

Planning Guide

Grade 1 *Numbers to 20*

Number

Specific Outcomes 4, 5, 6

This Planning Guide can be accessed online at:

http://www.learnalberta.ca/content/mepg1/html/pg1_numbersto20/index.html

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Planning Guide: *Grade 1 Numbers to 20*

Strand: Number

Specific Outcomes: 4, 5, 6

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

Strand: Number

- Specific Outcomes:**
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.
 6. Estimate quantities to 20 by using referents.

Curriculum Focus

This sample focuses on:

- representing and describing numbers to 20
- comparing sets containing 20
- estimating quantities to 20.

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** (p. 3)
- **Step 2: Determine Evidence of Student Learning** (p. 4)
- **Step 3: Plan for Instruction** (p. 5)
- **Step 4: Assess Student Learning** (p. 10)
- **Step 5: Follow-up on Assessment** (p. 12)

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

In Grade 1, students will need various opportunities to look at numbers between 10 and 20 with concrete materials. They should make connections with how these numbers are used in their everyday lives. Teachers must prepare here for later outcomes where the relationships of one more than, two more than, one less than and two less than will build upon the work students have done in Kindergarten. For example, students use 15 as a referent, knowing that two more than 15 is 17 and they use 20 as a referent, seeing 18 as two less than 20.

Students also need to be encouraged to develop an intuitive sense of number and how numbers relate to each other. Given three sets of counters, students should be able to indicate which has more and which has less without counting. Teachers need to listen to students while at the same time challenging them to share their ideas about 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

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

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.
6. Estimate quantities to 20 by using referents.



Grade 2

Specific Outcomes

4. Represent and describe numbers to 100, concretely, pictorially and symbolically.
5. Compare and order numbers up to 100.
6. Estimate quantities to 100, using referents.

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.

- Represent a given number up to 20, using a variety of manipulatives, including ten frames and base ten materials.
- Read given number words to 20.
- Partition any given quantity up to 20 into two parts and identify the number of objects in each part.
- Model a given number, using two different objects; e.g., 10 desks represents the same number as 10 pencils.
- Place given numerals on a number line with benchmarks 0, 5, 10 and 20.
- Find examples of a given number in the environment.
- Build a set equal to a given set that contains up to 20 elements.
- Build a set that has more, fewer or as many elements as a given set.
- Build several sets of different objects that have the same given number of elements in the set.
- Compare two given sets, using one-to-one correspondence, and describe them, using comparative words such as more, fewer or as many.
- Compare a set to a given referent, using comparative language.
- Solve a given problem (pictures and words) that involves the comparison of two quantities.
- Estimate a given quantity by comparing it to a given referent (known quantity).
- Select an estimate for a given quantity from at least two possible choices and explain the choice.

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. 7).

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. For example:

- Using the overhead projector, display between 1 and 10 counters for three seconds and ask students how many counters they see. Then ask, "How do you know?"
- Ask students questions such as, "John has two more books than Brian. If Brian has four books, how many does John have?"
- Ask students questions such as, "I have pennies and nickels in my hand. There are eight coins in all. Three are pennies. How many nickels do I have?"
- Have students hold up both hands, showing 10 fingers. Ask them to show you seven fingers. Ask them to show two more than seven and have them tell you how many that is. Ask them to show you one less than that amount. Have them tell you how many fingers they are holding up.

As you do these kinds of activities, it is important to have students verbalize their thinking whenever possible.

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. 6).

Sample Structured Interview: Assessing Prior Knowledge and Skills

Directions	Date:	
	Not Quite There	Ready to Apply
Using the overhead projector, display between 1 and 10 counters for three seconds and ask students how many counters they see. Then ask, "How do you know?"	<ul style="list-style-type: none"> Says an incorrect number or appears to be guessing. 	<ul style="list-style-type: none"> Is able to give the correct answer and explain it.
Ask students questions such as, "John has two more books than Brian. If Brian has four books, how many does John have?"	<ul style="list-style-type: none"> Says an incorrect number or appears to be guessing. 	<ul style="list-style-type: none"> Is able to give the correct answer and explain it.
Ask students questions such as, "I have pennies and nickels in my hand. There are eight coins in all. Three are pennies. How many nickels do I have?"	<ul style="list-style-type: none"> Says an incorrect number or appears to be guessing. 	<ul style="list-style-type: none"> Is able to give the correct answer and explain it.
Have students hold up both hands, showing 10 fingers. Ask them to show you seven fingers. Ask them to show two more than seven and have them tell you how many that is. Ask them to show you one less than that amount. Have them tell you how many fingers they are holding up.	<ul style="list-style-type: none"> Says an incorrect number or appears to be guessing. 	<ul style="list-style-type: none"> Is able to give the correct answer and explain it.

B. Choosing Instructional Strategies

Consider the following strategies when planning lessons.

- Provide students with many opportunities to represent numbers concretely.
- Allow students to make a purposeful link between pictorial, concrete and symbolic representations of numbers.
- Use objects that are familiar to students whenever possible when representing numbers.
- Students need to know that it is important to understand numbers between 10 and 20 because they are used every day; e.g., eggs come in a dozen, which is 12.
- Expect students to explain their answers about numbers verbally.

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. 8)

Sample Activity 1: Teaching Number

1. Numbers in the Classroom

For each of the numbers from 1 to 20, have students find objects in the classroom that represent the number; e.g., eight—there are eight windows in the classroom four—there are four students wearing glasses.

Look For ...

Do students:

- count out loud or in their heads?
- have to touch the objects to count them?

