

Grade 8 • Curriculum Correlation
Grade 8 2020 Ontario Curriculum and
Grades 4–8 • Open Questions for the Three-Part Lesson

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Open Questions for the Three-Part Lesson: *Number Sense and Numeration* [Number]

2020 Ontario Curriculum Expectations	Open Questions for the Three-Part Lesson: Number Sense and Numeration	Book & Page Number
B. NUMBER		
B1. Number Sense		
Overall Expectation: By the end of Grade 8, students will demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life		
Whole Numbers		
B1.1 represent and compare very large and very small numbers, including through the use of scientific notation, and describe various ways they are used in everyday life	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
B1.2 describe, compare, and order numbers in the real number system (rational and irrational numbers), separately and in combinations in various contexts	Q: What do you know about the decimal and percent representations of the fraction $\frac{13}{19}$ if 1 is a number between 10 and 19?	Number • Page 202
	Q: Use square tiles to build squares. What numbers of tiles (up to 150) are possible, and what numbers are not possible? What do you notice about the lists of numbers?	Number • Page 208
B1.3 estimate and calculate square roots, in various contexts	Q: Suppose a square has an area of 8 units. What do you know about the length of the sides?	Number • Page 206

Fractions, Decimals, and Percents		
B1.4 use fractions, decimal numbers, and percents, including percents of more than 100% or less than 1%, interchangeably and flexibly to solve a variety of problems	Q: What do you know about the decimal description of 0.2%?	Number • Page 202
	Q: How could you complete the following statement? X is 250% of X.	
	Q: The number of students at Elm St. School is 240% of the number of students at Miller School, but only 60% of the number of students at Lees School. What could the numbers of students at each school be? What is the fraction relationship between Lees School and Miller School?	Number • Page 203
	Q: If the numerator of a fraction is between double and triple the denominator, what do you know about the decimal and percent representations?	Number • Page 204
	Q: What percent might you use to compare the numbers 50 and 500?	
	Q: Someone says that there can't be a percent higher than 100% since 100% is everything. What could you say back?	
	Q: Which is greater: 225% or 100%? How do you know?	Number • Page 224
	Q: You want to estimate 225% of 317. What are some ways you might estimate it?	
	Q: You want to estimate 12.5% of \$135. What are some ways you might estimate the cost?	
	Q: The number 45 is a percent of another number, but the percent involves a decimal. What percent and what number might it be?	Number • Page 226
	Q: Write two different statements about a real-world situation that involves the amount 12.5%. One statement should make sense and the other statement should not make sense. Explain why each does or does not make sense.	

B2. Operations

Overall Expectation: By the end of Grade 8, students will: use knowledge of numbers and operations to solve mathematical problems encountered in everyday life

Properties and Relationships

B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving rational numbers, ratios, rates, and percents, including those requiring multiple steps or multiple operations

There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.

Math Facts

B2.2 understand and recall commonly used square numbers and their square roots

Q: Using a picture, explain why the square root of 17 is slightly more than 4.1.

Number • Page 209

Mental Math

B2.3 use mental math strategies to multiply and divide whole numbers and decimal numbers up to thousandths by powers of ten, and explain the strategies used

There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.

Addition and Subtraction		
B2.4 add and subtract integers, using appropriate strategies, in various contexts	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
B2.5 add and subtract fractions, using appropriate strategies in various contexts	Q: The sum of two fractions is less than their product. What might the fractions be?	Number • Page 215
	Q: In what sort of situation might you subtract two fractions and then add two fractions?	Number • Page 218
Multiplication and Division		
B2.6 multiply and divide fractions by fractions, as well as by whole numbers and mixed numbers, in various contexts	Q: Why does it make sense that $2\frac{1}{2} \times 26 = \frac{5}{6}$?	Number • Page 215
	Q: A division question leads to a result of a little more than $\frac{3}{5} \div \frac{1}{5}$. What might that division question be?	
	Q: You divide two fractions and the answer is less than 1. What fractions might you be dividing? How do you know your answer is correct?	
	Q: Determine as many fraction pairs as you can that you can divide and obtain the same result as $\frac{3}{4} \div \frac{1}{5}$. How did you create them?	Number • Page 216
	Q: The quotient of two fractions is almost $2\frac{1}{2}$. What might the fractions be? Draw pictures to show why your answers make sense.	Number • Page 216
	Q: The quotient of two fractions is $2\frac{1}{4}$ times greater than the product. What might the fractions be?	
	Q: The product of two fractions is greater than one of the fractions, but less than the other fraction. What could the fractions be?	Number • Page 218
	Q: You multiply two fractions and the product is close to $\frac{2}{3}$. What fractions might you have multiplied? Justify your thinking.	
Q: Choose two fractions greater than 1 to multiply. Draw a picture that would show how to figure out the product of the two fractions you chose.		

B2.7 multiply and divide integers using appropriate strategies in various contexts	Q: Which expression does not belong? Why?	Number • Page 219
	Q: You multiply some numbers, and the answer is close to -10 . What might you have multiplied?	
	Q: Use a number line to model a division involving whole numbers. How could you use a similar model to show a division involving negative integers?	
	Q: What division question involving negative numbers would you find easy to solve? Why?	Number • Page 220
	Q: The product of two integers is about 50 less than one of the integers. Explain your answer. Think of three or more possible pairs of integers.	Number • Page 221
	Q: Create a game that involves solving story problems that require the multiplication and division of integers to play the game.	
	Q: Create an expression involving five integers and four operation symbols. Use brackets in different places in your expression to make it worth as many different values as you can.	
	Q: Create two or more numerical expressions equal to -2 that have positive and negative integers, at least one exponent, and several operations and/or brackets. Prove that they are worth -2 .	
	Q: You modelled the division of two negative integers using counters. Both of the negative integers were greater than -100 . You ended up showing four groups of counters. What could the division have been? Why did you show four groups?	
	Q: Why does it make sense that $(-3) \times (-2) = 6$?	
	Q: Create a numerical expression with integers and exponents that you would probably evaluate incorrectly if you did not know the rules for order of operations. Explain.	Number • Page 222
	Q: Choose a negative and positive integer. What model would you use to show how to divide these integers?	
	Q: You have several equal-sized groups of negative counters. How do you know that they could represent more than one number sentence?	

<p>B2.8 compare proportional situations and determining unknown values in proportional situations, and apply proportional reasoning to solve problems in various contexts</p>	<p>There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.</p>	
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Open Questions for the Three-Part Lesson: *Measurement • Patterning & Algebra* [MPA]

C. ALGEBRA		
C1. Patterns and Relationships		
Overall Expectation: By the end of Grade 8, students will identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts		
Patterns		
C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values	Q: Plot a linear pattern of dots at (1, ■), (2, ■), (3, ■), and so on. What pattern does your graph show? What is the general term of the pattern? Repeat with a pattern where each y value is double what it was before. What do you notice about the general term?	MPA • Page 171
C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns	Q: Use toothpicks to build a growing pattern that grows by the same amount from term to term. Describe lots of things about your pattern.	MPA • Page 169
	Q: Use square tiles to create a linear growing pattern. Use colours to help make the pattern rule obvious. Use an algebraic expression to describe the general term. How do the colours help you write an algebraic expression? Then, change the colours, but do not change the number of tiles in each term of the pattern. Use a different algebraic expression to describe the general term, and explain how the colours help you.	MPA • Page 170
	Q: Plot a linear pattern of dots at (1, ■), (2, ■), (3, ■), and so on. What pattern does your graph show? What is the general term of the pattern? Repeat with a line that is one unit higher at each point. What do you notice about the general term?	

