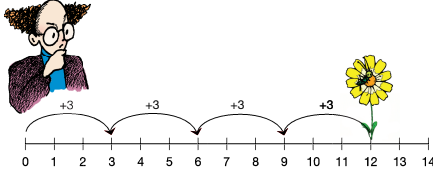## Constant Hoppers

Discuss

Constant hoppers are special math hoppers. They hop the same distance on every hop.

Professor Peabody studied the behavior of constant hoppers and found several kinds. One is the +3 (plus three) hopper. The +3 hopper always hops 3 units to the right on the number line. Professor Peabody saw a +3 hopper start at 0 and hop four times. Where did it land?

3 + 3 + 3 + 3 = 12 is an addition sentence that describes its trip.
$4 \times 3 = 12$ is a multiplication sentence that describes its trip.

1. **A.** A +2 hopper started at 0 and hopped 4 times. It landed on 8. Write an addition sentence that describe its trip.
   B. Write a multiplication sentence that describes its trip.
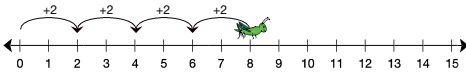
2. **A.** A +5 hopper started at 0 and hopped 3 times. Use your desk number line to show where it will land.
   B. Write an addition sentence that describes its trip.
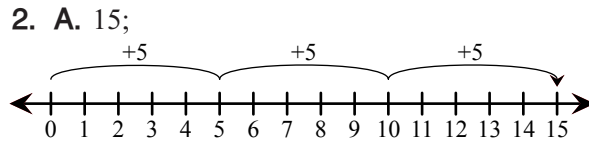   **C.** Write a multiplication sentence that describes its trip.

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Explore

Use your desk number line to solve the following problems.

3. **A.** A +10 hopper started at 0 and hopped 3 times. Where did it land?
   B. Write an addition number sentence that shows the hops.
   C. Write a multiplication number sentence that shows the hops.

4. **A.** A +4 hopper started at 0 and hopped 5 times. Where did it land?
   B. Write an addition number sentence the shows the hops.
   C. Write a multiplication number sentence that shows the hops.

5. **A.** A +2 hopper starts at 0. How many hops will it take to reach 10?
   B. A +10 hopper starts at 0. How many hops will it take to reach 60?
   C. A +6 hopper starts at 0. How many hops will it take to reach 30?
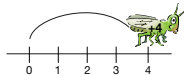
6. **A.** A +4 hopper started at 0. It hopped until it reached 24. How many hops did it make?
   B. A +2 hopper started at 0. It hopped until it reached 14. How many hops did it make?
   C. A +8 hopper started at 0. It hopped until it reached 40. How many hops did it make?
   D. Write a number sentence to show the hops for 6C.

7. **A.** A constant hopper started at 0 and hopped 4 times. It ended up at 20. How big were its hops?
   B. A constant hopper started at 0 and hopped 4 times. It landed on 40. How big were its hops?
   C. Compare the length of the hops in Question 7A with the length of the hops in Question 7B. What do you notice about the length of the hops?

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Questions 1–10

1. **A.** $2 + 2 + 2 + 2 = 8$
   B. $4 \times 2 = 8$

2. **A.** 15;

   B. $5 + 5 + 5 = 15$
   C. $3 \times 5 = 15$

3. **A.** 30
   B. $10 + 10 + 10 = 30$
   C. $3 \times 10 = 30$

4. **A.** 20
   B. $4 + 4 + 4 + 4 + 4 = 20$
   C. $5 \times 4 = 20$

5. **A.** 5 hops
   B. 6 hops
   C. 5 hops

6. **A.** 6 hops
   B. 7 hops
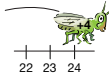   **C.** 5 hops
   D. $5 \times 8 = 40$ or $8 + 8 + 8 + 8 + 8 = 40$

7. **A.*** Every hop was 5 units.
   B.* 10 units
   C.* The +10 hopper hops twice as far as the +5 hopper.

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

8. **A.** $3 + 3 + 3 + 3 + 3 = 15$

   B. $3 \times 5 = 15$

   C. Possible response: Both number sentences show that the size of each hop is 3 units. Both show that the hopper hopped 5 times. Both also show that the hopper ended on 15.

9. **A.** a +5 hopper

   B. $5 \times 5 = 25$ or $5 + 5 + 5 + 5 + 5 = 25$

   C. 30

10. **A.** Possible response: Natasha is correct. The hopper moves +6 each time. After 3 hops it is on 18, so one more hop will be $18 + 6 = 24$.
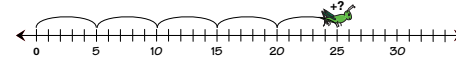
    B. $4 \times 6 = 24$ or $6 + 6 + 6 + 6 = 24$

✓ **Check-In: Questions 8–10**

8. Levi's number line shows the hops for the +3 hopper.

   A. Write an addition number sentence to show the hops.
   B. Write a multiplication number sentence to show hops.
   C. Show or tell how the number sentences in Questions A and B are similar.

9. Mara's number line shows that a constant hopper made 5 hops before it landed on 25.

   A. What kind of constant hopper did Mara use?
   B. Write a number sentence to show the hops on Mara's number line.
   C. If Mara's constant hopper makes one more hop on the number line where will it land?

10. Jason's number line shows where a +6 hopper will land in 3 hops. Jason said the next number his hopper will land on will be 26. Natasha said it will land on 24.
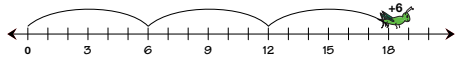
    A. Decide who is correct. Show or tell how you decided.
    B. Write a number sentence to show where a +6 hopper will land after 4 hops.

Use the *Professor Peabody's Constant Hoppers* Homework page in the *Student Activity Book* for more practice with constant hoppers.

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