

UNIT 2 *Arithmetic: Place Value*

Activities

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- 2.1 Rounding
 - 2.2 Place Value
 - 2.3 Approximation to Given Number of Decimal Places
 - 2.4 Place Value with Decimals
 - 2.5 Ordering Decimals
- Notes and Solutions

ACTIVITY 2.1

Rounding

Here we introduce the concept of rounding and see how it is used in practical contexts.

1. The attendance of the Arsenal v. Manchester United Charity Shield football match (1995) was quoted in newspapers in the following way.

<i>Newspaper</i>	<i>Number of Spectators</i>
Times	68 800
Telegraph	68 770
Daily Mail	69 000
Sun	70 000

- (a) Can they all be correct if they have given the number correct to a certain number of decimal places?
- (b) What are the possible actual attendance figures?
2. The number of people at a pop concert was given as 350 000 to the nearest 50 000. What is the
- (a) minimum possible number of people attending;
- (b) maximum possible number of people attending?

Extension

The number of complaints received by a train operating company one year was quoted as 5500 (to the nearest 100). The next year it was quoted as 5000 (to the nearest 1000). The train company publicly announced "improved services have led to a real reduction in complaints".

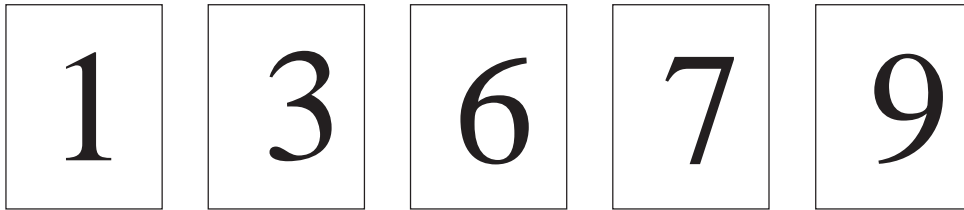
Are they justified in their statement?

ACTIVITY 2.2

Place Value

This is best done as a whole class activity with individual pupils taking each (large) digit card and moving themselves into the appropriate places - with the help of the class (and the teacher).

1. Using the digits



only once each time, find

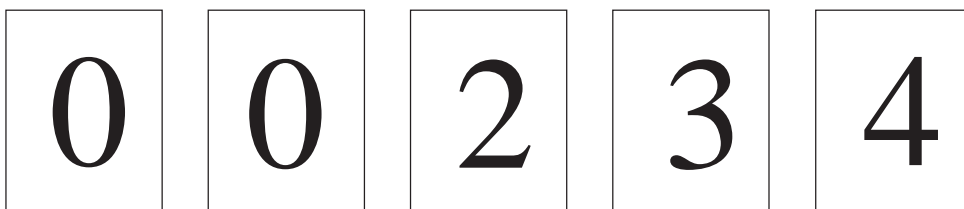
- (a) the largest number that can be made
- (b) the smallest number that can be made

when you use (i) 3 cards (ii) 4 cards (iii) all 5 cards.

2. Repeat the first problem using the digits;



3. Repeat the problem again now using the digits;



ACTIVITY 2.3 *Approximating to Given Number of Decimal Places*

Here we show how numbers given to a certain number of decimal places, are used in context.

1. Four students got the following results from a measurement in a science experiment:

<i>Ben</i>	4.754
<i>Sergier</i>	4.8
<i>Adam</i>	4.75
<i>Chris</i>	4.755

- (a) Can they all be correct?
- (b) What are the possible values of the measurements if given to an accuracy of 5 decimal places?
2. The height of a pupil was given as 123.4 cm to the nearest mm.
What is the
- (a) minimum possible value for the height of the pupil;
- (b) maximum possible value for the height of the pupil?

Extension

A student suggested that an easy way to give a number to a given number of decimal places was to do it stage by stage.

For example, to calculate 4.3412 to one decimal place, you work it out in the following way

$$4.2412 \longrightarrow 4.341 \longrightarrow 4.34 \longrightarrow 4.3$$

(to 3.d.p.) (to 2.d.p.) (1 d.p.)

