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**DETAILED COLOMBIAN CURRICULUM GUIDELINES (TRANSLATED) COMPARED WITH MAJOR STRANDS (ONTARIO) for MATH, SCIENCE and INTERNATIONAL LANGUAGES**

**MATHEMATICS**

<b>COLOMBIA CURRICULUM GUIDELINES</b>	<b>ONTARIO CURRICULUM STANDARDS</b>
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<b>MATHEMATICS (missing grade 10 and grade 11 present)</b>	<b>Major Strands</b>	<b>Overall Curriculum Comparison</b>
<p>1) Numerical thinking and numerical systems</p> <ul style="list-style-type: none"> <li>- Analyzing decimal representations of real numbers to differentiate between rational and irrational numbers.</li> <li>- Recognizing the density and incomplete nature of rational numbers through numerical, geometric and algebraic methods.</li> <li>- Comparing and contrasting the properties of numbers (integers, rational, real) and their relations and operations (numerical systems).</li> <li>- Using arguments from Number Theory to justify relations involving natural numbers.</li> <li>- Establishing relations and differences between different notations of real numbers to decide how to use them in a given situation.</li> </ul>	<ul style="list-style-type: none"> <li>- Characteristics of Functions</li> <li>- Exponential Functions</li> <li>- Discrete Functions</li> <li>- Exponential Functions</li> <li>- Mathematical Models</li> <li>- Geometry and Trigonometry</li> <li>- Transportation and Travel</li> <li>- Exponential and Logarithmic Functions</li> <li>- Trigonometric Functions</li> <li>- Rate of Change</li> <li>- Geometry and Algebra of Vectors</li> <li>- Organization of Data for Analysis</li> <li>- Statistical Analysis</li> <li>- Culminating Data Management Investigation</li> <li>- Applications of Geometry</li> <li>- Geometry and Trigonometry</li> <li>- Data Management</li> <li>- Reasoning With Data</li> <li>- Applications of Measurement</li> <li>- Derivatives and Their</li> </ul>	<p>There is a considerable relationship between the two overall curriculum objectives. The Colombian mathematics curriculum does not appear to cover accounting and financing, while the Ontario math curriculum does.</p>

<p>2) Special thinking and geometric systems</p> <ul style="list-style-type: none"> <li>- Identifying the properties of the curves in edges produced by the cuts (longitudinal and transversal) on a cone and a cylinder.</li> <li>- Localization of characteristics of geometric objects in systems of Cartesian representation and in other systems (polar, spherical...)</li> <li>- Solving problems where geometric properties of conical shapes are used in an algebraic way.</li> <li>- Using geometric arguments to solve and formulate problems in a mathematical context as well as in other sciences.</li> <li>- Describing and modeling periodic phenomena of the real world using trigonometrical relations and functions.</li> <li>- Recognizing and describing curves or geometric places.</li> </ul> <p>3) Metric thinking and measurement systems</p> <ul style="list-style-type: none"> <li>- Designing strategies to tackle measurement situations that require a specific degree of accuracy.</li> <li>- Solving and formulating problems involving measurements for attributes such as speed and density.</li> </ul>	<p>Applications</p> <ul style="list-style-type: none"> <li>- Polynomial and Rational Functions</li> <li>- Counting and Probability</li> <li>- Probability Distributions</li> <li>- Data Management</li> <li>- Quadratic Functions</li> </ul> <p><b>Major Strands Missing:</b></p> <ul style="list-style-type: none"> <li>- Earning and Purchasing</li> <li>- Saving, Investing, and Borrowing</li> <li>- Personal Finance</li> </ul>	
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<ul style="list-style-type: none"> <li>- Justifying results through processes of successive approximation, ranges of variation and limitations in measurement situations.</li> </ul> <p>4) Random thinking and data systems</p> <ul style="list-style-type: none"> <li>- Comparing studies from mass media.</li> <li>- Justifying inferences from mass media and from studies designed within the school context.</li> <li>- Designing random experiments (from physical, natural or social sciences) to study a problem or a question.</li> <li>- Describing tendencies in groups of related variables.</li> <li>- Interpreting basic notions related to information management (such as population, sample, random variable, statistician and parameter)</li> <li>- Comprehensive use of some measurements of centralization, localization, dispersion and correlation (percentiles, quartiles, centrality, distance, range, variance, covariance and normality).</li> <li>- Interpreting concepts of conditional probability and independent events.</li> <li>- Solving and formulating</li> </ul>		
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<p>problems using basic concepts of counting and probability (combinations, permutations, sample space, random statistic sampling, and sampling with replacement).</p> <ul style="list-style-type: none"><li>- Proposing inferences based on studies of statistical samples.</li></ul> <p>5) Variation thinking and algebraic and analytical systems</p> <ul style="list-style-type: none"><li>- Using approximation techniques in infinite numerical processes.</li><li>- Interpreting the notion of derivatives as a rationale of instant change in mathematical and non-mathematical contexts.</li><li>- Analyzing the relations and properties between algebraic expressions and graphics of polynomial and rational functions.</li><li>- Modeling situations of periodic variation with trigonometric functions.</li></ul>		
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**SCIENCES**

