DecaCards™

Sample Lessons

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A Real Hands-On Approach To Teaching Place Value

ORIGO
EDUCATION

Representing Numbers from 0–10

Purpose

Students will learn a specific system for showing an audience the numbers from 0–10 using their fingers. They will see that the raised fingers (on the audience's left) represent the given number and the unraised fingers show how many more are needed to make ten.

Introduction (Whole Class)

- Raise two fists with palms forward and guide the students to do the same. Ask, How many fingers are you holding up? (*None*.) Raise all your fingers and ask the students to do the same. Ask, How many fingers are you holding up now? (*Ten*.)

- Raise both fists then raise the little finger of your right hand. Ask the students to do the same. (There may be confusion as you are facing in the opposite direction to the class. Bringing students to the front of the class will help.) Ensure all students are displaying the correct finger. Ask, How many fingers are you holding up? (*One*.)

Representing 1 using fingers

- Raise the little finger and ring finger of your right hand and ask, How many fingers am I holding up? Raise your middle finger alongside the other two and ask, How many fingers am I holding up now? Continue on, showing all numbers to ten. Always use both hands — even for numbers less than six. At four, ask, How many more to make five? How many more to make ten? At seven, ask, How many more to make ten? Repeat this process until the class is confident with the system.

Consolidation (Pairs)

- Give each pair of students a set of DecaCards showing the numbers 1–9. Ask the students to find the card that shows, for example, 2 less than 10, or the card that shows 5 and 2. Guide the students to work together to find the correct card each time.

- Have one student use his or her fingers to represent a number between 0 and 10. The other student finds the matching card and identifies the number. The roles can then be reversed.

Reflection (Whole Class)

- Show all numbers from 0–10. Have individual students come to the front and represent a designated number while the class checks. Ask other students to show a number of their own choice for the audience to identify.

Materials

- For each pair of students:

    1 set of DecaCards showing 1–9

Extension

Hold both hands behind your back then briefly show six fingers. Ask, How many fingers did I hold up? How many more will make ten? Repeat showing other numbers and asking relevant questions.

Sample Lesson

Representing Teen Numbers

Materials

- For each pair of students:

    1 set of DecaCards showing 0–10

Extension

Ask pairs of students to use cards to represent numbers between 19 and 30.

Purpose

Students will see that numbers from 11–19 can be shown as one ten and a number of ones. This is the first of several lessons that show two-digit numbers as groups of tens and ones.

Introduction (Whole Class)

- Ask, Can someone show 11 fingers? Individual students may make some clever and amusing attempts before figuring out that a pair of students can do it easily. Ensure that 11 is represented correctly so that the audience can read left-to-right and see the 9 fingers that are needed to make 20.

Representing 11 using fingers

- Ask the class how they know there are 11 fingers. If a student suggests counting all the fingers, ask if there is another way. Students may suggest counting on from ten or say, *It's ten and one more.* Repeat for other numbers from 10–19. When students gain confidence repeat the activity asking, How many more will make 20?

Consolidation (Pairs)

- Give each pair of students a set of DecaCards showing 0–10. Have one student show a number using the ten card and a ones card. The other student identifies the number. The roles can then be reversed.

- Have one student in each pair give their partner the ten card and ask them to make any number from 10–19. The other student finds the appropriate ones card and shows the nominated number with both. The roles can then be reversed.

Reflection (Whole Class)

- Ask questions like, What cards will I use to show 14 fingers? If I have the ten card, what other card do I need to make a total of 17?

Representing Two-Digit Numbers to 99

Purpose

Students will see that all two-digit numbers can be represented as groups of tens and ones. They will discover the advantage of using groups of ten rather than counting by ones.

Introduction (Whole Class)

- Invite a pair of students to show a total of 14 fingers to the class. (Ensure that the student holding up 10 fingers is on the audience's left.) Ask, How can we figure out the total without counting all of the fingers? Can someone make the display show 24 fingers in total? (Again, ensure that the students holding up 10 fingers are on the audience's left.)

Representing 24 using fingers

Ask, Can we now show 34 fingers in total? How do we know there are 34 without counting each of the fingers? Discuss the advantages of using groups of ten rather than counting by ones. Repeat with other two-digit numbers.

- Bring one student to the front of the class and whisper a two-digit number. Have the student use classmates to represent the number using fingers in groups of tens and ones. Ask the class to identify the number, then repeat with other two-digit numbers.

Consolidation (Pairs)

- Give each pair of students one set of DecaCards showing 1–9 and 9 tens cards (DecaCards showing 10 fingers). Ask one student to represent a two-digit number using some tens cards and a ones card. The other student identifies the number. The roles can then be reversed.

- Have one student nominate a two-digit number and challenge his or her partner to represent it using the appropriate cards. The roles can then be reversed.

Reflection (Whole Class)

- Develop further understanding of the numbers from 10–99 by asking questions such as: What cards will I use to show 53? What numbers can I represent if I have 7 tens cards and 1 of the ones cards?

Materials

- For each pair of students:
    1 set of DecaCards showing 1–9
    9 tens DecaCards

Extension

Ask, How many students will be needed to represent 74? Ask the students to explain how they figured out their answer. A deep understanding of tens and ones is demonstrated by an answer such as, *7 for the seven tens and 1 more to show the ones.*

Counting On by Ones and Tens

Materials

- For each pair of students:

  1 set of DecaCards showing 1–9

  9 tens DecaCards

Extension

Write *81* on the board. Ask, How many more are needed to make 120? Can the students build to 100 and then add 20?

