# MATHEMATICS
SUPPORT CENTRE

Title: Decimal Places & Significant Figures

Target: On completion of this worksheet you should be able write any number to a given number of significant figures or decimal places.

Suppose the number of students on a course is 378. If we want to know the number of students to the nearest 10 then

378 → 370 lowest it could be
378 → 380 highest it could be
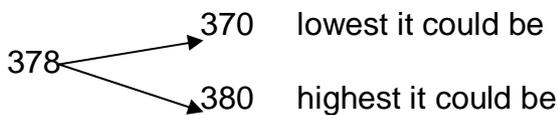
and 378 is closer to 380 than 370 so
378 = 380 correct to the nearest 10

Consider 42449. To find this to the nearest 100

42449 → 42400 lowest
42449 → 42500 highest

42449 is closer to 42400 so
42449 = 42400 correct to the nearest 100

If we want to correct 1250 to the nearest 100 then the lowest it could be is 1200 and the highest is 1300 but 1250 is exactly halfway between these. The convention is to take the higher figure so
1250 = 1300 correct to the nearest 100

Note the following:

37≥ ← more than 5 so go up

424↓9 ← less than 5 so no change

12°0 ← 5 so go up

Examples

1. Give 719 correct to the nearest 10

We look at the figure after the tens (ie the unit column) and see if it is 5 or more. It is 9 so the number goes up and the answer is 720.

2. Give 719 correct to the nearest 100

This time we look at the figure after the hundreds and see if it is 5 or more. It isn't so the number stays the same and the answer is 700.

3. Give 407592 correct to the nearest 1000

The figure after the thousands is 5 so the convention is for the number to go up. The answer is 408000.

4. Give 32196 correct to the nearest 10

The figure after the tens is more than 5 so the number goes up. The answer is 32200.

Exercise

Correct the following to the given accuracy:
1. 346 to nearest 10
2. 1204 to nearest 10
3. 53179 to nearest 100
4. 103467 to nearest 1000
5. 940979 to nearest 100

(Answers: 350, 1200, 53200, 103000, 941000)

Suppose £235 is to be divided equally between three people:

£235 ÷ 3 = £78·3333…

Each will receive £78·33 to the nearest penny. This is also the answer correct to 2 decimal places as there are 2 figures after the decimal point.

If you use your calculator to work out 55 ÷ 7 = 7·85714….. there are numbers right across the display on your calculator. Generally we do not require all these figures so we can write the answer to a given number of decimal places:

We use the following rules:

- Decide how many decimals places you want
- Consider the next figure to the right
- If it is less than 5 write the answer to the required number of decimal places without changing any digits
- If it is 5 or more then add 1 to the to the last digit you want

The above correct to 3 decimal places is 7·857 and to 2 decimal places is 7·86

Examples

1. 3·3437 = 3.34 correct to 2 decimal places (usually abbreviated to dp)
2. 601·1872 = 601·2 correct to 1 dp
3. 42·3961 = 42·40 correct to 2 dp
   Notice that the 0 is written in as the answer is to 2 decimal places so we must have 2 digits after the decimal point.
4. 6·99972 = 7·000 correct to 3 dp
5. 0·00134 = 0·001 correct to 3 dp

Exercise
Write the following to the given number of decimal places:

1. 34·1206 (3)	2. 5·5409 (2)
3. 21·0045 (2)	4. 156·461 (1)
5. 3·2396 (3)	6. 0·000329 (4)
7. 7·0019 (2)	8. 41·6996 (3)
9. 0·99639 (2)	10. 2·5053 (3)

(Answers: 34·121, 5·54, 21·00, 156·5, 3·240, 0·0003, 7·00, 41·700, 1·00, 2·505)

If 0·00000562 is corrected to 4 decimal places then the answer is 0·0000 which is not much use so we use **significant figures** instead.

The most significant figure in any number is the first non-zero so in the above example the most significant figure is **5**

Similarly, the most significant figure of **6238** is **6**, the least significant is **8** and there are 4 significant figures altogether.

Also, the most significant figure of **0·00405** is **4**, the least significant is **5** and there are 3 significant figures altogether.

Note: The zero between 4 and 5 is a significant figure.

Examples

1. Give 0· 003581 correct to 2 significant figures.

We use the same rules as before but count significant figures rather than decimal places.

0·003581 = 0·0036 correct to 2 sf

2. 0·00024041 = 0·000240 correct to 3 sf
3. 4278054 = 4280000 correct to 3 sf
4. 698205 = 700000 correct to 2 sf
5. 5·4389 = 5·44 correct to 3 sf

Exercise
Write the following to the given number of significant figures:

1. 3·413 (3)	2. 0·648 (2)
3. 27·612 (3)	4. 0·0026666 (4)
5. 5·0096 (3)	6. 493412 (2)
7. 87490 (1)	8. 129640 (2)
9. 409983 (4)	10. 70559 (3)

(Answers: 3·41, 0·65, 27·6, 0·002667, 5·01, 490000, 90000, 130000, 410000)