<b>COLOMBIA CURRICULUM GUIDELINES</b>	<b>ONTARIO CURRICULUM STANDARDS</b>
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<b>BIOLOGY</b>	<b>Major Strands</b>	<b>Overall Curriculum Comparison</b>
<p>(microbiology, biochemistry and biodiversity)</p> <ul style="list-style-type: none"> <li>- Explaining the relationships between DNA, the environment and the diversity of organisms.</li> <li>- Establishing relationships between mutation, natural selection and heredity.</li> <li>- Comparing cases in present day species that illustrate different modalities of natural selection.</li> <li>- Explaining the relationship between matter and energy in the food chain.</li> <li>- Discussing the importance of photosynthesis as a necessary process in the conversion of energy for aerobic organisms.</li> <li>- Searching for examples of thermodynamic principles in some ecosystems.</li> <li>- Identification and explanation of examples from the model of fluid mechanics in organisms.</li> </ul>	<ul style="list-style-type: none"> <li>- genetic continuity</li> <li>- evolution</li> <li>- cellular functions</li> <li>- metabolic processes</li> <li>- environmental science</li> <li>- cellular biology</li> <li>- homeostasis</li> <li>- diversity of living things</li> <li>- population dynamics</li> <li>- internal systems and regulation</li> <li>- genetic continuity</li> <li>- molecular genetics</li> </ul> <p><b>Major Strands Missing:</b></p> <ul style="list-style-type: none"> <li>- microbiology</li> <li>- animal anatomy and physiology</li> <li>- plants: anatomy, growth and functions</li> </ul>	<p>There are considerable similarities between the overall curriculum guidelines for biology in both Colombia and Ontario. The major strands that are absent from the Colombian Biology curriculum guidelines involve further study of plant and animal anatomy and physiology – both of which are covered in SCIENCE, TECHNOLOGY AND SOCIETY. There is perhaps also less emphasis on microbiology in Colombia than Ontario.</p>

<ul style="list-style-type: none"> <li>- Explaining the functions of neurons, based on chemical and electrical models.</li> <li>- Establishing relationships between the water and the element cycles with the energy of ecosystems.</li> <li>- Explaining different relationships between species living in ecosystems.</li> <li>- Establishing relationships between individuals, populations, communities, and ecosystems.</li> <li>- Explaining and comparing adaptations of living organisms in ecosystems of the world and in Colombia.</li> </ul>		
<b>CHEMISTRY</b>	<b>Major Strands</b>	<b>Overall Curriculum Comparison</b>
<p>(physical chemistry and analytical chemistry of elements, compounds and mixtures)</p> <ul style="list-style-type: none"> <li>- Explaining the structure of atoms according to different theories.</li> <li>- Explaining how to obtain nuclear energy based on the alteration of the atomic structure.</li> <li>- Identifying chemical changes in daily life and in the environment.</li> </ul>	<ul style="list-style-type: none"> <li>- matter and chemical bonding</li> <li>- quantitatives in chemical reactions</li> <li>- gasses and atmospheric chemistry</li> <li>- structure and properties</li> <li>- energy changes and rates of reaction</li> <li>- organic chemistry</li> <li>- chemical calculations</li> <li>- chemical chemistry</li> <li>- hydrocarbons and energy</li> <li>- cellular bio (BIOLOGY)</li> <li>- chemistry in the environment</li> </ul>	<p>There are considerable similarities between the overall curriculum guidelines for chemistry in both Colombia and Ontario. The Colombian chemistry curriculum does not outline the study of electrochemistry and electrochemical structure and</p>