C1.2 (continued)	<p>Q: Use counters in an irregular arrangement to create a linear growing pattern. What is the general term of your pattern? Repeat with a different pattern.</p>	MPA • Page 171
	<p>Q: Plot a linear pattern of dots at (1, ■), (2, ■), (3, ■), and so on. What pattern does your graph show? What is the general term of the pattern? Repeat with a pattern where each y value is double what it was before. What do you notice about the general term?</p>	
	<p>Q: Draw a graph of a linear growing pattern that goes through (2, 8). What is the general term for your graph? Show two solutions.</p>	
	<p>Q: Create a linear growing pattern with counters. What is the general term for your pattern?</p>	MPA • Page 172
	<p>Q: Create two patterns so that one of the patterns has a lot more numbers between 100 and 200 than the other. Explain how you know this is true. What is the general term for each pattern?</p>	MPA • Page 173
	<p>Q: Decide on a scale for the y-axis on the graph below. What is the value of the 30th term in the pattern?</p>	
	<p>Q: Choose values for a and b in the expression $a - bx$. If the expression describes the general term of a linear shrinking pattern where x is the term number, what would the graph of the pattern look like?</p>	
<p>Q: Choose values for a and b in a pattern that has the general term $an + b$ where n is the term number. Build the pattern with linking cubes. Create a table of values and a graph for your pattern.</p>	MPA • Page 176	

<p>C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing element in repeating, growing, and shrinking patterns involving rational numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing and shrinking patterns</p>	<p>Q: Use square tiles to create a linear growing pattern. Use colours to help make the pattern rule obvious. Use an algebraic expression to describe the general term. How do the colours help you write an algebraic expression? Then, change the colours, but do not change the number of tiles in each term of the pattern. Use a different algebraic expression to describe the general term, and explain how the colours help you.</p>	<p>MPA • Page 170</p>
	<p>Q: Use counters in an irregular arrangement to create a linear growing pattern. What is the general term of your pattern? Repeat with a different pattern.</p>	<p>MPA • Page 171</p>
	<p>Q: Create a linear growing pattern with counters. What is the general term for your pattern?</p>	<p>MPA • Page 172</p>
	<p>Q: Choose values for a and b in a pattern that has the general term $an + b$ where n is the term number. Build the pattern with linking cubes. Create a table of values and a graph for your pattern.</p>	<p>MPA • Page 176</p>
<p>C1.4 create and describe patterns to illustrate relationships among irrational numbers</p>	<p>Q: Choose a realistic price, of the form \$0. , for a single small-school supply item. Figure out what it would cost for 10 of these items. Then, figure out what it would cost for 100 of them. Explain your strategy. Tell what you think 1000 of them would cost and explain your thinking.</p>	<p>Number • Page 213</p>
	<p>Q: Angie divided a decimal number by 10 and Tai divided a different number by 1000, but they got the same answer. What could the divisions have been?</p>	<p>Number • Page 214</p>

C2. Equations and Inequalities

Overall Expectation: By the end of Grade 8, students will demonstrate an understanding of variables, expressions, equalities, and inequalities, and apply this understanding in various contexts

Equalities and Inequalities

<p>C2.1 add and subtract monomials with degree 1 and add binomials with a degree of 1 that involve integers, using tools</p>	<p>There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.</p>	
<p>C2.2 evaluate algebraic expressions that involve rational numbers</p>	<p>Q: The value of $a \cdot x + b$ is 142 when $x = 30$. What are possible values for a and b?</p>	<p>MPA • Page 168</p>
	<p>Q: Choose values for a and b, and fill in the first six rows of the table of values. Graph the data from the table.</p>	
	<p>Q: Choose values for a and b in $ax + b$, the general term of a linear growing pattern, where x is the term number. What is the value of the 100th term?</p>	<p>MPA • Page 172</p>
<p>C2.3 solve equations that involve multiple terms, integers and decimal numbers in various contexts, and verify solutions</p>	<p>Q: The general terms for two different linear growing patterns are $ax + b$ and $cx + d$, where x is the term number. They have the same 40th term. What could a, b, c, and d be? Are any of their other terms the same? How do you know?</p>	<p>MPA • Page 172</p>
	<p>Q: Choose a measurement formula that you know. How do you use algebra when you use that formula?</p>	<p>MPA • Page 178</p>
	<p>Q: Suppose you are solving the equation $3x - 2 = 4 - 8x$. What would be a bad first guess? Why? What would be a better first guess? Why?</p>	<p>MPA • Page 179</p>
	<p>Q: Which equation do you think doesn't belong? $3x - 2 = -14$ $20 - 8x = 52$ $4x - 18 = -30$ $6x + 8 = -16$</p>	
	<p>Q: An equation involving $3x$ is easy to solve just by looking at it. What might the equation be?</p>	
	<p>Q: Choose values for the blanks in this equation and represent the equation using a balance model. The values you choose can be different. $\square x - \square = 2x + 1$. If the solution is not an integer, change one of your choices until it is. Repeat with two other number choices.</p>	<p>MPA • Page 180</p>

C2.3 (continued)	Q: The solution to five different equations is $n = -1$. At least one equation has n on both sides. What might the equations be?	MPA • Page 181
	Q: Compare the solutions to these equations: $4x + 8 = -100$ $3x + 6 = -75$ $10x + 20 = -250$ Create another equation that you know will have the same solution before you solve it. Tell how you know.	
	Q: Two equations have the same solution. One equation involves $4x$ and the other involves $5x$. A constant in the second equation is 1 greater than a constant in the first equation. What could the equations be?	
	Q: Create an equation. Solve it using a balance model.	MPA • Page 182
	Q: You solve an equation using guess and check. 10 would be a good first guess, even though it is not the solution. What might the equation be? Why would 10 be a good first guess?	
	Q: An equation that includes the number 24 has the same solution as $3x - 8 = 12$. What might the equation be? How do you know?	
Q: How do you know that the solution to this equation must be a negative number without actually solving the equation?		
C2.4 solve inequalities that involve integers and verify and graph the solutions	Q: The general term of a linear growing pattern is $ax + b$, where x is the term number. If the value of the 100th term is more than 500, what are possible values of a and b ? What is the value of the 100th term?	MPA • Page 168

