

Vocabulary

Additional Support Resources

Alberta Education developed a list of resources in collaboration with teachers and administrators throughout Alberta to provide further support for the Kindergarten to Grade 9 Mathematics Program of Studies. These resources are not part of Alberta Education's Authorized Resource List, but are additional support resources for teachers to consider for use in their classroom. These resources are not authorized as they didn't go through an authorization process. They are simply approved as they have been reviewed by Alberta Education for certain criteria.

Algorithm

An effective method, procedure, or technique for solving a problem. As defined by Alberta Education in a [one-page document](#) on this topic, "algorithms are step-by-step procedures."

Approved Resource

In Alberta, there is no such thing as an approved resource.

Authorized Resource (in Alberta)

Alberta Education authorizes learning and teaching resources in four categories:

- student basic resources
- student support resources
- teaching resources
- distributed learning resources

Authorization indicates that the resources meet Alberta Education's evaluation criteria (e.g., curriculum congruency; instructional and technical design; Guidelines for Recognizing Diversity and Promoting Respect; preference for Canadian content; and First Nations, Métis and Inuit Content Validation); however, the use of authorized resources is not mandatory for program delivery. (page 123 from the [Guide to Education](#)).

For a list of authorized resources, see [Authorized Resources Database](#).

Classroom Culture

The behaviors, beliefs, values, that are agreed upon in the classroom. A positive classroom culture promotes trust and respect, encourages communication and discourse, and enhances student engagement. It includes how you organize your classroom, the ways tasks are given to the students, how groups are formed for group work, the students' work spaces (pen & paper vs. vertical whiteboards), etc.

Conceptual Understanding

“Conceptual understanding in mathematics means that students understand which ideas are key (by being helped to draw inferences about those ideas) and that they grasp the heuristic value of those ideas. They are thus better able to use them strategically to solve problems – especially non-routine problems – and avoid common misunderstandings as well as inflexible knowledge and skill.” [Grant Wiggins](#)

Concrete Stage (in the context of concrete, pictorial, symbolic)

The use of physical models to represent the mathematical thinking. Models are tools that can be manipulated and adapted in order to find possible solutions to problems. This stage allows students to develop their visualization skills which are essential to problem solving, enabling students to use concrete means to grapple with abstract concepts.

Although the concrete-pictorial-symbolic stages may appear to be a linear learning progression, it is not always the case. Often students will move between them several times in order to better master a concept.

Constructivism

Constructivism is a philosophy of learning founded on the idea that people actively construct knowledge or develop their own understanding rather than acquiring it.

Critical Thinking

The ability to think clearly and rationally about what to do. It includes the ability to engage in reflective and independent thinking. Someone with critical thinking skills is able to understand the logical and analogical connections between ideas. According to the Alberta Ministerial Order on Student Learning (2013), it is the ability to conceptualize, apply, analyze, synthesize, and evaluate to construct knowledge. [Source](#)

Differentiated Instruction

According to Alberta Education, “Differentiated instruction is a philosophy and an approach to teaching in which teachers and school communities actively work to support the learning of all students through strategic assessment, thoughtful planning and targeted, flexible instruction.” [Source](#)
Watch the video : [Learning from Mistakes](#)

Direct Instruction

The use of explicit teacher-centered teaching techniques, meaning that the teacher stands in front of a classroom and presents the information.

Discourse

According to NCTM, “mathematical discourse is the mathematical communication that occurs in a classroom. Effective discourse happens when students articulate their own ideas and seriously consider their peers mathematical perspectives as a way to construct mathematical understandings.” [Source](#)

Discovery Learning

A technique of inquiry-based learning considered a constructivist based approach to education. About Discovery Learning in Alberta: <https://education.alberta.ca/mathematics-k-6/program-supports/everyone/faqs/>

Effective Strategy

A strategy is effective if it leads to the correct answer.

Efficient Strategy

A strategy is efficient if it is well-organized and can be carried out in a reasonable amount of time.

Fixed Mindset

Students with a fixed mindset believe intelligence is a stable characteristic. They believe people either are or aren't good at something because it is just who they are. Success is the affirmation of their inherent intelligence.

Flipped Classroom

The flipped classroom describes a reversal of traditional teaching where students are first exposed to new material outside of class, usually via reading or lecture videos, and then class time is used to do the harder work of assimilating that knowledge through strategies such as problem-solving, discussion or debates. ([Vanderbilt University, Center for Teaching](#)).

