Grade 5 • Curriculum Correlation

Grade 5 2020 Ontario Curriculum and Grades 4–8 • Open Questions for the Three-Part Lesson

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Grades 4–8 • 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*	G4–8 Book/ Page Number
B. NUMBER		
B1. Number Sense **Overall Expectation:** By the end of Grade 5, students will demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life		
Whole Numbers		
B1.1 read, represent, compose, and decompose whole numbers up to and including 100 000, using appropriate tools and strategies, and describe various ways they are used in everyday life	**Q:** What real-life situation might the number 25 000 describe?	Number • Page 62
	Q: A five-digit number has two 5s and two 4s. Is it possible for one of the 5s to be worth 1000 times as much as the other 5? Is it possible for one of the 4s to be worth 10 times as much as the other 4? Explain your answer.	
	Q: Why might it make sense to show 10 000 like this where each block is a base ten thousand block?	
	Q: You read a whole number less than 100 000 and say the words twenty, sixty, hundred, and eight. What do you know about that number?	
	Q: Tell three or more things about the number 22 5. The missing digits can be the same or different.	
	Q: You read a five-digit number. How many words might you say? Think of all the possibilities. Explain your reasoning. Which numbers use the fewest words? Which numbers use the most words? Why?	Number • Page 63
	Q: List three or more ways you could describe how much 23 117 is. Which way do you think is the most useful way? Why?	
	Q: Find in the media (in newspapers, in magazines, or on the Internet) two numbers that are greater than 1000 but less than 10 000. What do these numbers represent? How would you write them in words?	
	Q: Describe three or more ways you could represent the number 80 000. Describe how each representation might be useful.	Number • Page 64
	Q: Do you think there are more ways to represent the number 30 005 or the number 30 050? Why do you think that?	

B1.1 (continued)	**Q:** Use three words to write three or more five-digit numbers. What could the numbers be? What do you notice about the numbers?	Number • Page 114
	Q: How many words might you use to write a number less than 100 000? Give an example for each possible number of words. When would you use a lot of words? When would you use only a few words? How do you know there are no other possibilities?	Number • Page 115

B1.2 compare and order whole numbers up to and including 100 000, in various contexts	**Q:** About how close together could 2 0 and 41 be? You can use digits more than once.	Number • Page 65
	Q: Write down three five-digit numbers you would find easy to compare. Explain why they are easy to compare.	
	Q: A number is a little bit less than 100 000. What might it be?	
	Q: A number is a little bit greater than 10 019. What might it be?	
	Q: You write down a five-digit number. You switch some of the digits around, and now your number is 19 800 greater. What else could your original five-digit number have been? Is there more than one possibility for this number? How do you know?	Number • Page 66
	Q: Think of five-digit numbers where the sum of the digits is 24. List 10 or more possible numbers. Order them from least to greatest.	
	Q: Use the digits 0 to 9, using each digit only once, to fill in the blanks. Then, put the numbers in order from least to greatest. Try it again using different numbers.	
	Q: What numbers might be at the marked points? Justify your choices.	Number • Page 67
	Q: Can a five-digit whole number ever be worth less than a four-digit whole number? Explain why or why not.	
	Q: If a number is closer to 22 000 than to 23 000, what do you know about the number?	
	Q: A five-digit number has a lot of 9s in it, but it is not worth that much more than 10 000. How is that possible?	
	Q: Jasmine says that to decide which number is greater, you compare the highest-value digits of the numbers. Do you agree or disagree? Explain.	

Fractions, Decimals, and Percents		
B1.3 represent equivalent fractions from halves to twelfths, including improper fractions and mixed numbers, using appropriate tools, in various contexts	**Q:** Use pattern blocks to show two equal fractions.	Number • Page 23
	Q: Choose three different fractions. Using counting rods, model each fraction in more than one way. Explain why your models are correct each way. Decide whether there is always more than one way to model any fraction. Explain your thinking.	Number • Page 24
	Q: Use a fraction tower to find all the equivalent fractions you can. What do you notice about the denominators of equivalent fractions?	Number • Page 25
	Q: Is it possible for X to be equivalent to X? How?	Number • Page 26
	Q: Why might some people say that the fraction shown is X and other people say it is X?	Number • Page 72
	Q: What number makes sense for the dot on the number line? Use a mixed number name and an improper fraction name.	
	Q: What mixed numbers or improper fractions do you find easy to model with pattern blocks?	
	Q: Which of these fractions does not belong? ... Explain why.	
	Q: The number X is changed to a fraction. What do you know about the fraction?	
	Q: Model several improper fractions that could be written as mixed numbers of the form X. Tell how the pictures are alike and how the pictures are different.	Number • Page 73
	Q: Name three improper fractions that you see in the diagram below. Tell where you see them. Tell what mixed number each fraction represents. Do you think it is easier to see the number as a mixed number or as an improper fraction? Why?	
	Q: Model X in four or more different ways. Tell what each way shows you about X.	Number • Page 74
	Q: Choose three or more improper fractions that have something in common. Describe what they have in common. Model the fractions in two or more ways. Tell what each model shows about the fraction.	
	Q: Model three improper fractions with a numerator of 10. How are the fractions the same? How are the fractions different?	Number • Page 75
	Q: Model two or more improper fractions with a denominator of 8. How are the fractions the same? How are the fractions different?	
	Q: Show that the same amount might be 92 of one thing but 94 of another thing. Could the amount be a different fraction, too?	
	Q: Tell four or more things about the fraction 13/4 .	

B1.3 (continued)	**Q:** A fraction is equivalent to 83 . What do you know about the numerator and denominator of the equivalent fraction?	Number • Page 76
	Q: Use pattern blocks to show two equal mixed numbers.	
	Q: Think about all of the fractions that are equivalent to X. Which of these is possible? • The difference between the numerator and denominator is 6.	Number • Page 78
	Q: Is it possible for the two improper fractions X and X to be equivalent? How could the two improper fractions be equivalent?	Number • Page 79
	Q: Why might someone say that the red pattern block is 1 ., but someone else might say it's a different fraction?	Number • Page 124
	Q: One improper fraction is much less than another. What might the two fractions be? How do you know?	
	Q: What improper fractions or mixed numbers do you see in this pattern? List four or more fractions.	Number • Page 125
	Q: Choose an improper fraction. Create three or more representations of that fraction. At least two of the representations should be similar. Tell why the representations are similar. Why are the other representations not quite as similar as these two representations?	
	Q: Model three different improper fractions with a numerator of 6. What is the same about all of them? What is different?	Number • Page 126
	Q: Model several different improper fractions with a denominator of 8. What is the same about all of them? What is different?	
	Q: Is it possible for the improper fraction X to be equivalent to X ? Why?	Number • Page 129

B1.4 compare and order fractions from halves to twelfths, including improper fractions and mixed numbers, in various contexts	**Q:** How would you fill in these blanks to make these fractions easy to compare? 4 and 5 . Explain.	Number • Page 23
	Q: One fraction is a lot less than another fraction. What might the two fractions be? How do you know your answer is right?	
	Q: Is there a fraction between X and X? Explain your answer.	
	Q: Create a sentence that includes all of these words and numbers: ...	
	Q: Choose a fraction. Add one to the numerator and one to the denominator. Model this fraction. Is the second fraction greater than, less than, or the same size as the first fraction? Repeat this process with three other fractions. Do you think the change in the size of the fraction depends on the fraction you start with?	Number • Page 24
	Q: Think of some fractions where the numerator of a fraction is three less than the denominator. Which of these could be true? • The fraction is less than ... Explain your thinking. ...	
	Q: Build the designs described below using blue (rhombus), green (triangle), and red (trapezoid) pattern blocks on top of two yellow (hexagon) pattern blocks. You will be figuring out what fraction of the two yellow blocks each colour covers. List the three fractions in order from greatest to least. ...	Number • Page 25
	Q: A fraction is just a little less than ó. What might it be? How do you know?	Number • Page 26
	Q: List three fractions with different denominators that are easy to put in order. Explain why it is easy to order them.	
	Q: Name three fractions less than X . How do you know they are less than X?	
	Q: When would X be less than X? Why is that true?	
	Q: Use counting rods to model both ⅘ and 54 at the same time. Explain how the model works.	Number • Page 76
	Q: Choose four fractions that are just a bit greater than 2. What do the fractions have in common? How are they different?	
	Q: Do you think there are more fractions between and or between and? Explain your reasons.	

