02 - Numbers - Notes

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This set of notes is part of a series of Numerical Reasoning Test (NRT) preparation resources which you can find at www.numericalreasoningtestsuccess.com.

These resources are organised into a number of different topics. For each topic, there is a set of notes (such as this one) and a question pack.

Each set of notes explains a set of skills, with example questions for each one. Within the question pack for the same topic, you can find practice questions (with answers) for each of these skills.

I advise that you work through the sets of notes in order. Within each set of notes, start by reading the explanation of the first skill. Then go to that skill in the question pack and complete the practice questions. Only once you have mastered a skill should you move onto the next one. And only once you have mastered all the skills in a set of notes should you move on to the next set of notes. This approach is called *mastery learning*.

If you find any errors in this document (including mathematical errors, typos or any other mistakes), please let me know at contact@numericalreasoningtestsuccess.com.

Round a given number to a given number of decimal places.

Examples

1) Round 457.684 to 2 dp.

2) Round 57.375 to 1 dp.

3) Round 3.496 to 2 dp.

Notes

Decimal places (dp) are the digits after the decimal point. For example, in the number 26.742, the first decimal place is 7, the second decimal place is 4 and the third decimal place is 2.

To round a number to a particular number of decimal places, we first go to that decimal place and see what number is there. So, in Example 1, we go to the second decimal place and see that it is an 8. Then we go to the next decimal place and see what number is there (4 in this case). If this number is below 5 (i.e. 0-4) then we round down, meaning that we keep the previous digit as it is and cut the number off there. If the number is 5 or more (i.e. 5-9), then we round up, meaning that we increase the previous digit by 1 and cut the number off there. In Example 1, we have a 4, so we round down: we keep the 8 as it is and cut the number off there. This means the answer is 457.68.

In Example 2, we are asked to round to 1 dp, so we start by going to the first decimal place and we see that it is a 3. We then go to the next digit which is a 7. Since this is in the range 5-9, we round up: we increase the 3 to a 4 and cut the number off there. This means the answer is 57.4.

In Example 3, we start by looking at the second decimal place, which is a 9. We then look at the next decimal place which is a 6, meaning that we have to round up. However, when we increase 9 by 1 we get 10, which is a 2-digit number. This means that we have to increase the digit before the 9 by 1 and replace the 9 with a 0. In this example, the digit before the 9 is a 4 so we increase it to a 5. Once we have replaced the 9 with a 0, we cut the number off there. This means the answer is 3.50. Note that we have to write the 0 in order for the answer to be correct, because otherwise our answer will not be to 2dp.

Round a given number to a given number of significant figures.

Examples

1) Round 3.4049 to 3 sf.

2) Round 0.0030752 to 3 sf.

3) Round 4.96 to 2 sf.

4) Round 5873 to 2 sf.

Notes

Some numbers start with a zero followed by a decimal point and then more zeros. For example:

- 0.00000378293.
- 0.004805487
- 0.0000000000000700483

For numbers like this, rounding to a certain number of decimal places does not always produce a useful answer. For example, if we round each of the numbers above to 2 dp they all become 0.00, which is not very helpful since they are actually all very different to each other. It is because of this problem that people sometimes use significant figures instead of decimal places when rounding.

The rule for deciding which digits in a number are significant figures is as follows:

- Any zeros at the start of the number are not significant figures.
- The first digit that is not zero and all of the digits after it (even if they are zeros) are significant figures.

For example, consider the number 0.0000000000000700483. It starts with fourteen zeros. These are not significant figures. Then there is a 7. The 7 and **all** of the digits after it -

including the two zeros - are significant figures. Therefore, the significant figures are the ones shown in bold here: 0.0000000000000**700483**. Also, although we would not usually write them, there are also an infinite number of zeros at the end of the number. These are also significant figures: 0.0000000000000**70048300000000000...**.

To round a number to a particular number of significant figures we follow the same steps we use to round to a particular number of decimal places, just using significant figures instead of decimal places.

We can now solve the example questions:

1) Round 3.4049 to 3 sf

   The first 3 significant figures are: 3.40. Since the next digit is a 4, we round down. So the answer is 3.40.

2) Round 0.0030752 to 3 sf

   The three zeros at the start are not significant figures. The first 3 significant figures are 307. Since the next digit is a 5 we round up. So the answer is 0.00308.

