[MATHS PROBLEM]

SIGNIFICANT FIGURES

Students are often confused about how to round a number to a specified number of significant figures

In this lesson, students connect significant figures to other ways of rounding.

THE DIFFICULTY

*Fill in the missing numbers in the table below. Students may be confused about what 'significant figures' means, and may round to 1, 2 and 3 **decimal places** instead. Or they may be confused about whether to count zeroes or* not, so they might think that 30.5449 to 2 significant figures is 30.5. Or they may use incorrect 'successive' rounding when working out 30.5449 to 4 significant figures, rounding 30.5449 first to 30.545 and then rounding **this rounded value** to 30.55. **The correct answers are in** red.

	Rounded to...			
Number	1 significant figure	2 significant figures	3 significant figures	4 significant figures
30.5449	30	31	30.5	30.54
0.030 544 9	0.03	0.031	0.0305	0.030 54
3054.49	3000	3100	3050	3054

THE SOLUTION

*For each of these numbers, say which column **the most significant digit** is in.*

30.5449   0.030 544 9   3054.49   5.3449   0.53994   534.99

This could be a quickfire activity, with flashcards and mini-whiteboards. Each time, all students need do is identify the column (ones, tens, tenths, thousandths, etc.) containing the digit worth the most.

It will always be the first non-zero column from the left. Students might incorrectly think that it is the **largest digit** – e.g., the 9 in 30.5449, even though this is actually worth the least.

To round to **1 significant figure**, we round to **this** column. So, to round 30.5449 to 1 significant figure, we round to the nearest 10. To round 0.0305449 to 1 significant figure, we round to the nearest 0.01. To round 3054.49 to 1 significant figure, we round to the nearest 1000.

Write down 10 more statements like these, making the numbers as varied as you can.

Students can be allowed to abbreviate their sentences to avoid repetition, or you can just ask them to list the two numbers for each statement. Alternatively, a printable sheet is available at bit.ly/ts121-mp1.

Now look at what happens for **2 significant figures**. To round 30.5449 to 2 significant figures, we round to the nearest 1. To round 0.0305449 to 2 significant figures, we round to the nearest 0.001. To round

3054.49 to 2 significant figures, we round to the nearest 100.

Students might need reminding that 'rounding to the nearest 0.1' or 'rounding to the nearest tenth' is the same as 'rounding to 1 decimal place'. *Write 10 more statements like these, again varying the numbers and using several different numbers of significant figures.*

Now complete the table below. The answers are included here in red – a blank table can be found in the task sheet.

Number	number of significant figures	...means that we round to the nearest...	...which gives this answer:
2160.32	1	1000	2000
962.34	3	1	962
48 647.5	1	10 000	50 000
92.1944	2	1	92
87.3759	3	0.1	87.4
6756.86	3	10	6760
43.2221	3	0.1	43.2
66.7856	4	0.01	66.79
247 406	4	100	247 400
802 571	3	1000	803 000

In this table, we have the number 247 406. Why would it be a problem If we change that number to 247 401?

This may be hard for students to answer, but the transformation 247 406 → 247 400 must be rounding to the nearest 100. However, 247 401 → 247 400 could be rounding to the nearest 100 **or** the nearest 10, leaving two possible answers.

Checking for understanding

To assess students' understanding, ask them to create a table like this for their partner, swap, complete, and then swap back and check.

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