

fs4u

Approximation

‘How To’ Booklet 35

Approximation

Many numbers we use are approximations. They are not exact but they are about the right size.

For example - if 26,943 people attend a football match, using an approximation of 27,000 gives a good idea of the number at the match.

Expressing numbers to a stated number of decimal places or significant figures is a useful way of rounding off numbers.

Decimal Places

The decimal places in a number come **AFTER** the decimal point.

For example - each of these numbers are 3 decimal places.

0.792 5.001 78.060 1254.000

To number the places, start at the decimal point and count to the right.

For example - in this number 8.671

6 is the 1st decimal place

7 is the 2nd decimal place

1 is the 3rd decimal place

A common way to approximate a decimal is to reduce the number of decimal places it has.

For example -	0.371	= 0.4	(correct to 1 decimal place)
	16.054	= 16.05	(correct to 2 decimal places)
	9.1865	= 9.187	(correct to 3 decimal places)

To Correct a Decimal to a given Number Of Decimal Places

- 1 Find the last decimal place you want.
- 2 Now look at the figure in the next decimal place (to the right)

If this figure is 4 or less round **down**.
(i.e. just forget the decimal places you do want.)

If this figure is 5 or more round **up**.
Add 1 to the figure in the last place you want.

To correct a decimal to 1 dp look at the 2nd decimal place
 2 dp look at the 3rd decimal place
 3 dp look at the 4th decimal place and so on.

Activity

To correct to 1 decimal place

Look at the 2nd decimal place. It is 5, so round up.

29.3517

29.4

So 29.3517 = 29.4 (to 1 decimal place)

b) To correct to 2 decimal places

↓ ↓

Look at the 3rd decimal place. It is less than 5, so round down.

29.3517

29.35

So 29.3517 = 29.35 (to 2 decimal places)

c) To correct to 1 decimal place

↓ ↓

Look at the 2nd decimal place. It is larger than 5 so round up by adding 1 to 9

3.98

4.0

So 3.98 = 4.0 (correct to 1 decimal place)

Significant Figures

As you read a number from left to right the first figure you come to, that is NOT zero, is called the first significant figure.

e.g. 251

↑

1st significant figure

3.025

↑

1st significant figure

0.103

↑

1st significant figure

0.002

↑

1st significant figure

NOTE

To correct a number to a stated number of significant figures you round it up or down in the usual way. Make sure that you keep the place value of each figure correct in the number. You may need to fill some places with '0's to do this.

e.g. 745921

(to 1 significant figure)

700000

↑

These zeros keep the place value of the 7 correct

Activity

Correct each of these to

- i 1 decimal place
- ii 2 decimal places
- iii 3 decimal places

a	15.42137
b	5.82634
c	9.52877
d	6.49229
e	0.32145
f	2.903075
g	5.099

Correct each number to

- i 1 significant figure
- ii 2 significant figures
- iii 3 significant figures

1	14.723
2	0.3215
3	0.03861
4	5.8271
5	8.2504
6	2385
7	0.06149
8	0.008471
9	0.0095201
10	0.3954
11	0.9972

Choosing a Suitable Degree of Accuracy

The question may tell you what degree of accuracy to use. Sometimes you have to decide what size of answer is sensible. Use your common sense. The accuracy of an answer depends on the accuracy of the values used to produce it. In general your answer should have AT MOST one significant figure more than this value. Often it will have the same number of significant figures.

Activity

Give your answers to each of these to an appropriate degree of accuracy:-

1	A 3 m length of wood is cut into 3 equal pieces. What is the length of each piece?
2	17 rubbers have a mass of 54g. What is the mass of each rubber?
3	1 litre of coffee is poured into 15 cups. How much is in each cup?
4	1 3lb bag of flour was used to make 18 fairy cakes. How much flour was used for each cake?
5	25m of fabric were used to cover 14 chairs. How much was needed for each chair?