3) Round 4.96 to 2 sf

   The first 2 significant figures are 4.9. Since the next digit is a 6, we round up. The 9 becomes a 10, so we have to increase the 4 to a 5 and change the 9 to a zero. So the answer is 5.0 (remember, we have to write the 0 or the answer won't be to 2 sf).

4) Round 5873 to 2 sf

   The first 2 significant figures are 58. The next digit is a 7, so we round up. However, we cannot just write 59 as the answer. The 5 in 5873 represents 5000, whereas the 5 in 59 represents 50. Therefore, we have to add zeros to take us up to the decimal point. This ensures that place value is maintained. The answer is therefore 5900. We have to add in zeros like this when we are working to the left of the decimal point.

Calculate the difference between two numbers.

Examples

1) Calculate the difference between 3.47 and 0.68.

2) What is the difference between -53 and 42?

3) Find the difference between -6.67 and -4.32.

Notes
To find the difference between two numbers, we start by identifying which number is more positive and which is more negative.

To do this, imagine a number line (or draw one out on paper) and ask which number is closer to the positive end (positive infinity) and which is closer to the negative end (negative infinity). The number closer to the positive end is the more positive number and the number closer to the negative end is the more negative number.

If both numbers are positive, then the more positive number is just the bigger number and the more negative number is just the smaller number. So, in Example 1, we would identify that 3.47 is the bigger number and 0.68 is the smaller number (which means that 3.47 is more positive and 0.68 is more negative).

If at least one of the numbers is negative, then the concepts of bigger and smaller become ambiguous. For example, which is bigger: -8 or 3? Some people would say -8 is bigger, others would say 3. To avoid this confusion, we instead ask which is more positive and which is more negative.

In Example 2, the more positive number is 42 and the more negative number is -53.

In Example 3, the more positive number is -4.32 and the more negative number is -6.67.

Once we have identified which number is more positive and which is more negative, we are ready to calculate the difference. To do this, we start with the more positive number and subtract the more negative number.

In Example 1, we would type 3.47 - 0.68 into the calculator and press =, which gives 2.79.

In Example 2, we need to do the following calculation: 42 - -53. We could type this into the calculator and press = to get the answer, which is 95. However, subtracting -53 is the same as adding 53, so we could save a tiny bit of time by just typing in 42 + 53 and pressing =. Either option is perfectly fine.

In Example 3, we would either type -4.32 - -6.67 or -4.32 + 6.67 into the calculator and press =, which gives 2.35.

Note that the difference between two numbers is always positive (even if one or both of the numbers is negative). Therefore, if you get a negative answer then you must have made a mistake. It could be that you used the two numbers the wrong way round. If this is the case, then the correct answer is simply the answer you got but without the negative sign.

For example, if you were doing Example 1 and you accidentally did 0.68 - 3.47 instead of 3.47 - 0.68, then you would get -2.79. If you then realised that you had used the two numbers the wrong way round, you would know that the correct answer is 2.79.

Given the amount of some resource available, and the amount of resource needed to obtain one item, find the number of items that can be obtained.

Examples

1) The cost of one Biology textbook is £17.99. The Biology department of a school has £2500 to spend on textbooks. How many textbooks can the Biology department purchase?

2) Jerry is inviting some friends round for dinner. He has 1000g of pasta. He wants to cook 90g per person. How many people can Jerry make pasta for?

Notes

For this type of question, we have to divide the amount of resource available by the amount of resource needed to obtain one item. This gives us the number of items that can be obtained.

However, this may give an answer which is not a whole number, and often it is only possible to have a whole number of the item. For example, if we were doing a question where we had to work out how many cars can be purchased and we got an answer of 14.7, this cannot be the final answer because it is not possible to have 0.7 of a car. Therefore, we have to ask ourselves what is the largest whole number of items that can be obtained. In this case, 14 whole cars can be purchased so the answer is 14.

Note that we do not round the answer, we simply find the largest whole number that can be obtained (in other words, we just drop everything after the decimal point). So, in the cars example, we do not round 14.7 to the nearest whole number. If we did, it would give 15, which is not a valid answer because there is not enough money to purchase 15 cars.

In Example 1, we do 2500 ÷ 17.99 which gives 138.9660923. Therefore, 138 textbooks can be purchased.

In Example 2, we do 1000 ÷ 90 which gives 11.11111111. Therefore, Jerry can make pasta for 11 people.