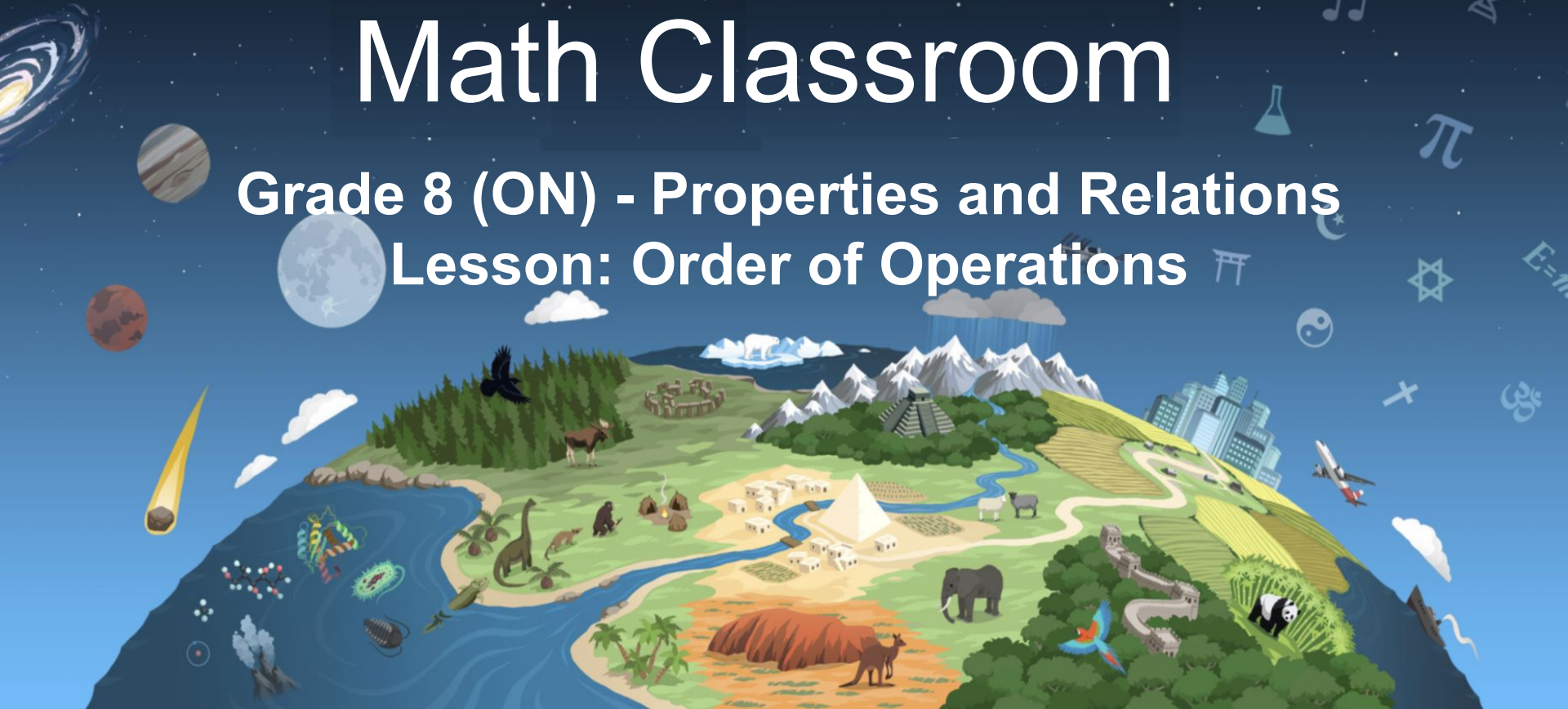


Binogi in Your Math Classroom

Grade 8 (ON) - Properties and Relations
Lesson: Order of Operations



Supported by



Resource Guide for Teachers

© 2020

All rights reserved. This resource is intended for personal and classroom use only.

All of the materials in this guide may be downloaded and printed for non-commercial use in educational contexts.

