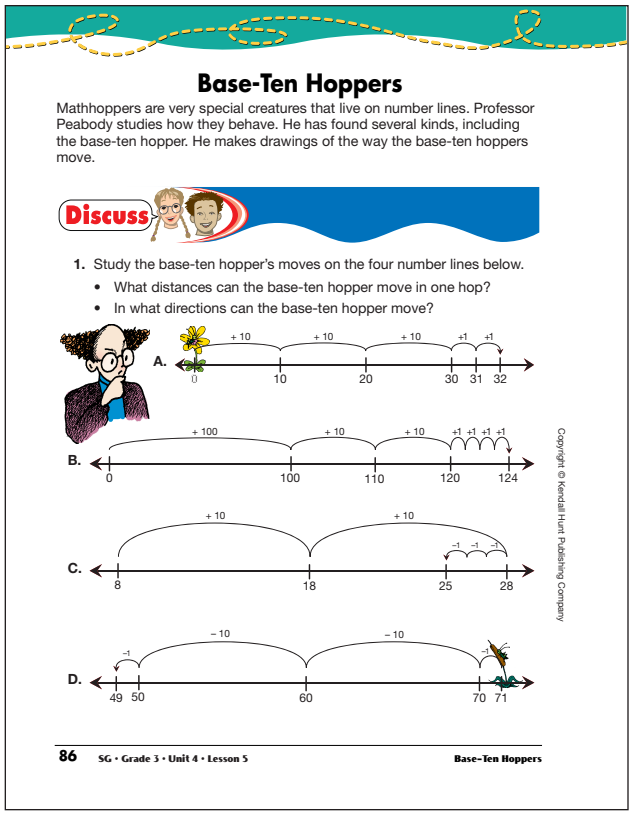

Base-Ten Hoppers

Mathhoppers are very special creatures that live on number lines. Professor Peabody studies how they behave. He has found several kinds, including the base-ten hopper. He makes drawings of the way the base-ten hoppers move.

Discuss

1. Study the base-ten hopper's moves on the four number lines below.
   - What distances can the base-ten hopper move in one hop?
   - In what directions can the base-ten hopper move?

A. + 10, + 10, + 10, +1, +1 — 0, 10, 20, 30, 31, 32

B. + 100, + 10, + 10, +1, +1, +1, +1 — 0, 100, 110, 120, 124

C. + 10, + 10, –1, –1, –1 — 8, 18, 25, 28

D. – 10, – 10, –1, –1 — 49, 50, 60, 70, 71

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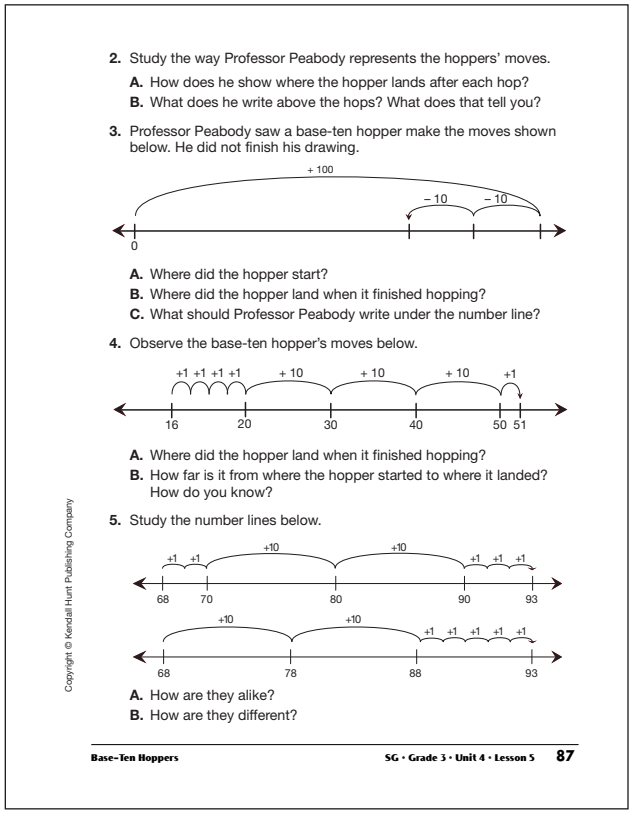

2. Study the way Professor Peabody represents the hoppers' moves.
   - **A.** How does he show where the hopper lands after each hop?
   - **B.** What does he write above the hops? What does that tell you?