<ul style="list-style-type: none"> <li>- Explaining chemical changes from the perspective of different models.</li> <li>- Explaining the relationship between the atom's structure and the bonds that it makes.</li> <li>- Verifying the effects of pressure and temperature on chemical changes.</li> <li>- Using the periodic table to determine the physical and chemical properties of elements.</li> <li>- Performing quantitative calculations in chemical changes.</li> <li>- Identifying the conditions that control the speed of chemical changes.</li> <li>- Assigning the characteristics of chemical changes to normal conditions</li> <li>- Linking the structure of carbon with the formation of organic molecules.</li> <li>- Linking functional groups with the physical and chemical properties of substances.</li> <li>- Explaining chemical changes that take place in human beings.</li> </ul>	<ul style="list-style-type: none"> <li>- Earth materials (SCIENCE)</li> <li>- Matter and Qualitative analysis</li> <li>- chemical systems and equilibrium</li> <li>- solutions and solubility</li> </ul> <p><b>Major Strands missing:</b></p> <ul style="list-style-type: none"> <li>- electrochemical structure and properties</li> <li>- electrochemistry</li> </ul>	<p>properties.</p>
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PHYSICS	Major Strands	Overall Curriculum Comparison
<p>(particle mechanics, thermodynamics, wave phenomena and electromagnetism)</p> <ul style="list-style-type: none"> <li>- Establishing relationships between the different forces that work on bodies at rest or in motion and establishing the conditions to preserve mechanical energy.</li> <li>- Establishing a mathematical model to study the movement of everyday use objects based on the forces that work on them.</li> <li>- Explaining the transformation of mechanical energy into thermal energy.</li> <li>- Establishing relationships between stability and the center of the mass of an object.</li> <li>- Establishing relationships between the conservation of linear momentum and impulsive forces in systems of objects.</li> <li>- Explaining the behavior of fluids in movement and at rest.</li> <li>- Linking mass, distance and the force of gravitational attraction between objects.</li> <li>- Establishing relationships between the gravitational field</li> </ul>	<ul style="list-style-type: none"> <li>- Forces and motion</li> <li>- Forces and motion: Dynamics</li> <li>- Mechanical systems</li> <li>- Electricity and magnetism</li> <li>- Energy and Momentum</li> <li>- Energy, work and power</li> <li>- Energy transformations</li> <li>- Matter energy interface</li> <li>- Hydraulic and Pneumatic systems</li> <li>- Science and Space (SCIENCE)</li> <li>- Electric, gravitational and magnetic fields</li> <li>- Electricity and electronics</li> <li>- Electrical Circuits (SCIENCE)</li> <li>- Matter and qualitative analysis (CHEMISTRY)</li> <li>- waves and sound</li> </ul> <p><b>Major Strands missing:</b></p> <ul style="list-style-type: none"> <li>- communications technology</li> <li>- light and geometric optics</li> </ul>	<p>There are considerable similarities between the overall curriculum guidelines for Physics in both Colombia and Ontario. The strands missing in the Colombian curriculum guidelines are extremely specific and do not significantly affect overall curriculum and learning objectives.</p>

