Mathematics

Planning Guide

Kindergarten *Numbers 1–10*

Number
Specific Outcomes 3, 4, 5

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Planning Guide: *Kindergarten Numbers 1–10*

Strand: Number
Specific Outcomes: 3, 4, 5

This *Planning Guide* addresses the following outcomes from the Program of Studies:

> **Strand:** Number
>
> **Specific Outcomes:**
> 3. Relate a numeral, 1 to 10, to its respective quantity.
> 4. Represent and describe numbers 2 to 10, concretely and pictorially.
> 5. Compare quantities 1 to 10, using one-to-one correspondence.

Curriculum Focus

This sample focuses on:

- developing number sense.

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

When students begin Kindergarten, most of them have some initial development of basic counting. They need to develop understanding of the size of numbers, number relationships and patterns. In Kindergarten, students need repeated experience with counting objects found in their environment. As they count, they link the number word to objects being counted to establish a one-to-one correspondence.

Students should develop understanding that the order in which we count does not alter the result and that the last number in the count represents the total number of objects being counted. Students need to be given many opportunities to practise counting as they quantify the amount in a collection. They should answer questions such as, "How many boys are in the front of the room?" or "How many crayons does Bobby have?" You may also ask them to count the number of steps it takes to go to the office and they should be able to make the count.

Students should also be able to recognize how many objects are in a small group (about four or five). They should see small groups as part of a larger group. Students need to develop flexibility in thinking about numbers to develop number sense. Teachers need to provide students with opportunities to demonstrate many ways of representing a number, including both concretely and pictorially. Students need to talk about where and when they might use specific numbers.

Sequence of Outcomes from the Program of Studies

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

Kindergarten

Specific Outcomes

3. Relate a numeral, 1 to 10, to its respective quantity.

4. Represent and describe numbers 2 to 10, concretely and pictorially.

5. Compare quantities 1 to 10, using one-to-one correspondence.

Grade 1

Specific Outcomes

3. Demonstrate an understanding of counting by:
   - indicating that the last number said identifies "how many"
   - showing that any set has only one count
   - using the counting-on strategy
   - using parts or equal groups to count sets.
4. Represent and describe numbers to 20, concretely, pictorially and symbolically.
5. Compare sets containing up to 20 elements, using:
   - referents
   - one-to-one correspondence
   to solve problems.

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 achievement indicators may be used to determine whether students have met this specific outcome.

- Construct a set of objects corresponding to a given numeral.
- Name the number for a given set of objects.
- Hold up the appropriate number of fingers for a given numeral.
- Match numerals with their given pictorial representations.
- Partition a given quantity into two parts, using fingers, counters or other objects, and identify the number of objects in each part.
- Show a given number as two parts, using pictures, and name the number of objects in each part.
- Construct a set to show more than, fewer than or as many as a given set.
- Compare two given sets through direct comparison and describe the sets, using words such as more, fewer, as many as or the same number.

Some sample behaviours to look for in relation to these indicators are suggested for many of the instructional activities in **Step 3, Section C, Choosing Learning Activities** (p. 8).

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 number. For example:

- Given one spatial relationship, can students show another spatial arrangement; e.g., given one arrangement of five dots on a pie plate, will they recognize a different arrangement of the five dots? This shows an understanding of equivalent sets.
- If they are shown two sets of objects, can they tell you which set has the largest number of objects and/or which set has the smallest number of objects?
- If they are shown one set of objects, can they find another set with the same number of objects?
- If they are given a numeral, can they represent the numeral, and one or two more and one or two less than the numeral? (Remember to call the written number a *numeral*.)
- Give students a set of eight buttons. Ask students how many buttons are in the collection. If the student correctly counts and says "eight," ask, "Are there eight buttons?" If the student hesitates and counts again, question whether or not the student has developed cardinality, which is the ability to know that the last count word is the number of items in the set.

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. 7).

Sample Structured Interview: Assessing Prior Knowledge and Skills

Directions	Date:	
	Not Quite There	**Ready to Apply**
Given one spatial relationship, can students show another spatial arrangement; e.g., given one arrangement of five dots on a pie plate, will they recognize a different arrangement of the five dots?	• Is not accurate in the count or simply duplicates the arrangement.	• Shows various arrangements of five dots accurately.
If they are shown two sets of objects, can they tell you which set has the largest number of objects and/or which set has the smallest number of objects?	• Identifies, incorrectly, which is larger or smaller. • Is unable to explain why.	• Identifies, correctly, the larger or smaller set. • Can justify the answer.
If they are shown one set of objects, can they find another set with the same number of objects?	• Responds incorrectly. • Finds an equivalent set but cannot explain why they are equivalent.	• Is able to select equivalent sets. • Explains why they are equivalent.
If they are given a numeral, can they represent the numeral, and one or two more and one or two less than the numeral?	• Cannot write the numeral. • Can write the initial numeral but cannot write a numeral that is one or two more or less.	• Can write the numeral. • Can write a numeral that is one or two more or less.
Give students a set of eight buttons. Ask students how many buttons are in the collection. If the student correctly counts and says "eight," ask, "Are there eight buttons?'	• Hesitates and counts again.	• Immediately says there are eight buttons.

