二年级沉浸式一课数学的设计

游寅耀
汉办大理会志愿者
龙小学 Draper Elementary School
yinyao.you@canyonsdistrict.org
目标：
我要了解游老师设计一课数学的思路。
The Backward Design Process

1. Identify desired results
2. Determine assessment evidence
3. Plan learning experiences and instruction

定目标
找测评（方式）
做设计
The Backward Design Process

1. Identify desired results
2. Determine assessment evidence
3. Plan learning experiences and instruction

定目标
找测评 (方式)
做设计
纵观全局定目标

- 教师用书（课程标准）
- Pacing
### Lesson 3-1
**Objective** Add within 100 using place-value strategies and a hundred chart.

**Essential Understanding** Patterns on a hundred chart can be used to add numbers and to develop mental math strategies and number sense.

**Vocabulary** Tens, Ones

**Materials** Hundred Chart (Teaching Tool 17)

---

### Lesson 3-2
**Objective** Add tens to two-digit numbers using an open number line.

**Essential Understanding** Two-digit numbers can be broken apart and added in different ways. You can represent how you break apart and add numbers with hops or jumps on an open number line.

**Vocabulary** Open number line

**Materials** Open Number Lines (Teaching Tool 14), Index cards

---

### Lesson 3-3
**Objective** Use an open number line to add tens and ones within 100.

**Essential Understanding** Two-digit numbers can be broken apart using tens and ones and added in different ways. You can represent how you break apart and add numbers with hops or jumps on an open number line.

**Vocabulary** None

**Materials** Open Number Lines (Teaching Tool 14), Hundred Chart (Teaching Tool 17), Connecting cubes (or Teaching Tool 5)

---

**On-Level and Advanced Activity Centers**
- Center Games

---

**On-Level and Advanced Activity Centers**
- Center Games
Lesson 3-4
BREAK APART NUMBERS TO ADD
pp. 141–146

Content Standards 2.NBT.B.5,
2.NBT.B.9
Mathematical Practices MP.2, MP.4,
MP.5, MP.7, MP.8

Objective Add within 100 using place-
value strategies.

Essential Understanding Two-digit
numbers can be broken apart using tens
and ones and added in different ways.

Vocabulary Break apart, Mental math

ELL Speaking: Express ideas.

Materials Hundred Chart (Teaching
Tool 17), Place-value blocks (or Teaching
Tool 19), Break-apart Strategies (Teaching
Tool 21), Index cards

On-Level and Advanced
Activity Centers
• Problem-Solving Reading Mat

Lesson 3-5
CONTINUE TO BREAK APART NUMBERS
TO ADD pp. 147–152

Content Standards 2.NBT.B.5,
2.NBT.B.9
Mathematical Practices MP.1, MP.4,
MP.7

Objective Break apart numbers into tens
and ones to find their sum.

Essential Understanding Two-digit
numbers can be broken apart using tens
and ones and added in different ways.

Vocabulary None

ELL Reading: Demonstrate comprehension
by retelling information.

Materials Break-apart Strategies
(Teaching Tool 21)

On-Level and Advanced
Activity Centers
• Center Games

Lesson 3-6
ADD USING COMPENSATION
pp. 153–158

Content Standard 2.NBT.B.5
Mathematical Practices MP.2, MP.3,
MP.8

Objective Break apart addends and
combine them in different ways to make
numbers that are easy to add mentally.

Essential Understanding When
adding two-digit numbers, you can add
an amount to one addend and subtract
the same amount from another addend to
make addition easier.

Vocabulary Compensation

ELL Reading: Use support from peers/
teachers to develop vocabulary.

Materials Compensation Strategies
(Teaching Tool 22), Counters (or Teaching
Tool 6), Blank Mini Double Ten-Frames
(Teaching Tool 9)

On-Level and Advanced
Activity Centers
• Math and Science Activity
**Lesson 3-7**

**Practice Adding Using Strategies**
pp. 159–164

- **Content Standards**: 2.NBT.B.5, 2.NBT.B.6, 2.NBT.B.9
- **Mathematical Practices**: MP.2, MP.4, MP.5

**Objective**
Choose and use any strategy to add two-digit numbers.

**Essential Understanding**
There are different ways to add two-digit numbers. Certain strategies may be better to use for a problem than others.

