# **Division Discussion Guide (for use during or after reading)**

1. Use your own words to describe and define division. (What Is Division?, p. 4-5)
   1. Division is represented by the ÷ symbol and can be used to split numbers into equal sized groups. Division is the same as repeated subtraction, just more efficient. Division can also be thought of as the opposite of multiplication.
2. Consider the story situation on pages 6 and 7. How can both division and multiplication be used to show 3 groups of 3? (Three’s Company, p. 6-7)
   1. Both division and multiplication can be used to represent the same grouping story situation. For example, 3 x 3 = 9 represents three groups each containing 3 shells for a total of 9 shells. On the other hand, 9 ÷ 3 = 3 can represent the same situation: 9 shells shared by 3 friends provided 3 shells for each friend.
3. Look at the strategy used on pages 8-12. Why was skip counting by twos a helpful strategy for dividing 12 by 4? (In the Bag, p. 8-12)
   1. The characters did not know the quotient of 12 ÷ 4, so they decided to partition the soccer balls into 4 bags visually. Instead of dividing them one at a time, they decided to be more efficient by placing two soccer balls in each bag to start. They skip counted by twos to see that they placed 8 soccer balls in bags and have 4 remaining. Next, they placed the 4 soccer balls into the bags and saw that each bag contained 3 soccer balls. Skip counting by 2 made the process of dividing the soccer balls into bags more efficient.
4. How can repeated addition or repeated subtraction be used to solve a division problem like 15 ÷ 5? (Rocks in Boxes, p. 12-15)
   1. To solve the problem 15 ÷ 5 with repeated addition, we can rethink the problem as 5 x ? = 15. We can use repeated addition and skip count by 5s: 5, 10, 15. Three 5s makes 15, so 15 ÷ 5 = 3.
   2. We can solve this problem using repeated subtraction as well. Instead of counting up by 5, we’ll count back from 15 by 5: 10, 5, 0. There are three 5s in 15, so 15 ÷ 5 = 3.
5. Explain how a number line can be used to show a division problem, such as 18 ÷ 3. (Walking Around, p. 16-17)
   1. A number line can be used to show division, just like it can show multiplication! For example, to divide 18 by 3 on a number line, we can start at 18 and jump back groups of 3 until we reach 0. This is known as the skip counting back strategy or as repeated subtraction. 18 ÷ 3 = 6.
6. We know multiplication is the same as repeated addition. Explain why division can be considered repeated subtraction. (Rocks in Boxes, Walking Around, p. 12-17)
   1. Multiplication and division are opposite operations, just as addition and subtraction are. If multiplication is the same as repeated addition, then the opposite is true, too: Division is the same as repeated subtraction. In addition, we can think about division as repeated subtraction because we are taking away (subtracting) the same amount from a total over and over (repeatedly).
7. Consider the story situation and strategy described on pages 18-21. Why did the characters decide to split 28 in half even though they originally wanted to divide by 4, not 2? (Camping Out, p. 18-21)
   1. In order to divide 28 by 4 mentally, the characters used what they knew about halving, a strategy that is the opposite of doubling. In order to find 28 ÷ 4, the characters first found 28 ÷ 2, and then divided that quotient by 2 once more. Half of 28 is 14, and half of 14 is 7, so 28 ÷ 4 = 7. We can check out work with multiplication by doubling: 7 x 2 = 14, and 14 x 2 = 28.
8. How could you use the halving strategy to solve 20 ÷ 4? (Camping Out, p. 18-21)
   1. One way to solve the problem 20 ÷ 4 is to use a halving strategy. First, we can split 20 in half to get 10. This shows 20 ÷ 2. We must then divide that quotient in half once more to find the final quotient of 20 ÷ 4. Half of 10 is 5, so 20 ÷ 4 = 5.
9. Describe the relationship between division and multiplication. (Division in the Wild, p. 22-27)
   1. Division and multiplication can be seen as opposite operations. We use division to split a total and create equal groups, whereas we use multiplication to combine equal groups to find a total. We can use multiplication to double check our division work and vice versa!
10. Why is the answer considered “undefined” when we try to divide by zero? (Who’s Who: Brahmagupta, p. 32-33)
    1. We cannot actually divide anything by zero. Division represents splitting things into groups. If we try to divide by zero, we are really splitting things into no groups – that does not work! In addition, division is the opposite of multiplication. If we were to try to divide 10 by 0, we could ask ourselves 0 x ? = 10, but nothing will make that number sentence true. Because we cannot divide by zero, we say the answer is “undefined.”