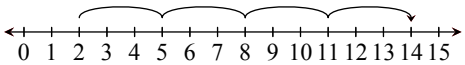
Student Guide

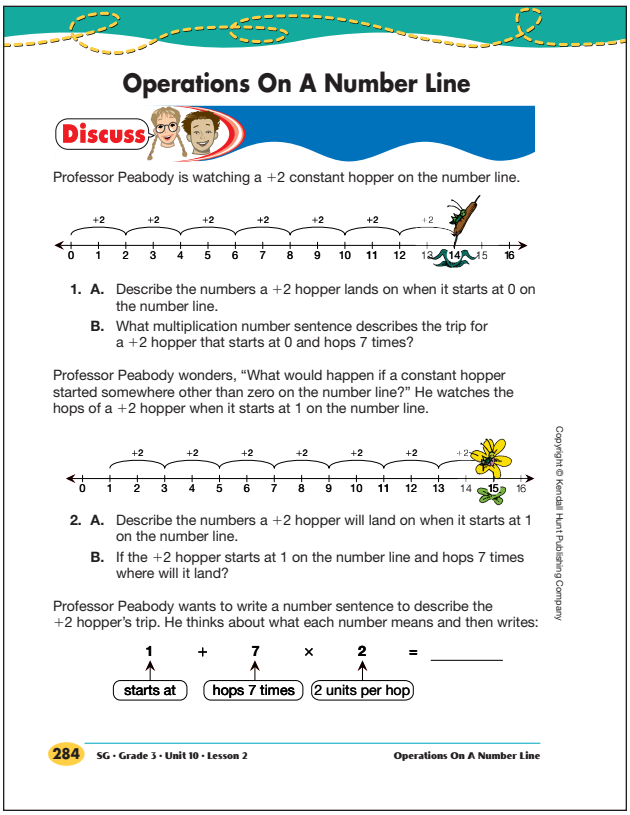
Operations on a Number Line (SG pp. 284–286) Questions 1–11

Note: Number sentences may vary. One possible number sentence is given in the answers below.

1. **A.*** Even numbers; multiples of 2
   B. $7 \times 2 = 14$
2. **A.*** Odd numbers
   B. 15
3. The 2 tells that the constant hopper started on 2; the 4 tells that it hopped 4 times; the 3 tells that its hops are all 3 units.
4. **A.** Sam is correct.
   B. Possible response: I multiply 4 hops of 3 units first, $4 \times 3 = 12$, and then I add on 2 because the hopper started at 2 instead of 0.
   C.



5. **A.** 4
   B. The 10 tells that the constant hopper started on 10; the 2 tells it hopped 2 times; the 3 tells that its hops are all 3 units; the 4 is where the hopper landed.
   C. Professor Peabody multiplies 2×3 first to show the distance the hopper traveled.
   D. Professor Peabody subtracts 6 from 10 to get 4 because the hopper started on 10 and went back 2 hops of -3.



Operations On A Number Line

Discuss

Professor Peabody is watching a +2 constant hopper on the number line.

1. **A.** Describe the numbers a +2 hopper lands on when it starts at 0 on the number line.
   B. What multiplication number sentence describes the trip for a +2 hopper that starts at 0 and hops 7 times?

Professor Peabody wonders, "What would happen if a constant hopper started somewhere other than zero on the number line?" He watches the hops of a +2 hopper when it starts at 1 on the number line.

2. **A.** Describe the numbers a +2 hopper will land on when it starts at 1 on the number line.
   B. If the +2 hopper starts at 1 on the number line and hops 7 times where will it land?

Professor Peabody wants to write a number sentence to describe the +2 hopper's trip. He thinks about what each number means and then writes:

1 + 7 × 2 = _____
starts at | hops 7 times | 2 units per hop

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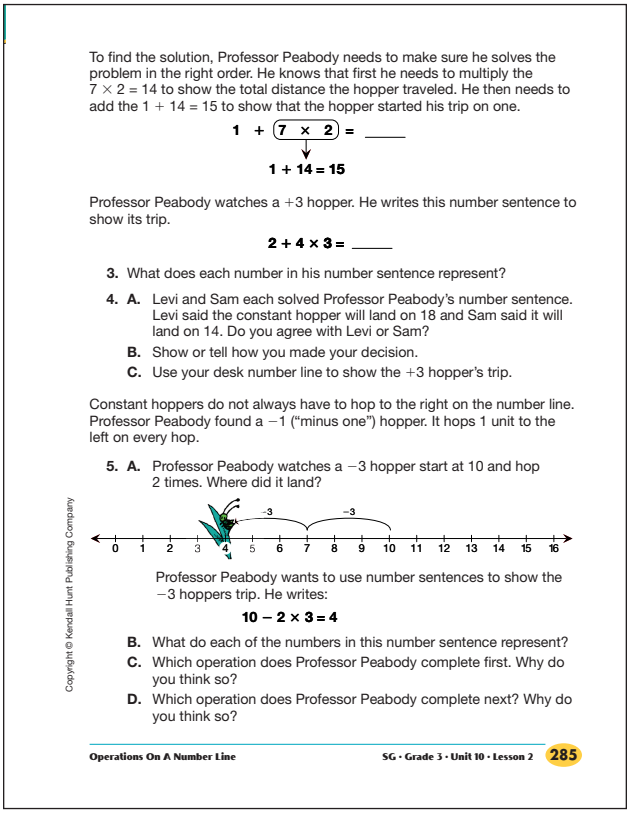

