Mathematics Tasks | Grade 6

The tasks listed below support teaching and learning related to the learning outcomes from the 2022 Mathematics Curriculum for Grade 6. Multiple forms of representation (physical, visual, contextual, verbal, and symbolic) can be incorporated at any stage of the learning cycle to support students' conceptual understanding of mathematical concepts.

Many of these resources offer ideas for implementing the task, as well as suggestions for scaffolds and extensions. Some tasks are appropriate for multiple grades, especially with modifications. Therefore, teachers may wish to look at tasks in the grades above and below for more tasks.

<table>
<tr><th colspan="4">Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.</th></tr>
<tr><td colspan="4">Learning Outcome: Students investigate magnitude with positive and negative numbers.</td></tr>
<tr><td>Exploring positive & negative numbers</td><td>Swimming Pool
A task to introduce negative numbers.</td><td>Sea Level
A task to increase familiarity with negative numbers on a vertical number line.</td><td>Tug Harder!
This game reinforces negative numbers and their relationship to positive numbers on a horizontal number line.</td></tr>
<tr><td rowspan="3">Adding & subtracting integers</td><td colspan="3">The following Planning Guide was developed for the 2007 AB Mathematics Program of Studies (PoS). However, the planning process and many of the tasks and assessments still align with the 2022 AB Mathematics Curriculum. Please ensure that the Learning Outcome and Knowledge, Understanding, and Skills and Procedure statements are kept in mind as tasks are selected.
▪ Addition and Subtraction of Integers: This Planning Guide was developed for Grade 7 in the 2007 PoS. It contains information and sample activities to develop an understanding of adding and subtracting integers.</td></tr>
<tr><td colspan="2">Floats and Anchors
This Desmos activity examines the important relationship between magnitude and the distance from zero on the number line.</td><td>Pros and Cons
An activity that challenges students to consider how positive and negative integers interact to create sums or differences and the impact of different combinations have on the total.</td></tr>
<tr><td colspan="2">Negative Dice
This task allows students to explore the relationship between positive and negative integers exploring possible sums.</td><td>Adding Integers
In this activity, students practice adding positive and negative integers in the context of a card game. The goal of the game is to create two groups of cards, each with the same sum.</td></tr>
<tr><td>Adding & subtracting integers in context</td><td colspan="2">How Much did the Temp Drop?
This task examines the relationship between positive and negative integers within a temperature context.</td><td>Debt Recovery
This money-based task explores how debt can be used to explore how owing money can be combined with the concept going having less than zero.

Note | In this problem "p" is equivalent to cents. The value can be changed to dollars to help set the context for students.</td></tr>
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Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.		
Learning Outcome: Students investigate magnitude with positive and negative numbers.		
Adding & subtracting integers in context continued	Dealing In Horses This activity examines the concept of positive and negative integers as they relate to exchanging money for goods or services.	Highs and Lows An Nrich activity that explores the vertical nature of positive and negative integers and their relationship to changing temperatures.

Number Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing and operating.			
Learning Outcome: Students solve problems using standard algorithms for addition and subtraction.			
Addition and subtraction	Ch-ch-ch-change! (p.8) Students are challenged to use the least number of coins to determine a sum using Canadian and Australian currency. Note | A discussion opportunity: How can currency values influence familiarity with skip-counting or adding/subtracting different amounts?	Subtracting with Multi-Decimals Adding with Multi-Decimals These Open Middle tasks aim to explore students' ability to create sums and differences within a given set of parameters in order to satisfy the problem.	Get to Subtracting Zero This subtraction activity challenges students' ability to subtracting three-digit numbers from 999 in order to reach zero exactly. Note | This activity could be reversed to play to 999 from zero to attend to addition operation skills.

Number Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing and operating.			
Learning Outcome: Students analyze numbers using prime factorization and exponentiation.			
Prime factorization and exponentiation	The following Planning Guide was developed for the 2007 AB Mathematics Program of Studies (PoS). However, the planning process and many of the tasks and assessments still align with the 2022 AB Mathematics Curriculum. Please ensure that the Learning Outcome and Knowledge, Understanding, and Skills and Procedure statements are kept in mind as tasks are selected. ▪ Factors and Multiples: Step 3 includes sample activities to explore teaching prime and composite numbers by connecting to multiples and factors of numbers.		
	3 Act Task This 3 Act Task can be used to explore factors and multiples, prime and composite numbers, and the associative property of multiplication.	Finding Factors An activity aimed at extending thinking when thinking about how we can ask more exploratory questions with factors.	Counting Factors An activity to explore the power of using a prime factorisation representation of a number.