B. Choosing Instructional Strategies

Consider the following strategies when planning lessons.

- Wherever possible, the number activities should involve some physical materials.
- Students should communicate numbers in various ways.
- Provide opportunities for students to represent numbers in many different ways.
- Encourage students to display numbers whenever possible, either with manipulatives or by enacting the number physically; e.g., showing fingers, clapping.
- To motivate students, use familiar objects whenever possible.
- Expect students to explain, verbally, how they know how many are in a set.

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. **Teaching Number** (p. 9)

Sample Activity 1: Teaching Number

1. Show Me the Number

   Give each student a ten frame and 10 counters. Have students show you different numbers from one to ten. You might say the number or write the numeral on the board and then have students display the number in the ten frame. Repeat with different examples.

   > **Look For …**
   > Do students:
   > ☐ show the correct number both when you write it and say it?

2. Subitize

   Display a ten frame on the overhead projector and after three seconds cover it. Ask students to sketch, on an empty ten frame, what they saw and then write the corresponding numeral. Repeat with different examples.

3. Part to Part to Whole Relationships

   Give students two different coloured sticker dots and ask them to make different dot plates of numbers, using the two different colours; e.g., they might show eight dots, with five red and three yellow. Ask them to share with the class the different ways they made the number. This helps students become familiar with part-to-part-to-whole relationships for numbers up to 10.

4. Stand Up

   Line up10 students in front of the class, each sitting on a chair. Then have them stand according to your instructions. Ask seven students to stand. Get the class to help the lineup know when they have seven. Next have them sit. Then ask for two more than five to stand. Have the class help again. Ask, "What number is that?" Repeat for different numbers, sometimes asking for the number directly, sometimes asking in combinations, such as two more than three or one less than five. Then ask for three boys and four girls to stand. Always ask, after each statement, "What number is that?"

   > **Look For …**
   > Do students:
   > ☐ identify the correct number?
   > ☐ work as a group to figure out the right number of students?

5. Food Graph

   Read the story *The Very Hungry Caterpillar* by Eric Carle. The caterpillar in this story enjoyed many foods. Prepare a large graph with the foods the caterpillar ate (include photographs of the food). Give each student a small sticky note. Have them write their names on the sticky notes, then place the sticky notes on the area of the graph that shows their favourite food. When everyone has placed a sticky note on the graph, ask graph questions;

e.g., "What food was chosen the most/least? How many apples were chosen?" You can also graph the exact items the caterpillar ate and do a direct correspondence to the story.

For an activity based on number word recognition for this story, visit http://www.swlauriersb.qc.ca/english/edservices/pedresources/webquest/caterpillar/caterpilla r.htm.

6. Unifix Cube Riddles

    Ask each student to get 10 unifix cubes in the following configuration: five red, three green and two yellow. Students can work in pairs to solve the following riddles.
    - I have three red cubes and three green cubes. How many cubes do I have?
    - I have two yellow cubes and the same number of red cubes. How many cubes do I have?
    - I have eight cubes altogether. There are five red cubes and the rest are green. How many cubes are green?
    - I have two green cubes and some red cubes. I have two more red cubes than green cubes. (Allow students to figure this part out before proceeding). How many cubes do I have?
    - I have five red cubes. There is one more green cube. How many green cubes do I have?
    - Remember, I have five red cubes. I have one less yellow cube than red cubes. How many yellow cubes do I have?

7. Spatial Arrangements

    Provide students with paper plates and coloured dot stickers or something else to glue onto the plates. Have them make different spatial arrangements for the numbers between one and ten.

    Some examples for *eight* might be:

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    O  O       OOOO        O     O        OOOOO    O     O
    O  O       OOOO          O     O      OOO      O     O
    O  O                       O     O                 O     O
    O  O                         O     O               O     O
    ```

8. Counting Triangles and Hexagons

    Have students work in pairs. Give each pair six green triangles and six yellow hexagons. Ask them to identify what is the same about each set and what is different. This will help them see that number is not related to the size of the objects. On the overhead projector, set out six counters. Ask students, "How many are being displayed?" Rearrange the counters so that they are either closer together or more spread out. Ask students, "How many are being displayed?" Follow-up by asking, "How do you know?" each time.