<p>model and the Universal Law of Gravitation.</p> <ul style="list-style-type: none"><li>- Establishing relationships between macroscopic and electrostatic forces.</li><li>- Establishing relationships between gravitational and electrostatic fields, and between electric and magnetic fields.</li><li>- Linking voltage and current with the different elements of a complex electrical circuit and for the entire system.</li></ul>		
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<b>GENERAL SCIENCE/ EARTH AND SPACE SCIENCES</b>	<b>Major Strands</b>	<b>Overall Curriculum Comparison</b>
<p>1) Science, Technology and Society</p> <ul style="list-style-type: none"> <li>- Explaining the technological applications of the model of fluid mechanics.</li> <li>- Analyzing the development of electrical circuit components and their impact on everyday life.</li> <li>- Analyzing the potential of natural resources in obtaining energy for different uses..</li> <li>- Establishing relationships between sports, and physical and mental health.</li> <li>- Explaining how antibiotics work, and recognizing the importance of their proper use.</li> <li>- Recognizing the harmful effects of excessive consumption of caffeine, tobacco, drugs and alcohol.</li> <li>- Explaining the chemical changes in food preparation, industry and the environment.</li> <li>- Confirming the usefulness of microorganisms in the food industry.</li> <li>- Describing cultural and technological factors</li> </ul>	<ul style="list-style-type: none"> <li>- Science and Space (SCIENCE)</li> <li>- Technologies in everyday life (SCIENCE)</li> <li>- Electrical Circuits (SCIENCE)</li> <li>- Introduction to earth sciences (EARTH AND SPACE SCIENCES)</li> <li>- Earth Materials (EARTH AND SPACE SCIENCES)</li> <li>- Energy Transformations (PHYSICS)</li> <li>- Human Impact on the Environment (SCIENCE)</li> <li>- Energy alternatives and global impact (SCIENCE)</li> <li>- Body input and body function (SCIENCE)</li> <li>- The immune system and human health (SCIENCE)</li> <li>- Organic products in everyday life (SCIENCE)</li> <li>- Animal anatomy and physiology (BIOLOGY)</li> <li>- Diversity of living things (BIOLOGY)</li> <li>- Pathogens and Disease (SCIENCE)</li> <li>- Chemistry at home and work (SCIENCE)</li> <li>- Micro-organisms (SCIENCE)</li> <li>- Science and contemporary societal issues (SCIENCE)</li> <li>- medical technology (SCIENCE)</li> <li>- communications systems</li> </ul>	<p>There is considerable similarity between the overall Colombian curriculum objectives in Science, Technology and Society and Ontario’s Science courses. The major strands that are missing in the Colombian curriculum are in the area of science materials and safety, agriculture and horticulture and communications technology. In the Colombian curriculum, there is a focus on reproductive health and technology.</p> <p>There is a very limited relationship between the Colombian Sciences and Ontario’s Earth and Space Sciences curriculum. Except for an understanding of natural resources and a general introduction to earth sciences, the Colombian science curriculum does not</p>

<p>affecting human sexuality and reproduction.</p> <ul style="list-style-type: none"> <li>- Discussing the importance of contraception and the prevention of sexually transmitted diseases in maintaining the health of individuals and the public.</li> <li>- Identifying technologies developed in Colombia.</li> </ul>	<p>(SCIENCE)</p> <p><b>Major Strands missing:</b></p> <ul style="list-style-type: none"> <li>- everyday chemicals and safe practice (SCIENCE)</li> <li>- waste management (SCIENCE)</li> <li>- materials and safety (SCIENCE)</li> <li>- communications: sounds and pictures (SCIENCE)</li> <li>- gardening, horticulture, landscaping and forestry (SCIENCE)</li> <li>- alternative environments (SCIENCE)</li> <li>- The earth as a planet (EARTH AND SPACE SCIENCES)</li> <li>- Internal and surficial earth processes (EARTH AND SPACE SCIENCES)</li> <li>- Earth history (EARTH AND SPACE SCIENCES)</li> </ul>	<p>appear to cover earth and space sciences as does the Ontario curriculum.</p>
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## INTERNATIONAL LANGUAGES/ SPANISH