**Vocabulary**
None

**ELL Strategies**
Use prior experiences to understand meaning.

**Materials**
- Open Number Lines (Teaching Tool 14), Hundred Chart (Teaching Tool 17), Place-value blocks (or Teaching Tool 19)

**On-Level and Advanced Activity Centers**
- Math and Science Activity

---

**Lesson 3-8**

**Solve One-step and Two-step Problems**
pp. 165–170

- **Content Standard**: 2.OA.A.1
- **Mathematical Practices**: MP.1, MP.2, MP.4, MP.5

**Objective**
Use drawings and equations to solve one-step and two-step problems.

**Essential Understanding**
Some problems can be solved in one step. Other problems can be solved in two-steps—first, by solving a sub-problem or by answering a hidden question, and then by using that answer to solve the original problem.

**Vocabulary**
None

**ELL Speaking**
Share information in cooperative learning interactions.

**Materials**
- Place-value blocks (or Teaching Tool 19), Bar Diagrams (Teaching Tools 15 and 23)

**On-Level and Advanced Activity Centers**
- Problem-Solving Reading Mat

---

**Lesson 3-9**

**Math Practices and Problem Solving: Use Appropriate Tools**
pp. 171–176

- **Mathematical Practices**: MP.5 Also MP.1, MP.2, MP.3
- **Content Standards**: 2.OA.A.1, 2.NBT.B.5

**Objective**
Choose an appropriate tool and use it to solve a math problem.

**Essential Understanding**
Good math thinkers know how to pick the right tools to solve math problems.

**Vocabulary**
None

**ELL Speaking**
Express opinions.

**Materials**
- Connecting cubes (or Teaching Tool 5), Counters (or Teaching Tool 6), Blank Mini Double Ten-Frames (Teaching Tool 9), Open Number Lines (Teaching Tool 14), Hundred Chart (Teaching Tool 17), Place-value blocks (or Teaching Tool 19)

**On-Level and Advanced Activity Centers**
- Center Games
LESSON 3-3
ADD TENS AND ONES ON AN OPEN NUMBER LINE

FOCUS
Domain: 2.NBT Number and Operations in Base Ten.
Cluster: 2.NBT.B Use place value understanding and properties of operations to add and subtract.
Content Standards: 2.NBT.B.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. Also, 2.NBT.B.9.
Objective: Use an open number line to add tens and ones within 100.

Essential Understanding: Two-digit numbers can be broken apart using tens and ones, added in different ways. You can represent how you break apart and add numbers with hops or jumps on an open number line.

Materials: Open Number Lines (Teaching Tool 14), Hundred Chart (Teaching Tool 17).

COHERENCE
In Lesson 3-2, students learned how to use an open number line to add tens to a two-digit number. In this lesson, students can use an open number line to add two 2-digit numbers. As students become fluent with adding tens and ones, they may compensate by a group of tens or a group of ones.

RIGOR
This lesson emphasizes conceptual understanding, procedural skill, and fluency. The focus is on using place value understanding and properties of operations to become fluent in two-digit addition. Adding tens and ones on an open number line involves decomposing and composing numbers and supports the development of place-value addition strategies and computational fluency. Encourage students to discuss any place-value patterns and mental-math strategies they see as they complete this lesson.

Watch the Cherry For Lesson Video.

ENGLISH LANGUAGE LEARNERS
Speaking: Explain content area information.
Use with or after the Visual Learning Bridge on Student's Edition, p. 136.
Beginning: Read Guided Practice Item 1. Point to 24. Say: Break apart this number.

Write 24 = ___ + ___ + ___. Instruct students to work with partners to break apart 24 by filling in the blanks. Ask students to trace with their fingers on the number line to show how 59 + 24 can be solved by breaking apart 24. Point to Item 2. Ask students to explain to partners how to break apart 25.

Intermediate: Read Guided Practice Item 1. Instruct students to break apart 24 by filling in the blanks; 24 = ___ + ___ + ___. Ask students to explain how 59 + 24 can be solved using the open number line. Point to Item 2. Ask students to work with partners to solve the problem by breaking apart one of the numbers.

Advanced: Instruct students to explain to partners how to break apart 24 and use the number line to solve 59 + 24. Point to Item 2. Ask students to solve the problem by breaking apart one of the numbers and using the open number line. Instruct students to explain their solutions to partners.

Summarize: How does breaking apart numbers help with adding two-digit numbers?
DEVELOP: PROBLEM-BASED LEARNING

COHERENCE: Engage students by connecting prior knowledge to new ideas. Students use an open number line to add two 2-digit numbers, and they write an equation to show the sum. This prepares them for the next part of the lesson where they learn how to use an open number line to count on tens and ones to find the sum of two 2-digit numbers.