3. Professor Peabody saw a base-ten hopper make the moves shown below. He did not finish his drawing.

   - **A.** Where did the hopper start?
   - **B.** Where did the hopper land when it finished hopping?
   - **C.** What should Professor Peabody write under the number line?

4. Observe the base-ten hopper's moves below.

   - **A.** Where did the hopper land when it finished hopping?
   - **B.** How far is it from where the hopper started to where it landed? How do you know?

5. Study the number lines below.

   - **A.** How are they alike?
   - **B.** How are they different?

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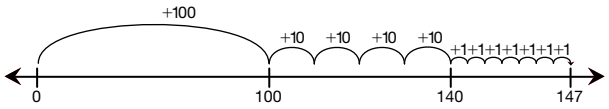
Student Guide

Base-Ten Hoppers (SG pp. 86–90)
Questions 1–12

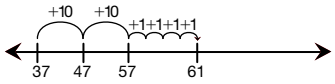
1. **A.*** tens and ones; forward
   B.* hundreds, tens, and ones; forward
   C.* tens and ones; forward and backward
   D.* tens and ones; backward
2. **A.*** By writing the number under each hop.
   B.* The amount and direction of the hop; + for forward and – for backward.
3. **A.** At zero
   B. 80
   C. The numbers where the hopper lands for each hop: 100, 90, 80.
4. **A.** 51
   B. 35. I added each hop.
   1 + 1 + 1 + 1 + 10 + 10 + 10 + 1 = 35
5. Possible Answers:
   A.* They both start and end on the same number. They both use hops of 10 and 1 forward.
   B.* The first made a ten by hopping two +1 hops to 70 then skip counting by tens to 90 and adding ones left over to 93. The second started with skip counting by tens then adding the ones.
6. Answers will vary. Possible response:
   Begin at 0, move forward +100, four +10 hops, and seven +1 hops to 147.



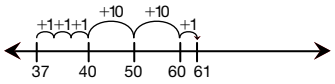
***Answers and/or discussion are included in the lesson.**

7. A. Answers will vary. Possible response:

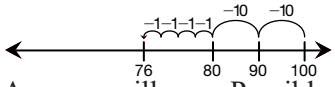
Begin at 37, go forward two +10 hops and four +1 hops to 61.



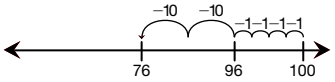
B. Begin at 37, go forward three +1 hops to 40, two +10 hops to 60, and one +1 hop to 61.



8. A. Begin at 100, go two –10 hops and four –1 hops to 76.



B. Answers will vary. Possible response. Begin at 100, go four –1 hops to 96 and two –10 hops to 76.



9. A.* The hopper made jumps for each number in the number sentence.

B.* He wrote 200 for the 2 hops of 100, 30 for the 3 hops of 10, and 3 for the 3 hops of one.

10. A. I agree this number sentence shows that the hopper moved a total of 38 hops. The hopper made 4 hops of 10 forward and two hops of 2 backward.