C3. Coding		
Overall Expectation: By the end of Grade 8, students will solve problems and create computational representations of mathematical situations using coding concepts and skills		
Coding Skills		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves the analysis of data in order to inform and communicate decisions	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
C4. Mathematical Modelling		
Overall Expectation: By the end of Grade 8, students will apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations		
This overall expectation has no specific expectations. Mathematical modelling is an iterative and interconnected process that is applied to various contexts, allowing students to bring in learning from other strands. Students' demonstration of the process of mathematical modelling, as they apply concepts and skills learned in other strands, is assessed and evaluated.	Q: Find out how much one litre of gas costs. Find out how many litres of gas it takes to travel 100 km. Choose a location more than 100 km from where you live. Figure out approximately how much it would cost for gas to go there and then get back home. Justify your calculations.	Number • Page 213
	Q: A bookcase has eight shelves. Each shelf is 83 cm long and about 25 cm deep. About how many books can the bookcase hold? How could you check if your answer makes sense?	
	Q: In 2010, the world's population was about 6.84 billion; in 2011, it was about 6.92 billion; in 2012, it was about 6.99 billion; and in 2013, it was about 7.07 billion. What might the world's population be in 2020; if population growth begins to slow down? Explain your thinking. How sure are you about your growth assumptions?	Number • Page 225

C4. (continued)	<p>Q: In Ontario, there is 13% HST (harmonized sales tax), but in Alberta, there is no provincial sales tax; there is only the 5% GST (goods and services tax).</p> <p>Q: About how much more in taxes might a student in Ontario spend on school supplies than a student in Alberta? Justify your conclusion.</p>	Number • Page 225
	<p>Q: Use percents to compare the height of a baby at birth with the height of an adult.</p>	Number • Page 226
	<p>Q: You are driving on a four-lane highway. About how long is it likely to take you to drive 352 km?</p>	Number • Page 228
	<p>Q: Research to find a reasonable hourly pay rate for an occupation in Canada. How much do you think the annual salary for a person in that occupation might be? Explain your thinking.</p>	Number • Page 229
	<p>Q: The world's biggest cookie was about 34 m wide</p> <p>a) About how many normal cookies would this be?</p> <p>b) About how much sugar do you think might have been used to make it?</p>	
	<p>Q; Choose a reasonable price for 1 kg of nuts. Use that information to determine an appropriate price for 350 g of these nuts. What strategy made sense to use and why?</p>	Number • Page 230
	<p>Q: Research sizes and prices of small, medium, and large pizzas. Which pizza is the best deal?</p>	MPA • Page 157

Open Questions for the Three-Part Lesson: *Geometry and Spatial Sense • Data Management and Probability* [GSSDP]

D. DATA		
D1. Data Literacy		
Overall Expectation: By the end of Grade 8, students will manage, analyse, and use data to make convincing arguments and informed decisions, in various contexts drawn from real life		
Data Collection and Organization		
D1.1 identify situations involving one-variable data and situations involving two-variable data, and explain when each type of data is needed	Q: What data might you research and use to argue that humans are having a negative impact on the environment?	GSSDP • Page 188
D1.2 collect continuous data to answer questions of interest involving two variables, and organize the data sets as appropriate in a table of values	Q: You are collecting data about . Fill in the blank. Then, tell some examples of discrete, categorical, and continuous data that you could collect for this topic.	GSSDP • Page 180
	Q: Collect continuous data on a topic of your choice with the following conditions: • Your data set includes at least 20 values. ^[1] _[SEP] • Your greatest data value is at least 40 more than your least data value.	GSSDP • Page 181
	Q: You wish to form a convincing argument about _____. Fill in ^[1] _[SEP] the blank. Next, collect either primary or secondary data about your topic. Then, using a digital device, create a graph of your data that will support your argument. Tell how your graph does this.	GSSDP • Page 191

Data Visualization		
<p>D1.3 select from among a variety of graphs, including scatter plots, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs</p>	<p>Q: Draw a graph that describes the relationship between two time units, such as seconds and hours, minutes and years, or years and months.</p>	<p>MPA • Page 175</p>
	<p>Q: Choose the number of minutes you might practise something every week, such as soccer or piano. Draw a graph to show the number of hours it would take to practise a total of 25 hours.</p>	<p>MPA • Page 178</p>
	<p>Q: Which of these graphs do you think is the least like the others?</p>	<p>GSSDP • Page 180</p>
	<p>Q: Collect continuous data on a topic of your choice with the following conditions:</p> <ul style="list-style-type: none"> • Your data set includes at least 20 values. • Your greatest data value is at least 40 more than your least data value. 	<p>GSSDP • Page 181</p>
	<p>Q: Conduct a survey about your classmates with the following conditions: ... The survey is about a recent experience that your classmates have had.</p>	<p>GSSDP • Page 182</p>
	<p>Q: Think of something that you have to practise for a long time to get good at it. Then, show on a scatter plot how the more that you practise this affects how good you are at it. Tell why you think that your graph makes sense.</p>	
	<p>Q: When might it be useful to use a scatter plot to display the data results of a survey that you conducted on your classmates?</p>	<p>GSSDP • Page 183</p>
	<p>Q: Zoey thinks that the best way to display the data that she is working with is on a scatter plot. Collect primary or secondary data that you think might be similar to the data that Zoey is working with. Using a digital device, display the data on a scatter plot. Then, explain why a scatter plot works well for displaying your data.</p>	<p>GSSDP • Page 186</p>
	<p>Q: Describe a trend that you might see on a graph. Then, show what a graph with this trend might look like.</p>	<p>GSSDP • Page 189</p>
<p>Q: You wish to form a convincing argument about _____. Fill in the blank. Next, collect either primary or secondary data about your topic. Then, using a digital device, create a graph of your data that will support your argument. Tell how your graph does this.</p>	<p>GSSDP • Page 191</p>	
<p>D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and scatter plots, and incorporating any other relevant information that helps to tell a story about the data</p>	<p>There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.</p>	

Data Analysis		
<p>D1.5 use mathematical language, including the terms “strong”, “weak”, “none”, “positive”, and “negative”, to describe the relationship between two variables for various data sets with and without outliers</p>	<p>Q: A company’s sales are probably related to ____, but its sales are probably not related to _____. Fill in the blanks in a way that makes sense.</p>	<p>GSSDP • Page 188</p>
	<p>Q: You wish to form a convincing argument about _____. Fill in the blank. Next, collect either primary or secondary data about your topic. Then, using a digital device, create a graph of your data that will support your argument. Tell how your graph does this.</p>	<p>GSSDP • Page 191</p>
	<p>Q: “I predict that there is a relationship between _____ and _____.” Fill in the blanks in a way that makes sense. Then, design a survey or experiment that would allow you to find out if this relationship exists. Using a digital device, display your results on a scatter plot. Explain whether your graph shows that this relationship exists, and describe any trends that you see in your graph.</p>	
	<p>Q: There is a strong relationship between two of the characteristics of something, and there is a weak relationship between two of its other characteristics. Give an example of something that would suit this description.</p>	<p>GSSDP • Page 192</p>
	<p>Q: There is a strong relationship between _____ and _____. Fill in the blanks in a way that makes sense. Next, show or tell how you could graph data to display this relationship. Then, show or tell how you could graph these same data values while trying to hide this relationship.</p>	<p>GSSDP • Page 193</p>