<b>COLOMBIA CURRICULUM GUIDELINES</b>	<b>ONTARIO CURRICULUM STANDARDS (INT. LANGUAGES)</b>
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<b>SPANISH (grades 10 and 11)</b>	<b>Major Strands</b>	<b>Overall Curriculum Comparison</b>
<p>1) Focus on the construction processes of the system of meanings</p> <ul style="list-style-type: none"> <li>- Clarification and understanding how language functions in its text productions, thus building relationships between the meaning of a text and its structural forms.</li> <li>- Internalizing usage rules of linguistic structures in text production</li> <li>- Understanding communicative intentions in text production.</li> <li>- Using all the linguistic elements in text production, by showing correction processes and self-checks.</li> </ul> <p>2) Focus on interpreting processes and text production</p> <ul style="list-style-type: none"> <li>- Inclusion and identification of thematic essays and types of texts according to the object of study, selecting the proper information to compare the ideas presented on those texts.</li> <li>- Production of thematic</li> </ul>	<p>- Oral Communication: Listening, Speaking</p> <ul style="list-style-type: none"> <li>- Reading</li> <li>- Writing</li> <li>- Grammar and Language Knowledge</li> </ul> <p><b>Categories used for Evaluation:</b></p> <p>1) Knowledge/ Understanding</p> <ul style="list-style-type: none"> <li>- knowledge of the required linguistic elements (grammar, vocabulary, spelling, pronunciation)</li> <li>- understanding of materials read</li> <li>- understanding of spoken language</li> </ul> <p>2) Thinking/ Inquiry</p> <ul style="list-style-type: none"> <li>- critical and creative thinking skills</li> <li>- inquiry skills (e.g., formulating questions, planning, selecting strategies and resources, analyzing and interpreting information, forming conclusions)</li> </ul> <p>3) Communication</p> <ul style="list-style-type: none"> <li>- communication of information and ideas, orally and in writing</li> <li>- communication for</li> </ul>	<p>The Spanish curriculum is an upper level study of literature and semiotics, while the Ontario curriculum for International Languages is the study of a second language for non-native speakers.</p> <p>*There is no need to include Oral Communication (Listening) in the Colombian curriculum guidelines or as a strand missing in the Ontario context. Students from Colombia possess a superior level of all of the major strands covered in the International Languages criteria.</p>

<p>essays and critical reviews taking into account consulted theories.</p> <ul style="list-style-type: none"> <li>- Preparation of discussions and participation in forums.</li> <li>- Understanding all types of texts particularly argumentative essays, where information is organized in order of importance, related and analyzed to compare and enrich own ideas.</li> <li>- Producing a variety of texts, particularly argumentative essays where ideas are developed in depth.</li> </ul> <p>3) Focus on cultural and aesthetic processes associated with language: the role of literature</p> <ul style="list-style-type: none"> <li>- Inclusion of 19<sup>th</sup> century literary and artistic works.</li> <li>- Inclusion of stylistic characteristics that describe the artistic or literary work in relation to historical moments; and identification of the social role of the artistic work.</li> <li>- Understanding 20<sup>th</sup> century artistic and literary works.</li> <li>- Analyzing the stylistic characteristics and complexities of artistic or literary works and identifying references, excerpts, characters or</li> </ul>	<p>different audiences and purposes</p> <ul style="list-style-type: none"> <li>- use of various forms of communication</li> </ul> <p>4) Application</p> <ul style="list-style-type: none"> <li>- use of the required language structures and vocabulary</li> <li>- making connections (e.g., between the language and the culture, including the arts, and the world outside the school)</li> </ul> <p><b>Major Strands missing:</b></p> <p>-Oral Communication: Listening*</p>	
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<p>situations existing in other texts.</p> <p>4) Focus on interactive principles and the cultural processes of communication ethics</p> <ul style="list-style-type: none"><li>- Explaining in a critical way the meaning of signs, symbols, codes and other signs used by humans, differentiating languages and message structures in order to utilize them in their own creations.</li><li>- Adopting a critical stand towards messages received; Interpreting the meanings of messages and analyzing and using them in students' own creations.</li></ul>		
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