No part of the guide may be copied, reproduced, distributed or transmitted in whole or in part for commercial uses without the prior written consent of Dr. Emmanuelle Le Pichon.

Please visit:

<https://escapeprojects.ca/> for additional resources and information.

Prepared by:

Dr. Emmanuelle Le Pichon

Dr. Dania Wattar

Rosalia Cha

Bitá Correa

Jhonel Morvan

Mai Naji

Neha Kapileshwarker

Reviewed by:

Dr. Alexandre Cavalcante

Grade 8 - B2. Properties & Relationship

: Example of Learning Objectives and Big Ideas

Overall Expectation

B2. use knowledge of numbers and operations to solve mathematical problems encountered in everyday life

Specific Expectation

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

Learning Objectives

To use the order of operations to solve multi-step math expressions.

Big Ideas

Order of operations can be used when simplifying math expressions.

Assessment

1. Assessment FOR

: Diagnostic questions, Minds On, Action

2. Assessment AS: Consolidation

B2.1 Mathematical Terms and Resources/Materials

Vocabulary

order of operations, BEDMAS, addition, subtraction, multiplication, division, exponential expression, powers, bracket

Pair/Group Activities

Please follow your school's **Covid-19 safety protocols** for any pair/group activities.

Language Friendly Pedagogy

At the beginning of the lesson, students will be invited to add key terms in their **Concept Detective** and add any new words that they come across throughout the lesson.

Binogi Related Resources

Video: **Order of Operations**

Assessment: 3 quizzes available

Other Resources

Minds On Matching Activity:

http://holi-frysk.nl/lesmateriaal/06_HF_LES_Meertalige_rekentaal_EN.pdf

Consolidation Activity: **My Favourite "No"s**

At the beginning of class... (5 ~ 10 min)

1. Share learning objectives - *To use the order of operations to solve multi-step math expressions.*
2. Co-create success criteria
 - Sample :
 - *I can use order of operations (BEDMAS).*
 - *I can rewrite the math expression after each operation is performed.*
3. Ask the students to add the following words in their Concept Detective which they will fill out throughout the lesson: ***order of operations, BEDMAS, brackets, exponents, division, multiplication, addition, subtraction, mathematical expressions, mathematical sentences, equations and any new terms***
4. Diagnostic Questions: Teachers should systematically start with 2 or 3 diagnostic questions by

a) using the previous year's specific expectation

- What is another way of expressing $2 \times 2 \times 2 \times 2$?
- $11 - 2 \times 3 = ?$

b) OR by students do Binogi quizzes

Grade 6	Grade 7	Grade 8
B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and whole number percents, including those requiring multiple steps or multiple operations	B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations	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

Minds On

Task Component	Instruction	Assessment Focus Look Fors	Notes
Before (Activation/ Review) ~10 mins	<p>Matching game.</p> <ol style="list-style-type: none">Students are given with a piece of paper that will have either a word, symbol, or definition. Then they need to find peers that match with what they have. The resource can be found here - the teacher enlarges the copy, cut, then distribute to students.<ul style="list-style-type: none">Example:<ul style="list-style-type: none">Student 1 has '+'. Then, this student has to find classmates who have a paper with "plus", "addition", "sum", "together", "The operation that represents the sum of two or more numbers", "Opposite/inverse of subtraction"Once students find each other, student(s) who speaks another language in that group teach the term and symbol in that other language to the rest of the group members.Create a word wall with students' work. <p>Resources: http://holi-frysk.nl/lesmateriaal/06_HF_LES_Meertalige_rekentaal_EN.pdf</p>	<p>How do students represent their understandings and linkages between concepts?</p> <p>How does the activity connect to, and help prepare students for problem solving?</p> <p>How are you interacting with your students?</p>	<p>Teacher records answer / wonderings / understandings. Asks students to elaborate/explain their responses with the class.</p>