<p>D1.6 analyse different sets of data presented in various ways, including in scatter plots and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions</p>	<p>Q: Think of something that you have to practise for a long time to get good at it. Then, show on a scatter plot how the more that you practise this affects how good you are at it. Tell why you think that your graph makes sense.</p>	<p>GSSDP • Page 182</p>
	<p>Q: You overhear someone say, “I don’t think that it’s a good idea to use a stem-and-leaf plot or a line plot for the data.” Why do you think that this person might have said this?</p>	<p>GSSDP • Page 184</p>
	<p>Q: Choose one of these graphs. Tell what you think this graph could be about.</p>	<p>GSSDP • Page 188</p>
	<p>Q: How are these graphs similar? How are they different?</p>	<p>GSSDP • Page 189</p>
	<p>Q: Draw four different lines and/or curves on a line graph. Then, describe each line or curve.</p>	
	<p>Q: The same graph or table is used to make two opposing arguments. How is this possible?</p>	<p>GSSDP • Page 192</p>
	<p>Q: Two different people are looking at the same graph or table and make very different conclusions about it. How is this possible?</p>	<p>GSSDP • Page 193</p>

D2. Probability

Overall Expectation: By the end of Grade 8, students will describe the likelihood that events will happen, and use that information to make predictions

<p>D2.1 solve various problems that involve probability, using appropriate tools and strategies, including Venn and tree diagrams</p>	<p>There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.</p>	
<p>D2.2 determine and compare the theoretical and experimental probabilities of multiple independent events happening and of multiple dependent events happening</p>	<p>Q: A probability activity has three or more possible outcomes. The theoretical probabilities of each outcome occurring are not the same. What could the ratios for the theoretical probabilities be? What could they not be? Why?</p>	<p>GSSDP • Page 198</p>

E. SPATIAL SENSE		
E1. Geometric and Spatial Reasoning		
Overall Expectation: By the end of Grade 8, students will describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them		
Geometric Reasoning		
E1.1 identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations	Q : Use a lot of the same one or two pattern blocks to make a design. Have the blocks fit together so that they don't leave any gaps between them.	GSSDP • Page 131
	Q : Imagine that you are asked to tile a floor. Show what the floor might look like for each of the following situations: A. One regular polygon is used to tile the floor. B. One irregular polygon is used to tile the floor. C. A combination of polygons is used to tile the floor. Tell what transformations you used when designing each floor.	GSSDP • Page 132
	Q : "The interior angles of a shape are what determines whether duplicates of this shape can tile a plane." Do you agree with this statement? Explain your answer.	GSSDP • Page 135
	Q : How can you tile a surface using pattern blocks without there being any gaps? What properties of the blocks help you to decide which blocks to place where?	GSSDP • Page 165
E1.2 make objects and models using appropriate scales, given their top, front, and side views or their perspective views	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
E1.3 use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios	Q: A pentomino is a polygon made from five congruent squares. Trace square tiles onto tracing paper to make two congruent pentomino shapes that have different orientations. Tell how you know that the shapes are congruent. Then, make or sketch a larger version of your pentomino shapes. Tell how you know that your new pentomino shape is mathematically similar to the previous ones that you made.	GSSDP • Page 124
Location and Movement		
E1.4 describe and perform translations, reflections, rotations, and dilations on a Cartesian plane, and predict the results of these transformations	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	

E2. Measurement

Overall Expectation: By the end of Grade 8, students will compare, estimate, and determine measurements in various contexts

The Metric System

E2.1 represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships, and exponential notation

There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.

Lines and Angles

E2.2 solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons

Q: Draw a line. Then, draw a line that intersects it. Label each line and angle ^[SEP] on your diagram with letters. Then, use mathematical notation to tell all the things that you can about your diagram.

GSSDP • Page 122

Q: You draw a line segment, and then you add a perpendicular bisector to it. You find this pretty easy to do. Why might this be?

Q: What do you know by looking at this image of three congruent triangles? What are you not so sure about?

GSSDP • Page 160

Q: What might the angles in this triangle be? Explain your answer.

Q: Estimate the measurement of each angle below. Tell ^[SEP] why your estimates make sense.

Q: Using square dot paper, draw a pair of parallel lines. Next, draw a transversal. Use ^[SEP] a protractor to measure all the angles that are created. Then, repeat for a different transversal. Tell all the things that you notice about the angle measurements.

GSSDP • Page 161

Q: Use one elastic to create two triangles on a geoboard. Then, draw your triangles on square dot paper. Measure the angles in each triangle by using a protractor. Then, repeat two or more times for different triangles. Tell what you notice about the angles. Then, find the sum of the angles in each of your triangles. Tell what you notice.

E2.2 (continued)	Q: Choose two of the following angle problems. Solve for the missing angles, and explain how you came up with your answers.	GSSDP • Page 161
	Q: Would you rather find the angle measurements in the first image or the second image below? Why? Tell how you would determine the angle measurements in the image that you chose.	GSSDP • Page 162
	Q: Using square and/or isometric dot paper, make three or more triangles where you know the angles without needing a protractor to measure them. Then, make three or more triangles where you would need to use a protractor to measure their angles. Label the measurements of the angles in each of your triangles, and explain why you needed or didn't need to use a protractor to measure each angle.	

Length, Area, and Volume

E2.3 solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional objects, using appropriate formulas	Q: When might a home builder consider volume or capacity when building parts of a house?	MPA • Page 160
E2.4 describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle	Q: What do you notice about this picture?	GSSDP • Page 167
	Q: Draw a right triangle using a protractor. Then, estimate its side lengths. Measure the side lengths afterwards, and see how close your estimates were.	
	Q: Choose two pegs on a geoboard that are fairly far from each other. Using elastics, connect the two pegs using the shortest route possible. Then, connect the pegs using a different, longer route.	GSSDP • Page 167
	Q: In a small group, cut 13 squares from centimetre grid paper for each whole-numbered side length from 1 cm to 13 cm. On each square, write its area. Experiment to see how you can use the sides of three different squares to make a right triangle. Then, tell what you notice about the relationship between the areas of the three squares.	GSSDP • Page 168

E2.4 (continued)	<p>Q: A certain polygon can be decomposed into all right triangles. On centimetre grid paper, show what the polygon could be, and decompose it into right triangles. Then, use the Pythagorean relationship to determine some of the unknown lengths of the triangles.</p>	GSSDP • Page 168
	<p>Q: Choose two of the three triangles below. Cut out squares from centimetre grid paper that have side lengths that match the lengths of the known sides of each of your triangles. Then, tell what the side length of each missing side is by using your squares as tools.</p>	GSSDP • Page 169
	<p>Q: If you didn't have a ruler, when wouldn't it be helpful to consider the Pythagorean relationship to determine the missing side length of a triangle?</p>	GSSDP • Page 170
	<p>Q: Use the Pythagorean relationship to show that if two sides of a right triangle are close in length, the third side is either about X times as long as each of the other two sides, or it's very short compared to the other two sides.</p>	