B1.4 (continued)	**Q:** Place the following numbers on a number line. Tell how you decided where they should go on the number line.	Number • Page 77
	Q: Choose three different improper fractions. Add 3 to each numerator and 3 to each denominator. Is the new fraction greater than or less than the original, or is it equal to the original? Why does what happened after you added 3 to each numerator and denominator make sense?	
	Q: Suppose the numerator of a fraction is 9 more than the denominator. Which of the following statements could be true? • The fraction is greater than 2. ...	
	Q: Is there a single digit that you can place in all of the following statements to make them true? Are there others? Explain.	Number • Page 78
	Q: A fraction is just a little greater than 1 31 .What might the fraction be? How do you know?	Number • Page 79
	Q: You are going to compare two mixed numbers: X and X. What information is the most important in order to decide which number is greater?	
	Q: List three improper fractions with different denominators that are easy to put in order. Explain why it is easy to put them in order.	
	Q: Is it easier for you to compare two improper fractions or two mixed numbers? Why?	
	Q: Use a diagram to show a mixed number and what its improper fraction equivalent is.	Number • Page 127

B1.5 read, represent, compare, and order decimal numbers up to hundredths, in various contexts	**Q:** You are counting by hundredths starting at 5.28. What words will you hear a lot when you count the first 30 numbers? Which words won't you hear as much when you count the first 30 numbers? Why?	Number • Page 80
	Q: You read a number of the form X. What is true about how you would read it no matter what digits are inserted?	
	Q: Create a number of the form X, where one of the digits is worth exactly 100 times as much as another of the digits.	
	Q: A number is of the form X. What do you know for sure about the number? What else might be true about the number?	
	Q: Shade in these amounts on hundredths grids and write the amounts as decimal numbers: a) a number greater than 0.45 ...	Number • Page 81
	Q: Choose a decimal number of the form . . Represent and describe the number in four or more ways. Tell what each way shows about your number.	
	Q: Create a number line and mark where each of these decimals would appear on the line: 0.41, 0.9, 2.24, 1.28, 0.85, and 2.5 Explain your placement of the numbers.	
	Q: Draw some lines of different lengths. Measure them and tell how many metres (not centimetres) long each line is.	
	Q: How are the decimals 0.45 and 0.35 alike? How are they different?	Number • Page 82
	Q: How are the two 5s in 5.25 different?	
	Q: Do you think it is more helpful to read 1.23 as one and 23 hundredths or as one and two-tenths and three-hundredths?	
	Q: Choose a starting decimal hundredth and count by hundredths for 10 or more numbers. What do you notice?	
	Q: Which two decimal numbers do you think are most alike? Why?	Number • Page 83
	Q: A decimal number is between 0.3 and 0.4. What might the number be? Which value is it closest to?	
	Q: A decimal number is just slightly less than 1.5. What might it be? Explain.	
	Q: Prepare a guidebook that would tell the person who reads it how to compare a number that is a decimal tenth to a number that is a decimal hundredth. Make sure to explain the importance of each step.	Number • Page 84

B1.5 (continued)	**Q:** Is there a single digit that you can place in all of the s that makes all these statements true? Are there other digits that would make all these statements true?	Number • Page 85
	Q: Put the digits 0 to 9 in the blanks to make this order from least to greatest correct. Use each digit only once. Think of many possibilities.	
	Q: How could 0. be greater than 0. ?	Number • Page 86
	Q: For each statement, find numbers where the hundredths digit is 4 more than the tenths digit and makes the statement true: a) The decimal is less than 4.28 ...	
	Q: Which digit in 3.28 matters most when you are comparing it to another decimal in order to decide which decimal is greater?	
	Q: Choose three numbers between 10and 12 with decimal hundredths. Two of them should be very close together but have different tenths digits. The third decimal number should be less than the other two. Order them from least to greatest.	
	Q: You read an amount of money, and some of the words you say are twenty, cents, five, dollars, and fifty. What amount might use these words?	Number • Page 93
	Q: Write down four amounts of money that include dollars and cents. Use each of the ten digits at least once. Includeat least one amount greater than $100. Write down the words you would say to describe each amount. Repeat two or more ways.	Number • Page 94

B1.6 round decimal numbers to the nearest tenth, in various contexts	**Q:** A person's height is estimated as 1.6 m. How many metres might the actual height be?	Number • Page 83
	Q: Is there a single digit that you can place in all of the s that makes all these statements true? Are there other digits that would make all these statements true?	Number • Page 85
	Q: Describe a number of the form X that you would round up to round to the nearest tenth, but round down to round to the nearest whole number.	Number • Page 86
B1.7 describe relationships and show equivalences among fractions, decimal numbers up to hundredths, and whole number percents, using appropriate tools and drawings, in various contexts	**Q:** It is easy to write the decimal X as a fraction. What might the decimal be?	Number • Page 80
	Q: Choose three fractions you can show as decimal hundredths. Use materials to show how the decimals and fractions are equal. Then, choose three fractions that you can't show as decimal hundredths. Explain why you can't show the fractions as decimal hundredths.	Number • Page 82
	Q: Draw several pictures that would help someone see why 0.1 = 0.10.	Number • Page 84

B2. Operations **Overall Expectation:** By the end of Grade 5, students will: use knowledge of numbers and operations to solve mathematical problems encountered in everyday life		
Properties and Relationships		
B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers and decimal numbers, including those requiring more than one operation, and check calculations	**Q.** Two whole numbers are as easy to add and subtract mentally as they are to multiply. What might they be?	Number • Page 90
	Q. I multiplied a number by 7 in my head by multiplying it by a slightly larger number and taking some away. What number might I have multiplied by 7?	Number • Page 92
	Q. Why might it be easier for someone to multiply 4 X 26 in her head than 3 X 78?	
	Q. When do you find it easy to subtract two numbers greater than 50 in your head? Why?	
	Q. A bus holds 48 students. Would you figure out how many students are on four buses the same way you'd figure out how many students are on nine buses if you were calculating in your head? Explain.	
	Q. How could knowing that 2.14 − 0.85 = 1.29 help you solve other decimal subtraction questions?	Number • Page 96
	Q. To add two decimals in her head, Ava subtracted 0.2 from one of the numbers and added 0.2 to the other number. What might the question have been? Why can she do that?	
	Q. Fletcher said that to subtract two decimals, you can ignore the decimal points, subtract the numbers, and then put the decimal point back. Do you agree or disagree? Explain.	
	Q. You solve a problem involving multiplication of two two-digit numbers, and the product is about 300. What might the problem have been?	Number • Page 96
	Q. How would you break up 39 and/or 25 to multiply 39 X 25?	Number • Page 100
	Q. Why is it just as easy to multiply a number by 200 as by 2?	
	Q. Would you use the same strategies to multiply X and X? Explain.	
	Q. Choose a two-digit number that does not end in zero. Explain how you would use mental math to multiply it by 6.	Number • Page 144
	Q. You want to divide a number in your head by first dividing it by a bigger number. What might you be dividing by and why?	

Math Facts		
B2.2 recall and demonstrate multiplication facts from 0 × 0 to 12 × 12, and related division facts	**Q.** You walk almost 4 km. How many metres do you think you might have walked?	Number • Page 90
	Q. Two whole numbers are as easy to add and subtract mentally as they are to multiply. What might they be?	
Mental Math		
B2.3 use mental math strategies to multiply whole numbers by 0.1 and 0.01 and estimate sums and differences of decimal numbers up to hundredths, and explain the strategies used	**Q:** How is multiplying 0.01 X 34 similar to multiplying 0.34 X 100?	Number • Page 153
	Q: Do you think it is easier to multiply by 0.1 or divide by 10 to calculate one-tenth of 384?	
	Q: You multiply a whole number by 0.1, and there is a 4 in the tenths place. If you multiply that same number by 0.01, there is a 7 in the ones place. What might the number be? Why are there so many options?	