1. Pose the Solve-and-Share Problem
   MP.4 Model with Math Students use an open number line and write an equation to add two 2-digit numbers.

2. Build Understanding
   What are you asked to do? Find 35 + 24 using the open number line below. Is his work correct? Explain.

Yes; Sample answer: He counted on 3 tens, then he counted back 2 ones to add 28.

7. Number Sense Matt found 55 + 28 using the open number line below. Is his work correct? Explain.

Topic 3 | Lesson 3

5. Transition to the Visual Learning Bridge
   You used an open number line to find 35 + 24. Later in this lesson, you will learn different ways to use an open number line to add tens and ones to a two-digit number.

6. Extension for Early Finishers
   Write 68 + = 86 on the board. Ask students to use an open number line to find the missing addend. Have them share their strategies for finding the unknown. Repeat with _____ + 45 = 73. [Check students’ work.]

Kate breaks apart 24 by place value. She explains that to add 35 + 24, you can first place 35 on the number line. Then add the tens and then the ones in 24. From 35, she counts on 2 tens and 4 ones. Her work, explanation, and equation are accurate.

Tanya starts at 0 and counts by 5s, labeling the number line as she counts. She circles 35, the first addend. Then she counts on by 5s until she adds 25, and she lands on 60. She circles 60 and says 24 is one less than 25, so the answer is one less than 60, or 59. Her reasoning...
<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>1/8</td>
</tr>
<tr>
<td>Unit 1 Review</td>
<td>Math: 3-1</td>
<td>Math: 3-2</td>
<td>Math: 3-3</td>
<td>Math: 3-4</td>
<td>Math: 3-5</td>
<td>Content: Maps/Geography</td>
</tr>
<tr>
<td></td>
<td>Recess: T &amp; Y</td>
<td>Recess: C &amp; M</td>
<td></td>
<td>Recess: E &amp; Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Unit 2 Week 1</td>
<td>Math: 3-6</td>
<td>Math: 3-6</td>
<td>Math: 3-7</td>
<td>Math: 3-8</td>
<td>Math: 3-8</td>
<td>Content: Producers/ Animal Environment</td>
</tr>
<tr>
<td></td>
<td>Recess: M &amp; T</td>
<td>Recess: E &amp; C</td>
<td></td>
<td>Recess: C &amp; Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Unit 2 Week 2</td>
<td>Math: 3-9</td>
<td>Math: Topic 3 Test</td>
<td>Math: 4-1</td>
<td>No School</td>
<td>No School</td>
<td>Content: Producers/ Animal Environment</td>
</tr>
<tr>
<td></td>
<td>Recess: E &amp; T</td>
<td>Recess: M &amp; Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Unit 2 Week 2</td>
<td>Math: 4-2</td>
<td>Math: 4-3</td>
<td>Math: 4-3</td>
<td>Math: 4-4</td>
<td>Math: 4-4</td>
<td>Content: Producers/ Animal Environment</td>
</tr>
<tr>
<td></td>
<td>Recess: C &amp; T</td>
<td>Recess: E &amp; M</td>
<td></td>
<td>Recess: T &amp; Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>31</td>
<td></td>
<td></td>
<td>Content: Producers Consumers/Animal Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit 2 Week 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bus Duty: T &amp; M</td>
<td>Recess: E &amp; C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

 mogelijk

**Pacing**
The Backward Design Process

1. Identify desired results
2. Determine assessment evidence
3. Plan learning experiences and instruction

- 定目标
- 找测评（方式）
- 做设计
深入实用找测评（方式）

✧ 学生用书
✧ 考试试题
Formative
小白板、课堂练习、回答问题、Exit Ticket、表演、搭档合作／讨论等

Summative
考试
How can you use the open number line to find $35 + 24$?

Write an equation to show the sum. Explain your work.

___ + ___ = ___
Find $48 + 23$. Use an open number line.

**One Way**

This way shows jumps by 10s and 1s.

So, $48 + 23 = 71$.

**Another Way**

This way shows how you can make bigger jumps. Both ways are correct.

---

**Do You Understand?**

**Show Me!** Explain how you can use an open number line to find $56 + 35$.

---

**Guided Practice** Use an open number line to find each sum.

1. $59 + 24 = ___$

2. $47 + 25 = ___$
Independent Practice

Use an open number line to find each sum.

