Y8 Maths Knowledge Organiser Topic 2: Rounding and estimating

What must I be able to do?	Key vocabulary	
You may need to revise the following: • Year 7 Topic 1: Place value and rounding **New content:** ☐ Round any number to a required number of significant figures ➢ Mathswatch N38 ☐ Use rounding to significant figures to estimate calculations ➢ Mathswatch N34a and N34b ☐ Use a calculation to work out other calculations ➢ Mathswatch (GCSE) 92	**Significant figures**	The digits of a number that carry meaningful contributions to its size. The most significant figure is the first digit which is not a 0 when reading from left to right. This is usually referred to as 1 significant figure or 1 s.f.

Rounding to significant figures

The first significant figure (1.s.f) is the first digit in a number which is not a 0. It is the digit with the most value.

E.g. the 1st s.f. is underlined in each of these numbers:
3456 67 0.403

To round to 1.s.f you need to identify which place value column that digit is in and round to that accuracy

e.g. When rounded to 1 significant figure:

- 3456 becomes 3000 as the 1st s.f. is in the thousands so we round to the nearest thousand.
- 67 becomes 70 as the 1st s.f. is in the tens so we round to the nearest ten.
- 0.403 becomes 0.4 as the 1st s.f. is the tenths so we round to the nearest tenth (the same as to 1.d.p.)

The second significant figure is just the next digit after the first significant figure. This can be a 0.

e.g. When rounded to 2 significant figures:

- 3456 becomes 3500 as the 2nd s.f. (the 4) is in the hundreds so we round to the nearest hundred.
- 67 remains as 67 as the 2nd s.f. (the 7) is in the ones so we round to the nearest integer.
- 0.405 becomes 0.41 as the 2nd s.f. (the 0) is in the hundredths so we round to the nearest hundredth (the same as to 2.d.p).

Use rounding to estimate calculations

This is the same idea as with estimation in Year 7 but you will see more questions involving division by decimals.

e.g. Estimate the following:

a) $\frac{4215 \times 82}{0.487}$

You need to round to a sensible number of significant figures to ensure that you can work out the answer.

In this case, 4215 to 1.s.f. is 4000

82 to 1.s.f is 80 and 0.487 to 1.s.f is 0.5

Therefore our estimation becomes $\frac{4000 \times 80}{0.5}$

$4000 \times 80 = 320000$ so we get $\frac{320000}{0.5} = 640000$

Dividing by $\frac{1}{2}$ is the same as multiplying by 2 (Year 7 Unit 7)

While 1.s.f. is often good enough, it won't always work.

e.g Estimate $\sqrt{321 \times 18}$

$= \sqrt{320 \times 20} = \sqrt{6400} = 80$

Here we choose 2.s.f for 321 as this allows us to aim for the square number 6400 (64 x 100 - both are square numbers). It would not have worked with 321 to 1.s.f. as 300 x 20 is 6000 and 60 is not square.

Using a calculation to find others

You will be given a calculation with the answer and need to use this to write the answer to other calculations. The idea is to do it without needing to fully work out the answer from scratch.

These questions nearly always involve the original values being multiplied or divided by powers of 10.

e.g. Given that $85 \times 2843 = 241655$ write down the answer to

a) 85×28.43

Look for what has changed and how it has changed

28.43 is $2843 \div 100$

So this is $85 \times 2843 \div 100 = 241655 \div 100$

$= 2416.55$

b) 850×284.3

850 is 85 x 10 and 284.3 is $2843 \div 10$

So this is $85 \times 2843 \times 10 \div 10 = 241655 \times 10 \div 10$

$= 241655$