

# Planning Guide

## Grade 1 *Basic Facts to 18*

### Number

#### Specific Outcome 10

**This Planning Guide can be accessed online at:**

[http://www.learnalberta.ca/content/mepg1/html/pg1\\_basicfactsto18/index.html](http://www.learnalberta.ca/content/mepg1/html/pg1_basicfactsto18/index.html)

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# Planning Guide: *Grade 1 Basic Facts to 18*

**Strand:** Number

**Specific Outcome:** 10

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

**Strand:** Number

**Specific Outcome:** 10. Describe and use mental mathematics strategies (memorization not included), such as:

- counting on and counting back
- making 10
- using doubles
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

## Curriculum Focus

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This sample focuses on:

- developing strategies for learning the basic + and - facts to 18.

## What Is a Planning Guide?

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**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

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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. 5)
- **Step 3: Plan for Instruction** (p. 6)
- **Step 4: Assess Student Learning** (p. 11)
- **Step 5: Follow-up on Assessment** (p. 13)

## Step 1: Identify Outcomes to Address

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### 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 be built upon these lessons and 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

None.



**Grade 1**

Specific Outcomes

10. Describe and use mental mathematics strategies (memorization not included), such as:

- counting on and counting back
- making 10
- using doubles
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.



**Grade 2**

Specific Outcomes

10. Apply mental mathematics strategies, such as:

- using doubles
- making 10
- one more, one less
- two more, two less
- building on a known double
- thinking addition for subtraction

for basic addition facts and related subtraction facts to 18.

## Step 2: Determine Evidence of Student Learning

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### 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. (It is not intended that students recall the basic facts but become familiar with strategies to determine sums and differences mentally.)

- Use and describe a personal strategy for determining a given sum.
- Use and describe a personal strategy for determining a given difference.
- Write the related subtraction fact for a given addition fact.
- Write the related addition fact for a given subtraction fact.

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

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### 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:

- Ask students to count on to 10 from a number you give them between 1 and 10.
- Ask students to count back to 1 from a number you give them between 1 and 10.
- Show students a set of between 1 and 10 objects for three seconds and then cover the set, asking students to tell you how many were in the set. Ask them to explain how they knew this.
- Have interlocking cubes available to students. Ask students to show you eight cubes and then have them write the numeral for that quantity. Repeat with other numbers.

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. 7).

## Sample Structured Interview: Assessing Prior Knowledge and Skills

Directions	Date:	
	Not Quite There	Ready to Apply
Ask students to count on to 10 from a number you give them between 1 and 10.	<ul style="list-style-type: none"> <li>Is not able to count on from any number given.</li> </ul>	<ul style="list-style-type: none"> <li>Is able to count on to 10 from any number given.</li> </ul>
Ask students to count back to 1 from a number you give them between 1 and 10.	<ul style="list-style-type: none"> <li>Is not able to count backward from any number given.</li> </ul>	<ul style="list-style-type: none"> <li>Is able to count backward to 1 from any number given.</li> </ul>
Show students a set of between 1 and 10 objects for three seconds and then cover the set, asking students to tell you how many were in the set. Ask them to explain how they knew this.	<ul style="list-style-type: none"> <li>Is not able to identify the number shown or appears to be guessing.</li> </ul>	<ul style="list-style-type: none"> <li>Is able to identify the number uncovered.</li> </ul>



## **B. Choosing Instructional Strategies**

Consider the following strategies when planning lessons.

- Students need to be provided with opportunities to develop their own strategies for determining a given sum or difference.
- Students will invent strategies for solving problems that include making doubles, making 10, using compensation and using known facts.
- Students should be asked to employ as many representations as possible for determining sums and differences, including physically acting out, drawing pictures, verbally explaining their ideas, using concrete materials and writing number sentences.
- For students to learn basic facts, they need time to understand the operation and invent their strategies rather than memorizing.
- Learning addition and subtraction facts can be facilitated by having students solve word problems with familiar contexts.
- Encourage students to create their own word problems. They can write these down or dictate them to a scribe.

## **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. How Many?

Have a group of approximately eight students stand in front of the room. Ask the class how many students are at the front. Divide the group into two smaller groups and ask the class how many students are at the front now and how do they know. Explore the different ways that we could partition the larger group.

#### Look For ...

Do students:

- count the small groups and recognize that the total remains the same?

### 2. Recess Line-up

Students should have access to counters or cubes as well as paper and markers. Present the following problem to students: "At recess time today, I am going to have you line up in two lines. How many students are in each line for our class?" Have them actually form the two lines as an example. The teacher should stand in the line-up if there is an odd number of students present. Then repeat this for students, using different even numbers in the class; e.g., 22, 24, 20, 16, 10. Have students draw pictures and write an addition sentence to describe what they drew. Draw attention to the fact that two 9s is the same as nine 2s, and so on.

#### Look For ...

Do students:

- notice doubling a number is counting by twos?

### 3. Ten Felt Markers

Have 10 green and 10 red felt markers (or make 10 red and 10 green paper felt markers) and two boxes (or make a paper box). Place 10 red felts in one box and 10 green felts in the other. Read the following story problem.