Action

Task Component	Instruction	Assessment Focus Look Fors:	Notes
<p>During (Working on it) ~15-20 mins</p>	<p>1. Watch a Binogi video on Order of Operations. <i>ELLs watch in the language the video offers.</i></p> <ul style="list-style-type: none"> - Pause the video, discuss and answer the questions from the video as a class. Do the quizzes together if time allows. - Write the "order of operations" together as a class: Brackets, Exponents, Multiplication/Division, Addition/Subtraction (BEDMAS) - Students share other strategies that they know (ie. In Brazil (Portuguese), for example, many students memorize the order through songs rather than having such an acronym) <p>2. Work in pairs:</p> <ul style="list-style-type: none"> ❖ Write the following number sentences and students find out which statement is true. Students show their work. <ul style="list-style-type: none"> ➤ $(22 - 19)^3 + 5 \times 2 - 4^2 = 12$ ➤ $(22 - 19)^3 + 5 \times 2 - 4^2 = 48$ ➤ $(22 - 19)^3 + 5 \times 2 - 4^2 = 21$ ➤ None of the above. The correct answer is _____ (students fill out their response). 	<p>What role do I and my students play during the problem solving process?</p> <p>What strategies do we predict students will use to do the math?</p> <p>What strategies are students using to do the math?</p>	<p>Have your students watch the videos in the language of their choice.</p> <p>Record students' thoughts.</p> <p>Think-pair-share: student think on their own first, then share with their partner, then with the class.</p> <p>In other languages, there might not be an acronym such as BEDMAS. In Brazil (Portuguese), for example, many students memorize the order through songs rather than having such an acronym. That might impact how students fill out their concept detective forms.</p>

Consolidation: “My Favourite ‘No’s”

Task Component	Instruction	Assessment Focus Look Fors
After ~15 mins	<ol style="list-style-type: none"><li data-bbox="455 292 1296 380">1. The teacher collects students' work from the “Action” activity #2 and quickly go through them. <li data-bbox="455 532 1296 713">2. The teacher identifies “My Favourite ‘No’s” - watch the video.<ol style="list-style-type: none"><li data-bbox="556 636 1219 713">a. Go over some of the wrong responses to correct misconceptions. <li data-bbox="455 865 909 898">3. Complete Concept Detective.	<p data-bbox="1408 292 1837 418">How do students represent their understandings and linkages between concepts?</p> <p data-bbox="1408 494 1837 620">How does the activation activity connect to, and help prepare students for problem solving?</p> <p data-bbox="1408 680 1798 805">How are you interacting with your students during the activation?</p>

Extension/Differentiation/Modification

	Instruction	Assessment Focus Look Fors:
<p>- Individual Practice: A question(s) for extension that students can do independently to assess understanding of the concept(s)</p> <p>- Differentiation (Modifications/ extensions)</p>	<p>- Fill in the boxes to make the math statement true. Missing numbers are whole numbers.</p> $(\square + 4) - 36 \div (2 + \square)^2 = 10$ <p>Students work in pairs to activate math discourse. There are multiple solutions to this questions; hence, students can find their own solutions and discuss with their partner.</p>	<p>How does the individual practice question relate to the problem, skills or strategies? Why is the individual practice question important for teachers and students?</p> <p>Are there any other strategies that can be used to differentiate instruction?</p>

Parents and Community Connection

Homework Assignment

: [Concept Detective](#) - students can complete any terms they did not complete and add any mathematical terms they wish to include in their glossary with their parents

: Students watch the Binogi video they watched in class at home with their parents either in English or in one of the provided languages (there is an option for subtitles). Discuss.

: After the video, have students and family members brainstorm their own question and ways to answer the question

Learning Trajectory Goals

Task Component	Instruction	Notes
<p>Based on student understanding, what may the next lessons entail (differentiated instruction, explicit teaching, another 3 part problem solving lesson, use of technology, exploring strategies or tools...)?</p>	<p>The following lesson will be Multi-Step Word Problems. In this lesson, students will apply order of operations to solve multi-step word problems. As well, they will learn to identify key mathematical terms and numbers.</p>	<p>For Teachers: Compare and contrast the use of Learning Goals and Success Criteria within literacy and numeracy lessons.</p>