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.				
Learning Outcome: Apply standard algorithms to multiplication and division of decimal and natural numbers				
Multiplication and division	Farmer Holly's Hay Wagon Students problem solve how many hay bales a wagon can hold base on weight and size. Note | Click here for the solution.	Multiply and Divide This *Open Middle* problem explores both multiplication and division with the objective of creating equivalency using both operations.	Grand Pa's Math A challenging problem that allows students to explore using a systematic guess and check strategy and provides the opportunity for a follow-up discussion/exploration of how-to divisibility rules could be used. Note | Grade 6 students in the 2022-2023 school year have not been taught the divisibility rules." Click here for the solution.	
Multiplication	Latin Multiplication A task that combines multiplication and logical problem-solving skills to explore multi-digit multiplication.	Multi-digit Multiplication This *Open Middle* problem challenges learner to create a true statement which produces a three-digit product from when multiplying two, two-digit numbers.	Orange You Glad! (p.17) A task that examines how multiplication and division can be included in larger problems involving money through real world context.	
	Multiplying Decimals An *Open Middle* task that explores producing a whole number of products.	Multiplying Decimals Given One An *Open Middle* task that explores producing product with a decimal.	Two-digit multiplication This *Open Middle* problem challenges learners to produce either the largest or smallest product possible within the given parameters.	
Division	Lucky Ducks A problem using division of three digit by two-digit values, involving money. (Solution)	Greta's New Gig A division task that explores the payment per hour. This problem combines division of three digit by two-digit values. (Solution)	Division Rules A task that explores the division of three-digit numbers by one digit. Note | This task can be modified to meet additional needs.	Dividing Two Digit Numbers An *Open Middle* task that explores how learners might produce the smallest quotient possible when dividing a three-digit number by a one-digit number.

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.				
Learning Outcome: Students relate fractions to quotients.				
Relate fractions to quotients	Fractions as Indicated Division A page from John Van de Walle's *Elementary and Middle School Mathematics: Teaching Developmentally*, this resource will support understanding fractions as a quotient and provide sample classroom activities.	Sharing Pizza 3 Act task videos that can be used to explore dividing pizzas among 2 or 3 people.	Pizza Portions An activity using the context of pizza to relate fractions to division.	Baking Brownies A problem to share brownies equally. See different methods to approach task. Partitioning into fourths Share wholes, partition remainder Four equal portions Using a number line

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.			
Learning Outcome: Students add and subtract fractions with denominators within 100.			
From Marilyn Burns, a series of lessons to engage students in the study of fractions through a real-world context. ▪ An examination of fractions in the world around us: Can 1/3 + 1/3 = 2/6? Planning Guides The following Planning Guides were developed for the 2007 Program of Studies. However, the planning process and many of the tasks and assessments still align with the 2022 AB Mathematics Curriculum. Please ensure that the Learning Outcome and Knowledge, Understanding, and Skills and Procedure statements are kept in mind as tasks are selected. ▪ Addition and Subtraction of Positive Fractions and Mixed Numbers: This Planning Guide was developed for Grade 7 in the 2007 PoS. It contains information and sample activities to develop an understanding of adding and subtracting positive fractions and mixed numbers.			
Adding and subtracting fractions	Adding and Subtracting Fractions 3 Act Task A series of activities related to strengthening students' understanding of adding and subtracting unit rates. This learning is all demonstrated through Kit-Kats and how it can break apart into equal pieces.	Adding Fractions to Make a Whole This *Open Middle* question attends to identifying equivalent fractions and any numbers with the same unit can be compared, added, or subtracted.	Pouring Paints This task aims to strengthen students' understanding of how different fractions can be combined in order to make a whole.

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.			
Learning Outcome: Students add and subtract fractions with denominators within 100.			
Adding and subtracting fractions continued	Linked Chains A task that explores creating a 20-chain link connection, representing a whole in a fraction. This activity challenges students to create several ways to create a whole using a variety of combination of links.	The Fraction Challenge A series of tasks exploring the relationship of addition and subtraction of fractions.	Adding 3 Fractions to get 1 This Open Middle task examines the relationship between common denominators and the addition of fractions to equal one whole.

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.		
Learning Outcome: Students interpret the multiplication of natural numbers by fractions.		
Multiplying fractions and natural numbers	Peaches Today, Peaches Tomorrow... This task has a playful context to draw curious learners in, and then offers lots of opportunities to practice routine fraction calculations while making progress towards solving the problem.	Multiplying a Fraction by a Whole Number to Make 1 An *Open Middle* task where students use the digits 1 to 9 to make a product of 1 when multiplying a fraction and a whole number.