Addition and Subtraction		
B2.4 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 100 000, and of decimal numbers up to hundredths, using appropriate tools, strategies, and algorithms	**Q:** Two schools each sent more than 300 students to an event. One school sent almost twice as many students as the other. Using mental math, decide how many students each school sent, and calculate the total number of students. Describe your strategies. Try lots of possibilities.	Number • Page 91
	Q: You add two decimal hundredths and subtract a third one. The result is a bit more than 3. What could the numbers be?	Number • Page 93
	Q: The answer is 3.12. What might the question have been?	
	Q: You add a decimal tenth to a decimal hundredth and the answer is 3.92. What might the numbers have been?	
	Q: Fill in the blanks with the digits 0 to 9, using each digit only once, to make the equations true.	Number • Page 94
	Q: You bought something and paid the clerk $50. You got two bills and four coins in change. How much money might you have spent? Think of two or more possibilities. Explain your answer.	
	Q: Two problems are each solved by subtracting 1.32 from another decimal. What real-life problems might these two problems have been? Solve each one.	
	Q: Write an instruction manual for other students to teach them how to subtract decimal hundredths from decimal tenths.	Number • Page 95
	Q: You are subtracting two decimal hundredths. What is the best way to estimate the answer?	Number • Page 96
	Q: Use a diagram to show a mixed number and what its improper fraction equivalent is.	Number • Page 127
	Q: You subtract two whole numbers and estimate the difference to be 420. What might the numbers be?	Number • Page 142
	Q: Two nearby towns decide to join together to become a single town to save administrative costs. The total population of the two towns is about 8000, but the larger town's population is about 500 more than the smaller town's population. What might the exact population of the two original towns be? Think of at least three possibilities. Describe your strategy for at least one choice.	Number • Page 143
	Q: Create a question involving the addition and subtraction of four-digit numbers that might look difficult, but is really pretty easy. Explain why it's easy.	Number • Page 144

Multiplication and Division		
B2.6 represent and solve problems involving the multiplication of two-digit whole numbers by two-digit whole numbers using the area model and using algorithms, and make connections between the two methods	**Q:** How might knowing that there are 24 hours in a day help you solve other math problems involving time where large numbers are involved?	Number • Page 70
	Q: Which expression do you think does not belong? ...	Number • Page 98
	Q: You solve a problem involving multiplication of two two-digit numbers, and the product is about 300. What might the problem have been?	
	Q: Use the digits 0 to 9 to make these equations true. Use each digit only once.	Number • Page 99
	Q: Choose four or five sets of two-digit numbers so that the total amount for the problem below is greater than 500 but less than 700. Solve each problem. ...	
	Q: Choose three pairs of two-digit numbers. Create problems that would involve multiplying these numbers. Then, solve the problems.	
	Q: To model X, Sarah used 20 base ten blocks. What might her model have looked like? What other two-digit multiplications might be modelled with 20 base ten blocks?	
	Q: Choose a multiplication involving two two-digit numbers that would be easy to solve in two or more ways. Explain your thinking.	Number • Page 100
	Q: What are some good ways to estimate X? Which of your estimates do you think is closest to the exact answer? Why?	
	Q: You solve a problem where you divide 442 by 3. What might the problem be? How would you estimate the result?	Number • Page 142
	Q: How might you multiply 40 X 32 mentally?	
	Q: You multiply two numbers in your head. The answer is about 400. What numbers might you have multiplied?	
	Q: You solve a problem involving the multiplication of a two-digit number by a four-digit number, and the answer is about 100 000. What might the problem be? Explain.	Number • Page 145
	Q: Choose a two-digit number and a four-digit number. Create a problem that involves multiplying these two numbers, and then solve the problem. Create three other problems with different sets of numbers.	Number • Page 146
	Q: Describe two or more good ways to estimate 4930 X 38. Which of your estimates do you think is closer to the exact product? Why?	Number • Page 147

B2.7 represent and solve problems involving the division of three-digit whole numbers by two-digit whole numbers using the area model and using algorithms, and make connections between the two methods, while expressing any remainder appropriately	**Q:** City politicians decide that there should be one community centre for every 5000 people. How many community centres do you think they should build for a population of 32 800 people? How did you decide that?	Number • Page 68
	Q: A hockey arena holds 13 224 people. About how many games would it have to sell out for there to be 100 000 seats sold?	
	Q: How would knowing how many days 100 hours is help you figure out how many days 10 000 hours is? How does knowing this help you figure out how many days 100 000 hours is?	Number • Page 70
	Q: How might knowing that there are 24 hours in a day help you solve other math problems involving time where large numbers are involved?	
	Q: You divide a four-digit number by a two-digit number. What do you know about the product?	Number • Page 145
	Q: What is an example of a situation where you might divide 1200 by 4?	
	Q: Create and solve three problems that would be solved by dividing 3008 by 12. Make the problems seem quite different.	Number • Page 146
	Q: This number line shows a division of a four-digit number by a two-digit number. Choose a value for the jump size and a value for point A, and explain what division it shows. Repeat with a different jump size and a different value for A.	
	Q: Choose a division where you would divide a four-digit number by a two-digit number that would be easy to do. Explain your thinking.	Number • Page 147
	Q: Does it make sense to say that X is halfway between __ and __? Explain.	

B2.8 multiply and divide one-digit whole numbers by unit fractions, using appropriate tools and drawings	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	

B2.9 represent and create equivalent ratios and rates, using a variety of tools and models, in various contexts	**Q:** You travel 180 km in two hours. At that rate, tell how far you could go for other amounts of time.	Number • Page 104
	Q: Decide on a price for 12 doughnuts. At that price, what will 9 doughnuts cost?	
	Q: If you know that 8 books cost $38, what other numbers of books would be easy to figure out the cost of at that rate?	
	Q: Choose prices so that the cost of one T-shirt is slightly more than the cost of one pair of shorts. Tell how you solved the problem. ...	Number • Page 105
	Q: If you know how much 6 items cost, what different strategies could you use to figure out the cost of 8 items?	Number • Page 106
	Q: Choose values for the missing numbers to make the following statement true. Explain your thinking. ...	
	Q: Describe some problems you could solve by knowing that someone's heart rate is 72 beats per minute. Solve one of the problems.	
	Q: Tell everything you can about the number of red counters versus the number of blue counters.	Number • Page 130
	Q: If you flip a coin10 times, what ratios of heads to tails do you think you are likely to get? What ratios are you unlikely to get? Why?	
	Q: Choose one of these ratios. Describe a situation when you are likely to see this ratio. 1:10 1:1 17:10	
	Q: Which of these ratios do you think might describe the ratio of the number of classrooms in a school to the number of students in the school? Why would only the one(s) you chose be possible?	
	Q: Use two colours of counters. Set up a situation where there are more than three times as many colour A counters as colour B counters. Then, describe each of these ...	Number • Page 131
	Q: Choose a ratio. Model that ratio three or more ways. How are the models alike? How are the models different?	
	Q: Find three or more recipes used to create drinks or desserts. What ratios of the ingredients are typical in these sorts of recipes?	

B2.9 (continued)	**Q:** Do you think that the ratios 5:2 and 24:10 are more alike than the ratios 5:2 and 20:17? Explain.	Number • Page 132
	Q: How are ratios like fractions? How are they different?	
	Q: Why would someone say the ratio of 1:2 is equivalent to the ratio of 2:4?	
	Q: Suppose you are comparing two amounts using a ratio and the first term is greater than the second term. What do you know for sure about the comparison?	
	Q: A model of yellow and red counters shows the ratio 4:5. What fractions might it also show?	Number • Page 161

Grades 4–8 • Open Questions for the Three-Part Lesson: *Measurement • Patterning & Algebra* [MPA]

2020 Ontario Curriculum Expectations	Open Questions for the Three-Part Lesson: *Measurement • Patterning & Algebra*	G4–8 Book & Page Number
C. ALGEBRA		
C1. Patterns and Relationships **Overall Expectation:** By the end of Grade 5, 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 describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts	**Q:** Find a repeating pattern based on translations somewhere around you.	MPA • Page 72
	Q: What clues would you use to decide whether a pattern is a repeating translation pattern?	MPA • Page 75
C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs	**Q:** Make a geometric pattern using a different number of square tiles for each term. Describe your pattern.	MPA • Page 72
	Q: Create a number pattern that grows very slowly.	
	Q: Create four increasing number patterns. Make one of the patterns increase by 7. Increase each pattern by a different number. Include the number 120 in all of the patterns. Describe which term is 120 in each pattern.	MPA • Page 73
	Q: The 20th term in a shrinking pattern is in the 500s and the 30th term is in the 300s. What might the pattern be? How do you know you are right?	
	Q: Create a geometric growing pattern that uses exactly 50 shapes in the first 5 terms.	
	Q: Create a geometric growing pattern that uses 26 shapes in the sixth term. How many shapes are used in the first 11 terms? Explain.	MPA • Page 74
	Q: Create a repeating translation pattern where the distance moved to the right is much greater than the distance moved up or down. Then, create a repeating translation pattern where the distance moved to the right is triple the distance moved up or down.	
	Q: You predict that the 20th term of a growing number pattern is close to 600, but it is not exactly 600. What could the pattern be? Think of two or three possibilities. Explain how you created each pattern.	

