Lesson Plan: Rounding Decimals

Level: Stage 4

Syllabus link: MA4-5NA "operates with fractions, decimals and percentages"

LESSON OUTLINE

During the first part of the lesson, students will be taught how to round decimals using our step-by-step guide. They will be provided with selected examples to illustrate the process of how to round to a specified number of decimal places.

In the second portion of the lesson, students will download and use real data from the SWAQ stations to practice their new skills of rounding decimals.

Resources/Materials:

- Worksheet (included)
- Laptop/device with internet access
- Workbooks

Description of activity:

Before beginning this activity, students should be familiar with the concepts of place value and decimals. They should also have had some experience rounding numbers to the nearest whole number.

Introduce the idea that sometimes, we want to be able to simplify a number by writing it with less decimal places than it originally contains. To do this, we need to follow some basic rules for rounding decimals.

To teach this concept, we will be using the following step-by-step method.

HOW TO ROUND DECIMALS – STEP by STEP GUIDE

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question.

Step 2: Look at the first number after the line you have drawn.

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5).

Step 4: If the number is less than 5, round down. If the number is greater than or equal to 5, round up.

Ask your students to copy the steps into their notebooks. You will then use the following examples to illustrate the process.

<u>Example 1 – Rounding down</u>

Q: Round 7.31 to one decimal place.

Use these examples to illustrate the step-by-step method. In this example, the students will see what happens when the number after the line is less than 5 and we round down. Make sure to explicitly outline what happens at each step, as follows.

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question, in this example, one.

7.3|1

Step 2: Look at the first number after the line you have drawn. In this case, it is the number 1.

7.3|<mark>1</mark>

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5). In this case, the number 1 is less than 5.

1 < 5

Step 4: Since 1 is less than 5, we will round down. This means that we remove all the decimal places after the line and keep everything before the line, without changing any numbers.

7.3|1 → round down → 7.3

<u>Example 2 – Rounding up</u>

Q: Round 0.5468 to two decimal places.

In this example, the students will see what happens when the number after the line is greater than 5, and we round up. Make sure to explicitly outline what happens at each step, as follows.

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question, in this example, two.

0.54|68

Step 2: Look at the first number after the line you have drawn. In this case, it is the number 6.

0.54|<mark>6</mark>8

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5). In this case, the number 6 is greater than 5.

6 ≥ 5

Step 4: Since 6 is greater than or equal to 5, we will round up. This means that we remove all the decimal places after the line and we increase the number before the line, in this example the number 4, by one.

0.54|68 → round up → 0.55

Example 3 – Rounding up with a 5

Q: Round 708.1592 to one decimal place.

In this example, the students will see what happens when the number after the line is equal to 5, and we round up. Make sure to explicitly outline what happens at each step, as follows.

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question, in this example, one.

708.1|592

Step 2: Look at the first number after the line you have drawn. In this case, it is the number 5.

708.1|592

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5). In this case, the number 5 is greater than or equal to 5.

5 ≥ 5

Step 4: Since 5 is greater than or equal to 5, we will round up. This means that we remove all the decimal places after the line and we increase the number before the line, in this example the number 1, by one.

708.1|592 → round up → 708.2

Example 4 – Rounding up with a 9

Q: Round 3.97 to one decimal place.

In this example, the students will see what happens when the number before the line is a 9, and we need to round this number up. A common mistake is that students forget to include a zero after rounding, so be sure to emphasise that the answer should have the same number of decimal places as asked for in the question. Make sure to explicitly outline what happens at each step, as follows.

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question, in this example, one.

3.9|7

Step 2: Look at the first number after the line you have drawn. In this case, it is the number 7.

3.9|7

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5). In this case, the number 7 is greater than or equal to 5.

7 ≥ 5

Step 4: Since 7 is greater than or equal to 5, we will round up. This means that we remove all the decimal places after the line and we increase the number before the line, in this example the number 9, by one. However, increasing 9 by one makes 10, a two-digit number. So we increase the number before 9 by one and write a zero at the end.

