CAISL
Carlucci American International School of Lisbon

GRADE 7 MATH FRAMEWORK

Contents

EXPECTATIONS

MATH TOOLS

To support curriculum implementation, the Common Core recommends the use of certain math tools at each grade level. CAISL implements these recommendations, with the exception of a graphing calculator, which CAISL chooses to introduce in High School. See link below:
https://www.caislisbon.org/uploaded/Curriculum_links/Math/Manipulatives_6-8.pdf

MENTAL MATH

To reinforce computational fluency, students are expected to practice mental math calculations based
on grade level content on a weekly basis.

INFORMATION TECHNOLOGY EXPECTATIONS

Students will be expected to use a variety of digital tools according to grade level expectations stated in CAISL's Research and Information Technology Integration Scope and Sequence.
See link below:
https://www.caislisbon.org/uploaded/Curriculum_links/2019-2020/IT_Skills_Scope_and_Sequence_by_Grade.pdf

PERFORMANCE INDICATORS

MATH PRACTICES

Explanations of Math Practices: By the end of the year students will be expected to problem solve, reason mathematically, and communicate efficiently according to grade level expectations.
See link below:
https://www.caislisbon.org/uploaded/Curriculum_links/Math/Math_Practice_Progressions_5-12.pdf

PROBLEM SOLVING

Make sense of problems and persevere in solving them
Look for and make use of structure Deductive Reasoning
Look for and express regularity in repeated reasoning Inductive Reasoning

MATHEMATICAL REASONING, COMMUNICATION, AND MODELING

Reason abstractly and quantitatively
Construct viable arguments and critique the reasoning of others
Model with mathematics
Use appropriate tools strategically
Attend to precision

MATH CONCEPTS

RATIOS AND PROPORTIONAL RELATIONSHIPS

Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. DOK 1,2
Recognize and represent proportional relationships between quantities. DOK 1,2
Use proportional relationships to solve multistep ratio and percent problems. DOK 1,2 E

THE NUMBER SYSTEM

Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers, represent addition and subtraction on a horizontal or vertical number line diagram. DOK 1,2

Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. DOK 1,2
Solve real-world and mathematical problems involving the four operations with rational numbers. DOK 1,2 E

Understand informally that every number has a decimal expansion, the rational numbers are those with decimal expansions that terminate in 0s or eventually repeat. Know that other numbers are called irrational. DOK 1

Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. DOK 1,2

EXPRESSIONS AND EQUATIONS

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. DOK 1

Understand 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. DOK 1,2
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, coconvert between forms as appropriate, and assess the reasonableness of answers using mental computation and estimation strategies. DOK 1,2,3 E

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. DOK 1,2,3

GEOMETRY

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. DOK1,2

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. DOK1,2 E

Describe the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. DOK1,2

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. DOK1,2

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. DOK1,2
Solve real-world and mathematical problems involving area, volume and surface area of two three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. DOK1,2 E

Verify experimentally the properties of rotations, reflections, and translations. DOK 2

Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations, given two congruent figures, describe a sequence that exhibits the congruence between them. DOK1,2 E

Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. DOK1,2

Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations, given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. DOK1,2

Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. DOK1,2,3

Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. DOK1,2

STATISTICS AND PROBABILITY

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. DOK 2 E

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. DOK 2,3

Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. DOK 2,3

Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. DOK 2,3

Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. DOK 1

Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. DOK 2,3

Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies, if the agreement is not good, explain possible sources of the discrepancy. DOK 2,3 E

Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. DOK 1,2,3

Represent data with plots on the real number line dot plots, histograms, and box plots. DOK 1,2

Use statistics appropriate to the shape of the data distribution to compare center (median, mean and spread interquartile range, standard deviation) of two or more different data sets. DOK 1,2

Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). DOK 1,2

<u>FURTHER CURRICULAR EXPECTATIONS</u>

For the Performance Indicator (Rations and Proportional Relationships):

Recognize and represent proportional relationships between quantities.

- 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.
- Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn*.

- 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.

For the Performance Indicator (The Number System):
Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers, represent addition and subtraction on a horizontal or vertical number line diagram.

- Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged*.
- Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- 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.
- Apply properties of operations as strategies to add and subtract rational numbers.

Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

- Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- 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.
- Apply properties of operations as strategies to multiply and divide rational numbers.
- Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

For the Performance Indicator (Expressions and Equations):
Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

- 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?*
- 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*.

For the Performance Indicator (Geometry):
Verify experimentally the properties of rotations, reflections, and translations.

- Lines are taken to lines, and line segments to line segments of the same length.
- Angles are taken to angles of the same measure.
- Parallel lines are taken to parallel lines.

For the Performance Indicator (Statistics and Probability):
Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

- 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*.
- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*

Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

- 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.
- 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.
- 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?*