3. $34 + 15 = \underline{\hspace{2cm}}$

4. $46 + 34 = \underline{\hspace{2cm}}$

5. $28 + 16 = \underline{\hspace{2cm}}$

6. $59 + 26 = \underline{\hspace{2cm}}$

7. Number Sense  Matt found $55 + 28$ using the open number line below. Is his work correct? Explain.

[Diagram of open number line with arrows showing addition steps: $+10$, $+10$, $+10$, $-2$ from 55 to 85]

Topic 3 | Lesson 3
8. **MP.5 Use Tools** There are 24 apples in a basket. There are 19 apples on a tray. How many apples are there in all?

____ apples

9. **MP.5 Use Tools** Jamie has 27 more berries than Lisa. Lisa has 37 berries. How many berries does Jamie have?

____ berries

10. **Higher Order Thinking** Use two different number lines to show that \(34 + 23\) has the same value as \(23 + 34\).

11. **Assessment** Use the numbers on the cards. Write the missing numbers under the number line to show how to find the sum.

\[
\begin{align*}
63 & \quad 68 & \quad 43 & \quad 53 \\
+10 & \quad +10 & \quad +5 & \\
\hline
& & & \\
\end{align*}
\]

\[43 + 25 = \]
Part B

How can you use the open number line to find the sum?

A. Start at 40. Count 3 tens to 70. Then count on 5 ones. You land on 75.

B. Start at 48. Count 3 tens to 78. Then count on 5 ones. You land on 83.


D. Start at 48. Count 4 tens to 88. Then count on 5 ones. You land on 93.
Use an open number line to find the sum of 36 + 27.

Part A
What numbers are missing from the number line? Choose all that apply.

A. 46
B. 56
C. 63
D. 66
Part A
Which equation does the open number line show?

A. \[ 48 + 30 = 78 \]
B. \[ 48 + 25 = 73 \]
C. \[ 48 + 35 = 83 \]
D. \[ 48 + 40 = 88 \]
The Backward Design Process

1. **Identify desired results**
2. **Determine assessment evidence**
3. **Plan learning experiences and instruction**

- 定目标
- 找测评 (方式)
- 做设计
目标：
我要了解游老师设计一课数学的思路。
全面展开做设计

- 教案
- DOK
- Explicit Instruction
### 教案

<table>
<thead>
<tr>
<th>Grade 2</th>
<th>Lesson: 5-3</th>
<th>Reference to English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Standard(s): 2.NBT.3</td>
<td>Domain: Number and Operation in Base Ten</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language Objective(s):</th>
<th>Content Objective(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will compare two-digit numbers using symbols.</td>
<td>Students will use the words greater than, less than, equal to to compare two-digit numbers.</td>
</tr>
<tr>
<td>我会用符号来比较两位数字。</td>
<td>我会用“大于，小于”和“等于”来比较两位数字。</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Essential Understanding:</th>
<th>Academic Vocabulary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numbers can be used to show how many. In a two digit number, the tens digit tells how many groups of ten, and the ones digit tells the number of ones.</td>
<td></td>
</tr>
<tr>
<td>数字可以用来表示数量。在两位数中，十位表示十的倍数，个位表示一的倍数。</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials:</th>
<th>Language and Word Wall:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Number cards 0-11 (Teaching tool)</td>
<td>大于，小于，等于</td>
</tr>
<tr>
<td>• 2 boxes of crayons, different sizes (optional)</td>
<td>Sentence Frame: [ ] 于 [ ]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson: Using Symbols to Compare Numbers</th>
<th>Instructional Time: 35 mins</th>
</tr>
</thead>
</table>

#### Opening: (3 minutes) –

1. “你们知道怎么比较十位数和个位数吗? 请用符号来比较。你有没有一个有 64 个蜡笔的盒子？你可以画一个有 24 个蜡笔的盒子来比较吗？”

2. Teacher: “如果你们有蜡笔，你们可以用盒子来表示数量。你有 64 个蜡笔，他有 24 个蜡笔。

3. “现在我们来比较数字。请你比较数字 25 和 16。你知道谁是更大的数字吗？”

#### Introduction to New Material (Direct Instruction): (8 minutes)

1. “你们知道怎么比较十位数和个位数吗? 请用符号来比较。你有没有一个有 64 个蜡笔的盒子？你可以画一个有 24 个蜡笔的盒子来比较吗？”

2. Teacher: “如果你们有蜡笔，你们可以用盒子来表示数量。你有 64 个蜡笔，他有 24 个蜡笔。

3. “现在我们来比较数字。请你比较数字 25 和 16。你知道谁是更大的数字吗？”