B. Four hops of 10 forward is like 40 and the 2 hops of 1 backward is – 2. 40 – 2 = 38

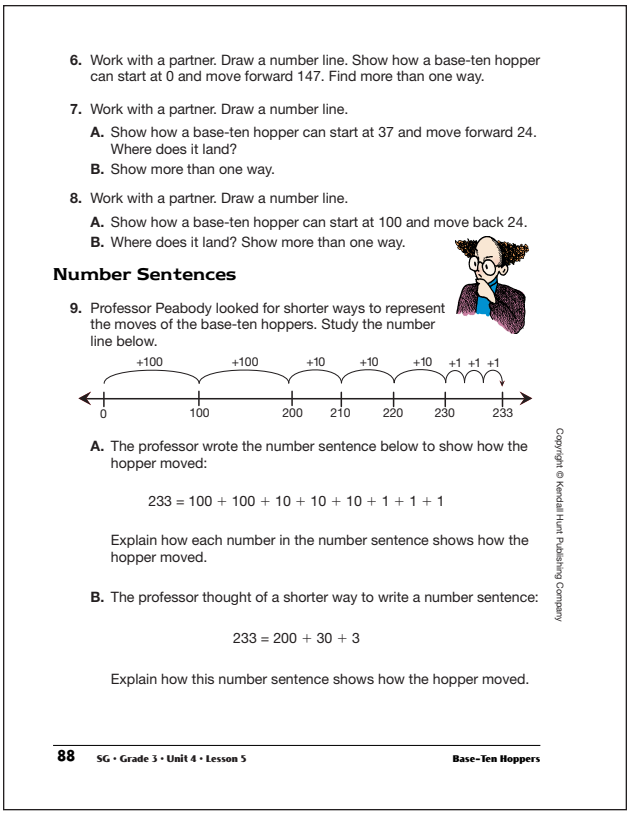
11. Students should conclude that both number sentences are correct.

A. Answers will vary. Listen for explanations students give for their number sentences. They may record each hop in their number sentences (10 + 10 + 10 – 1 – 1 – 1 – 1 = 26) or combine the forward and backward hops to show one total (30 – 4 = 26).

B. Answers will vary.

10 + 10 + 1 + 1 + 1 + 1 + 1 + 1 = 26 or

20 + 6 = 26



6. Work with a partner. Draw a number line. Show how a base-ten hopper can start at 0 and move forward 147. Find more than one way.

7. Work with a partner. Draw a number line.
   - **A.** Show how a base-ten hopper can start at 37 and move forward 24. Where does it land?
   - **B.** Show more than one way.

8. Work with a partner. Draw a number line.
   - **A.** Show how a base-ten hopper can start at 100 and move back 24.
   - **B.** Where does it land? Show more than one way.

Number Sentences

9. Professor Peabody looked for shorter ways to represent the moves of the base-ten hoppers. Study the number line below.

+100 +100 +10 +10 +10 +1 +1 +1
0 100 200 210 220 230 233

- **A.** The professor wrote the number sentence below to show how the hopper moved:

  233 = 100 + 100 + 10 + 10 + 10 + 1 + 1 + 1

  Explain how each number in the number sentence shows how the hopper moved.

- **B.** The professor thought of a shorter way to write a number sentence:

  233 = 200 + 30 + 3

  Explain how this number sentence shows how the hopper moved.

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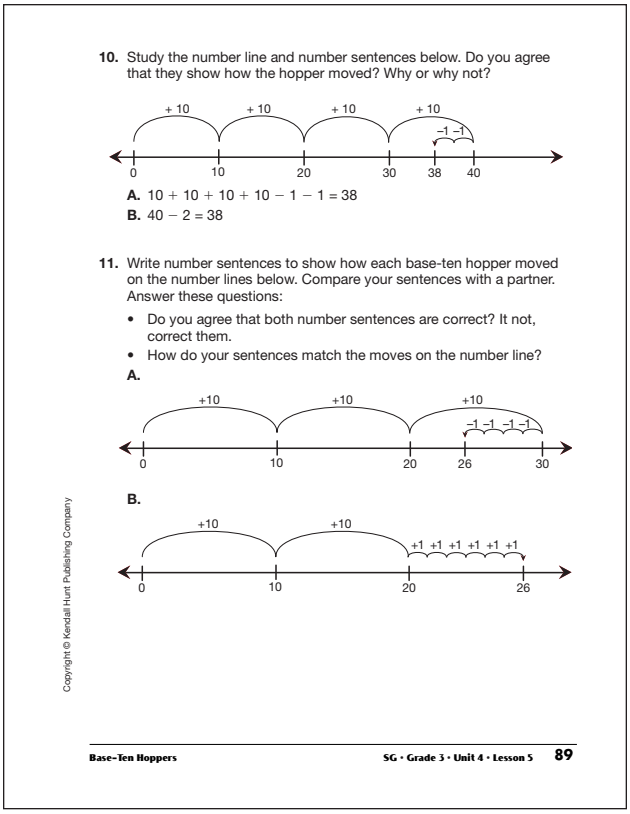

10. Study the number line and number sentences below. Do you agree that they show how the hopper moved? Why or why not?

+ 10 + 10 + 10 + 10 –1 –1
0 10 20 30 38 40

- **A.** 10 + 10 + 10 + 10 – 1 – 1 = 38
- **B.** 40 – 2 = 38

11. Write number sentences to show how each base-ten hopper moved on the number lines below. Compare your sentences with a partner. Answer these questions:
   - Do you agree that both number sentences are correct? It not, correct them.
   - How do your sentences match the moves on the number line?

