

ESTIMATION AND ROUNDING

GENERAL INFORMATION

Background

Estimation is a common mathematical process that many of us use regularly though we may not use the term. Think about cooking, moving furniture or calculating the cost of items. These tasks often require estimation. At school, estimation can help students to make reasonable guesses at solutions to problems and check the validity of calculations.

Australian Curriculum Link(s):

- Use estimation and rounding to check the reasonableness of answers to calculations ([ACMNA099](#))

Year Level(s): 5

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Details:

- Demonstrate an understanding of estimation and how it can be used
- Round numbers appropriately when obtaining estimates to numerical calculations
- Use estimation to check the reasonableness of answers to addition and subtraction calculations, e.g. $1438 + 129$ is about $1440 + 130$

POSSIBLE ACTIVITIES

Getting started

Estimation is about finding an answer to a problem (often quickly) that is “close enough” to the right answer to help us. For example, if we only had \$20 to buy food and we knew that the four items we wanted to buy were each less than \$5 we could quickly estimate (as $4 \times 5 = 20$) that we would have enough money.

Estimation can also help children to check whether their calculations are valid. For example, if we wanted to find 19×5 , we might think that 20×5 is 100, so 19×5 must be less than that. Here we have “rounded” 19 to the nearest ten. This process of rounding numbers can assist with making quick calculations and estimates.

Rounding Numbers

Rounding is a process of changing numbers slightly to make calculations easier to complete mentally. To round numbers we need to begin by thinking about which digit in the number we want to “keep”.

For example, to round the number 74, we might decide we want to round it to the nearest 10. To do this we are “keeping” the 7. Now we look at the other digit the 4. As 4 is less than 5 we round the 74 down to 70.

Round to the nearest 10	
<p style="text-align: center;">32</p> <p style="text-align: center;">Keep the 3 as it's in the tens place As the 2 is less than 5 round down</p> <p style="text-align: center;">32 rounded to the nearest 10 becomes 30</p>	<p style="text-align: center;">86</p> <p style="text-align: center;">Keep the 8 as it's in the tens place As the 6 is more than 5 round up</p> <p style="text-align: center;">86 rounded to the nearest 10 becomes 90</p>

If we wanted to estimate a solution to the problem $32 + 86$ we might use rounding to estimate $30 + 90 = 120$ so if our solution is too far away from this estimate we know we have probably made a calculation error.

What about 5?

As 5 is in the middle we could choose to round up or down. Mathematicians do not like this uncertainty, so it has been decided that 5 is always rounded up. When rounding to the nearest 10 (or a multiple of 10):

- Numbers ending in **0, 1, 2, 3** and **4** are **rounded down**
- Numbers ending in **5, 6, 7, 8** and **9** are **rounded up**

Rounding Decimals

We use a similar process when rounding decimal numbers. Firstly, we need to determine how many digits (after the decimal point) we want to have after we have rounded the number.

- Rounding to **tenths** means to leave one number after the decimal point
- Rounding to **hundredths** means to leave two numbers after the decimal point

Often in maths questions, children will be asked to round a decimal to a given number of decimal places, for example, round 1.365 to two decimal places which will make it 1.37.

Round to the nearest hundredth	
<p>12.367 Keep 12.36 As the 7 is more than 5 round up</p>	<p>1.732 Keep 1.73 As the 2 is more than 5 round down</p>
<p>12.367 rounded to the nearest hundredth becomes 12.37</p>	<p>1.732 rounded to the nearest hundredth becomes 1.73</p>

Questions

- What is estimation?
- Why do we estimate?
- What is an example of when estimation might be used?
- What is rounding?
- How do we round numbers?
- What happens with numbers that end in a 5?

Activities

The following activities may help children to practise their estimation and rounding skills.

- **MathGames** by **TeachMe** have several estimation and rounding activities with different levels of challenge: <https://au.mathgames.com/estimation>
- More estimation and rounding activities can be found on the **Sheppard Software** site: <https://www.sheppardsoftware.com/mathgames/menus/roundestimate.htm>

For further tips to help children with rounding, check out this video by MuchoMath:

<https://www.youtube.com/watch?v=UP7YmXJc7Ik>

FURTHER INFORMATION

Australian Curriculum and Assessment Reporting Authority. (2014). *Foundation to Year 10 curriculum: Mathematics*. Retrieved <https://www.australiancurriculum.edu.au/f-10-curriculum/mathematics/>

NSW Government Education Standards Authority. (2018). *Mathematics K-10: Rationale*. Retrieved from <https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/mathematics/mathematics-k-10/rationale>

Math is Fun. (2017). *Rounding numbers*. Retrieved from <https://www.mathsisfun.com/rounding-numbers.html>

MuchoMath. (2008, June 23). *Rounding numbers* [Video]. YouTube. <https://www.youtube.com/watch?v=UP7YmXJc7Ik>