9. Ten Frames and Counters

    Give each student a ten frame and 10 counters. Have all students show you the number nine with five counters in the top row and four in the bottom, filling from left to right. Now ask

students what they will do to display the number six. Ask them, "Will you remove or add counters to the ten frame?" Once students have answered and then acted on it, have them record what they produced in a blank ten frame and write the numeral beside the ten frame they coloured in. Display their work on the board, identifying which ones are the same and which ones are different. Hopefully, you will see different ways of displaying six. If not, produce some ten frames that look different. This can be repeated, starting with any number up to 10, having students either remove or add counters.

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?

Sample Assessment Tasks

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

Note: Performance-based assessment tasks are under development.

1. Show examples of different pairs of sets of objects; e.g., show two sets of eight, two sets of nine, two sets of six. Ask students to find the pairs that match. Make sure that a few pairs are not equivalent so that you can ask them to identify mistakes. Use large stickers or illustrations when showing these to the whole group.

2. Give each student numeral cards from 1 to 10. Ask them to match the 10 numerals with corresponding sets of numbers. Show sets of up to 10 items and ask them to hold up the corresponding numeral card. You can also hold up dot cards with the numbers from 1 to 10. Also, ask students individually to set out their numeral cards from 1 to 10 and from 10 to 1.

3. Using the ten frames individually, ask them to all show you a number you announce to the class. Walk around and see if they have the correct number of corresponding dots.

4. Give two different representations of sets of up to ten. Ask students which has more and which has less.

B. One-on-one Assessment

Assessment activities can be used with individual students, especially students who may be having difficulty with the outcome.

1. Ask a student to print a numeral between 1 and 10 and draw a set of objects that corresponds to that numeral. Repeat for several different numbers.

2. Have a student roll a set of two dice and build a set with manipulatives to represent the number on the dice.

3. Ask a student to count on from a given number up to 10 and do the same thing counting backward from 10. Ask, "What comes next?" when you say a number. Show him or her a numeral and ask him or her to clap that many times. You can clap and ask the student to point to the numeral on a piece of paper.

4. Show a student 10 counters. Ask him or her to count four and cover them with his or her hand. Ask, "How many did you hide?" and then have him or her count on from this number (four) up to 10.

5. Give the student five interlocking cubes. Ask, "How many would you have if there were two more?" and "How many would you have if there was one less?"

6. Give the student a tower of four cubes and another tower of seven cubes. Ask, "Which is closer to 10?" and then ask, "How do you know?" Have the student tell you, "Which is closer to five?" and "How do you know?" Allow him or her to use more interlocking cubes to rebuild the tower or build a new tower if he or she needs a while to figure out this problem.

C. Applied Learning

Provide opportunities for students to use their number strategies in a practical situation and notice whether or not the strategies transfer.

1. For each of the numbers from 1 to 10, ask students to use it in a sentence about themselves; e.g., "I am five years old." or "I have 10 fingers." or "I have two eyes."

2. Play true or false with students. Choose sentences that are relevant to their lives and have them correct the false sentences to make them true; e.g., "We have had five days this month.", "We have 10 boxes of paper in our classroom.", "We have three balls to play with at recess.", "We have six recesses every day.", "There are seven windows in our classroom.", "There are five zoos in Calgary."

3. This weekend, count how many people you see wearing uniforms. Make a chart to show what you saw each day of the weekend.

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

If a student is having difficulty learning to count to 10 and making one-to-one correspondences with sets up to 10, begin by working with sets up to five first. Chanting can help students remember how to count. Songs and other things with rhythms can also help. Use manipulatives as much as possible and choose objects relevant to the student. Repetition will help. When writing numerals, have students write them in many different mediums, including tracing on sandpaper and in the sandbox. (You can cut out numeral shapes in sandpaper and have students trace the shapes.)

B. Reinforcing and Extending Learning

Students who have achieved or exceeded the outcomes will benefit from ongoing opportunities to apply and extend their learning.

Consider strategies, such as the following.

- Present problem-solving situations for students where they can extend their learning. For example, ask what they would do if they could buy flowers that are yellow and red and tell them that you want 10 flowers. How many red flowers and how many yellow flowers would they buy to get 10 flowers? How many other combinations of red and yellow flowers could they buy?
- Give a student 10 pennies and tell him or her that he or she can buy from a selection of items. The items include a piece of gum for two cents, an eraser for four cents, a plastic toy for three cents, a pencil for five cents, a sticker for one cent, etc. Ask what he or she can buy for 10 cents.
- Have a student make his or her own number book. Allow students to take digital photographs of sets from one to ten. Print the photographs and paste them onto a page where the student then writes the numeral and the number word.
- Provide tips for parents on practicing numbers from one to ten at home. Ask them to support students as they look for sets of objects at home. Ask them to help make a graph of how many different items they have at home; e.g., how many beds, how many windows, how many people.

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Step 2 References

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