C1.2 (continued)	**Q:** The 30th term in a growing number pattern is the same as the 15th term in another growing number pattern. What could the two patterns be?	MPA • Page 74
	Q: Create a pattern that is more like the pattern 200, 197, 194, 191, ... than it is like the pattern 147, 145, 143, 141, ... Explain why your pattern is more like the first pattern.	MPA • Page 75
	Q: Create a growing number pattern and a shrinking number pattern that have the same 20th term. Explain how you know they have the same 20th term.	
	Q: You can see the top part of the tiles in a pattern, but you can't see all of the tiles. What could a related number pattern be? Explain your thinking.	MPA • Page 76
	Q: The second term in a pattern is 2 and the third term is 4. Create a table of values for the first 10 terms.	MPA • Page 77
	Q: Create a number pattern that increases by 3. Then, show two ways to model the pattern. Which model do you think makes it easier to see the increase of 3? Why?	MPA • Page 78
	Q: Create a table of values for a pattern based on multiplying each term by the same number to get the next term. Model the first four terms of the pattern.	
	Q: The third term of a growing pattern is 10. Create the first six rows of a table of values to represent a possible pattern. Model the first four terms of the pattern with square tiles or counters.	
	Q: Create a shrinking pattern with square tiles. Use a table of values to describe the number of tiles used for each figure in the pattern.	MPA • Page 79
	Q: Create a growing pattern that includes the number 20. Show the pattern in a table of values. Then, model the pattern to make it obvious that it's a pattern. Explain why this is obvious.	

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns	**Q:** What numbers might go in the blanks? Why? Think of more than one possibility.	MPA • Page 72
	Q: Describe two number patterns where you think it's easy to predict the 20th term. Explain why you think it's easy.	MPA • Page 75
	Q: The 10th term in a growing number pattern is 38. The 50th term is more than 100. What do you predict about the 100th term? Why?	
	Q: Can you predict the 50th term value in this pattern? Are you sure?	MPA • Page 76
	Q: Choose a number to start a growing pattern. Choose a value to add to each term to get the next term. Make a table of values for the first 5 terms.	
	Q: A table of values shows a shrinking pattern. What could the table look like for the first 10 rows?	MPA • Page 77
	Q: The second term in a pattern is 2 and the third term is 4. Create a table of values for the first 10 terms.	
	Q: Create a number pattern that increases by 3. Then, show two ways to model the pattern. Which model do you think makes it easier to see the increase of 3? Why?	MPA • Page 78
	Q: Create a table of values for a pattern based on multiplying each term by the same number to get the next term. Model the first four terms of the pattern.	
	Q: The third term of a growing pattern is 10. Create the first six rows of a table of values to represent a possible pattern. Model the first four terms of the pattern with square tiles or counters.	
	Q: Create a shrinking pattern with square tiles. Use a table of values to describe the number of tiles used for each figure in the pattern.	MPA • Page 79
	Q: Create a growing pattern that includes the number 20. Show the pattern in a table of values. Then, model the pattern to make it obvious that it's a pattern. Explain why this is obvious.	
	Q: What do you think a table of values describing a pattern is most useful for?	MPA • Page 80
	Q: Do you think it is usually easier to figure out the pattern rule for a geometric pattern from looking at its shapes or from looking at a table of values? Explain your thinking.	
	Q: Choose values for the blanks in this pattern rule: Start at ☐ and subtract ☐ from each term to get the next term. What could the table of values look like for the first five terms?	

C1.3 (continued)	**Q:** If you know the term values in the third and sixth rows of a table of values for a pattern, how sure can you be of the term value in the ninth row? Explain your thinking.	MPA • Page 80
	Q: Which rows do you think you need to see in a table of values before you are pretty sure what a pattern is?	

C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal tenths and hundredths	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	

C2. Equations and Inequalities **Overall Expectation:** By the end of Grade 5, students will demonstrate an understanding of variables, expressions, equalities, and inequalities, and apply this understanding in various contexts		
Variables		
C2.1 translate among words, algebraic expressions, and visual representations that describe equivalent relationships	**Q:** Fill in the blanks to describe a relationship. If you double ____, then you automatically double ____.	MPA • Page 142
	Q: When you read a certain algebraic expression, you say the words "triple" and "more." What might the expression be? Describe what the expression means.	
	Q: Choose a babysitting fee for one hour. If you graphed the relationship between the amount earned and the number of hours spent babysitting, what would be true about your graph?	MPA • Page 146
	Q: Choose an algebraic expression involving p. What pattern does that expression relate to? Why?	
	Q: Choose a value for a in the general term $a \bullet x + 4$ 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 $4f + 2t = 100$.	
	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.	MPA • Page 177

C2.1 (continued)	**Q:** Create a game where you have to match algebraic expressions or equations with words that describe them.	MPA • Page 177
	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?	
	Q: S and T describe the amounts that Selena and Tammy have in savings. If you know that $S + T$ is \$180, what else do you know about S and T?	MPA • Page 81
	Q: Jerron, Liam, and Adrian pooled their money to buy a \$100 present. Jerron put in more than Liam but less than Adrian. Suppose J, L, and A are the amounts they put in. How would you describe the total amount? What do you know about the possible values for J, L, and A?	
	Q: What could the missing numbers be in this equation?	MPA • Page 82
	Q: Think of some situations that could be described with $P = 2 \times Q$. In each situation, what would P represent? What would Q represent?	
	Q: You have learned a lot of facts about operations. For example, you can add numbers in any order: $a + b = b + a$. Choose three facts about operations and represent each fact using variables.	
	Q: You want to represent the relationship between a, b, and c with a picture. What pictures might you draw for $a \times b = c$?	
	Q: Suppose 4 × □ = . What other equations relating □ and △ must also be true?	
	Q: The equation $P = (2 \times l) + (2 \times w)$ relates the length and width of a rectangle to its perimeter. What values are possible for l, w, and P? Are only certain values possible, or are all values possible?	MPA • Page 83

C2.2 evaluate algebraic expressions that involve whole numbers	**Q:** Create an algebraic expression involving the variable *x*. Evaluate it for a high value of *x*. Then, evaluate it for a low value of *x*.	MPA • Page 143
	Q: If you substitute values of *x* that are natural numbers (counting numbers greater than 0) in the algebraic expression 3 • *x* − 4, you can create a pattern. Which term values in the pattern are about 200 apart?	
	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 4*x* + ▯, 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

Equalities and Inequalities		
C2.3 solve equations that involve whole numbers up to 100 in various contexts, and verify solutions	**Q:** You think it is easy to figure out the missing number in a division equation. What might the equation be, and why do you think it is easy?	MPA • Page 81
	Q: Fill in the blanks to make a three-digit number and a one- digit number. Explain how you chose your numbers.	
	Q: What could the missing numbers be in this equation?	MPA • Page 82
	Q: Think of some situations that could be described with $P = 2 \times Q$. In each situation, what would P represent? What would Q represent?	
	Q: Suppose 4 × □ = . What other equations relating □ and △ must also be true?	
	Q: A division equation has a missing number. You figure out that the missing number is 12. What might the equation be?	MPA • Page 83
	Q: You figure out the missing number in a subtraction equation by adding. What might the equation be?	
	Q: The solution to four different equations is 5. One is an addition equation, one is a subtraction equation, one is a multiplication equation, and one is a division equation. What could the equations be?	
	Q: The equation $P = (2 \times l) + (2 \times w)$ relates the length and width of a rectangle to its perimeter. What values are possible for l, w, and P? Are only certain values possible, or are all values possible?	
	Q: The missing number in one equation is double the missing number in another. It's easy to see right away that it's double. What might the equations be? Why is it easy to see that the missing number is double?	

C2.4 solve inequalities that involve one operation and whole numbers up to 50, and verify and graph the solutions	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	

C3. Coding **Overall Expectation:** By the end of Grade 5, 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 conditional statements and other control structures	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	
C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	

C4. Mathematical Modelling **Overall Expectation**: By the end of Grade 5, 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:** Research to find a location in the world where the average summer and winter temperatures are very close. Find another location where the average summer and winter temperatures are very far apart. How close is the first set of temperatures? How far apart is the other set of temperatures? How are the locations different?	MPA • Page 68
	Q: A store sells refrigerators for $1,200. How many refrigerators might the store have in its warehouse? Estimate how much money the store would make from selling all of the refrigerators.	Number • Page 68
	Q: About how long would it take for two or more of these to happen? Explain how you calculated your answer. • a movie theatre selling $100,000 worth of tickets ...	Number • Page 69
	Q: An office has some boxes holding 250 staples and some boxes holding 500 staples. There are more boxes with 500 staples than boxes with 250 staples. If there are exactly 100 000 staples altogether, how many of each type of box might there be? Show your thinking.	
	Q: If you blink about 16 times a minute, about how long would it take to blink about 100 000 times?	
	Q: Describe three or more real-life problems where 25 000 is the answer.	Number • Page 69
	Q: What real-life problem might you solve by knowing how many 2000s make 100 000?	
	Q: Estimate the total distance in metres that you walk each day. Show how you came up with your estimate.	MPA • Page 89
	Q: What might the mass in kilograms of the water in a swimming pool be?	
	Q: Suppose an apple tree produces enough apples each year to fill 20 boxes with a mass of about 20 kg each. About how many apples might that be?	