#### Guided Practice: (12 minutes)

1. “你们知道怎么比较十位数和个位数吗? 请用符号来比较。你有没有一个有 64 个蜡笔的盒子？你可以画一个有 24 个蜡笔的盒子来比较吗？”

2. Teacher: “如果你们有蜡笔，你们可以用盒子来表示数量。你有 64 个蜡笔，他有 24 个蜡笔。

3. “现在我们来比较数字。请你比较数字 25 和 16。你知道谁是更大的数字吗？”

#### Independent Practice: (5 minutes)

1. “你们知道怎么比较十位数和个位数吗? 请用符号来比较。你有没有一个有 64 个蜡笔的盒子？你可以画一个有 24 个蜡笔的盒子来比较吗？”

2. Teacher: “如果你们有蜡笔，你们可以用盒子来表示数量。你有 64 个蜡笔，他有 24 个蜡笔。

3. “现在我们来比较数字。请你比较数字 25 和 16。你知道谁是更大的数字吗？”

#### Assessment: (15 minutes)

1. “你们知道怎么比较十位数和个位数吗? 请用符号来比较。你有没有一个有 64 个蜡笔的盒子？你可以画一个有 24 个蜡笔的盒子来比较吗？”

2. Teacher: “如果你们有蜡笔，你们可以用盒子来表示数量。你有 64 个蜡笔，他有 24 个蜡笔。

3. “现在我们来比较数字。请你比较数字 25 和 16。你知道谁是更大的数字吗？”

#### Use the modeling cycle:
DOK (Depth of Knowledge)

DOK 1
- Memory and Repeating
- Recall & Reproduction

DOK 2
- Skill/Concept

DOK 3
- Strategic Thinking and Resoning
- Method, Strategy and Reasoning (Proof)

DOK 4
- Extended Thinking
- 思维扩展
说一个生活中你如何用开放式数字线证明并解决数学问题。

用开放式数字线找出总和。

1. 59 + 24 = ____________

【图示】

有38个苹果，比________多27个苹果。________有多少个苹果？用开放式数字线解答问题。

________个苹果
**I Do**
老师做
如何一步一步用开放式数字线找到总和

**We Do**
学生和老师一起做
带着学生如何一步一步用开放式数字线找到总和

**Y’All Do**
学生们做
同桌间一起思考如何一步一步用开放式数字线找到总和

**You Do**
自己做
自己思考如何一步一步用开放式数字线找到总和以及完成练习

『 Explicit Instruction 』
开讲了！
目标：我会用开放式数字线做两个两位数的加法。
新词汇

开放式数字线：
是一个帮你做加法或是减法的工具。
它可以从任何一个数字开始。
做一做，说一说

你怎么用开放式数字线帮你做35 + 24？请解释。
写一个算式表示总和。

____ + ____ = _____
用开放式数字线找出48 + 23。

第一种方法：
跳过____个数，然后跳过____个数。

第二种方法：
你可以跳过一个更大的数字。
学生和老师做

用开放式数字线找出总和。

$59 + 24 = \_\_\_\_\_\_\_\_\_\_

从____开始，数____个十到了____，
然后数____个一到了____。
所以，____ + ____ = ____。
从___开始，数___个十到了___，
然后数___个一到了___。
所以，___ + ___ = ___。

3-3 用开放数数线做两个数的加法
学生们做

用开放式数字线找出总和。

47 + 25 = ____

从____开始，数____个十到了____，然后数____个一到了____。所以，__ + ____ = ____。
目标：我会用开放式数字线做两个两位数的加法。

我会了 3
还可以 2
还不会 1

上课中间——检测目标
自己做

用开放式数字线找出总和。

34 + 15 = ____

从____开始，数____个十到了____，
然后数____个一到了____。
所以，____ + ____ = ____。
自己试着做

用开放式数字线找出总和。

28 + 16 = ____

从____开始，数____个十到了____，然后数____个一到了____。

所以，___ + ____ = ____。
3. 用两条不一样的数字线表示34+23的总和和23+34是一样的？

4. 用上卡片上的数字。在数字线下写下缺少的数字来表示怎样找到总和。

目标：我会用开放式数字线做两个两位数的加法。

3 我会了 2 还可以 1 还不会
The Backward Design Process

1. Identify desired results
2. Determine assessment evidence
3. Plan learning experiences and instruction

- 定目标
- 找测评（方式）
- 做设计
目标：
我要了解游老师设计一课数学的思路。

3. 我会了
2. 还可以
1. 还不会
Any questions?

谢谢！祝大家一切顺利！😊

You can find me at:
yinyao.you@canyonsdistrict.org