F. FINANCIAL LITERACY		
F1. Money and Finances		
Overall Expectation: By the end of Grade 8, students will demonstrate an understanding of the value of Canadian currency		
Money Concepts		
F1.1 describe some advantages and disadvantages of various methods of payment that can be used when dealing with multiple currencies and exchange rates	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	
Financial Management		
F1.2 create a financial plan to reach a long-term financial goal, accounting for income, expenses, and tax implications	There are no Grade 8 Open Questions that meet these 2020 curriculum expectations.	
F1.3 identify different ways to maintain a balanced budget, and use appropriate tools to track all income and spending, for several different scenarios		
F1.4 determine the growth of simple and compound interest at various rates using digital tools, and explain the impact interest has on long-term financial planning		

Consumer and Civic Awareness		
F1.5 compare various ways for consumers to get more value for their money when spending, including taking advantage of sales and customer loyalty and incentive programs, and determine the best choice for different scenarios	Q: Use grocery store flyers to find a product that is available in two different sizes. Decide which size is the better buy and why. Repeat with two or more other products.	Number • Page 229
	Q: A 1.47 L container of liquid detergent costs \$8.77 at a particular store. Another store sells a liquid detergent in 2 L containers. What do you think the second store might charge if its detergent is a better buy?	Number • Page 230
F1.6 compare interest rates, annual fees, and rewards and other incentives offered by various credit card companies and consumer contracts to determine the best value and the best choice for different scenarios	There are no Grade 8 Open Questions that meet this 2020 curriculum expectation.	

Grade 8 Open Questions that now align with other grades in the Ontario 2020 Curriculum

Grade 8 Open Questions that now align with Grade 4 Expectations

Grade 4 D2.1	Q: When drawing cards from a set of playing cards, what are some things that are likely to happen? What are some things that are unlikely to happen?	GSSDP • Page 194
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Grade 8 Open Questions that now align with Grade 5 Expectations

Grade 5 B2.9	Q: Choose a reasonable price for a dozen cookies. How much will 8 cookies cost? Explain your answer.	Number • Page 228
Grade 5 C2.1	Q: Choose a value for a in the general term $a \cdot x + 4$ of a linear growing pattern, where x is the term number. Suppose a term has a value of 144. What equation would you solve to figure out the value of x ? Why does that work?	MPA • Page 169
	Q: What real-life situation might the equation $2x + 5 = 13$ describe?	MPA • Page 174
	Q: Create an expression that includes at least four of the words below. Write the expression algebraically. and, triple, less, four, ten, double	
	Q: Describe some everyday situations where you can use an equation.	MPA • Page 176
	Q: Describe two or more situations that could be represented by the equation $4f + 2t = 100$.	MPA • Page 177
	Q: Create two or more algebraic expressions where the values of the expressions are all integer multiples of 4 no matter what integer values you substitute for the variables.	
	Q: Create a game where you have to match algebraic expressions or equations with words that describe them.	
	Q: Write an algebraic expression with three variables that includes the number 2. How would you describe the expression in words?	MPA • Page 178
Q: The equation $4x = 4000y$ describes the relationship between two variables, x and y . What might the variables represent?		

Grade 5 C2.2	Q: Create a small cross-number puzzle where the clues are algebraic expressions and the puzzle shows the values for $x = 10$.	MPA • Page 177
	Q: The value of the 50th term of a linear growing pattern is 412. The general term is $4x + *$, where x is the term number. What equation or equations would you solve to figure out the term number for the term value 448?	MPA • Page 182
Grade 5 D1.1	Q: Create a survey question that would help with making a school-wide decision. Then, plan how you would conduct the survey in the following ways...	GSSDP • Page 199
	Q: “A representative sample is a lot more useful than a census.” Do you agree with this statement? Why or why not?	
	Q: Explain how you would conduct a fair survey.	
Grade 5 D1.5	Q: Make a set of 8 to 10 data values that has a mean, median, and mode that are a lot different from one another. Show that your data set meets these conditions by supplying its mean, median, and mode.	GSSDP • Page 184
	Q: Gather numerical data of 15 or more values from a survey or experiment that you have conducted in the past. Then, repeat the survey or experiment in a way that will yield different results. Calculate the mean, median, and mode of both data sets. Then, tell if using the mean, median, or mode is the best way to compare your two data sets. Explain your answer.	GSSDP • Page 186
Grade 5 D2.1	Q: Create a spinner probability game that is a bit unfair to one of the players. Use ratios to show that this is the case. Then, play your game five times while using a different number of spins for each game. Record who wins each time. For each game, compare each winner’s ratio of wins to spins against your initial ratios. If they differ, explain why that might be.	GSSDP • Page 195
	Q: Play 15 rounds of rock, paper, scissors with a partner. Record the favourable and unfavourable results for each player. Then, compare the results. Tell what you notice.	GSSDP • Page 194
	Q: Describe an experiment that would have a pair of complementary events with the same theoretical probability of occurring. Tell what that probability is. Then, repeat for an experiment that has a pair of complementary events that have much different theoretical probabilities of occurring. Tell what these probabilities are.	GSSDP • Page 196
	Q: If the theoretical probability of one complementary event occurring is _____ then the theoretical probability of its complementary event occurring is _____. Fill in the blanks using examples of each of the following:	GSSDP • Page 198

Grade 5 D2.2	Q: Pick a two-digit number that is less than 20. If you flipped a coin this number of times, decide how many times you think that it would turn up heads and how many times you think that it would turn up tails. Then, flip a coin the number of times that you chose, and compare the results to your prediction.	GSSDP • Page 194
	Q: Design a probability experiment that has a favourable outcome that can be described by a fraction that has an even numerator and an odd denominator. Then, conduct your experiment 1 time, and record the result. Repeat for conducting your experiment 10 times, 40 times, and 100 times. Compare each of your four experimental probabilities of the outcome in question with its theoretical probability. Tell what you notice.	GSSDP • Page 196
Grade 5 E1.5	Q: How might you know that a shape has been rotated?	GSSDP • Page 177
Grade 5 E2.2	Q: Use a picture or model to show why you multiply a number of square metres by 10 000 to figure out the number of square centimetres that would describe the same area.	MPA • Page 152
	Q: You know how to describe square metres in terms of square millimetres. Is it easier to use that information to describe square metres in terms of square centimetres or to describe square kilometres in terms of square metres? Explain.	MPA • Page 154
	Q: You multiply a measurement by one million to write it using a different unit. What might the original unit and the new unit be?	