Purpose

Students will add ones to a given two-digit number to reach a multiple of ten, then add the appropriate number of tens to reach 100. They will also apply this strategy to other multiples of ten.

Introduction (Whole Class)

- Invite 10 students to the front of the class and ask them to represent 100. Ask, How many fingers are there in total? Have the 5 students on the audience's left show a total of 47 while the others drop their hands. Ask, I have 47, how many more do I need to make 100? Elicit several responses such as counting back from 100 to 47 or subtracting 47 from 100 to find the difference. Discuss and show the idea of starting at 47, adding 3 to make 50, and then adding 50 more to reach 100, so that the difference is (3 + 50) 53. Repeat with new students and a different starting number.

- Repeat the activity with 7, 8, or 9 students showing the numbers 70, 80, or 90 as target numbers.

Consolidation (Pairs)

- Give each pair of students one set of DecaCards showing 1–9 and 9 tens cards. Ask one student to represent a two-digit number using some tens cards and a ones card. The other student then determines how many more are needed to make 100. Guide this student to use cards to help find and display the solution. The roles can then be reversed.

- Repeat the activity with different target numbers.

Reflection (Whole Class)

- Ask the students if they think they can solve similar problems without the aid of fingers or cards. Write *65* on the board and ask how many more are needed to make 100. Ask individuals to solve the problem and explain the strategy they are using. Repeat using other numbers.

- Can the students use these mental strategies if the target number is a multiple of ten less than 100? Ask, If I have 26, how many more do I need to make 70? Students may be able to add 4 to make 30, then add 40 to make 70 showing that the difference is (4 + 40) 44.

Understanding Place Value in Four-Digit Numbers

Purpose

Students will see how the position of a numeral in a four-digit number determines its value.

Introduction (Whole Class)

- Ask a group of students to show 2438 fingers. If this lesson is taught soon after Sample Lesson 8, students will probably see the need for a representation of 1000. If not, bring out this idea. Ask, What do you think 1000 will look like? Display one of the Thousand Charts and discuss its properties.

- Guide the group to model 2438 with charts, strips, and fingers. Position them in the appropriate places and write 2 on the board above the thousands, 4 above the hundreds, and so on. Discuss the fact that, in a four-digit number, the 2 could mean 2000, 200, 20, or 2, depending on where it is placed.

- Show that 2438 is 2000 + 400 + 30 + 8. Reinforce the purpose and advantages of the place-value system by guiding the students to explain that it is also 2400 + 38, 2000 + 438, 2430 (243 tens) + 8, 2438 ones, and so on. Repeat for other four-digit numbers.

Consolidation (Individuals or Pairs)

- Write 4293 on the board. Ask students to write this number in as many different groups of thousands, hundreds, tens, and ones as they can. Some possible solutions are: 4000 + 200 + 90 + 3 (4 thousands, 2 hundreds, 9 tens, and 3 ones); 4200 + 93 (42 hundreds + 93 ones); 4290 + 3 (429 tens + 3 ones); or 4293 ones.

Reflection (Whole Class)

- Ask groups of students to use Thousand Charts, Hundred Strips, and their fingers to display and discuss their solutions to the Consolidation activity.

Materials

- 4 Thousand Charts
- 9 Hundred Strips

Extension

Discuss the importance of a zero in four-digit numbers, e.g. in 7360, 4902, 6047, 3006, and 8000.

Fractions of 100 and 1000

Materials

- 10 Hundred Strips
- 6 Thousand Charts

Extension

Relate the fractions of 100 to the concept of percentage.

Purpose

Students will investigate fractions of 100 and 1000.

Introduction (Whole Class)

- Invite 10 students to the front of the class and have them show 100 fingers. Ask, How will we show half of 100? (*Make a gap to show 2 groups of 50*.) How will we divide 100 into tenths? (*Make a gap between each student*.) What is $\frac{1}{10}$ of 100? What is $\frac{3}{10}$ of 100?

- Have the students model fifths (5 groups of 2 students showing 20 fingers each). Ask, What is $\frac{1}{5}$ of 100? What is $\frac{4}{5}$ of 100? Guide the group to model quarters. This may require some discussion before students see that the 3rd and 8th students can stretch out their hands to join the groups on either side, giving 4 groups of 25.

- Display a Thousand Chart. Ask, What is half of 1000? Fold the chart to show 500. What is $\frac{1}{10}$ of 1000? (Draw students' attention to the top hundred strip on the chart.) What is $\frac{7}{10}$ of 1000? What is $\frac{1}{5}$ of 1000? Fold the chart to show 200. Discuss other fractions such as $\frac{3}{5}$. Discuss and model other fractions of 1000, e.g. $\frac{1}{20}$ (50), $\frac{1}{50}$ (20), $\frac{1}{100}$ (10), and so on.

Consolidation (Pairs and Groups)

- Have students work in pairs to find and record as many fractions of 100 as they can. Allow them to refer to a Hundred Strip if necessary.

- Guide groups of students to find and record as many fractions of 1000 as they can. Allow them to refer to a Thousand Chart if necessary.

Reflection (Whole Class)

- Ask the students to share and discuss their solutions to the Consolidation activity.