General Outcomes

General outcomes are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades. [Source](#)

Growth Mindset

Students and educators who demonstrate a growth mindset understand that intelligence can be developed. Students focus on improvement, take risks and work hard to learn more and get smarter. Based on years of research by Stanford University's Dr. Dweck, Lisa Blackwell Ph.D., and their colleagues, we know that students who learn this mindset show greater motivation in school, better grades, and higher test scores. [Source](#)

Inclusion

An attitude and approach that embraces diversity and learner differences and promotes equal opportunities for all learners in Alberta. [Source](#)

Inquiry-Based Learning

Inquiry-Based Learning is a process where students are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge. That knowledge is new to the students and may be used to answer a question, to develop a solution or to support a position or point of view. The knowledge is usually presented to others and may result in some sort of action. ([Source](#): Focus on Inquiry, Alberta Learning, 2004)

Instruction

The transmission of information about how to do or use something. The teaching of a particular skill or subject.

Instructional Practices

Instructional Practices encompass everything a teacher implements in the classroom that fuels effective and efficient classroom interactions to drive student on their learning journey.

Instructional Strategies

An instructional strategy is a method used in teaching to engage the students in learning. “Instructional approaches and strategies are evidence- and research-based and are adaptable and diverse to provide appropriate learning experiences, challenges, and supports to all students.” (Ministry of Education, Saskatchewan) [Source](#)

Manipulatives

Any object that can be manipulated by students and teachers in order to convey an idea or model an abstract concept in mathematics. According to Domino (2010), there are 3 types of manipulatives. There are the day-to-day objects you can find anywhere like money and buttons. The second type is composed of commercial objects that were not meant to be math manipulatives but can play that role beautifully like Lego Blocks and finally, the objects that were created and that are sold for that specific purpose like Cuisenaire Rods. [Source](#)

Mathematical Processes

The 7 Mathematical Processes are intended to permeate learning and teaching in Alberta. They are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and embrace lifelong learning in mathematics. The Mathematical Processes are communication, connection, reasoning, technology, problem solving, mental math and estimation, visualization. [Source](#)

Mathematical Strategies

The application of a procedure with reasoning. Strategies can be explained as meaningful steps students take to solve a problem. These can include traditional algorithms and personal strategies. In Alberta, students are not expected to master all strategies. [Source](#)

Outcome

Outcomes include general outcomes, specific outcomes and the 7 mathematical processes. General outcomes are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades. Specific outcomes are statements that identify the specific skills, understanding and knowledge that students are required to attain by the end of a given grade. [Source](#)

Pictorial Stage (in the context of concrete, pictorial, symbolic) (aka semi-concrete)

During the pictorial stage, students make connections between concrete manipulatives and visuals of manipulatives. They also begin to work with visual representations such as diagrams and pictures of problems. The teacher may demonstrate this stage themselves through the use of interactive whiteboards or other medium at the same time that students are working with concrete manipulatives. Although the concrete-pictorial-symbolic stages may appear to be a linear learning progression, it is not always the case. Often students will move between them several times in order to better master a concept.

Programming Principles

In Alberta, programming takes place at the local level and is concerned with effective delivery of the programs of study to the students enrolled. Programming decisions are made by school authorities, schools, teachers and students. Programming involves a variety of processes for ensuring effective program implementation. These processes include:

- identifying outcomes for learning (based on programs of study and student progress)
- organizing for instruction (including the grade configuration of schools)
- selecting learning activities
- selecting learning resources
- assessing student progress
- evaluating student progress
- providing time for learning based on student progress.

Programming decisions are best made at the local level to ensure that the scope of the programs offered and the delivery of those programs are responsive to the learning needs of all students. Decision making at the local level also provides the opportunity for effective use of local resources and for local guidelines to be recognized. This is done in many different ways (e.g., by introducing enrichment activities, optional courses, alternative programs, work experience, mentoring and adjustments in instructional time). [Source](#)

Resource (aka Instructional Resource)

Instructional resources can be defined as anything which is read, listened to, manipulated, observed or experienced by students as part of the instructional strategy. Resources may be consumable or non-consumable.

Responsive Instruction

Responsive instruction is the result of ongoing formative assessment. It involves adjusting instruction as needed, providing support to students who need to develop a better understanding and challenges to those who are ready for more.

Required Resource

In Alberta, any resource, generally an approved resource, that is mandated by a school authority for use by teachers and/or students.

Specific Outcome

Specific outcomes are statements that identify the specific skills, understanding and knowledge that students are required to attain by the end of a given grade. [Source](#)

Symbolic Stage (in the context of concrete, pictorial, symbolic) (aka abstract stage)

In the symbolic stage, a student should be capable of representing problems by using mathematical notation, for example: $12 \div 2 = 6$. Although the concrete-pictorial-symbolic stages may appear to be a linear learning progression, it is not always the case. Often students will move between them several times in order to better master a concept. [Source](#)

Virtual Manipulatives

Digital objects that are representations of real manipulatives. They can be manipulated by a finger on the mouse or on a touch screen, in the same way as their authentic counterparts. Virtual versions of concrete manipulatives such as counters, Base 10 Blocks, Cuisenaire Rods, and Tangrams, are often available at no cost online or in App Stores.