A.

+10 +10 +10 –1 –1 –1 –1
0 10 20 26 30

B.

+10 +10 +1 +1 +1 +1 +1 +1
0 10 20 26

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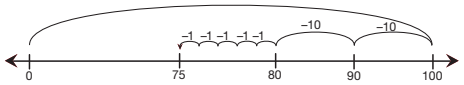
***Answers and/or discussion are included in the lesson.**

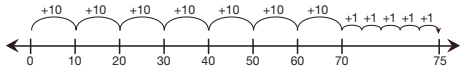
12. Write number sentences to show how each base-ten hopper moved. Compare your sentences with a partner. Answer these questions:

- Do you agree that both number sentences are correct? If not, correct them.
- How do your sentences match the moves on the number line?

A.



B.



Use the *Helping Professor Peabody* pages in the *Student Activity Book* to practice showing partitions of numbers on a number line and with number sentences.

Homework

Draw number lines to show how the base-ten hoppers move.

- **Show above the hop the distance and direction of each move.**
- **Show below the number line where the hopper lands after each move.**

1. **A.** The base-ten hopper starts at 0 and moves forward 116.
   B. Write a number sentence that shows how the hopper moved.
2. **A.** Show two ways that a base-ten hopper can start at 28 and move forward 43.
   B. Where does the hopper stop?
3. **A.** The base-ten hopper starts at 200 and moves back 31.
   B. Write a number sentence that shows how the hopper moved and where it stopped.
4. **A.** Show two ways that a base-ten hopper can start at 74 and move back 26.
   B. Where does the hopper stop?

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12. Students should conclude that both number sentences are correct.

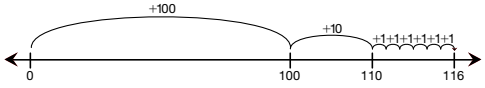
A. Answers will vary.
100 – 10 – 10 – 1 – 1 – 1 – 1 – 1 = 75 or
100 – 25 = 75

B. Answers will vary.
10 + 10 + 10 + 10 + 10 + 10 + 10 + 1 + 1 + 1 + 1 + 1 + 1 = 75 or 70 + 5 = 75

Homework (SG p. 90)
Questions 1–4

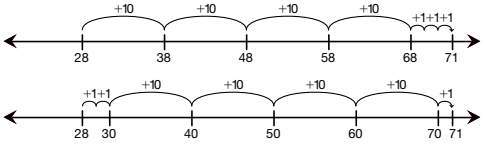
One possible set of moves is shown.

1. **A.** Start at zero, move forward
+ 100, + 10, + 1, + 1, + 1, + 1, + 1, + 1



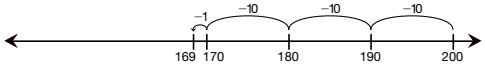
B. 116 = 100 + 10 + 1 + 1 + 1 + 1 + 1 + 1

2. **A.** Start at 28, move forward
+ 10, + 10, + 10, + 10, + 1, + 1, + 1 or
forward + 1, + 1, + 10, + 10, + 10, + 10, + 1



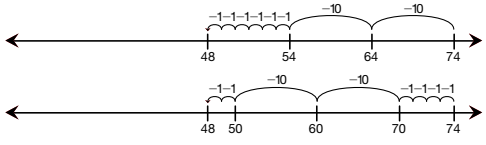
B. It stops at 71.

3. **A.** Start at 200, move – 10, – 10, – 10, – 1, stop on 169



B. 200 – 30 – 1 = 169

4. **A.** Start at 74, move – 10, – 10, – 1, – 1, – 1, – 1, – 1, – 1 and land on 48 or
Start at 74, move – 1, – 1, – 1, – 1 to 70, then back – 10, – 10, to 50, then back – 1, – 1, to 48.



B. It stops at 48.