Mathematics

# Planning Guide

## Grade 3

*Counting to 1000*

## Number

Specific Outcome 1

**This Planning Guide can be accessed online at:**
http://www.learnalberta.ca/content/mepg3/html/pg3_countingto1000/index.html

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# **Planning Guide:** *Counting to 1000*

**Strand:** Number
**Specific Outcome:** 1

This *Planning Guide* addresses the following outcome from the program of studies:

| | |
|---|---|
| **Strand:** Number | |
| **Specific Outcomes:** | 1. Say the number sequence 0 to 1000 forward and backward by:<br>• 5s, 10s or 100s, using any starting point<br>• 3s, using starting points that are multiples of 3<br>• 4s, using starting points that are multiples of 4<br>• 25s, using starting points that are multiples of 25.<br>[C, CN, ME] |

## Curriculum Focus

The changes to the curriculum targeted by this sample include:

- The general outcome for the number strand in the revised program of studies states simply that the goal of this entire strand is to "develop number sense." The number strand is no longer divided into "number concepts" and "number operations." Number sense includes, for example, the ability to partition numbers and the ability to reason multiplicatively. These abilities apply to both numbers and operations.
- In the previous program of studies, general outcomes at each grade level specified magnitudes of numbers and particular operations, implying that number sense develops in a linear fashion. A more current understanding of student's mathematical development is that number sense deepens over time. Student's understanding of even 1-digit numbers is not fully developed until they are able to think of numbers abstractly (as quantities that do not necessarily refer to specific objects or as progressions on a scale).
- The revised program of studies for Grade 3 no longer includes skip counting forward or backward by 2s, as this is covered in Grade 2.
- The revised program of studies for Grade 3 includes counting by 3s and 4s, using starting points that are multiples of 3 and 4, respectively.

## What Is a Planning Guide?

**Planning Guides** are a tool for teachers to use in designing instruction and assessment that focuses on developing and deepening students' understanding of mathematical concepts. This tool is based on the process outlined in *Understanding by Design* by Grant Wiggins and Jay McTighe.

## Planning Steps

The following steps will help you through the Planning Guide:

## Step 1: Identify Outcomes to Address

### Guiding Questions

- What do I want my students to learn?
- What can my students currently understand and do?
- What do I want my students to understand and be able to do based on the Big Ideas and specific outcomes in the program of studies?

### Big Ideas

- Numbers can be used in a variety of ways; for example, to count objects, to represent abstract quantities, to signify position in a sequence, to measure, or as codes or labels that do not relate to quantity (e.g., telephone numbers).
- Numbers relate to each other in a variety of ways.
- Numbers can be partitioned in a variety of ways.
- There are patterns in numbers that can be discovered by counting in different ways.
- Discovering patterns in numbers helps develop an understanding of number relationships and helps develop number sense.
- Visual and concrete experience of quantity helps develop number sense.
- Greater understanding of number leads to greater mathematical power and flexibility.

## Sequence of Outcomes from the Program of Studies

See http://education.alberta.ca/teachers/program/math/educator/progstudy.aspx for the complete program of studies.

| Grade 2 | Grade 3 | Grade 4 |
|---|---|---|
| **Specific Outcomes** | **Specific Outcomes** | **Specific Outcomes** |
| 1. Say the number sequence 0 to 100 by:<br>• 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively<br>• 10s, using starting points from 1 to 9<br>• 2s, starting from 1<br>[C, CN, ME, R] | 1. Say the number sequence 0 to 1000 forward and backward by:<br>• 5s, 10s or 100s, using any starting point<br>• 3s, using starting points that are multiples of 3<br>• 4s, using starting points that are multiples of 4<br>• 25s, using starting points that are multiples of 25.<br>[C, CN, ME] | 1. Represent and describe whole numbers to 10 000, pictorially and symbolically.<br>[C, CN, V] |
| 2. Demonstrate if a number (up to 100) is even or odd.<br>[C, CN, PS, R] | | |
| 3. Describe order or relative position, using ordinal numbers (up to tenth).<br>[C, CN, R] | | |
| 4. Represent and describe numbers to 100, concretely, pictorially and symbolically.<br>[C, CN, V] | | |

## Step 2: Determine Evidence of Student Learning

### Guiding Questions

- What evidence will I look for to know that learning has occurred?
- What should students demonstrate to show their understanding of the mathematical concepts, skills and Big Ideas?

