

Teaching Knowledge and Employability Math

This introduction to teaching Knowledge and Employability Math includes the following topics:

Resource Overview

Step One: Plan for Instruction

Step Two: Prepare for Instruction

Step Three: Use the Resource in the Classroom

Step Four: Assess and Reflect.

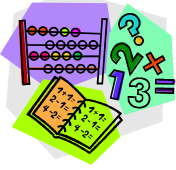
Resource Overview



The math component of the Knowledge and Employability Studio is organized into the following topics:

- Math Strategies
- Numbers
- Patterns and Relations
- Shape and Space
- Statistics and Probability
- Assessment Rubrics.

The resource is divided by concepts, not by grade level; however, within each section there is a progression from introductory to more complex concepts. Each concept or topic relates to a strand of the math knowledge and employability curriculum.




There are three main types of documents in the math section.

Type	Description
Teaching pages 	<p>The teaching pages contain information and strategies on various topics within the skill sets. For example, for the skill of converting from one metric unit to another there is a metric staircase, metric units mnemonic and several examples. After introducing and exploring the topic and providing various strategies, teachers can have students practise the skill by converting from one metric unit to another in the practice section.</p> <p>The teaching pages are written at a reading level that will be accessible to most students, and they can be printed for student use, used as the basis for teacher lessons or used as reference materials on bulletin boards and in class displays.</p>

<p>Tools</p> 	<p>The tools are skills-based blackline masters located under Math Strategies that students can use as they complete the activities and practice included in the teaching pages. The tools are flexible enough to use with content that ranges in difficulty. Most of the tools are provided in Microsoft Word™ format so that they can be used electronically or modified by the teacher, if desired. Once the tools have been introduced and modelled for the class, they can be used by students with increasing independence.</p> <p>Links to the tools are included, where relevant, throughout the resource.</p>
<p>Assessment pages</p> 	<p>The assessment pages are rubrics that allow teachers to evaluate student understanding and performance on specific tasks or on an ongoing basis. A rubric is included for each of the key skill sets covered in the resource. All of the assessment materials are provided in Word™ format so that teachers can add, delete or modify the outcomes listed.</p>

Elements of the Teaching Pages

So that students can easily see where they are expected to complete work, work with others, make connections to the real world and refer back to examples, the different elements of the teaching pages are clearly marked with icons and labels.

Element	Description
<p>Practice</p> 	<p>The practice sections are included throughout the resource after a concept or skill has been introduced and modelled. The practice sections include questions that build from easier to more difficult. More practice questions can be added or practice sections can be skipped, depending on the skill levels (or grade levels) of the students.</p>
<p>Examples</p> 	<p>Examples are included after each new skill, strategy or process is introduced. The examples show how a math problem can be answered and the steps involved in solving for an answer. Often multiple examples are included to demonstrate various different strategies for solving a math problem.</p>
<p>Group/Partner Work</p> 	<p>Where students are asked to compare their answers with others in the class or work together to solve a math problem, the group/partner work icon appears on the left side of the page. Group and partner work is a key component of cooperative learning and should be encouraged on a regular basis.</p>

Element	Description
<p>Think About ... When might people have to convert from one unit to another in the workplace?</p>	<p>Throughout the resource, students are invited to make connections between their learning in math to real-life applications of the skills they are learning. These connections are important for providing context and meaning and encourage students to connect mathematical concepts to everyday experiences.</p>

Step One: Plan for Instruction

Review the Curriculum

To begin planning for instruction, review the program of studies and note the outcomes covered in the grade you are teaching.

The [Knowledge and Employability Math Program of Studies](#) describes four strands that relate directly to the various sections of the online resource.

The Knowledge and Employability courses are designed to give students the skills they will need to return to the regular math program, should they be capable of it. For more information on transition planning, see [Planning for Transitions](#) in the Teacher Workstation.

Consider the following questions in relation to the program of studies.

- In what order and combination should outcomes be addressed to best meet the needs of your students and to best fit an interdisciplinary approach?
- Are there any topics that fit well with seasonal activities, field trips, guest speakers or other presentation opportunities?
- How will you infuse Universal Strategies outcomes into activities to meet student needs?

Review Math Resources

Consult the [authorized basic and support resources](#).

- Which resources will appeal to your students and best meet their needs?
- How will you use these resources to meet curriculum outcomes?
- Which specific activities would you like to build into your lesson plans?