C4. (continued)	**Q:** You are driving a long way. How much faster will you get there if you increase your speed by 10 km/h?	Number • Page 105
	Q: A car uses a little less than 9 L of gas for every 100 km it travels. Think of three friends or relatives who live far away. Estimate how much you would spend on gas to visit each friend and then return home.	
	Q: Research how a person's rate of growth (in height) changes as he or she grows up. Describe what you learned, and then apply that information to predict the height of a new baby, who is now 50 cm tall, at different stages in his or her life. Then, compare this rate of growth to the rate of growth of a maple tree. Describe the differences.	

Grades 4–8 • Open Questions for the Three-Part Lesson:
Geometry and Spatial Sense • Data Management and Probability [GSSDP]

2020 Ontario Curriculum Expectations	Open Questions for the Three-Part Lesson: *Geometry and Spatial Sense • Data Management and Probability*	G4–8 Book & Page Number
D. DATA		
D1. Data Literacy **Overall Expectation:** By the end of Grade 5, 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 explain the importance of various sampling techniques for collecting a sample of data that is representative of a population	**Q:** When conducting a survey with a large group of people, Landon thinks that you should survey just some of the people in the group to get an idea of what everyone's answer would be. Eika thinks that you should survey all of the people in the group. Which person do you agree with? Why?	GSSDP • Page 62
	Q: Imagine that a teacher is trying to decide on snacks to bring for a class party. To help herself decide, the teacher puts each of her students' names in a hat and draws one name out. The teacher allows the person whose name is drawn to decide on the snacks for the class. Is this a fair way to decide? Why or why not?	GSSDP • Page 63
	Q: What data might you be asked to collect that would help with improving the school in some way? Who would you collect the data from, and how would you collect the data? Tell why you think that your plan would work well.	GSSDP • Page 64
	Q: Imagine that a large population needs to be surveyed. Describe what this large population could be. Next, describe why this large population might be surveyed. Tell who you would survey in a sample survey to get a good idea of how this population feels about the topic. Tell why your sample group would work well.	GSSDP • Page 68
	Q: How many people would you need to survey from our class regarding a certain issue in order to get a good idea of how the whole class feels? Explain your answer.	GSSDP • Page 108

D1.1 (continued)	**Q:** How might you collect data about your classmates in a fair way? How might you collect data about your classmates in an unfair way?	GSSDP • Page 142
	Q: "It's better to conduct a census than a survey sample." Do you agree with this statement? Why or why not?	GSSDP • Page 145
	Q: Describe a way that you can create bias when collecting data. Then, describe a way that you can create bias when displaying data.	
	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: A. using a representative sample B. using a non-representative sample C. using a census	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.	

D1.2 collect data, using appropriate sampling techniques as needed, to answer questions of interest about a population, and organize the data in relative-frequency tables	**Q:** Choose one of the following: bar graph stem-and-leaf plot line plot Write a survey question where you would choose this type of graph to display the results. Tell why this graph would be a good choice.	GSSDP • Page 63
	Q: What data might you be asked to collect that would help with improving the school in some way? Who would you collect the data from, and how would you collect the data? Tell why you think that your plan would work well.	GSSDP • Page 64
	Q: Conduct a survey with three or more categories that will help you learn something about your classmates. Then, display the data in a way that makes sense and in a way that doesn't make sense. Tell why you chose each way.	GSSDP • Page 103
	Q: Collect primary and secondary data about a topic that interests you. Display each set of data on its own graph. Tell why you chose each graph type.	GSSDP • Page 104

Data Visualization		
D1.3 select from among a variety of graphs, including stacked-bar graphs, 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	**Q:** Choose a concern that you have regarding the environment. Collect data about your topic from a credible source, and display it in a table or graph.	GSSDP • Page 64
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in relative-frequency tables and stacked-bar graphs, and incorporating any other relevant information that helps to tell a story about the data	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	

Data Analysis		
D1.5 determine the mean and the median and identify the mode(s), if any, for various data sets involving whole numbers and decimal numbers, and explain what each of these measures indicates about the data	**Q:** With a group, think of a task that you think your classmates could do several times in 10 seconds. Then, together, do the following: Predict what the mean would be if your classmates performed this task. Challenge your classmates to do the task. Collect the results, and calculate the mean. Then, graph the data. Describe the shape of the data and how its shape relates to the mean.	GSSDP • Page 72
	Q: Remove the face cards from a deck of cards. Draw 10 cards, and arrange them in a way that will help you to determine the mean, median, and mode of the values on your cards. Then, determine the mean, median, and mode while considering any aces to have a value of 1.	
	Q: A lot more than half of the values in two sets of data are the same. The means of the two sets are a lot different. Show what the data sets might look like. Tell how you figured out each mean.	GSSDP • Page 109
	Q: Some people say that the mean gives you a good sense of all the data in a set because it balances all the values in it. Do you agree? Why or why not?	GSSDP • Page 112
	Q: Think of a survey question to ask your classmates. Then, survey a small sample, a medium-sized sample, and a census of the class. Tell what conclusions you might draw about your class from each of your sets of results.	GSSDP • Page 144
	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

D1.6 analyse different sets of data presented in various ways, including in stacked-bar graphs 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	**Q:** Which one of these graphs do you think is the least like the others?	GSSDP • Page 62
	Q: You don't agree with the way that Kasim collected the results from an experiment with number cubes. With a partner, design an experiment, and show how Kasim might have collected the results. Then, conduct your experiment, and collect the results in a way that you think would be more useful for analyzing them.	GSSDP • Page 66
	Q: How do you decide which secondary sources of data to trust?	GSSDP • Page 68
	Q: What do you know for sure by looking at this graph? What are you not so sure about?	GSSDP • Page 69
	Q: The shape of one graph is symmetrical. The shape of another graph is almost flat but not quite. What might the graphs look like?	
	Q: Choose a location anywhere in the world. Research the average high and low temperatures each month for that location. Graph the information and describe the trends in the graph.	
	Q: Jon reads a graph and makes the following conclusions: • It rained more in April than in May. • The shape of the data is fairly flat except at • The mean of all the data is a bit greater one spot. than the mode.SEP What might the graph look like? Tell how you know that your graph works.	GSSDP • Page 73
	Q: The following can be said about a certain data set that has between 8 and 12 data values: • Its mean is a lot greater than its mode.SEP • The difference between its mean and its median is more than 4.SEP • The difference between its greatest value and its least value is an even number. What might the data set look like? Tell how you know that you're right.	

D2. Probability **Overall Expectation:** By the end of Grade 5, students will describe the likelihood that events will happen, and use that information to make predictions		
D2.1 use fractions to express the probability of events happening, represent this probability on a probability line, and use it to make predictions and informed decisions	**Q:** How can you describe this image by using numbers?	GSSDP • Page 76
	Q: How might you show the probability of winning at rock, paper, scissors to someone who doesn't know how to play?	
	Q: What is something that occurs about ¼ of the time? What is something that occurs about ½ of the time?	
	Q: You have to choose between four flavours of ice cream that you like equally. How might you design a way to help you decide which one to have?	
	Q: There are three to six possible outcomes to an experiment. What might the experiment be? List all the possible outcomes. Then, represent the possible outcomes by using a shape that is divided into a number of equal parts that is the same as the experiment's number of possible outcomes.	GSSDP • Page 77
	Q: You use two different fractions to describe the possible outcomes of a probability experiment. What might the experiment be? Tell what fractions you used. Then, conduct your experiment 12 times, and collect the results. Use a fraction tower to help you tell whether the outcomes match your predictions.	
	Q: A bag has 12 socks in it. Draw 12 very different socks to show what the bag's contents might look like. Use fractions to tell the chance of three things that could happen if you pulled out a sock from the bag.	GSSDP • Page 78
	Q: Choose one of the following: coin(s) spinner(s) playing cards number cube(s) Conduct a probability experiment for your choice, and record the results. Using the same number of outcomes and the same number of test rounds as your first experiment, repeat for another choice above.	

