

fs4u

Approximations

'How To' Booklet 6

Estimation and Approximation

Nearest ten, hundred or thousand.

We sometimes need only an approximate answer to a problem. Numbers may be expressed to the nearest ten or hundred or thousand.

Examples

- 1 Round 36 to the nearest ten
36 is nearer to 40 than 30 – answer is therefore 40
- 2 Round 457 to the nearest hundred
457 is nearer to 500 than it is to 400 – answer is therefore 500
- 3 Round 65 to the nearest ten
65 is halfway between 60 and 70
In this case **we always round up** – answer is therefore 70

Activity

Round the following numbers to the nearest ten.

a. 8 b. 19 c. 93 d. 172 e. 345

Round the following to the nearest hundred

f. 75 g. 124 h. 358 i. 805 j. 977

Round the following to the nearest thousand

k. 595 l. 1052 m. 7499 n. 8950 o. 9606

Decimal Places

Numbers as answers to questions may need to be approximated to a given number of decimal places. This is particularly true when using a calculator.

If we are correcting an answer to two decimal places then we look at the next (third) decimal place.

- if this is less than 5 (i.e. 0 to 4) the second decimal place stays as it is.
- if the third decimal place is 5 or greater the second decimal place is increased by one.

Examples

1 Write 36.5823 to 2 decimal places

Answer = 36.58

2 Write 15.87 to 1 decimal place

The second decimal place is 7, so the first decimal place is increased by one.

Answer = 15.9

3 Write 121.654 to 1 decimal place

The second decimal place is 5 so add one to the first decimal place.

Answer = 121.7

Exercise

Write the following to two decimal places

1 5.6322 2 14.8634 3 85.249

4 28.655 5 12.959 6 37.962

Write the following to one decimal place

7 0.872 8 1.309 9 14.3499

10 124.66 11 5.972 12 8.554

Significant Figures

Numbers as answers to questions sometimes need to be approximated to a given number of significant figures. This is particularly true when using a calculator.

To write a number to a given number of significant figures is exactly the same as writing a number of decimal places except that we need to count all the figures in the number, not just the ones after the decimal point. We always count the significant numbers from the left.

Examples

- 1 Write 24.739 to 4 significant figures
The fourth significant figure is increased by one

Answer = 24.74 (i.e. four figures written down)

- 2 Write 16.045 to 2 significant figures

Answer = 16

- 3 Write 3750.284 to 2 significant figures

The third significant figure is 5 so the second is increased by one, but the decimal point must be in the same place.

Answer = 3800

- NB** the number is three thousand, seven hundred and fifty point two, eight, four, so the answer is three thousand eight hundred.

Exercise

Write the following to the given number of significant figures

- 1 2.434 to 3 significant figures
- 2 8.714 to 2 significant figures
- 3 12.87 to 3 significant figures
- 4 59.86 to 3 significant figures
- 5 275.2738 to 3 significant figures
- 6 0.05847 to 2 significant figures
- 7 3752.24 to 1 significant figures
- 8 94.82 to 1 significant figures
- 9 0.01234 to 2 significant figures
- 10 70.849 to 3 significant figures

Choosing and Using Appropriate Instruments

Examples of instruments that may be used

a	calculator
b	ruler
c	compasses
d	protractor
e	set square
f	bathroom scales
g	tape measure

In the following questions state what instruments you have selected to use.
Give your answer using that instrument

1	What is your height?
2	Measure the width of this sheet
3	Draw a circle of radius 3 cm inside a circle of radius 5 cm
4	Draw, accurately, three lines parallel to each other.
5	Draw a triangle with one side 10cm long with angles 30° , 90° and 60°
6	Measure the length of the room.
7	A man earns £4.25 per hour. What is his wage for a $37\frac{1}{2}$ hour week?