Grade 8 Open Questions that now align with Grade 6 Expectations

Grade 6 B2.4	Q: You buy three packages of meat with a total mass of 2 kg. One package has a mass of 0.358 kg. What could the other two masses be?	Number • Page 214
Grade 6 B2.6	Q: A number with a ones digit of 8 has 7 as a factor. What could the number be? What are its other factors?	Number • Page 206
	Q: How might you sort the following numbers into two different sets?	
Grade 6 B2.10	Q: What picture would you draw to make sense of what $3 \div \frac{3}{8}$ means?	Number • Page 218
Grade 6 B2.12	Q: You saved % on an item, which led to a savings of a little more than \$5. What do you think the item might have cost?	Number • Page 224
	Q: You are buying an item, and your goal is to save exactly \$47. What could the discount and the original cost be? Think of six or more possibilities, and justify two of them.	Number • Page 225
	Q: If you wanted to save about the same on a \$40 item at one store as you would save on a \$50 item at another store, how would the percent discounts have to compare?	Number • Page 226
	Q: Make a design with yellow, red, and blue pattern blocks. If the yellow is worth \$9, how much should your design be worth?	Number • Page 227

Grade 6 C2.3	Q: Zahra wrote $ax - b = *$ to figure out which term number in a pattern has a value of *. Choose values for a and b. Then, choose a high value that is in	MPA • Page 179
Grade 6 D1.2	Q: Conduct a survey or experiment in which the results are better suited for a histogram than a bar graph. Using a digital device, display your data on a histogram, and justify why a histogram is better for this data set than a bar graph.	GSSDP • Page 185
	Q: Collect either primary or secondary data that you think will be well suited for a histogram, and arrange your data in a frequency table with intervals. Next, display the data on a histogram. Then, make a second histogram with a different scale and/or intervals. What conclusions could you make based on each of your graphs?	GSSDP • Page 190
Grade 6 D1.3	Q: Andy thinks the best way to display the data that he is working with is by using a histogram. Collect primary or secondary data that could be similar to Andy's data, and display the data on a histogram.	GSSDP • Page 181
	Q: What other type of graph is a histogram most like? Why? What other type of graph is a histogram most different from? Why?	GSSDP • Page 183
	Q: Conduct a survey or experiment in which the results are better suited for a histogram than a bar graph. Using a digital device, display your data on a histogram, and justify why a histogram is better for this data set than a bar graph.	GSSDP • Page 185
	Q: Survey your classmates on a topic of your choice where the results are numbers. Using a digital device, display the data on two very different types of graphs. Tell which one you think gives a better sense of the data and why.	
	Q: Describe a situation where you would use a histogram and a situation where you would not use a histogram. Explain your answer. Then, repeat for scatter plots.	GSSDP • Page 187
	Q: "Histograms are not as useful as bar graphs." Do you agree with this statement? Why or why not?	
	Q: Collect either primary or secondary data that you think will be well suited for a histogram, and arrange your data in a frequency table with intervals. Next, display the data on a histogram. Then, make a second histogram with a different scale and/or intervals. What conclusions could you make based on each of your graphs?	GSSDP • Page 190
Grade 6 D1.5	Q: Describe a situation where you think that comparing the means of two data sets is the best way to compare the sets. Explain why you think this. Then, repeat for either median or mode.	GSSDP • Page 187

Grade 6 D1.6	Q: Tell how the shape of the same data can look very different on two different histograms. Give an example that supports your explanation. Explain why someone might want to graph data each of the two ways in your example.	GSSDP • Page 183
	Q: How are these graphs similar? How are they different?	GSSDP • Page 184
	Q: Collect either primary or secondary data that you think will be well suited for a histogram, and arrange your data in a frequency table with intervals. Next, display the data on a histogram. Then, make a second histogram with a different scale and/or intervals. What conclusions could you make based on each of your graphs?	GSSDP • Page 190
	Q: Some histograms show trends. Others do not. Create an example of a histogram that shows a trend. Repeat for a graph that doesn't show a trend. Then, describe any rates of change and trends that you see in your graphs.	GSSDP • Page 192
Grade 6 D2.2	Q: Draw a tree diagram or area model to help you calculate the theoretical probability of turning up two heads, two tails, or one of each when you flip two coins at the same time. Choose either 12, 16, or 20 rounds of flipping two coins. Then, flip two coins for the number of rounds that you chose. Record the results, and compare your experimental and theoretical probabilities.	GSSDP • Page 197
Grade 6 E1.1	Q: Which two of the following shapes do you think have the most similar geometric properties? Why?	GSSDP • Page 163
	Q: Using square dot paper, do the following: 1. Draw four different quadrilaterals that are rhombuses and four others that are not rhombuses. 2. Draw two diagonals through each quadrilateral by drawing a line from each vertex to the vertex that it does not share a side with. 3. Tell all the things that you notice after adding these diagonals...	GSSDP • Page 164
	Q: Provide students with a variety of printed quadrilaterals.) You start sorting quadrilaterals with a square in the middle of a Venn diagram like this... One of the rings has a rule that has something to do with the diagonals that could be drawn within each shape. The other two rings have rules regarding other geometric properties. Create a sorting rule for each ring, and sort six or more different quadrilaterals into the various sections of the rings. Then, repeat these steps while using the same shapes and starting with the square somewhere else.	GSSDP • Page 165
	Q: In some quadrilaterals, the diagonals in them are perpendicular bisectors. In other quadrilaterals, they are not. What do you know for sure about the quadrilaterals in each case? What are you not so sure about?	GSSDP • Page 166

Grade 6 E1.4	Q: How might this triangle have transformed from position A to position B?	GSSDP • Page 173
	Q: On grid paper, draw a map of our classroom. For the objects on your map, use simplified shapes that take up full squares. Then, perform eight or more transformations of some of the objects on your map that include translations, 90°, 180°, and 270° rotations as well as reflections to show how our classroom could be set up differently. Use precise language to explain each of your transformations.	GSSDP • Page 174
	Q: Think of an activity that you enjoy. Describe how you use transformations while doing this activity.	
	Q: Imagine that you are doing a chore or cleaning an area of your home. Tell how translations, rotations, and reflections are incorporated into this task.	GSSDP • Page 177
	Q: Which two types of transformations are the most similar? Explain your answer.	
Grade 6 E2.1	Q: A sign says that a new shopping mall will be 2 000 000 cm ² . Is it easy to tell if it is a giant mall, a small mall, or neither? Explain.	MPA • Page 152
	Q: Think of an object with either a surface area or a volume that people would not consider very big. Describe the object using different units so that it sounds big.	MPA • Page 153
	Q: What units could go in the blanks to make this statement true? Think of at least three pairs of units	MPA • Page 154
	Q: Choose a decimal number of square centimetres. Rename that area as a number of square metres.	

Grade 8 Open Questions that now align with Grade 7 Expectations

Grade 7 B1.3	Q: A rational number is just a little less than $-\frac{1}{2}$. What could this rational number be?	Number • Page 202
	Q: What are some ways you might represent $-\frac{2}{3}$?	
	Q: Suppose $-a/b > -c/d$. Explain which of the following could happen and when it could happen: a) a and b are closer together than c and d ...	Number • Page 203
	Q: Use the digits 0 to 9 to order the fractions from least to greatest. Use each digit only once. Try to do it three or more ways.	
	Q: How could you justify why $-\frac{2}{3} < -\frac{1}{4}$?	Number • Page 204
Grade 7 B2.6	Q: Name two numbers that are different, but have exactly the same numbers for prime factors. Name two or more other pairs of numbers with the same prime factors. What do you notice?	Number • Page 206
	Q: Choose a manipulative that you could use to show a common multiple and a common factor of a two-digit number and one-digit number of your choice. Using the same numbers, repeat with another manipulative. Then, repeat the whole thing with other sets of numbers.	Number • Page 207
	Q: Two numbers, each number with three prime factors, have eight common factors. What could the numbers be? List three common multiples of the two numbers. Explain why they have eight common factors.	Number • Page 208
	Q: List two numbers less than 10 that could not possibly be common factors of $8\boxed{} \times 5\boxed{}$. Then, list three numbers that definitely are. Explain.	Number • Page 209
	Q: How could you show why 45 is a common factor of 450 and 315?	
	Q: How could you show that 90 is a common multiple of 6 and 45?	

