a-MAZE-ing Secret Paths

Math Concepts

- whole numbers
- place value
- comparing numbers
- estimation
- addition
- subtraction

Materials

- TI-10
- **a-MAZE-ing Secret Paths** recording sheets
- pencils

Overview

Students will investigate patterns in place value and the effects of adding and subtracting by using the calculator to explore relationships between numbers on the hundred chart.

Introduction

1. Have students choose a number from the hundred chart on their recording sheets. Then have them look at the number to the right of it. Ask them how this number is different from the first number.

   Example: 28 is "one" more than 27.

2. Have each student enter the number he or she chose in the calculator. Ask: What would you do to change the calculator display so that it shows the value of the number in the square to the right?

   Example: Enter **27** [+] **1** [=] to change 27 to 28.

3. Have each student investigate the number to the left, below, and above his or her original number in the same way.

   After each investigation, ask: What did you have to do on your calculator to change the number in the display to the number in the square to the left, below, and above the number you chose?

4. Model how to play **a-MAZE-ing Secret Paths** for students using a transparency of the recording sheet. Draw a path on the hundred chart and record the path with numbers and operations. Next, have students follow the path using a calculator.

   Example: For a beginning number of 76 and an ending number of 64, you could record this path: 76 - 1 - 1 - 10. Read the path to students and have them follow the steps on their calculators. Students should arrive at your ending number of 64. (For this example, students should press **76** [−] **1** [−] **1** [−] **10** [=].)

a-MAZE-ing Secret Paths *(continued)*

Introduction (continued)

5. Have students choose two numbers on the hundred chart and secretly draw a path between those two numbers. The path must move from square to square either horizontally or vertically, **not diagonally**. Using numbers and operation symbols, have students individually record the steps in their paths on the stone path provided on their recording sheets.

6. Now have students work in pairs. Tell the first partner to read the beginning number and each step for moving through the path to reach the ending number (without revealing the ending number). Have the second partner listen, use a calculator to enter each number and operation, and press [=] at the end of the directions to display the ending number. Then have students compare the recorded ending number with the ending number displayed on the calculator.

7. Have the partners switch roles and play the **a-MAZE-ing Secret Paths** game again.

Collecting and Organizing Data

While students explore their mazes, ask questions such as:

- Which steps in your path move to the left? How far do they move to the left? Which steps in your path move to the right? How far do they move to the right? How about up and down?
- What happens to the numbers when your path moves up and down?
- What happens to the numbers when your path moves to the left or right?
- How do you record this in your description of your path?
- How can you make your path begin and end at the same number (make a loop)?
- How can you make certain geometric shapes with your path?

How can you use the calculator to record the steps in the path that move to the right? To the left? Up? Down?

How are the numbers you are seeing on the calculator connected to the numbers on the hundred chart?

How can you use the scroll feature, ◁▷, to explore the path entered on the calculator?

a-MAZE-ing Secret Paths *(continued)*

Analyzing Data and Drawing Conclusions

After students have taken turns exploring several paths, have them work as a whole group to analyze the descriptions of their paths. Ask questions such as:

- What information did you use to decide how to record your path?
- Did your directions lead your partner to display the correct ending number on the calculator? Why or why not?
- How could you change your description and still lead your partner to the correct ending number on the same path?
- What happens if you change the order of the steps in your description? Does it change your path? Does it change your ending number?
- Could you make your path shorter, easier to follow? How?

If your partner displayed the wrong ending number, how could you use that number to decide how to change the description of your path?

How can you use the scroll feature, ◁▷ ◁▷, to help you decide how to change your path?

Continuing the Investigation

Have students:

- Draw three more paths between the same beginning and ending numbers and compare their descriptions of the paths. Ask: How are they alike? How are they different? Can you find anything in common among all four paths?
- Investigate the questions: What if your beginning and ending numbers were equal to each other (a loop)? How would this affect the kinds of paths you could draw? How would this affect the descriptions of your paths?
- Investigate the question: If the rules changed to allow diagonal steps in your path, how would this affect the description of your path?

Name:

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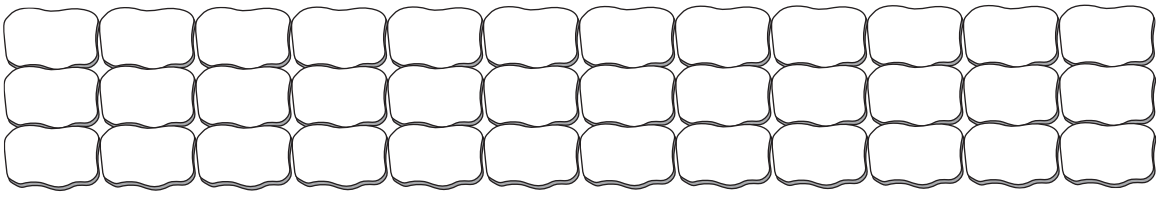
Recording Sheet

Collecting and Organizing Data

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Move from my beginning number to my ending number by following this path.



Patterns we found while we were doing this activity.