Number: Organizing Idea: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.			
Learning Outcome: Students apply equivalence to the interpretation of ratios and rates.			
Apply equivalence to the interpretation of ratios and rates	Mixing Lemonade Use the interactivity activity to compare different mixtures of lemonade (ratios) and develop a strategy for deciding which combination of water and lemon juice has a higher concentration.	Paint In this interactive task students will use ratio tables to mix paint that is the same color as a given paint color. They will also decide which mixtures from a list will create equivalent ratios of paint.	Same or Different A prompt that compares two equivalent ratios in a symbolic representation using the routine Alike and Different or Same or Different.

<table>
<tr><td colspan="5">Algebra Organizing Idea: Equations express relationships between quantities.</td></tr>
<tr><td colspan="5">Learning Outcome: Analyze expressions and solve algebraic equations</td></tr>
<tr><td rowspan="2">Solving Equations</td><td>Solve Me Puzzles (Mobiles)
Provides students the opportunity to explore and play with equations. These problems can also be used to discuss like terms and simplify algebraic expressions by combining like terms.

Note | This is an internet-based activity which can be done as individuals and/or as a whole class.</td><td>Solving One Step Equations
An Open Middle task that explores solving multiple one step equations that interconnected equations. This task can help support different strategies for solving equations.
Additional Problem</td><td>Sven's Gym Cans (p.68)
This problem provides an opportunity to explore solving equations with unknown variables.</td><td>Fruity Totals
Students practice solving simultaneous equations and develop reasoning skills through manipulating algebraic expressions.

Note | A digital resource which allows for multiple questions of similar nature.</td></tr>
<tr><td>What's It Worth
This problem provides a challenge in reasoning. Students work with multiple unknowns and sort through an abundance of information.</td><td>Two Step Equations
An Open Middle task that explores solving two-step equations.</td><td colspan="2">Border Problem
This lesson provides the opportunity for students to explore personal strategies related to algebraic properties. The problem provides the opportunity to discuss the associative property of addition and the distributive property.

Note | Square tile manipulatives could be used when engaging with this task.</td></tr>
<tr><td>Order of Operations</td><td>Commit and Capture (p.20)
A partner or small group activity/game that explores the role of number placement within an order of operations equation.</td><td>100 Board Wipe Out (p. 7-8)
An activity that challenges thinking and procedural understanding when using order of operations.</td><td>Make 24
A task that provides four numerical values along with addition, subtraction, multiplication and division in order to create 24 as a final total.</td><td>Albert's Insomnia
A task that allows for learners to choose four numerical values along with addition, subtraction, multiplication and division in order to create the largest value possible.</td></tr>
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Geometry: Organizing Idea: Shapes are defined and related by geometric attributes.			
Learning Outcome: Students analyze shapes through symmetry and congruence.			
Tessellations	Tessellation Interactivity A *GeoGebra* interactivity to explore tessellations.	Tessellating Triangles A task exploring tessellation of different types of triangles.	Tessellating Transformations A challenge to create tessellations using equilateral triangles, reflections and rotations.
Congruence	Congruent FIgures Students explore congruent and noncongruent figures. The activity asks students to explain how they know whether two shapes are congruent or not.	Are They Congruent? Students use transformations to make arguments for why two figures are or are not congruent. Note | Pair A, on slide, 3 requires students to reflect across a diagonal line.	Peg Rotation This is a challenging activity that asks students to apply their knowledge of transformations. Note | Although some students may be able to visualize the transformations, having tracing paper, or transparencies available will help support all learners.

Coordinate Geometry: Organizing Idea: Location and movement of objects in space can be communicated using a coordinate grid.			
Learning Outcome: Explain location and movement in relation to the position in the Cartesian plane			
Position in the Cartesian Plane	When Lightning Flashes, is it Raining? This task will support the importance of plotting the location of a point in the Cartesian plane using coordinates.	Coordinate Cunning Like Connect 4, students play in partners trying to get four points in a row.	Finding Treasure An activity that explores the relationship of order pairs and the horizontal and vertical nature of the Cartesian plane.
	Battleship This game is played just like the old Milton-Bradley game Battleship. Yet here we'll be playing within the context of the Cartesian Plane.	The (Awesome) Coordinate Plane Activity In this activity, students will encounter a series of challenges, each asking them to graph a point Cartesian Plane.	
Transformations	A Cartesian Puzzle This task will support understanding in location of the vertices of a polygon in the Cartesian plane using coordinates.	Mirror Mirror This task represents an initial task for explore the idea of reflection across an axis and the impact a reflection has on the appearance of a polygon.	