D2.1 (continued)	**Q:** A probability experiment or game has four possible outcomes, but not all of the outcomes have a 1/4 chance of happening. Explain how that could be by giving an example and telling the chance of each possible outcome happening in the form of a fraction.	GSSDP • Page 79
	Q: Make 50¢ by using one type of coin. Then, make 50¢ by using a different type of coin. Imagine placing all these coins in a bag. Use words, fractions, and a shape divided into equal parts to represent the probability of pulling out each type of coin from the bag. Tell how these three representations are similar and how they are different.	
	Q: Tell one or more fractions that would represent the probability of the following terms: unlikely less likely likely more likely Explain why your fractions make sense.	
	Q: Think of a game that involves drawing cards from a deck. Tell about a possible favourable outcome and a possible unfavourable outcome when drawing cards in the game.	GSSDP • Page 113
	Q: You use the same number to describe the probability of something happening with a number cube, a spinner, and a coin. What could the number be? What could you be describing in each case?	
	Q: A ratio describes what turns up when you pour 10 two-sided counters out of a container. If one side of each counter were red, and one side of each counter were yellow, what ratios of colours would you likely see? What ratios would you not likely see? Why?	
	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

D2.2 determine and compare the theoretical and experimental probabilities of an event happening	**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: 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

Grades 4–8 • Open Questions for the Three-Part Lesson:
Geometry and Spatial Sense • Data Management and Probability [GSSDP]

E. SPATIAL SENSE		
E1. Geometric and Spatial Reasoning **Overall Expectation:** By the end of Grade 5, 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 triangles, and construct different types of triangles when given side or angle measurements	**Q:** On triangle dot paper, make at least three triangles for each of the following triangle types:	GSSDP • Page 48
	Q: Choose an acute angle. Using a protractor and a ruler, make a triangle that has this angle between two sides that are each less than 20 cm long. Repeat for two different triangles.	
	Q: An acute, an obtuse, and a right triangle each have at least one side that is exactly 10 cm long. What might the triangles look like?	
	Q: Draw a triangle. Measure its angles and side lengths. Decide on just three measurements that you could give to someone that would allow this person to make a triangle that is congruent to the one that you drew. Then, find a different set of three measurements that would work as well. Give your two sets of measurements to a classmate to see if he or she can accurately draw your triangle each time.	GSSDP • Page 121
	Q: Which two of these triangles do you think are the most alike? Why?	GSSDP • Page 123
	Q: Pick one word from each column: Tell all the things that you know and don't know about the symmetry, angles, and sides of a triangle that can be described in these two ways. Repeat one or more times for a different pair of words.	GSSDP • Page 125

E1.2 identify and construct congruent triangles, rectangles, and parallelograms	**Q:** Make one of each of these types of triangles out of geostrips: Next, use a protractor and a ruler to measure the side lengths and the inner angles of each triangle, and record your measurements. Cover up your triangles, and then challenge a partner to make each of them out of geostrips by using only your measurements.	GSSDP • Page 49
	Q: Pick one word from each column. Tell all the things that you know about a triangle that can be described by these words. Next, tell all the things that you don't know about a triangle that can be described by these words. If it is impossible to describe a triangle using the two words that you chose, tell why this is impossible. Repeat for one or two other combinations of words from the table.	
	Q: Choose one description from column A, one from column B, and one from column C. Next, make a shape that can be represented by these three descriptions. Then, repeat for two or three other combinations of descriptions.	GSSDP • Page 86
	Q: Create a piece of geometric art that contains only straight lines and each of the following:	GSSDP • Page 121
	Q: Draw a polygon that has several angles, and label its vertices with letters to make the following true. Tell how you satisfied the conditions.	
	Q: You overhear someone say, "You always have to give the length of at least one side when giving instructions for creating a triangle." Do you agree with this statement? Why or why not?	GSSDP • Page 122
	Q: Two shapes share an angle measurement and at least one side length measurement but look a lot different from each other. Use a geoboard to show what the shapes might look like.	GSSDP • Page 123
	Q: Draw two congruent polygons with different orientations on dot paper. Measure the side lengths, angles, perimeter, and area of each one. Tell what you notice.	GSSDP • Page 127
	Q: "Area is the most important measurement to know if you are determining whether two shapes are congruent." Robin disagrees with this statement. Why do you think that is?	

E1.3 draw top, front, and side views of objects, and match drawings with objects	**Q:** How many cubes might there be in this structure?	GSSDP • Page 91
	Q: Using more than one colour, build a tower out of eight or more linking cubes. Make your tower's base out of four of the cubes. Next, make a coloured 3-D sketch of your tower on isometric dot paper. Then, show your sketch to a partner, but do not show him or her your original tower. Challenge your partner to build your tower. When he or she is done, compare your towers, and tell how they are similar and different.	GSSDP • Page 92
	Q: Create a structure out of linking cubes that looks like this from the top: Then, on square dot paper, use colours to sketch a top view, front view, back view, and side view of your structure. Without showing your original structure, challenge a partner to make your structure by using only your sketches. Then, compare your structure to your partner's structure.	
	Q: How is it possible for sketches of the same 3-D figure to look so different from one another?	GSSDP • Page 93

Location and Movement		
E1.4 plot and read coordinates in the first quadrant of a Cartesian plane using various scales, and describe the translations that move a point from one coordinate to another	**Q:** Two points are close together on a Cartesian coordinate plane. Two other points are far apart. What might the coordinates of the points be? Tell why your answers make sense.	GSSDP • Page 96
	Q: How does using a coordinate system make it easy to find objects on a map or grid?	GSSDP • Page 96

E1.5 describe and perform translations, reflections, and rotations up to 180° on a grid, and predict the results of these transformations	**Q:** Pick image A, B, or C, and tell how the pattern block might have gotten from its first location to its second location.	GSSDP • Page 53
	Q: You look at two or three different designs made out of pattern blocks. It's hard for you to tell if one half of the design was created from a translation of the other half or if one half is instead a reflection of the other half. What might the designs look like? Show how each design might have been created by using either a reflection or a translation.	GSSDP • Page 55
	Q: Using triangle dot paper, show and explain why sometimes you can't know for sure how a shape has been moved from one place to another unless you are told how this was done.	GSSDP • Page 58
	Q: How might the square have moved from position A to position B?	GSSDP • Page 97
	Q: Make three designs out of square tiles. One should show a reflection, one should show a rotation, and one should show a translation.	
	Q: Sketch a regular pentagon, hexagon, or octagon. Then, trace your shape using tracing paper. Next, rotate your shape differently to see how else it could look. Then, repeat with an irregular version of the same shape. Tell what you notice each time.	

E1.5 (continued)	**Q:** Draw an irregular polygon. Then, choose a point of rotation inside your shape, and mark a dot there. Trace your shape using tracing paper. With your tracing aligned on top of your original shape, poke a hole through both shapes with a pencil where you see the point of rotation. While keeping your pencil and your original shape in place, show what your polygon would look like if you rotated it 90° clockwise, 90° counter-clockwise, and 180°. Then, repeat these steps for a point of rotation outside your shape.	GSSDP • Page 98
	Q: A pattern on centimetre grid paper shows a rotation and a reflection. What might the pattern look like?	GSSDP • Page 99
	Q: Thinking about everyday situations, when would you use a 90° rotation? When would you use a 180° rotation?	
	Q: Imagine that two different shapes have been transformed in the same way. For one shape, it is easy to know how it was transformed. For the other shape, it is not easy to know how it was transformed. Explain how this might be possible.	
	Q: The shape below was transformed from quadrant 1 into quadrant 2, from quadrant 2 into quadrant 3, and then from quadrant 3 into quadrant 4. How might the shape have been transformed each time for it to look like this in quadrant 4:	GSSDP • Page 131
	Q: The same transformation is described in two different ways. Tell how this is possible. Give an example to show that your answer makes sense.	GSSDP • Page 134
	Q: Tell a strategy for performing reflections and a strategy for performing rotations. Then, explain how the two strategies are similar and how they are different.	
	Q: How might you know that a shape has been rotated?	GSSDP • Page 177

E2. Measurement **Overall Expectation:** By the end of Grade 5, students will compare, estimate, and determine measurements in various contexts		
The Metric System		
E2.1 use appropriate metric units to estimate and measure length, area, mass, and capacity	**Q:** When might you use milligrams to measure a mass?	MPA • Page 24
	Q: A plastic container holds about 200 mL of water. Estimate what the volume of the container would be if the container were solid.	MPA • Page 63
	Q: The capacity of a container is about 1500 mL. What might the container be?	MPA • Page 64
	Q: When does it make more sense to measure with tonnes than with kilograms?	MPA • Page 68
	Q: Would it ever make sense to talk about a kilogram of things that are very light, such as raisins?	MPA • Page 69
	Q: What do you think a centigram is? When might it make sense to measure in centigrams?	
	Q: Estimate the height of a basketball net. How tall is that in millimetres?	MPA • Page 88
	Q: Estimate the total distance in metres that you walk each day. Show how you came up with your estimate.	MPA • Page 89
	Q: Estimate how much mass you would carry in a backpack for a two-day camping trip. Then, make a list of what you would bring and how much each item might weigh to see if your guess was close. You do not need to include clothes or footwear that you will be wearing.	
	Q: What might the mass in kilograms of the water in a swimming pool be?	
	Q: Suppose an apple tree produces enough apples each year to fill 20 boxes with a mass of about 20 kg each. About how many apples might that be?	MPA • Page 90
	Q: You are measuring something and you decide it is important to be precise. What might the situation be?	MPA • Page 91
	Q: When might a decimetre be a reasonable unit to measure in?	
	Q: What is a reasonable estimate for each of the following comparisons?	