### Using Achievement Indicators

As you begin planning lessons and learning activities, keep in mind ongoing ways to monitor and assess student learning. One starting point for this planning is to consider the achievement indicators listed in the *Mathematics Kindergarten to Grade 9 Program of Studies with Achievement Indicators*. You may also generate your own indicators and use them to guide your observation of the students.

The following indicators may be used to determine whether or not students have met this specific outcome. Can students:

- extend a given skip-counting sequence by 5s, 10s or 100s, forward and backward, using a given starting point?
- extend a given skip-counting sequence by 3s, forward and backward, starting at a given multiple of 3?
- extend a given skip-counting sequence by 4s, forward and backward, starting at a given multiple of 4?
- extend a given skip-counting sequence by 25s, forward and backward, starting at a given multiple of 25?
- identify and correct errors and omissions in a given skip-counting sequence?
- determine the value of a given set of coins (nickels, dimes, quarters and loonies) by using skip counting?
- identify and explain the skip-counting pattern for a given number sequence?

Sample behaviours to look for related to these indicators are suggested for some of the activities listed in **Step 3, Section C: Choosing Learning Activities** (p. 9).

## Step 3: Plan for Instruction

### Guiding Questions

- What learning opportunities and experiences should I provide to promote learning of the outcomes and permit students to demonstrate their learning?
- What teaching strategies and resources should I use?
- How will I meet the diverse learning needs of my students?

### A. Assessing Prior Knowledge and Skills

Before introducing new material, consider ways to assess and build on students' knowledge and skills related to numbers to 1000. For example:

- Check to make sure that students can skip count by 2s from 0 to 30.
- Check to make sure that students can skip count by 5s to 55.
- Have students skip count by 10s, past 110, to see if they understand numbers greater than 100.
- Ask students to start at 10 and skip count by 2s, then stop them and ask them to start at 60.
- Have students count by 2s, starting at 1.
- Finally, have students count by 2s from a variety of odd and even starting points.
- If students are able to show that they understand the concept of skip counting from different starting points, have them skip count by 5s from numbers that are multiples of 5, and by 10s from numbers that are multiples of 10.
- Ask students to skip count by 10s, starting at 7.

If a student appears to have difficulty with these tasks, consider further individual assessment, such as a structured interview, to determine the student's level of skill and understanding. See **Sample Structured Interview: Assessing Prior Knowledge and Skills** (p. 8).

## Sample Structured Interview: Assessing Prior Knowledge and Skills

| **Directions** | Date: | |
|---|---|---|
| | **Not Quite There** | **Ready to Apply** |
| To make sure students understand the counting sequence, have them start counting at 1s, and see how high they can go. Stop the student at 65. | The student leaves out a number from time-to-time in the 1s sequence, or does not progress to the next decade in the correct order. | The student knows the sequence of the numbers in the 1s and in the decades. |
| To make sure students understand the counting sequence past 100, have them start counting at 80. Stop them at 120. | The student struggles with the order and naming of numbers greater than 100 or greater than 109. | The student is able to count accurately using numbers over 100. |
| To test students' understanding of the number sequence, ask them to start at 25 and count backward. | The student is unable to count backward without missing a number. | The student is able to successfully count backward from 25 to 0, with some hesitations or self-corrections. |
| To ensure that students understand skip counting, have them group and count a set of 20 objects by 2s and by 5s.<br><br>After the student has counted by 2s, ask how many objects there would be if the objects were counted by 1s? How many by 5s? | The student is unable to group in equal groups or skip count successfully.<br><br>The student may not understand that the result of counting a set of objects will be the same regardless of the method. | The student is able to group to count and skip count.<br><br>The student understands the principle of conservation of numbers and can apply it in a skip-counting situation. |

