstrating understanding of the relationship between the fractional budgeted amounts)

1 point for contextualizing (using the relationships between the fractional budgeted amounts, the total budget amount, and the individual budget amounts)

Exemplary Response:

a. $\frac{2}{5}+\frac{1}{3}+\frac{1}{6}=\frac{12+10+5}{30}=\frac{27}{30}=\frac{9}{10}$; $1-\frac{9}{10}=\frac{1}{10}$

b. \$85,200;

$\frac{1}{10}x = 8{,}520$

$\left(\frac{10}{1}\right)\frac{1}{10}x = 8{,}520$

$x = 85{,}200$

c. \$18,750;

$\frac{2}{5}y = 45{,}000$

$\left(\frac{5}{2}\right)\frac{2}{5}y = 45{,}000\left(\frac{5}{2}\right)$

$y = 112{,}500$

$112{,}500\cdot\frac{1}{6} = 18{,}750$