E2.2 solve problems that involve converting larger metric units into smaller ones, and describe the base ten relationships among metric units	**Q:** You walk almost 4 km. How many metres do you think you might have walked?	MPA • Page 52
	Q: Estimate the length, width, height, or perimeter of two items in metres. Then, measure them in metres. How long are they in centimetres?	MPA • Page 53
	Q: About how many square metres is the top of a picnic table? How large is that in square centimetres?	MPA • Page 90
	Q: What metric unit do you think makes sense in the blank? Why does it make sense?	MPA • Page 91
	Q: Walk eight steps. Measure the distance you moved as . metres. Then, convert the measurements to decimetres, centimetres, and millimetres. Are these numbers greater or less than the numbers in metres? How much greater or less? Why?	Number • Page 108
	Q: What might the mass of a heavy TV be? Give the mass using two different units.	MPA • Page 122
	Q: Draw a picture to show why you multiply a number of centimetres by 10 to figure out the number of millimetres that describes the same length.	
	Q: You have 1.24 L of orange juice and a little less apple juice. How many millilitres of apple juice might there be?	
	Q: Measure the area of your school gym in square metres. Then, describe the area in square centimetres. Which measurement do you think is a better description? Why?	MPA • Page 123
	Q: Describe the capacity of something that people would not consider very large. Then, describe it using different units so that it sounds big.	
	Q: What units might go in the blanks to make this statement true? Use two different pairs of units.	MPA • Page 124
	Q: Choose a decimal number of kilograms. Rename that mass as a number of grams.	
	Q: What numbers might go in the blanks to make this statement true? The first number is a decimal and both numbers are greater than 100. L = mL.	
	Q: Why might you describe a measurement in thousands of square centimetres rather than square metres?	

	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

E2.2 (continued)	**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?	MPA • Page 154
	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.	

Grades 4–8 • Open Questions for the Three-Part Lesson:
Geometry and Spatial Sense • Data Management and Probability [GSSDP]

Angles		
E2.3 compare angles and determine their relative size by matching them and by measuring them using appropriate non-standard units	**Q:** Draw an angle. Then, draw an angle that is about half as big as the first angle. Then, draw an angle that is about twice as big as the first angle.	GSSDP • Page 10
	Q: Two angles from a triangle pattern block can be combined to create the same angle as an angle on a trapezoid pattern block: What other two identical angles from a pattern block can you combine to create an angle on another pattern block?	
	Q: Draw a right angle and half a right angle by using a tool to make them the correct size. Then, draw two or three other angles. Estimate the number of degrees of each of these angles by using only your right angle and your half a right angle as tools.	GSSDP • Page 11
	Q: Choose two of these angles, and describe them.	GSSDP • Page 44
	Q: Use geostrips to make three or four different polygons. The angles within each polygon should be equal.	
	Q: One of these shapes is different from the others because of something to do with angles. Which shape do you think it is? Why?	
	Q: On a geoboard, make an angle that you know the name of. Then, make an angle that you don't know the name of.	
	Q: Aaliyah says that a 2-D shape with sides that are all the same length has angles that are all the same size. Do you agree with this idea? Explain your answer.	GSSDP • Page 46
	Q: Sketch a triangle with just one angle greater than a right angle. Then, sketch a triangle with no angles greater than a right angle.	GSSDP • Page 47
	Q: Put two or more pattern blocks together to make an irregular polygon. Decide if the angles inside your new shape are acute, right, obtuse, straight, or larger than a straight angle.	GSSDP • Page 84
	Q: Make a quadrilateral and a pentagon each out of two or three pattern blocks. Trace them. Compare the angles in your shapes with the angles of a triangle pattern block. Tell if the angles in your shapes are bigger than, smaller than, or the same as those in the triangle pattern block.	GSSDP • Page 107

E2.4 explain how protractors work, use them to measure and construct angles up to 180°, and use benchmark angles to estimate the size of other angles	**Q:** Thinking about how a right angle is 90°, tell what number of degrees could represent each of the descriptions below. Explain whether more than one answer for each would work. straight angle half a right angle less than a right angle greater than a right angle.	GSSDP • Page 12
	Q: Isla used a tool to compare the angles of the pattern blocks below to half a right angle. Show or tell what you think she did.	
	Q: Draw two straight angles, two right angles, or two half-right angles that are the same but that someone might think are different. Tell how you would show that they are the same.	
	Q: Draw three different acute angles. Measure each angle using a protractor. Then, using a protractor and a different angle from the ones before, draw three acute angles that are the same size but that look a lot different from one another.	GSSDP • Page 45
	Q: Find two or three different acute angles on pattern blocks. Then, measure the angles using a protractor.	
	Q: Sketch two different triangles. Use a ruler to measure their side lengths and a protractor to measure their angles.	GSSDP • Page 47
	Q: Draw four acute angles and four obtuse angles that look a lot different from one another. Estimate the size of your angles, and then measure them with a protractor.	GSSDP • Page 85
	Q: Prya wants to compare the angles of these two shapes. What do you think is a good way to compare the angles?	GSSDP • Page 108
	Q: Imagine that someone bisected an acute angle, a right angle, an obtuse angle, and a straight angle. What would you know for sure about each of the new angles that were created? What would you not know about them?	GSSDP • Page 122

Grades 4–8 • Open Questions for the Three-Part Lesson: *Measurement • Patterning & Algebra* [MPA]

Area		
E2.5 use the area relationships among rectangles, parallelograms, and triangles to develop the formulas for the area of a parallelogram and the area of a triangle, and solve related problems	**Q:** Sketch three shapes that each have an area of 1 m^2. Label the dimensions.	MPA • Page 93
	Q: Choose a two-digit number to be a measure of area. Use dynamic geometry software to construct a triangle, a parallelogram, and a rectangle with this area.	
	Q: Choose four consecutive whole numbers. One number will be the area of a square, one will be the area of a rectangle, one will be the area of a triangle, and one will be the area of a parallelogram, all in square centimetres. Construct these shapes using centimetre grid paper or dynamic geometry software.	MPA • Page 94
	Q: Construct a parallelogram with a base that is double its height and an area that is between 70 cm^2 and 100 cm^2.	
	Q: The area of a non-rectangular parallelogram is about 45 cm^2 and its perimeter is about 30 cm. What could the dimensions of the parallelogram be?	
	Q: Is it easier to construct a triangle or a square with an area of 18 cm^2? Explain.	MPA • Page 95
	Q: You have a rectangle with an area of *A*. How can you use this rectangle to construct triangles with areas that are easy for you to figure out?	
	Q: Create a parallelogram and a rectangle with the same side lengths. How do you think their areas are related? Why?	MPA • Page 96
	Q: Which shape do you think does not belong?	
	Q: Choose an area in square centimetres. Construct three different triangles and three different parallelograms with the area you chose.	MPA • Page 97
	Q: The area of a parallelogram is exactly 10 cm^2 greater than the area of a triangle. What could the dimensions of the shapes be?	
	Q: What are the areas of three or more parallelograms you can make on a 5-by-5 geoboard? What are the areas of three or more triangles you can make on the same size of geoboard? Show them.	

E2.5 (continued)	**Q:** Build a triangle on a geoboard so that the elastic touches exactly four pegs. The elastic can touch a peg either at a vertex or along the side of the triangle. Build at least three more triangles of different sizes and shapes that each touch four pegs. How does the area of each triangle relate to the number of pegs that fall inside the triangle?	MPA • Page 98
	Q: Create three different parallelograms on grid paper. Calculate the area of each parallelogram twice. First, use the bottom edge as the base and then use a slanted side as the base. Make sure to use the proper height for the base you are using. What do you notice?	
	Q: Two parallelograms have the same side lengths. How close are their areas likely to be? Explain.	MPA • Page 99
	Q: To determine the area of a triangle, Angie took half of 10 and multiplied by 4. What might the triangle look like?	
	Q: The area of a triangle is 4 times the area of a parallelogram. How might the dimensions compare?	
	Q: Show that a taller triangle can have less area than a shorter one.	