## B. Choosing Instructional Strategies

Consider the following guidelines for teaching about counting to 1000:

- Use an "Assessment for Learning" approach to ensure that students understand the learning intentions for all activities, understand what distinguishes quality work, receive descriptive feedback about their progress, and have opportunities for self- and peer-assessment. For example, use the "Traffic Lights for Counting to 1000" masters found at the end of this document. Have students use this tool for self-assessment of learning intentions both before and after learning about numbers to 1000.
- Immediately after presenting a task, have students discuss the task with a partner and make predictions as to the outcome of the task.
- Have students work in partners or groups of three or four to complete tasks.
- Invite students to reflect on their predictions after a task has been completed.
- Plan a significant amount of time for students to compare strategies and outcomes as a whole class after a task has been completed. During this time, ask questions about the efficiency and mathematical thinking of particular responses in order to encourage greater abstraction and mathematical elegance.
- Differentiating a task. Students who are looking for patterns in skip counting may start with single digit numbers or make use of manipulatives. Some students will be able to use higher numbers and find more complex patterns. Allow students to explore numbers beyond 1000 or additional skip-counting patterns to those listed in the specific outcome for Grade 3. Encourage students to make comparisons and generalizations about different skip-counting patterns.
- Teach through problem solving. Challenge students with tasks that are open ended and nonroutine, and avoid "showing them how to do it." Allow students to explore numbers, create representations and present solutions in ways that may be different from those of other students.

## C. Choosing Learning Activities

The following learning activities are examples of activities that could be used to develop student understanding of the concepts identified in Step 1.

**Sample Activities:**

1. **Start Numbers and Jump Numbers** (p. 10)
2. **Counting Money** (p. 11)
3. **Skip-counting Number Rolls** (p. 12)

## Sample Activity 1: Start Numbers and Jump Numbers

This activity is adapted from *Elementary and Middle School Mathematics: Teaching Developmentally* (p. 20) by John A. Van de Walle and Sandra Folk. Copyright © 2005 by Pearson Education Canada Inc.

Draw on prior knowledge by asking students if they have ever observed patterns in the numbers, either in the numbers that they know, in the number line, or in the hundreds chart. Write numbers vertically on the board, going back to the top with each decade. Does anything repeat itself? Students may notice the sequence of the decades, the repetition of 0 to 9, or something about odd and even numbers. Alternatively, you can illustrate patterns by showing skip counting by 2s.

As a warm-up activity, ask groups of students to skip count starting at 50 and write their lists vertically on the board. One group will count by 2s, another by 5s, another by 10s, and another by 25s. What observations can students make about each of the lists? Compare the lists. What do students notice about numbers appearing in different lists?

Now students can work on their own or with a partner to make a more interesting list. They can start at any number between 1 and 100 and skip count by 5s, 10s or 100s. They should come up with six different lists, three all starting from the same number and counting by 5s, 10s and 100s, and three starting from different numbers. They should compare lists and look for patterns and rules.

**Look For …**

Do students:

- ☐ make systematic observations?
- ☐ notice the difference made by the magnitude of a jump number?
- ☐ notice repeated numbers?
- ☐ notice characteristics of numbers, such as whether a number is even or odd, or place value patterns?
- ☐ make reasonable rules, conjectures and generalizations?

In the large group, have students present their lists and findings. Are there rules or generalizations that can be made from the evidence collected from the whole group? Write down the students' conjectures and have them go back and test them.

A variation on this lesson is to have students look for patterns when skip counting by 3s or 4s from 0. This will help students develop the ability to skip count by 3s or 4s starting from numbers that are multiples of 3 and 4, respectively.

To extend this activity and challenge students further, have them skip count by 2s, 3s or 4s starting at any number. Have them look more deeply for patterns in any of the above activities. For example, what do you notice when you add digits together? How do the new numbers relate to one another?

## Sample Activity 2: Counting Money

The best way to contextualize money activities is to count money that needs to be counted; for example, as part of a school or class fundraiser, or a milk, snack or lunch program.

Ask students to predict the total amount of money in a large collection and tell them you are going to count this as a class.

