# **Operations with Whole Numbers Comprehension Check**

For questions 1 and 2, consider the function table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Input | 6 | 7 | 10 | 12 |  |
| Output | 12 | 14 | 20 |  | 30 |

1. What rule best represents this function table? Describe how you found your answer.
2. Use your function rule from question 1 to complete the remainder of the function table.
   1. Input = 12, output =
   2. Output = 30, input =
3. In math, what is a function? What are inputs and outputs?
4. Describe how to compare two expressions such as “twenty-four split into 3 groups” and “2 fewer than eleven.”
5. How are estimation and rounding related?
6. What are bases and exponents? Explain how to find the value of 53.
7. Use number sense strategies to solve divide 28,000 by 70. Explain your thinking.
8. What are powers of ten? Find the first five powers of ten and describe any patterns you notice.
9. What is mental math? Why is it important to develop mental math thinking skills?
10. What is reasonableness in the area of mathematics? Why is it important for mathematicians to consider reasonableness when solving problems?

# **Operations with Whole Numbers Comprehension Check Answer Key**

For questions 1 and 2, consider the function table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Input | 6 | 7 | 10 | 12 |  |
| Output | 12 | 14 | 20 |  | 30 |

1. What rule best represents this function table? Describe how you found your answer.
   1. The rule “multiply by two” best represents this table. Each of the completed input and output entries show this relationship. For example, 6 x 2 = 12, 7 x 2 = 14, and 10 x 2 = 20.
2. Use your function rule from question 1 to complete the remainder of the function table.
   1. Input = 12, output = 24 because 12 x 2 = 24.
   2. Output = 30, input = 15 because 15 x 2 = 30, or because 30 ÷ 2 = 15.
3. In math, what is a function? What are inputs and outputs?
   1. In math, a function is a relationship between two groups of numbers, called the input and the output. Each input has exactly one output. Functions are dictated by function rules and include a second number as well as at least one operation. For example, a function rule may state “subtract 2,” meaning we would need to subtract 2 from the input to find the output.
4. Describe how to compare two expressions such as “twenty-four split into 3 groups” and “2 fewer than eleven.”
   1. In order to compare two expressions, we must first find the value of each expression separately. For example, “twenty-four split into 3 groups” can be thought of as 24 ÷ 3, or 8. “2 fewer than eleven” can be thought of as 11 – 2, or 9. Now that we have simplified the expressions, we can compare their values. Because 8 < 9, we can say “twenty-four split into 3 groups is less than 2 fewer than 11.”
5. How are estimation and rounding related?
   1. Both estimation and rounding can be used to find approximate amounts and answers. When estimating a solution to a problem, it can be helpful to first round the digits you are working with to create a simpler problem that is easier to solve. For example, in order to estimate the product of 11 and 29, we could round both factors to 10 and 30, a problem that is easier to solve mentally. Because 10 x 30 = 300, we can estimate the product of 11 and 29 to be close to 300. (The actual product of 11 and 29 is 319, which is relatively close to the estimate.)
6. What are bases and exponents? Explain how to find the value of 53.
   1. Bases and exponents work together to represent repeated multiplication. A base is the bottom number, and an exponent is written in small superscript. In this example, the base is 5 and the exponent is 3. To find the value of 53, we can rewrite it as 5 x 5 x 5. We can solve this to get a final solution of 125. 53 = 125.
7. Use number sense strategies to solve divide 28,000 by 70. Explain your thinking.
   1. Students’ solutions will vary, however, they will likely highlight number sense ideas and strategies related to diving by powers of ten.
   2. One possible solution strategy would be to notice that we can remove a zero from each number to get a simpler problem of 2,800 divided by 7. Because we know 28 divided by 7 is 4, we can use what we know about zeros, multiplication, and division to determine that 2,800 divided by 7 is 400. We can use reasoning to state 28,000 divided by 70 is 400.
8. What are powers of ten? Find the first five powers of ten and describe any patterns you notice.
   1. Powers of ten refer to any exponent with 10 as a base. The exponent tells the number of zeros to include when writing the value in standard form.
   2. 101 = 10, 102 = 100, 103 = 1,000, 104 = 10,000, 105 = 100,000
   3. Students will likely note patterns in the growing number of zeros, the jump in place value, and that the exponent matches the number of zeros used in standard form.
9. What is mental math? Why is it important to develop mental math thinking skills?
   1. Mental math is math you can do in your head, often without the aid of pencils, paper, or calculators. It is important to be able to do mental math, especially with the four main operations, because we use numbers frequently in our everyday lives. In addition, knowing how to think about numbers mentally supports our number sense and flexible thinking skills that will benefit us as we encounter more complex math.
10. What is reasonableness in the area of mathematics? Why is it important for mathematicians to consider reasonableness when solving problems?
    1. Reasonableness refers to the idea that our mathematical answers make sense and are reasonable. It is important to consider reasonableness because if our answers are not reasonable, then we know we must try the problem again or approach it in a new way. Reasonableness not only includes considering the context of the problem at hand, but also whether the answer makes mathematical and logical sense. For example, although we may not have the product of 13 and 7 memorized, but we can say that 10,000 is not a reasonable product. In addition, we can extend our thinking to say that a reasonable product would be about 84 because 12 x 7 is 84 and 13 x 7 must be slightly more than that.