Find relevant sections of the Knowledge and Employability Studio and review the teaching pages and tools available.

- Are there student tools or teaching pages that support the activities or resources you have chosen?
- Are there tools or teaching pages that you can provide for students to use on an ongoing basis?

- Are there assessment or self-assessment tools that you can use to evaluate student learning?

Decide which activities you will use to address outcomes.

- Which activities best suit your students' ability levels?
- What teaching techniques will work best for your students in relation to the activities you have selected?

Identify other relevant resources

Other Alberta Education math resources provide opportunities for students to apply various levels of foundational skills with ICT skills, for example:

- Math5 Alive:
<http://www.learnalberta.ca/Launch.aspx?content=/content/me5l/html/Math5.html>
- Spy Guys:
<http://www.learnalberta.ca/Launch.aspx?content=/content/mesg/html/math6web/math6shell.html>
- Junior High Math:
<http://www.learnalberta.ca/content/mejhm/index.html?launch=true>

Review the Teacher Workstation

The Teacher Workstation contains information and strategies to help you enhance student learning and address unique elements of Knowledge and Employability courses, such as interdisciplinary learning. It may be helpful to review some or all of the following topics as part of your planning.

Inquiry-based Learning

There are many opportunities for inquiry-based learning in mathematics. For example, when students are asked to choose a strategy for solving a new math problem, they can be encouraged to think about what they know about the topic or a related topic and what they will need to find out about the topic. Students can then plan for finding the information they need, retrieve the information from various sources and share the information with others.

Interdisciplinary Learning

Interdisciplinary learning is another key element in the philosophy of Knowledge and Employability courses. The math component allows teachers to support interdisciplinary learning by providing:

- links from other subject areas, such as science, to relevant math tools or teaching
- links to universal tools that address skills common to learning
- activities that require cross-curricular skills, such as reading comprehension.

Metacognition

To develop or directly teach metacognition skills in math:

- ensure that students reflect on their learning in each topic. Have the students consider new learning and reflect upon it within the larger context of previous learning
- choose activities and examples that lead students to make connections between learning and their own experiences
- assign self-assessment activities, including checklists and rubrics from the English Language Arts section, to help students evaluate their learning strategies and the degree to which their knowledge base has broadened.

Information and Communication Technology

Information and Communication Technology (ICT) outcomes are infused into all programs of study. To ensure that ICT outcomes are addressed, have the students use the Internet and multimedia resources (see those listed on the previous page), where appropriate, to investigate topics. Also have the students use word processing and spreadsheet programs to create graphs and spreadsheets when investigating business math applications.

Differentiated Instruction

The math component includes:

- activities and practice questions that require a range of skills
- modular pieces that allow the teacher to pick and choose topics and activities, based on student abilities and interests
- varied assessment pieces that address knowledge, skills and attitudes, both collectively and independently.

These features allow teachers to differentiate instruction by selecting materials that will best meet the needs and interests of individual students.

Learning Styles

One important way of differentiating instruction is to acknowledge and support a variety of learning styles. To address a variety of learning styles:

- include activities and examples that appeal to visual, auditory and kinesthetic learning preferences
- include links and reference materials in a variety of media, including Web sites, films and books
- modify the online materials to present the information in different ways.

Cooperative Learning

To support cooperative learning, the math component includes:

- student activities and tools that include clear directions and some scaffolding that should allow students to work through activities with the teacher acting as facilitator
- various opportunities for group and partner work.

English language arts group work and self-assessment and peer assessment pieces can be used to evaluate a student's role in group work.

Lecturing

To support lecture-style teaching, the math component includes tools and information sheets that can be photocopied to use as overheads and/or handed out to students before a lecture.

Create your [Unit Plan](#) and [Lesson Plans](#)

Identify natural breaking points in the year to use as markers for the beginnings and ends of units.

- When are long weekends and holidays?
- Are there any celebratory and commemorative dates related to topics you will be covering?

Identify cross-curricular connections.

- Are there texts from other subject areas or occupational courses that could be used to discuss math strategies?
- Could examples be drawn from social studies, language arts or science topics?

Decide how you will organize the unit or lessons.

- How much time will students need to complete each activity?
- How will you organize your teaching into manageable units?