Draw on prior knowledge by reviewing conjectures and generalizations from Sample Activity 1. How might these rules apply when we are counting coins? What happens when we have to count mixed groups of change?

As a warm-up activity, have students count groups of quarters and discuss their strategies for counting quarters. Write the skip-counting sequence for 25 on the board. What patterns are in this sequence? How does this help when counting money? Can anyone figure out why a quarter is called a quarter?

Next, have students work with a partner to count collections of change. When they are sure of their amount, they should switch with another group to verify the count. If there are two different counts, can both be right? Have students work together to solve the problem of different counts.

**Look For …**

Do students:

- ☐ understand the value of different coins?
- ☐ understand how skip counting relates to counting coins?
- ☐ count coins of different denominations to arrive at an accurate total?
- ☐ create a strategy for counting a large collection that involves everyone and is efficient?
- ☐ check their own counts and the counts of other students?

In a large group, have students talk about what they learned about counting money. What are some strategies that make it easier?

Introduce another problem to the students. How can the whole class work together to count the total collection in a way that is efficient and accurate? The strategy that you choose together should ensure that everyone is involved and not just watching. Try the strategy.

Students can roll coins or package them so that the count can be easily verified by someone else. How would they record the amount on a paper so that it could be checked off? Have small groups work on recording strategies for the amount that they counted.

Return to the group to discuss the process. Ask students how they should record the total amount? How should it be broken down?

## Sample Activity 3: Skip-counting Number Rolls

Number rolls are long strips of paper on which students write the counting sequence, starting at the top and writing consecutive numbers vertically downward. Strips are taped to a straw or a toilet roll at the top edge and then rolled up so that more numbers can be added.

If number rolls are made on strips of grid paper, they can also be used to measure and compare lists of numbers. One way to do this is to use a three-column format in a word processing document and make tables, 3 columns wide and 20 rows long, in each column. Then photocopy these pages and cut them into three strips each. Students glue or tape strips on to the end of their number roll as they need them.

The basic number roll activity of counting by 1s is an excellent learning activity, and can be found in the Grade 3 planning guide for place value. It is a good idea to complete that activity before this one. Students who are struggling with skip counting by numbers over 100, in particular, will benefit from making number rolls up to and over 100, continuing at least to 400, in order to learn the patterns and sequence of three-digit numbers. This work is best done for short periods of time over the course of several days.

Number rolls can also be used to help students understand skip counting. For this activity, divide students into groups and have different students in each group prepare individual number rolls by skip counting by 3s, 4s, 5s, 10s, 25s or 100s. Recreate groups so that students with the same skip-counting number get together to look for patterns in their skip-counting sequences. Students can report the patterns they find in a whole class discussion, or return to their original groups to report.

Next have students work in their original groups to compare different skip-counting sequences. Which numbers are repeated in the different sequences? How frequently do these repeated numbers appear? What patterns emerge when different strings of numbers are compared? (For example, when looking for common numbers between the skip counting by 3s sequence and the skip counting by 4s sequence, common numbers appear every fourth number in the 3s pattern and every third number in the 4s pattern.) Challenge students to figure out why these patterns exist.

Finally, if number rolls have been made using the same size grid paper, have students also compare the length of the different strips. How quickly do these strings of numbers grow? Which ones grow more quickly? Why do some grow more quickly? Ask students to arrange strips in order from the quickest growth to slowest growth. (For example, the tenth number in the 3s sequence is 30. The tenth number in the 4s sequence is 40.)

Get together as a whole group and discuss what each group has discovered over the course of this investigation of numbers.

## Step 4: Assess Student Learning

### Guiding Questions

- Look back at what you determined as acceptable evidence in Step 2.
- What are the most appropriate methods and activities for assessing student learning?
- How will I align my assessment strategies with my teaching strategies?

In addition to ongoing assessment throughout the lessons, consider the following sample activities to evaluate students' learning at key milestones. Suggestions are given for assessing all students as a class or in groups, individual students in need of further evaluation, and individual or groups of students in a variety of contexts.