Grade 7 B2.7	Q: A number is created by multiplying several 2s by several 5s. What could the number be? Show how you calculated it.	Number • Page 198
	Q: A number greater than 10 420 is written as the sum of powers of 10 (in expanded notation). What do you know about the expanded form?	
	Q: How is 23 like 2×3 ? How is it different?	
	Q: Use the form X , replacing the s with whole numbers, to create at least eight numbers with values between 1000 and 2000. Do you think there are other numbers with values between 1000 and 2000? Why or why not?	Number • Page 199
	Q: Suppose you use different numbers for x and y . When is $xy > yx$? When is $xy < yx$?	
	Q: Find as many instances as you can when each of these is true: a) $2x = 4y$...	
	Q: Place the digits 2, 3, 4, 5, 6, and 8 in the blanks, and then write the number in standard form. Use each digit only once.	
	Q: Choose numbers between 1 and 15 for the blanks. Find the product and then write it in standard form.	Number • Page 200
	Q: The number X is much greater than 1000. What numbers might go in the two blanks? (You can use different numbers for the base and the exponent.) How do you know your numbers are correct?	
	Q: Do you think that a change in the base or a change in the exponent has more effect on the size of a number?	
Q: Do you think it's easier to change powers of 4 or powers of 5 to powers of other numbers? Explain.		
Q: Create a problem where you would add and multiply a decimal number to solve it. What is the answer?	Number • Page 214	
Q: You divide a decimal number by another number. The result has the same digits, but the decimal point moves two places. What number could you have divided by what number? Explain why.		
Q: You solved a problem involving multiplying decimals, and the answer was close to 4.2. What could the problem have been?		
Q: Do you think that $3(2+1)$ and $32 + 1$ should be worth the same or not? Explain.	Number • Page 220	
Q: If $ab < ba$, what might a and b be?	Number • Page 222	
Grade 7 B2.8	Q: How might you use pattern blocks to show a fraction multiplication question?	Number • Page 215
	Q: Use a series of diagrams to show why a lot of fraction products can be $\frac{3}{4}$.	Number • Page 217
Grade 7 B2.9	Q: How is dividing by 3.14 like dividing by a whole number? How is it different from dividing by a whole number?	Number • Page 212

Grade 7 B2.10	Q: Suppose you knew how far you could drive in 35 minutes. For what other times would it be easy for you to calculate how far you could drive?	Number • Page 227
	Q: Describe a situation where if you double one amount, a related amount also doubles.	Number • Page 228
	Q: You want to draw a graph to show the relationship between two amounts, but you want the graph to be a line. What might the relationship between the two amounts be?	Number • Page 230
	Q: Describe a situation where you might figure out something by using the proportion $38 = 218$.	
Grade 7 C2.2	Q: The value of the expression $3x + 9$ is a negative integer. What might the value of x be? Then, suppose the value of the expression is a fraction or a decimal. What might the value of x be?	MPA • Page 174
	Q: Use integer values for f and p , and evaluate the expression $8f - 6p + 4$. What do you notice about the values that you get for the expression?	MPA • Page 175
	Q: What is a value that you will never get when you evaluate $4x - 12y$ with integer values for x and y ? Explain why you will never get that value.	MPA • Page 178
Grade 7 C2.3	Q: An equation that includes -22 has a solution of -4 . What could the equation be?	MPA • Page 179
Grade 7 D1.2	Q: How could you organize recyclable materials into different categories?	GSSDP • Page 180
	Q: Conduct a survey about your classmates with the following conditions: • There are three or more categories. ...	GSSDP • Page 182
	Q: Survey your classmates on a topic of your choice where the results are numbers. Using a digital device, display the data on two very different types of graphs. Tell which one you think gives a better sense of the data and why.	GSSDP • Page 185
Grade 7 D1.6	Q: Construct two graphs. One should show how the radius and area of a circle are related, and the other should show how the radius and circumference of a circle are related. How are these graphs different? How are they the same?	MPA • Page 159
Grade 7 E1.3	Q: On centimetre grid paper, draw a rectangle. Next, draw two different rectangles that are mathematically similar to your first one. Tell how you know that your three rectangles are mathematically similar. Measure the side lengths, perimeter, area, and angles of each rectangle, and show the measurements in a table. Tell what relationships you see among the measurements.	GSSDP • Page 171
	Q: On centimetre grid paper, draw a right triangle with one side that is 6 cm and one side that is 8 cm. Find its area. Then, create two similar right triangles, and calculate their areas. What do you notice about the relationships between the side lengths and areas of each of your triangles?	

Grade 7 E1.4	Q: What might the coordinates of one or more vertices of a reflection of this parallelogram be? Explain your answer.	GSSDP • Page 173
	Q: Draw an irregular polygon in one of the quadrants of a Cartesian coordinate grid. Using the x-axis and y-axis as reflection lines, draw a reflection of your shape in two quadrants.	
	Q: A polygon is reflected on a Cartesian coordinate grid. One vertex of the original polygon is (1,), and one vertex of the reflected polygon is (, 4). Show how the polygon might have been reflected.	GSSDP • Page 175
	Q: Show four different ways that you can rotate an irregular polygon on a Cartesian coordinate grid. Use a variety of 90°, 180°, and 270° rotations and different points of rotation. Challenge a classmate to identify each of your rotations in detail.	
	Q: Show reflections by doing the following: 1. Draw an irregular polygon with five or more sides in the first quadrant of a Cartesian coordinate grid. 2. Reflect your polygon into quadrants 2 and 4 using the x-axis and y-axis as lines of reflection. Then, reflect the shape from quadrant 2 into quadrant 3 using the x-axis as a line of reflection...	GSSDP • Page 176
	Q: “It’s harder to reflect a shape using a diagonal line of reflection compared to a vertical or horizontal line of reflection.” Do you agree with this statement? Why or why not?	GSSDP • Page 177
Grade 7 E2.3	Q: How might this drawing help you estimate the circumference of the circle? How might it help you estimate the area of the circle?	MPA • Page 155
	Q: The circumference of a certain circle is about equal to the perimeter of a certain rectangle. What could the dimensions of the shapes be?	MPA • Page 156
	Q: The radius of Circle A is 1 cm greater than the radius of Circle B. Compare the diameters, circumferences, and areas of the two circles.	MPA • Page 158
	Q: Three circles have a radius, diameter, and circumference of 10 cm respectively. What might the other measurements of each circle be? What would the area of each circle be?	
	Q: Construct two graphs. One should show how the radius and area of a circle are related, and the other should show how the radius and circumference of a circle are related. How are these graphs different? How are they the same?	MPA • Page 159