Unit Plan Checklist

I know ...

- how the required outcomes will be combined into lessons
- what links can be made to events, celebrations and holidays
- how much time is required to cover the material in the unit.

Lesson Plan Checklist

I know ...

- how much time is required to complete each part of the lesson
- what curricular outcomes will be addressed
- what cross-curricular connections will be made
- how learning for different students will be differentiated
- what resources will be needed, including:
 - printed material from the online resource
 - books, magazines and newspapers
 - Internet sites and multimedia
 - reference books
 - visual texts such as photographs or films
 - rooms and equipment, including computers and printers
 - guest speakers
- how students will reflect on their own learning or metacognition
- what assessment tools will be used
- what preparation and culmination activities will be completed.

Step Two: Prepare for Instruction

Collect the resources required for students to complete the planned activities.

- Locate appropriate material from authorized resources, the Studio and other sources.
- Could you create a classroom library of related reading for students?
- What manipulatives might you use?
- Are there tools, equipment or examples from different occupations that could be used to illustrate math concepts?

Tip!

Although the Knowledge and Employability Studio is delivered as an online resource, the documents can be used in a variety of ways.



- Print and enlarge teaching pages and tools to create posters for the classroom.
- Print teaching pages and tools to create reference binders for students.
- Laminate copies of teaching pages with steps or strategies that students can borrow.
- Print tools as overheads and fill in information as a class.
- Create bulletin boards of key information and/or sample work.
- Print or photocopy tools and self-assessment for each student.
- Download Microsoft Word™ tools for students to use electronically.

Step Three: Use the Resource in the Classroom

When using the math resource in the classroom, it is important to introduce the teaching pages and tools in context, explain their purpose, model their use and provide opportunities for guided practice before students are expected to use these materials independently. Encourage student discussion and group work whenever appropriate. Write anecdotal notes to help you assess student performance and abilities, noting the date and context of your observations. You may wish to have relevant assessment materials, such as group work assessment rubrics, on hand as you observe the students. Note any adjustments you should make to your teaching or resources next time.

Step Four: Assess and Reflect

The assessment component of the math resource is comprised of rubrics that address the various skills included in the curriculum, e.g., Capacity (Measurement), Decimals, Fractions and Percents, Integers, Linear (Measurement), Multiples and Factors. For each main topic of the resource there is a corresponding assessment rubric that addresses the skills, process and knowledge covered.

Relevant Assessment Tools from English Language Arts

Assessment tools found in the English language arts section can be used to assess work completed in the math program. These tools include rubrics and checklists for assessing written work, presentations, research and group work.

- Assessment Rubric: Paragraph
- Self-assessment Rubric: Paragraph
- Assessment Rubric: Writing Mechanics
- Self-assessment Rubric: Writing Mechanics
- Assessment Checklist: Listening I
- Self-assessment Checklist: Listening I
- Assessment Checklist: Listening II
- Self-assessment Checklist: Listening II
- Self-assessment Rubric: Class Participation
- Assessment Rubric: Class Participation
- Self-assessment Checklist: Independent Project
- Assessment Checklist: Independent Project
- Self-assessment Checklist: Group Work Process
- Peer Assessment Checklist: Group Work Process
- Assessment Checklist: Group Work Process I (Individual Student)
- Assessment Checklist: Group Work Process II (Whole Group)
- Self-assessment Checklist: Group Work Process and Content
- Assessment Checklist: Group Work Process and Content
- Self-assessment Rubric: Group Work Process
- Assessment Rubric: Group Work Process
- Self-assessment Checklist: Problem-solving
- Assessment Checklist: Problem-solving

Reflecting on the Lesson

After completing a lesson, reflect on the various challenges and successes you and the students experienced.

- Were students able to complete their work within the time allowed? Why or why not?
- Were my expectations for student learning realistic?
- Was group work the best way to address the material or would independent or teacher-directed work have worked better?
- What concepts or skills did students struggle with and what may need to be retaught or reviewed?
- Which learning strategies worked best for students?
- Are there students who are struggling or who could use more of a challenge? How can I differentiate future instruction?
- Were students generally demonstrating the appropriate values and attitudes?
- What resources worked well? What new resources were found?
- What resources did not work well? Why?
- Are there different ways I could use the materials in the Knowledge and Employability Studio, such as providing tools for students to use electronically?