"I went to the store yesterday and wanted to buy some green markers and some red markers. When I got to the store, the markers only came in packages of 10. I only wanted 10 markers in total because I didn't have enough money for two boxes. I asked the person who ran the store if I could buy 10 markers, some green and some red. She said she didn't know how to do that so I told her my Grade 1 class would help me figure it out."

Remove the markers from the box and place them outside the box. Ask, "If I only want 10 markers in this box, how many green markers should I put in and how many red ones?" Have students suggest answers and place the appropriate number of markers in the box. Ask for another volunteer to come up and provide a different solution to the problem. Ask, "Is this a different solution? How do you know? Is there another possible solution?" Continue until several solutions have been presented.

Have students find a partner. Give each pair 10 green interlocking cubes and 10 red interlocking cubes. Tell them that you would like them to write down the answers you just figured out together on the sheet provided so that you can take them back to the store owner. On a large sheet, have them draw the different combinations of red and green markers that

add up to 10 and write the addition sentence beneath each drawing. They can use the interlocking cubes to check that they have remembered all the combinations.

#### 4. Story Problem

Have students write or create story problems for a given number sentence. Tell them that the number sentence you are giving them is the answer to their story problem, e.g.,  $9 + 6 = 15$  or  $11 - 3 = 8$ , and you would like to know a story problem that would fit the given answer. Model two or three examples for students first.

#### 5. Number Families

Give students three numbers in a number family, which are numbers related by addition or subtraction; e.g., 2, 9, 11. Have them write an addition and a subtraction sentence for each number family.

#### 6. Fatima

Tell students that a student, Fatima, was showing her teacher some work. Fatima wrote  $5 + 9 = 6 + 8 = 14$ . Ask students to explain how Fatima did this and if she is correct.

<p style="text-align: center;"><b>Look For ...</b></p> <p>Do students:</p> <ul style="list-style-type: none"><li><input type="checkbox"/> notice how when one addend goes up (e.g., 5 to 6) that the other addend must go down (e.g., 9 to 8)?</li><li><input type="checkbox"/> recognize that <math>11 + 7 = 18</math> is a related fact to <math>10 + 7 = 17</math>?</li></ul>
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#### 7. Yeung Li

Yeung Li showed his teacher his work. He wrote  $10 + 7 = 17$  so  $11 + 7 = 18$ . Was his thinking correct?

## Step 4: Assess Student Learning

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### 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. Provide students with concrete materials and present them with the following number problems. Ask them to solve the problem and the number sentence.
  - Charles has eight dimes. Danielle has four more dimes than Charles. How many dimes does Danielle have?
  - Brodie has 18 coins. Eight of his coins are dimes and the rest are quarters. How many quarters does Brodie have?
  - Sophie had 12 nickels. She gave some to her mother and now she has eight nickels. How many did she give to her mother?
  - Shona had 15 quarters. Her dad gave her some more. Now she has 18 quarters. How many did dad give her?
2. Have students create their own word problems for the number family 7, 9 and 16 (numbers related by addition and subtraction). Ask them to write a problem that uses these numbers in addition and another problem that uses these numbers in subtraction.

#### B. One-on-one Assessment

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

1. Have students explain how they obtain the answer for each of the following computations.
  - $8 + 9$
  - $4 + 7$
  - $9 + 6$
  - $6 + 4$
  - $7 + 8$

2. Ask students to write a related subtraction fact for the following addition facts.

- $7 + 7 = 14$
- $2 + 9 = 11$
- $12 + 6 = 18$
- $14 + 3 = 17$

3. Ask students to write a related addition fact for the following subtraction facts.

- $17 - 5 = 12$
- $13 - 7 = 6$
- $16 - 9 = 7$
- $12 - 8 = 4$

### **C. Applied Learning**

Provide opportunities for students to use their number strategies in a practical situation and notice whether or not the strategies transfer. Place five items with prices attached where students can see them; e.g., a stuffed bear for \$13, a bag of candy for \$4, a book for \$5, a toy truck for \$15 and a pencil for \$1. Ask students if they had \$20 what they could buy with the money. Record possibilities on the board.

Tell students the following story:

Michael has \$15 and he wants to treat his friend and himself.

Could he buy two books if each book cost \$6?

Could he buy two movie tickets if each ticket cost \$8?

Could he buy two pizzas if each pizza cost \$5?

Could he buy two trucks if each truck cost \$9?

## Step 5: Follow-up on Assessment

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### 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 are struggling may need extra time so that they can build connections between oral number words, written numbers and numerical quantities, that is, the meanings of the words and written numbers. We need to be certain that students understand the cardinal meaning of counting as opposed to merely counting and attaching no significance to the final count word. They need this skill before they can complete the outcome described in this lesson. They also need to understand how partner numbers (the addends) relate to the total number. Through storytelling, dramatic play or drawing, they need a lot of time to understand partitioning to 10. Students also need a great deal of reinforcement through the use of concrete materials.

### 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.

- Partner students so that students who are demonstrating success are working with students who are not yet successful. Give students encouragement about how to work as a team and share the work, explaining answers to each other.
- Have students use the computer to create story problems and write their solutions into number sentences.

## Bibliography

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### 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.