### A. Whole Class/Group Assessment

**Counting to 1000**

The following assessment can be given to the whole class, to small groups or to individual students, either orally or written. It can be broken up and given one question or a few questions at a time. The assessment can be easily modified using different numbers to ensure students have many chances to succeed.

Students can also be given a version of this assessment to complete using a number line or a number chart. In addition, ask students to write down or explain to you what patterns they observe in their lists of numbers.

While administering the assessment, or parts of this assessment, make notes about how students are answering the skip-counting questions. Are they able to answer quickly, understanding and applying the patterns they can observe in the numbers, or do they need to add the skip-counting number to each successive number? Do they need to make notes on paper in order to perform additions or keep track along the way?

**Name** _____

Write 10 more numbers in each list. Do you see a pattern?

Count up by 5s, starting at 763:

763,

Count up by 10s, starting at 87:

87,

Count up by 100s, starting at 21:

21,

Count up by 3s, starting at 18:

18,

Count up by 4s, starting at 32:

32,

Count up by 25s, starting at 150:

150,

Count backward by 5s, starting at 258:

258,

Count backward by 10s, starting at 529:

529,

Count backward by 100s, starting at 974:

974,

Count backward by 3s, starting at 99:

99,

Count backward by 4s, starting at 80:

80,

Count backward by 25s, starting at 675:

675,

**Name** _____

# SCORING GUIDE
# Numbers to 1000

| Level / Criteria | 4 Excellent | 3 Proficient | 2 Adequate | 1 Limited* | Insufficient / Blank* |
|---|---|---|---|---|---|
| **Counting by 5s, 10s and 100s** | The student can skip count forward by 5s, 10s or 100s, starting from any number from 1 to 1000. The student sees and uses patterns in the numbers to help do this quickly and easily. ☐ | The student can skip count forward by 5s, 10s or 100s, starting from any number from 1 to 1000. Sometimes it is difficult to figure out what number comes next. ☐ | The student can skip count forward by 5s, 10s or 100s, starting from different numbers from 1 to 1000. Student may have trouble skip counting backward or skip counting long sequences of numbers. ☐ | The student can skip count forward by 5s, 10s or 100s, starting from 0. Student can start from different numbers with support. The student cannot predict the patterns in sequences with random starting points. ☐ | The student cannot show that he or she can skip count by 5s, 10s or 100s. ☐ |
| **Counting by 3s, 4s and 25s** | The student can skip count forward by 3s, 4s and 25s, starting anywhere along the skip-counting sequence for those numbers. The student knows and uses the patterns for these skip-counting numbers. ☐ | The student can skip count forward by 3s, 4s and 25s, starting anywhere along the skip-counting sequence for those numbers. Sometimes it is hard to figure out what number comes next. ☐ | The student can skip count forward by 3s, 4s and 25s. The student may have trouble figuring out what number comes next or starting at numbers other than 0. ☐ | The student can skip count by 3s, 4s or 25s, with support. The student cannot see the patterns in these skip-counting sequences. ☐ | The student cannot show that he or she can skip count by 3s, 4s and 25s. ☐ |
| **Skip Counting Backward** | The student can apply the same ideas to skip counting backward as he or she does to skip counting forward. The student can think of patterns backward and easily apply these to the skip counting. ☐ | The student can skip count backward successfully most of the time. The student can skip count backward more easily by some numbers compared to other numbers. ☐ | The student can skip count backward some of the time. It is difficult to skip count backward without making mistakes. ☐ | The student can skip count backward with support. ☐ | The student cannot show that he or she can skip count backward. ☐ |

* When work is judged to be limited or insufficient, the teacher makes decisions about appropriate interventions to help the student improve.

## B. One-on-one Assessment

1. Ask students to count by 5s, then 10s. Make sure that they can count by 10s past 100. Next, ask if they can count by those numbers from starting points along the original skip-counting sequence. Ask them to count by 10s from the number 6.

   Use the following accommodations, if necessary:

   - use fingers to count up—see if the student notices a pattern
   - use a 100 chart and count up 5 or 10 at a time
   - place the appropriate number of pennies in front of the student and add dimes or nickels.

   Repeat for 5s from the number 2.