3.9|7 → round up → 4.0

After completing the examples as a class, give the students the worksheet to complete for practice. They will need a device with internet connection in order to access the data, and they should do their working out in their workbooks. At this point, you should walk around the classroom to check that all students have understood the work and answer any questions they may have. If you have not yet used any climate data from SWAQ, this would also be a good opportunity to quickly discuss what measurements such as humidity and air quality are.

Extension:

Related to rounding decimals is the syllabus link, "investigate terminating and recurring decimals (ACMNA184)". As part of this investigation, students should recognise that calculators may show approximations to recurring decimals. The SWAQ data is an example of this. For the air quality measures PM2.5 and PM10, there are recurring decimals that have been approximated. For example, 2/3 is displayed as 0.666666667. You can ask your students to try to identify which decimals may be approximations of recurring decimals, and to think about why they have been written with an approximation in excel (there would not be enough space in the cell to write the never-ending decimal!).

Things to note:

Because you will be using real, up-to-date data from the SWAQ stations, there is no way to know exactly what the numbers will show. Most of the recordings for PM2.5 and PM10 have several decimal places, however there may be instances where the numbers are already written with less decimal places than asked for in the question. Students may skip past these values.

Key Questions To Ask

How do we know whether to round up or down?

For what numbers will I round down? For what numbers will I round up?

What does it mean to round down?

What does it mean to round up?

If I want to round a number to two decimal places, which decimal should I be looking at to make my decision?

If I want to round a number to one decimal place, does the value of the third decimal matter?

What happens if the number I want to round up is a 9?

Why is useful to round decimals instead of just using the entire number?

Rounding Decimals

Instructions:

1. Go to www.swaq.org.au and click "explore the data"
2. Scroll down and click on the name of your school, or if your school does not have a SWAQ station, you can click on any school.
3. Scroll to the bottom of the page and click on the button to "download data"
4. Save the excel file to your computer. This file contains the weather data collected from your school's SWAQ station over the past week. You will be using this data to answer the following questions.

HOW TO ROUND DECIMALS – STEP by STEP GUIDE

Step 1: Count the decimal places and draw a line after the number of decimal places you have been asked for in the question.

Step 2: Look at the first number after the line you have drawn.

Step 3: Check whether this number is less than 5 (<5), or greater than or equal to 5 (≥5).

Step 4: If the number is less than 5, round down. If the number is greater than or equal to 5, round up.

EXAMPLE – Rounding down

Q: Round 5.62 to one decimal place.

Step 1: Count one decimal place and draw a line after that number.

5.6|2

Step 2: Look at the first number after the line, in this example, the number 2.

5.6|2

Step 3: Since the number 2 is less than 5, we will round down. This means that we remove all the decimal places after the line and keep everything before the line, without changing any numbers.

5.6|2 → round down → 5.6

EXAMPLE – Rounding up

Q: Round 2.578 to one decimal place.

Step 1: Count one decimal place and draw a line after that number.

2.5|78

Step 2: Look at the first number after the line, in this example, the number 7.

2.5|78

Step 3: Since the number 7 is greater than or equal to 5, we will round up. This means that we remove all the decimal places after the line and we increase the number before the line, in this example the number 5, by one.

2.5|78 → round up → 2.6

Question 1

Look at the second column in the spreadsheet labelled, "Temperature Min (Â°C)". Round these

numbers to the <u>nearest degree</u> (whole number).

Question 2

Look at the column labelled "Humidity Max (%)". Round these numbers to the <u>nearest</u>

<u>percentage</u>.

Question 3

Look at the column labelled "Wind Speed Min (km/h)". Round these numbers to <u>one decimal</u>

<u>place</u>.

Question 4

Look at the column labelled "Wind Speed Max (km/h)". Round these numbers to <u>one decimal</u>

<u>place</u>.

Question 5

Look at the column labelled "PM2.5 Average - 24h (Î¼g/mÂ³)". Where possible, round these

numbers to <u>two decimal places</u>.

Question 6

Look at the column labelled "PM10 Average - 24h (Î¼g/mÂ³)". Where possible, round these

numbers to <u>three decimal places</u>.