To find the solution, Professor Peabody needs to make sure he solves the problem in the right order. He knows that first he needs to multiply the $7 \times 2 = 14$ to show the total distance the hopper traveled. He then needs to add the $1 + 14 = 15$ to show that the hopper started his trip on one.

1 + (7 × 2) = ____
1 + 14 = 15

Professor Peabody watches a +3 hopper. He writes this number sentence to show its trip.

2 + 4 × 3 = ____

3. What does each number in his number sentence represent?
4. **A.** Levi and Sam each solved Professor Peabody's number sentence. Levi said the constant hopper will land on 18 and Sam said it will land on 14. Do you agree with Levi or Sam?
   B. Show or tell how you made your decision.
   C. Use your desk number line to show the +3 hopper's trip.

Constant hoppers do not always have to hop to the right on the number line. Professor Peabody found a −1 ("minus one") hopper. It hops 1 unit to the left on every hop.

5. **A.** Professor Peabody watches a −3 hopper start at 10 and hop 2 times. Where did it land?

Professor Peabody wants to use number sentences to show the −3 hoppers trip. He writes:

10 − 2 × 3 = 4

   B. What do each of the numbers in this number sentence represent?
   C. Which operation does Professor Peabody complete first. Why do you think so?
   D. Which operation does Professor Peabody complete next? Why do you think so?

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

✓ **Check-In: Questions 6–11**
Use a number line.

6. **A.** If a +6 hopper starts on 0 and hops 4 times where will it land?
   B. Write a multiplication number sentence to describe the hopper's trip.
7. **A.** A hopper starts at 0 and hops 6 times. It lands on 18. What kind of a constant hopper is it?
   B. Show or tell how you know.
   C. Write a number sentence to show the hopper's trip.
8. **A.** If a +4 hopper starts on 3 and hops 4 times where will it land?
   B. Write a number sentence to describe the hopper's trip.

9. **A.** Where will a −5 hopper land if it starts at 35 and hops 7 times?
   B. Write a number sentence to describe its trip.
10. **A.** A hopper starts on 14 and hops 4 times. It lands on 6. What kind of constant hopper is it?
    B. Show or tell how you know.
    C. Write a number sentence to describe the hopper's trip.
11. Rosa writes this number sentence to describe the trip for a +6 hopper:

    $2 + 4 \times 6 =$ ____

    Kim thinks the hopper will land on 26 but Mara thinks it will land on 36.

    Who do you agree with? Show or tell how you made your decision.

For more practice with constant hoppers and number sentences, use the *Constant Hoppers and Number Sentences* Homework pages in the *Student Activity Book*.

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Name _____ Date _____

Constant Hoppers and Number Sentences

Homework

Use the *Number Line 0–30* page in the Reference section of the *Student Guide* to help you complete each table.

1. A +3 hopper starts at 0.

Number of Hops	Hop Size	Lands On	Number Sentence
1	3		
2	3	6	2 × 3 = 6
3	3		
4	3		
5	3		

2. A +5 hopper starts at 0.

Number of Hops	Hop Size	Lands On	Number Sentence
1	5		
2	5		
3	5		
4	5		
5	5		

3. A constant hopper starts at 0.

Number of Hops	Hop Size	Lands On	Number Sentence
1		4	
2		8	
3		12	
4		16	
5		20	

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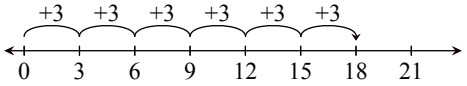
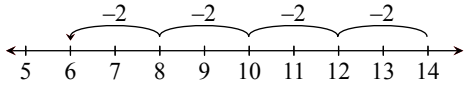
6. **A.** 24
   B. $6 \times 4 = 24$
7. **A.** +3 hopper
   B.



   C. $3 + 3 + 3 + 3 + 3 + 3 = 18$ or $6 \times 3 = 18$
8. **A.** 19
   B. $3 + 4 \times 4 = 19$
9. **A.** 0
   B. $35 - (7 \times 5) = 0$
10. **A.** −2
    B.



    C. $14 - (4 \times 2) = 6$
11. Kim is correct. Possible response: I multiplied 4×6 first to get 24 and then added 2 to make 26.