2. Monkeys at the Zoo

Tell students, "There are 16 monkeys at the zoo. Where they live, there is one big tree and one small tree. When it rains, the monkeys like to climb up a tree. One day when I visited the zoo, all the monkeys were in the trees. How many monkeys could be in the big tree and in the small tree? Are there other answers?" Draw two trees on the board and have construction paper monkeys to place in the trees. Change the position of the monkeys as students offer alternative answers.

3. Ways to Represent 20

Ask students to make arrangements of the numbers 10 to 20, using interlocking cubes with different colours; e.g., 14 might be five green, eight yellow and one blue or it might be seven black and seven red.

Using paper plates, ask students to create designs to represent a number between 10 and 20. On each plate, they can choose their number to write and then draw the appropriate number of objects. Alternatively, stickers could be used to represent the number of their choice.

Look For ...

Do students:

- count out the arrangements prior to gluing them to the plates?
- include the correct number of stickers and write the correct numeral?

On the overhead projector, place some counters. Cover some of the counters, leaving others exposed. Tell students, "I have eight counters under my hand. There are three showing. How many do I have altogether?" or "I have some counters under my hand. Seven counters are showing and I know I have 10 counters altogether. How many are under my hand?"

4. Language of Estimation

Students require a great deal of time to develop understanding of the concept of "about" as it relates to approximation. Estimation activities should use questions with:

- More or less than ___?
Are there more or less than 15 counters on the overhead projector?
- Closer to ___ or to ___?

Do I have closer to 10 cubes or closer to 15 cubes in the clear glass?

- Less than ____, between ____ and ____ or more than ____?
If I use this ruler to measure my desk, will it be less than 10 rulers, between 10 and 20 rulers or more than 20 rulers?
- About ____.
Use one of the numbers 5, 10, 15, 20. About how many triangles are on the overhead?

5. Secret Number

Tell students, "Think of a number between 10 and 20 and build a tower using that many interlocking blocks. Write the number down and hide it. This is your secret number. Now add five more cubes, remove two cubes, add eight cubes and then remove 10 cubes, add four cubes and then remove 10 cubes. Count the number of cubes in your tower. Show the teacher your tower. Ask him or her to guess your magic number." Count the cubes and then add five to find out each student's secret number.

6. Problem Solving

As a small group activity, tell students, "I have 13 cubes. Five of the cubes are yellow. The rest of the cubes are blue and red. There is the same number of red cubes as blue cubes. How many blue cubes do I have?"

Look For ...

Do students:

- count out loud, in their heads or work out the answer with the cubes?

Tell students, "Lee has 18 coloured cubes. They are green, yellow and red. There are two more green cubes than red cubes. There are two less yellow cubes than red cubes. There are six red cubes. How many green cubes does Lee have?"

Challenge problem: "John has 15 cubes. He has green, yellow and red cubes. He has two more green cubes than yellow cubes. And he has two more red cubes than green cubes. How many yellow cubes does John have?"

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. Tell students, "A classroom has 18 desks. The teacher is trying to arrange them in rows. Can you help her by drawing a picture of how she can arrange the desks? Are there other ways to arrange the desks? How do you know?"
2. Tell students, "In my bowl, I have apples and bananas. There are 14 pieces of fruit altogether. How many apples are there? Draw a picture of the fruit. Are there other possibilities?"
3. In groups of four students, give students interlocking cubes. Give a variety of directions that use more or less and have students build towers; e.g.,
 - Build a tower that is one more than 11.
 - Build a tower that is two less than nine.
 - Build a tower that is two more than 18.
 - Challenge students by saying, "What number do you think is one less than 15? Let's build a tower and see."

B. One-on-one Assessment

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

Ask individual students, "I was counting objects in our classroom. I counted exactly 18 of the same thing. What could I have been counting? Tell me why. What are some things I could not have been counting? Why could they not be the objects I was counting?"

Fill a plastic foam cup or another container with cubes. The cup should hold almost 20 cubes. Show it to the student and then ask, "How many cubes do you think are in the container?" Have

the student count the cubes. Then ask, "Are there more cubes or fewer cubes than you predicted?"

C. Applied Learning

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

Ask students to tell you whether or not statements such as the following are true or false.

- There are 18 students in our class.
- There are more boys than girls in our class.
- Johnny is missing 12 teeth.
- When we go out to recess, there are fewer children on the playground than we have in our class.
- Our teacher is able to carry 13 books.
- My mom can wear 12 pairs of shoes at once.
- My mom owns 15 pairs of shoes.
- It is more than 12 steps to walk across the classroom.
- A hockey stick costs less than \$20.
- A Barbie doll costs more than \$20.

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, return to the 1 to 10 concepts as a review and move slowly upward to 10 and 20. Begin with a smaller number of objects initially. After students master a smaller group of objects, increase the number used. Working one on one with the students will allow you to explore their individual thinking about the numbers 10 to 20. Encourage them to touch the objects as they count, saying the numbers out loud. Look at different ways of grouping the numbers over 10, making simple groupings.

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.

- Provide tips for parents on practicing using numbers between 10 and 20. Ask students to look for sets of things at home that are between 10 and 20.
- Ask students how many ways we can make 12, 13 and so on.
- Ask students to think of things that we purchase that come in sets greater than 10, such as eggs. Are there other examples?
- Ask students, "Are there sports where there are more than 10 players on the field at one time?"
- Ask students, "Are there vehicles that have between 10 and 20 wheels?"
- Ask students, "Can you find something in the room that is about 15 of your shoe lengths?"

Bibliography

Step 2 References

Alberta Education. *The Alberta K–9 Mathematics Program of Studies with Achievement Indicators*. Edmonton, AB: Alberta Education, 2007.

Other References

Wiggins, Grant and Jay McTighe. *Understanding by Design*. Alexandria, VA: Association for Supervision and Curriculum Development, 1998.