Grade 7 E2.4	Q: Using a compass and grid paper, draw two or more different circles with the centre (5, 5). Then, draw two or more different circles where the circumference of each one runs through (5, 5).	GSSDP • Page 163
	Q: Use a compass and the first quadrant of a Cartesian coordinate grid to draw three circles — one for each of the following conditions...	GSSDP • Page 164
	Q: You think that it's easy to draw a circle of a specific size and location on a Cartesian coordinate grid with just two pieces of information. What is the information likely to be? Why?	GSSDP • Page 166
Grade 7 E2.5	Q: If you know the area of a regular decagon, how could that help you to figure out the area of a circle that fits just inside the decagon?	MPA • Page 155
	Q: Estimate the area of the faceoff circle at the centre of an NHL hockey rink. Explain your thinking.	
	Q: Create a design made of at least three circles with a total area of approximately 100 cm ² . How do you know your design is correct?	MPA • Page 156
	Q: The number of square centimetres in the area of one circle is less than the number of centimetres in its circumference. What could the radius be? What could the radius not be?	
	Q: The area of a certain circle is about half the area of a certain triangle. What could the dimensions of the two shapes be?	
	Q: Draw a right triangle with three different side lengths. On each side of the triangle, draw a half circle so that each side of the triangle is the flat side of a half circle. Determine the area of each half circle. What relationship do you notice among the areas of the three half circles?	MPA • Page 157
	Q: Research sizes and prices of small, medium, and large pizzas. Which pizza is the best deal?	
	Q: How could you create a triangle with an area of about $\frac{1}{2}$ of the area of a circle? The three points of the triangle must touch the edge of the circle. Why do you think your triangle works?	MPA • Page 158
	Q: The radius of Circle A is 1 cm greater than the radius of Circle B. Compare the diameters, circumferences, and areas of the two circles.	
	Q: Draw a picture to show why the area of a circle with a radius of 1 unit is about 3 square units.	
	Q: Three circles have a radius, diameter, and circumference of 10 cm respectively. What might the other measurements of each circle be? What would the area of each circle be?	
	Q: Construct two graphs. One should show how the radius and area of a circle are related, and the other should show how the radius and circumference of a circle are related. How are these graphs different? How are they the same?	
	Q: Would it be easier for you to draw a circle with four times the area of another circle or to draw a circle with four times the circumference of another circle? Explain.	MPA • Page 159

Grade 7 E2.6	Q: The surface area of a cylinder is close to 100 cm ² . What could the dimensions of the cylinder be?	MPA • Page 162
	Q: The surface area of one cylinder is about double the surface area of another cylinder. What could the dimensions of the two cylinders be?	MPA • Page 163
	Q: The area of the curved face of a cylinder is about 60 cm ² . What could the area of the base of the cylinder be?	
	Q: You can ask for two measurements to help you figure out the surface area of a cylinder. If you can't ask for the radius and height, what would you ask for?	MPA • Page 164
Grade 7 E2.7	Q: Estimate the number of cubic metres that would fit in your classroom. How did you make your estimate?	MPA • Page 152
	Q: Is it possible for a figure with a volume of 1 m ³ to sit on a table with an area of 10 cm ² ? If so, how is it possible?	
	Q: Provide students with a variety of irregularly shaped plastic objects and a measuring cup with a capacity of at least 2 L.) Choose three or more objects that you think have volumes greater than 500 cm ³ . Use displacement to determine the actual volume of each object.	MPA • Page 153
	Q: Create and solve a problem that requires calculating the volume of a hexagonal prism and then converting the volume to a different unit.	
	Q: Describe a volume using two different metric units. One value should be about 1000 greater than the other.	
	Q: A piece of food is shaped like a cylinder and has a small volume but a big surface area. What might it be?	MPA • Page 160
	Q: Which is probably greater — the volume of a roll of forty quarters or the volume of a roll of twenty-five \$1 coins? Why do you think that?	
	Q: The volume of a certain cylinder is about $\frac{3}{4}$ as much as the volume of a rectangular prism. How might their heights and widths compare?	MPA • Page 161
	Q: What might the volume of a soup can be? Why do you think that?	
	Q: How might you estimate the volume of a fist?	
	Q: The number of square centimetres in the surface area of a cylinder is much greater than the number of cubic centimetres in its volume. What could the radius and height of the cylinder be?	MPA • Page 162
	Q: You want to set up an aquarium for fish. What might the dimensions of your aquarium be? How many 1 L containers of water will your aquarium hold?	
	Q: The volume of a cylinder is close to 1000 cm ³ . What could the dimensions of the cylinder be?	MPA • Page 163
	Q: The volume of one cylindrical pot is four times as much as the volume of another cylindrical pot. How might their heights and radii compare?	MPA • Page 164
	Q: Is it easier to make a cylinder with six times the volume of a given cylinder by changing the height of the cylinder or by changing the radius of the cylinder, or are both ways easy? Explain.	
	Q: Which of these two is easier to figure out: how many times as great the volume of Cylinder B is than the volume of Cylinder A or how much greater the volume of Cylinder B is than the volume of Cylinder A? Explain.	
	Q: How is figuring out the volume of a cylinder similar to figuring out the volume of a rectangular prism? How is it different?	

QUESTIONS THAT NO LONGER ALIGN WITH CURRENT CURRICULUM	
Q: What do you know about the number that is the answer to 10×3.42 ?	Number • Page 212
Q: About how many litres of juice are there if there are three 5.[] L pitchers and two 3.[] L pitchers? Explain your thinking.	
Q: A garden had an area of about 21.5 m ² . What do you think the length and width might have been?	
Q: Create a pair of fractions so that when you add, subtract, multiply, or divide them, the order from least to greatest is the following...	Number • Page 216
Q: What is the best way to bisect an angle (divide it into 2 equal parts)?	GSSDP • Page 160
Q: Find two or three examples of triangles, quadrilaterals, and/or circles in our classroom that are not related to our math materials. Explain whether you think that each shape has a functional or an artistic purpose.	GSSDP • Page 163
Q: Find two or more examples of triangles, quadrilaterals, and/or circles in our classroom that are not associated with our math materials. Each shape should have a functional purpose. Explain why you think that a designer or engineer used each of the shapes rather than another shape in the items that you found.	GSSDP • Page 165
Q: Describe a situation where the geometric properties of a shape are important in real life.	GSSDP • Page 166
Q: Using 3-D construction shapes or toothpicks and modelling clay, create three different 3-D figures. Tell what you notice about the number of faces and vertices compared to the number of edges on each of your figures.	GSSDP • Page 172
Q: Simone is using a pattern to determine the number of edges on a polyhedron. What pattern might she be using?	
Q: Edwin says, “You don’t need to see a figure or know its name to figure out the number of edges that it has.” Do you agree with this statement? Why or why not?	
Q: How is it possible for the theoretical and experimental probabilities of an outcome to be a lot different from each other?	GSSDP • Page 198