Coordinate Geometry: Organizing Idea: Location and movement of objects in space can be communicated using a coordinate grid.		
Learning Outcome: Explain location and movement in relation to the position in the Cartesian plane		
Transformations continued	Transformation Tease This activity explores the location and movement of the vertices of a polygon in the Cartesian plane using coordinates.	Transformations In this *Open Middle* task your learners will be challenged locate points on the Cartesian plane given the coordinates of the point and translate given points.

Measurement Organizing Idea: Attributes such as length, area, volume, and angle are quantified by measurement.				
Learning Outcome: Students analyze areas of parallelograms and triangles.				
Area of parallelograms and triangles	Covering Ground This series of tasks encourages students to investigate the relationship between the area of triangles, rectangles and parallelograms.	Cut and Make This task examines the area of composite shapes. This activity will help to strengthen the idea that area of one shape can help solve for the area of another. Note | The initial square could be printed on grid paper to support students in finding the total area.	Triangle Formation This task explores the relationship between triangles, their areas and the formation of other shapes including but not limited to rectangles, parallelograms and/or squares.	Tangram Area This is a challenging activity that explores the unique qualities of a parallelogram. Students can explore the dimensions of a parallelogram in relation to the dimensions of other shapes. Note | Students should be provided with physical tangram pieces or the image on paper to cut out.

Measurement Organizing Idea: Attributes such as length, area, volume, and angle are quantified by measurement.				
Learning Outcome: Interpret and express volume				
Rectangular prisms and volume Standard measures	Cubic Competition (p. 78) This *Problem of the Week* from the University of Waterloo provides opportunities to explore the relationship between area and volume. Note| Surface area is not an outcome but can be explored.	Making Boxes This task examines the relationship between measurement and the impact various measurements have on the total volume of a prism/container.	Volume of Rectangles An *Open Middle* task that explores the relationship between a right rectangular prism(s) and using multiplication to solve for volume.	Three Rectangular Prisms An *Open Middle* task that explores the relationship between of how dimensions can vary but total volume can be similar.
Rectangular prisms and volume Non-standard measures	Sugar Cubes A multi-day/lesson activity that explores the relationship of a cubic non-standard manipulative and the volume of rectangular prisms.	Dandy Candies A video based 3-Act task that explores the relationship of volume modeling the volume of various right rectangular prisms as three-dimensional arrays of cube-shaped units.	Making Cuboids A precursor problem to finding volume of cuboids that concentrates on the length of the edges of cuboids rather than on the faces or vertices.	

Patterns: Organizing Idea: Awareness of patterns supports problem solving in various situations.				
Learning Outcome: Students investigate functions to enhance understanding of change.				
Problem solving with patterns	Open Middle This *Open Middle* question examines the relationship between changing values in an algebraic rule representing a pattern.	Pocket Money This Problem explores how students can work to identify the dependent and independent variables in each situation, including situations involving change over time. Note | In #3 this question explores exponential growth, which can be discussed but would not be considered for assessment.	Tables and Chairs This task is aimed at strengthening student's ability to investigate strategies for determining a value of the dependent variable of a function given the corresponding value of the independent variable.	Hexagon Lines This task is similar to Tables and Chairs but uses hexagons rather than squares in its pattern. Students are faced with solving the algebraic rule to determine a given perimeter unknow number of hexagons.

<table>
<tr><td colspan="3">Statistics: Organizing Idea: The science of collecting, analyzing, visualizing, and interpreting data can inform understanding and decision making.</td></tr>
<tr><td colspan="3">Learning Outcome: Students investigate relative frequency using experimental data.</td></tr>
<tr><td rowspan="2">Investigate relative frequency using experimental data</td><td colspan="2">Planning Guides
The following Planning Guides were developed for the 2007 Program of Studies. However, the planning process and many of the tasks and assessments still align with the 2022 AB Mathematics Curriculum. Please ensure that the Learning Outcome and Knowledge, Understanding, and Skills and Procedure statements are kept in mind as tasks are selected.
▪ Probability: This Planning Guide was developed for Grade 7 in the 2007 PoS. It contains information and sample activities to develop an understanding of theoretical and experimental probability.</td></tr>
<tr><td>Tricky Track
An activity that challenges students to track trends and patterns in the frequency in the sums of rolling two dice. This task will help describe the likelihood of an outcome in an experiment using relative frequency.</td><td>Odds or Sixes
This game-based activity examines the relationship relative frequency of outcomes can be used to estimate the likelihood of an event.</td></tr>
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