E2.6 show that two-dimensional shapes with the same area can have different perimeters, and solve related problems	**Q:** Why is it always possible to create two shapes that look different but have the same area?	MPA • Page 61
	Q: Make two triangles on a geoboard that look very different, but you know that they have the same area. How do you know that they have the same area?	MPA • Page 99

F. FINANCIAL LITERACY		
F1. Money and Finances **Overall Expectation:** By the end of Grade 5, students will demonstrate an understanding of the value of Canadian currency		
Money Concepts		**Grade/Book/Page**
F1.1 describe several ways money can be transferred among individuals, organizations, and businesses	There are no Grade 5 Open Questions that meet this 2020 curriculum expectation.	
F1.2 estimate and calculate the cost of transactions involving multiple items priced in dollars and cents, including sales tax, using various strategies	**Q:** You bought something and paid the clerk $20. You got one bill and eight coins in change. How much money might you have spent? Think of lots of possibilities. Tell what coins you get back.	Number • Page 42
	Q: You pay for something with three bills and five coins. What might the item have cost? Explain your answer.	
	Q: You are counting how much there is if there are four dimes, two $20 bills, five quarters, three nickels, one $5 bill, two loonies, and one $10 bill. In which order would you count the money? Why?	Number • Page 43
	Q: You show an amount of money with coins but no pennies. What do you know for sure about the value when you write the amount of money in dollars and cents?	
	Q: You buy something and pay the clerk $10. You get one bill and five coins back. How much might your item have cost? Think of different possibilities, and show your thinking.	Grades K–3 OQs Number • Page 115
	Q: Twenty coins are worth about $8. What might the coins be? Give three or more possibilities.	
	Q: You buy three items, and your change from $10 is $3.15. What could each of your three items have cost? Explain your answer. Think of three or more possibilities.	
	Q: Choose two digits to fill in the boxes: $ ☐☐5. You can use different digits or the same digit twice. Tell three or more ways you can show that amount of money.	

Financial Management		
F1.3 design sample basic budgets to manage finances for various earning and spending scenarios	There are no Grade 5 Open Questions that meet these 2020 curriculum expectations.	
F1.4 explain the concepts of credit and debt, and describe how financial decisions may be impacted by each		
Consumer and Civic Awareness		
F1.5 calculate unit rates for various goods and services, and identify which rates offer the best value	There are no Grade 5 Open Questions that meet these 2020 curriculum expectations.	
F1.6 describe the types of taxes that are collected by the different levels of government in Canada, and explain how tax revenue is used to provide services in the community		

Grade 5 Open Questions that now align with other grades in the Ontario 2020 Curriculum

Grade 5 Open Questions that align with Grade 2 Expectations		
Grade 2 **F1.1**	**Q:** When might you start with four bills and three coins, trade for bills and coins of equal value, and end up with six bills and seven coins?	Number • Page 93

Grade 5 Open Questions that align with Grade 3 Expectations		
Grade 3 **B2.3**	**Q:** Choose a three-digit number and a two-digit number to subtract mentally. Then, tell how you would subtract the two numbers.	Number • Page 90
	Q: List three pairs of two-digit or three-digit numbers that are: a) easy to add in your head ...	Number • Page 91

Grade 5 Open Questions that align with Grade 4 Expectations		
Grade 4 **B1.1**	**Q:** You use three words to write out a four-digit number on a cheque. List four or more numbers you could be writing. Then, write the numbers out in words. What do you notice about the numbers that you wrote?	Number • Page 63
	Q: You read two numbers greater than 1000 that are written in words. Everything is exactly the same when you read them except for two words. What could the numbers be? How are their standard forms alike? How are their standard forms different?	Number • Page 64
Grade 4 **B2.1**	**Q:** What are two ways to break up the number 228 to make it easier to divide it by 3?	Number • Page 101
	Q: Can every division problem be solved by multiplication? Explain.	Number • Page 103
	Q: How could you use an easier problem to help you figure out how many numbers you would say to get to 435 if you skip count by 5s?	
Grade 4 **B2.2**	**Q:** You multiplied two numbers in your head. The product was almost 100. What numbers might you have multiplied?	Number • Page 90

Grade 4 **B2.6**	**Q:** You divide a three-digit number by a one-digit number, and the answer is less than 100. What numbers might you have divided? What do you notice about the hundreds digit in the three-digit number and in the one-digit number you divided by?	Number • Page 101
	Q: In what situation might you divide 120 by 5?	
	Q: Choose a remainder of 2, 3, or 4. Try to divide lots of three-digit numbers by one-digit numbers to get that remainder. Describe your strategy.	Number • Page 102
	Q: You can model 150 with six base ten blocks. If you divide by 6, there is no remainder. Is it true that if you model a number with a certain number of base ten blocks, you can always divide that number by the number of blocks and there will be no remainder?	
	Q: Choose an amount of money between $300 and $400 that a class might have raised. Choose the number of charities that the class decides to split the money equally among. Figure out how much money each charity gets. Show how to get your answer in three or more ways. Repeat with a different amount of money.	
	Q: Create and solve three problems where you have to divide 144 by 2. Make the problems seem quite different.	
	Q: How can you predict how many digits will be in the answer when you divide a three-digit number by a one-digit number?	Number • Page 103
	Q: What are three ways to estimate X?	
	Q: Show that it is possible to divide different three-digit numbers by different one-digit numbers but end up with the same answer. Tell why ending up with the same answer is not surprising.	
	Q: Choose a division involving a three-digit number that would be easy to do. Explain your thinking.	
Grade 4 **F1.2**	**Q:** Jane bought school supplies. She spent more than $122 in one store and almost $90 in another store. Choose the exact amounts in whole dollars that she spent. Then, using mental math, figure out how much she spent in total. Describe your strategies.	Number • Page 90
	Q: Three shirts cost $29, $49, and $62. You are going to buy more than one of at least one shirt. Using mental math, calculate how much you would spend. Describe your thinking.	Number • Page 91
	Q: You spent almost $400 buying several of the same thing. Using mental math, figure out how many items you bought and what each item cost. Think of different possibilities.	

Grade 5 Open Questions that align with Grade 6 Expectations		
Grade 6 **B2.12**	**Q:** Fill in the blanks to make this statement true: is X times as much as X.	Number • Page 87
	Q: Which phrase do you think does not belong? • 1. times as much as 8 ...	
	Q: How can 60 be X times as much as one number, but X times as much as another?	
	Q: Fill in the blanks, using a mixed number, decimal, or fraction in one of the blanks, to make this statement true: The number 20 is times as many as X .	
	Q: Choose a small counting rod, and mark a distance that is four rods long. Record what the distance is. Then, create distances in the following ways. Tell how many of which colour of rod is used. Use only one colour of rod for each amount.	Number • Page 88
	Q: There are 3. Times more people on the bus at the end of the workday than at around 2:00 p.m. What numbers of people do you think might be on the bus at each of these times? Why did you choose these numbers? Are there any numbers of people that could not fit on the bus? Why or why not?	
	Q: Four people have a total of more than $200. Each person has a whole number of dollars. Joel has the least amount of money. Charlie has 1.2 times as much as Joel. Anisa has 1. times as much as Charlie. Lianne has 2⅓ times as much as Anisa. How much might each person have? Show your thinking.	
	Q: A certain whole number is 2⅓ times as much as another whole number and 1.4 times as much as a third whole number. What could the number be? Show your thinking.	
	Q: Simon has read 2⅓ times as many pages as Makayla. Do you think Jane might have read exactly 40 pages? Why or why not?	Number • Page 89
	Q: When do you think it might be more useful to think of 15 as 1. tens instead of thinking of 15 as 5 greater than 10?	
	Q: Can the same whole number be 1⅓ times as much as one number, but 2⅔ times as much as another number? Explain.	
	Q: Suppose one whole number is 3⅓ times as much as another number. What do you know about the two numbers?	

Grade 6 **C1.4**	**Q:** How are the numbers 8.9 and 890 related? What number operation do you think you might do to get from 8.9 to 890? Why?	Number • Page 107
	Q: You multiply a decimal number with a 7 in it by 100. What do you know for sure about the product?	
	Q: You divide a decimal number by 10, and the result is between 0 and 1. What do you know about the original decimal?	
	Q: Jeff said that to multiply a number by 10, you put a 0 at the end, so 10 Å~ 3.4 = 3.40. What might you say to Jeff about his idea?	Number • Page 109
	Q: The number 4 . is divided by 100. What do you know for sure about the result?	
	Q: Do you agree that it is easier to multiply a decimal by 10 or 100 than by other numbers? Explain.	
Grade 6 **E2.1**	**Q:** Choose three small items and measure the length of each item in centimetres. Then, convert the measurements to metres. What do you notice about the two numbers? Why does what you notice make sense?	