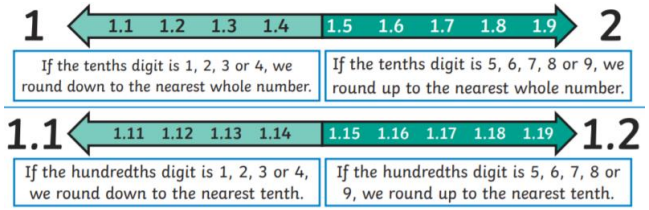
Unit 3 – Estimating and Approximating – Knowledge Organiser

Objectives:
Round numbers to the nearest 10,100,1000 etc. and nearest whole number/integer
Round numbers to any number of decimal places
Round numbers to any number of significant figures
Estimate quantities (numbers&measures) to an appropriate degree of accuracy
Estimate the results of computation
Be aware of rounding errors in the intermediate steps of calculations

Key Facts

Rounding to nearest whole(integer) & 1st decimal place (1dp/tenth):



Rounding to a variety of significant figures:

1. The **first significant number** is the first digit of a number which isn't zero.
2. The **2nd, 3rd, digits** follow immediately after the 1st, regardless of zeros.

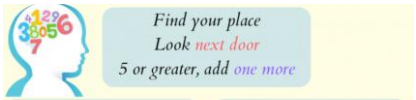
3. When rounding numbers the **place value** of each digit must be the same.

Estimating/Approximating:

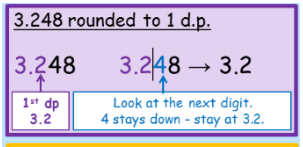
When estimating you are **not guessing** you are making the numbers 'easier' for you to work out the sum.
To estimate a sum, you need to
1. Round each number to **1s.f.**
2. Then calculate the sum using the **hierarchy of operations.**

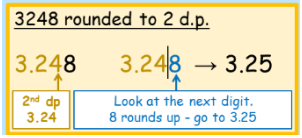
Fluency Examples

Rounding Examples:



Round to the nearest ten	Round to the nearest hundred
54 → 50	415 → 400
55 → 60	950 → 1000
313 → 310	7261 → 7300
549 → 550	7221 → 7200
1221 → 1220	36430 → 36400





EXAMPLES:

	to 3 s.f.	to 2 s.f.	to 1 s.f.
1) 54.7651	54.8	55	50
2) 0.00459O2	0.00459	0.0046	0.005
3) 30895.4	30900	31000	30000

Estimating/Approximating Examples:

Example 1:
Estimate $\frac{29.91 \times 38.3}{3.1 \times 3.9}$

- Round to 1s.f.

$$\frac{30 \times 40}{3 \times 4} = \frac{1200}{12} = 100.$$

Example 2:
Estimate $\frac{23.43 \times 4.3}{0.483}$

- Round to 1s.f.

$$\frac{20 \times 4}{0.5} = \frac{80}{0.5} = 160$$

Key words used in this unit:

Round – simplifying a number to make it less exact (close to it's original value), but more convenient for calculation

Decimal places – any of the places to the right of the decimal point in a number expressed in decimal notation. E.g. 5.732 has three decimal places.

Significant figures – in the number 12068, 1 is the first and most significant figure/digit and 8 is the fifth and least significant figure. In 0.246, the first and most significant figure is 2. Zeros at the beginning of a number are not counted as significant figures.

Approximation – a rough calculation (usually involving rounding) that produces a value that's close to the exact answer to the calculation, but not quite equal to it. The symbol for "approximately equal to" is ≈ .

Estimate/Estimation – is the process of making an educated guess or calculation about a value, quantity, or extent of something, often based on limited information.

Degrees of accuracy - 'Rounding decimals' refers to the rounding of decimal numbers to a specific degree of accuracy. The degrees of accuracy can be e.g. rounding to the nearest wholes, decimals or significant figures.

Key Concept Check

- Sal thinks that 3.999 to 2d.p. is 3.10 because the 9's round up to 10. Is she correct?
- Paul is thinking of a number, and to 2sf it is 3700. What is the highest and lowest possible number he could be thinking of?
- A football stadium wants to do a quick mental estimate of how much money they'll make if they sell tickets at £9.75 each. If the stadium holds 28,940 people what calculation could they do to estimate how much money is made from ticket sales?