2. Ask students to count by 100. Next, ask them to count by 100s, starting at 50 and adding 100 more each time.

   Use the following accommodations, if necessary:

   - use base-10 materials to keep track of the count
   - give the example of starting from 20 and counting up by 100s and ask the student to explain why this works the way it does.

2. Ask students to skip count by 3s from 0. Then, ask them to skip count by 3s from 100. Finally, ask them to skip count by 3s from 63.

   Use the following accommodations, if necessary:

   - use fingers to count up—see if the student notices a pattern
   - use a blank 100 chart and a pencil to keep track of the count.

   Repeat for 4s from the number 84.

## C. Applied Learning

Provide opportunities for students to work with mixed coins on a regular basis. Encourage them to count all amounts regularly.

Model skip counting using think-alouds whenever you notice yourself grouping to count; e.g., counting supplies or snack items. Intentionally allow yourself to be interrupted, and then start from where you left off, again using a think-aloud to illustrate your thought processes.

## Step 5: Follow-up on Assessment

### Guiding Questions

- What conclusions can be made from assessment information?
- How effective have instructional approaches been?
- What are the next steps in instruction?

### A. Addressing Gaps in Learning

Students who have difficulty with the number sequence and skip counting need many opportunities to count objects for a purpose. They need to understand that skip counting can be a more efficient way to arrive at the same total compared to counting by 1s. Teachers should also create counting experiences that extend a student's understanding.

For example:

- Use a metre stick and a base-10 rod to show counting by 10 from random starting points. First, establish that the student understands that each time the rod is moved it is the same as adding 10 more. Start at any 1-digit number and then add the length of the rod. Move it another 10 centimetres, and so on, noting the numbers. Ask students if they notice a pattern. Then, ask if they think the pattern would work for other numbers. Check this out.
- Create situations where students are required to count up by 5s or 10s from random starting points. Place three pennies in front of the students. Add a dime. Ask how much money there is in total. Continue adding dimes and asking for the total. Use the same task with a different number of pennies and nickels. The goal is for students to see a pattern.
- Create a skip-counting pattern using unit cubes and 10 bars along a surface. Cover all the materials. Uncover a group at a time and ask for the total in each group as it is uncovered. For example, students might be expected to recite 8, 13, 18, 23, 28, 33, 38 and 43 in response to materials being successively uncovered.
- Have students prepare everyday materials, such as craft materials or photocopying, to be handed out in 3s and 4s to the whole class, and ask them to count these materials before and as they hand them out.
- Have students make up problems that involve base-10 packaging or grouping; e.g., problems about items for sale, visual patterns, beads on necklaces.

## B. Reinforcing and Extending Learning

Students who have achieved or exceeded the outcomes will benefit from ongoing opportunities to apply and extend their learning. These activities should support students in developing a deeper understanding of the concept and should not progress to the outcomes in subsequent grades. Consider strategies, such as:

- encourage students to skip count from random starting points for the numbers 3 and 4, as well as other numbers not covered in this outcome, and to look for patterns
- encourage students to look for patterns in strings of numbers, including sequences that are not traditional skip-counting sequences, such as the Fibonacci sequence, successive powers of two, successive doubles, and successive squares of numbers
- encourage students to look for relationships between two different strings of numbers, and to describe those relationships using mathematical language and symbols
- encourage students to use T-tables to investigate patterns and relationships.

## Traffic Lights for Counting to 1000

Colour the light
- green for **yes**
- yellow for **maybe**
- red for **no**

Student Name: _____

| Before | | After |
|---|---|---|
| O | I can count forward and backward by 5s, starting from any number between 1 and 1000. | O |
| O | I can count forward and backward by 10s, starting from any number between 1 and 1000. | O |
| O | I can count forward and backward by 100s, starting from any number between 1 and 1000. | O |
| O | I can count forward and backward by 3s, starting from anywhere from 3 to 999. | O |
| O | I can count forward and backward by 4s, starting anywhere from 4 to 1000. | O |
| O | I can count forward and backward by 25s, starting anywhere from 25 to 1000. | O |

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