Student Activity Book

Constant Hoppers and Number Sentences (SAB pp. 391–392)
Questions 1–7

1. A +3 hopper starting on 0

Number of Hops	Hop Size	Lands On	Number Sentence
1	3	**3**	**1 × 3 = 3**
2	3	6	2 × 3 = 6
3	3	**9**	**3 × 3 = 9**
4	3	**12**	**4 × 3 = 12**
5	3	**15**	**5 × 3 = 15**

2. A +5 constant hopper starting on 0

Number of Hops	Hop Size	Lands On	Number Sentence
1	5	**5**	**1 × 5 = 5**
2	5	**10**	**2 × 5 = 10**
3	5	**15**	**3 × 5 = 15**
4	5	**20**	**4 × 5 = 20**
5	5	**25**	**5 × 5 = 25**

3. A constant hopper starting on 0

Number of Hops	Hop Size	Lands On	Number Sentence
1	**4**	4	**1 × 4 = 4**
2	**4**	8	**2 × 4 = 8**
3	**4**	12	**3 × 4 = 12**
4	**4**	16	**4 × 4 = 16**
5	**4**	20	**5 × 4 = 20**

4. A +3 hopper starting on 2

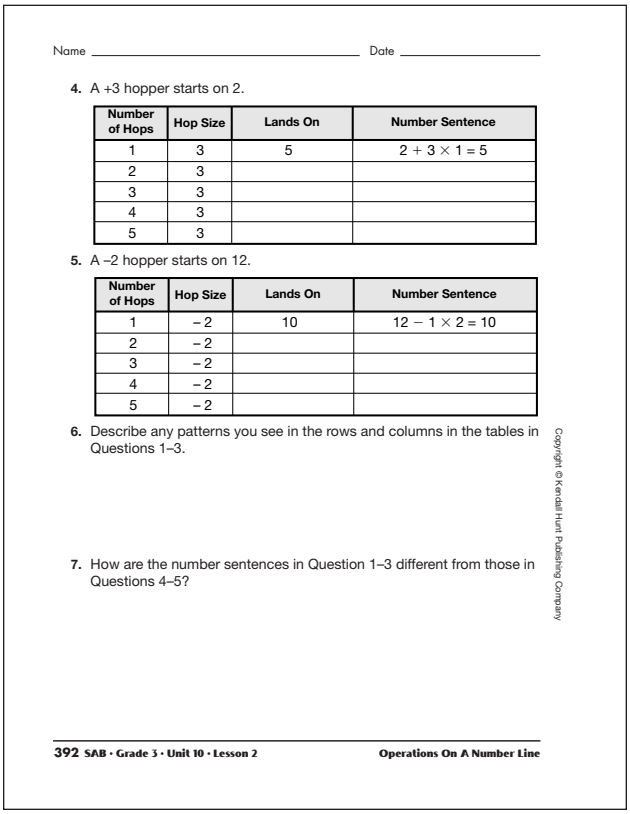
Number of Hops	Hop Size	Lands On	Number Sentence
1	3	5	$2 + 3 \times 1 = 5$
2	3	**8**	$\mathbf{2 + 3 \times 2 = 8}$
3	3	**11**	$\mathbf{2 + 3 \times 3 = 11}$
4	3	**14**	$\mathbf{2 + 3 \times 4 = 14}$
5	3	**17**	$\mathbf{2 + 3 \times 5 = 17}$

5. A −2 hopper starting on 12

Number of Hops	Hop Size	Lands On	Number Sentence
1	– 2	10	$12 - 1 \times 2 = 10$
2	– 2	**8**	$\mathbf{12 - 2 \times 2 = 8}$
3	– 2	**6**	$\mathbf{12 - 3 \times 2 = 6}$
4	– 2	**4**	$\mathbf{12 - 4 \times 2 = 4}$
5	– 2	**2**	$\mathbf{12 - 5 \times 2 = 2}$

6. Possible response: The numbers in the Hop Size column are always the same. The numbers in the Lands On column are multiples of the hop size. Going across the rows, if you multiply the number of hops times the hop size you get the lands on number.

7. The number sentences in Questions 1–3 are multiplication number sentences, number of hops times hop size equals the lands on number. In Questions 4–5, two operations are performed in the number sentences. In Question 4, a number is added to the numbers multiplied to show that the hopper starts at a spot other than 0. In Question 5, the product is subtracted from 12 to show that it was a −2 hopper that started on 12.



Name _____ Date _____

4. A +3 hopper starts on 2.

Number of Hops	Hop Size	Lands On	Number Sentence
1	3	5	$2 + 3 \times 1 = 5$
2	3		
3	3		
4	3		
5	3		

5. A –2 hopper starts on 12.

Number of Hops	Hop Size	Lands On	Number Sentence
1	– 2	10	$12 - 1 \times 2 = 10$
2	– 2		
3	– 2		
4	– 2		
5	– 2		

6. Describe any patterns you see in the rows and columns in the tables in Questions 1–3.

7. How are the number sentences in Question 1–3 different from those in Questions 4–5?

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