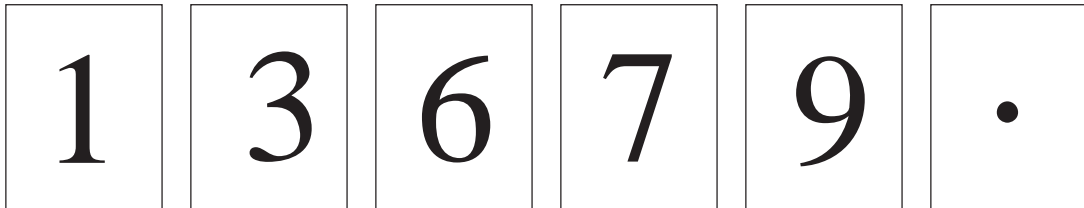
Will this method always give the correct answer?

ACTIVITY 2.4

Place Value with Decimals

This is best done as a whole class activity with individual pupils taking each (large) digit card and moving themselves into the appropriate places - with the help of the class (and the teacher).

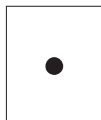
1. Using the digits



only once each, find

- (a) the largest number that can be made
 (b) the smallest number that can be made

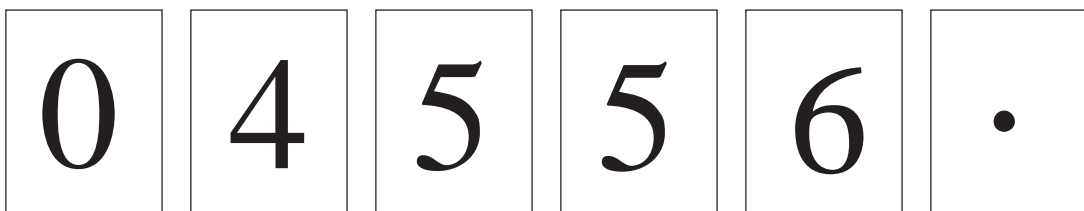
when you use the decimal point



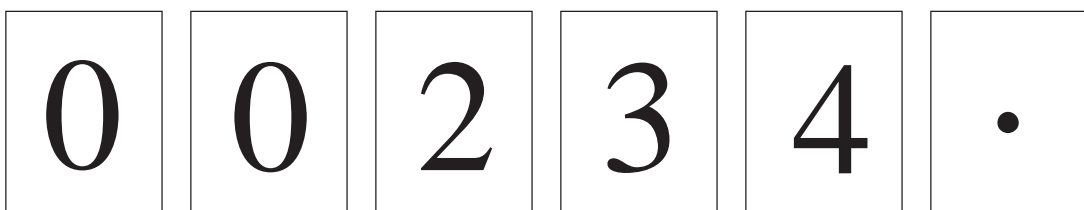
with

- (i) 3 more cards (ii) 4 more cards (iii) 5 more cards

2. Repeat the first problem using the digits



3. Repeat the problem again now using the digits



ACTIVITY 2.5

Ordering Decimals

This is best done as a whole class activity with individual pupils taking each (large) digit card and moving themselves into the appropriate places - with the help of the class (and the teacher).

1. Put these numbers in order, with the smallest first

0.5	0.99	0.905	0.59	0.509	0.9
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2. Repeat the same procedure with

0.18	0.089	0.101	0.81	0.019	0.809
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3. Merge the two sets of numbers together to form one set of numbers, in increasing order.

Extension

Get each member of the class to write a two or three decimal number (starting with 0.) on a sheet of A4. Collect all these in and organise the class into groups of equal size, say 7, 8, 9 or 10.

Give out all the numbers (face down) to each pupil, and see how fast each group can get these sets of numbers into the correct increasing order.

ACTIVITIES 2.1 - 2.3

Notes and Solutions

Notes and solutions are only given where appropriate.

2.1 This has been written as a teacher led activity to encourage discussion and to bring out the problems concerning rounding.

1. (a) Yes they can, if each is given to the nearest 100, 10, 1000, 10 000 respectively.
- (b) 68 765 to 68 774 are all possible.
2. (a) 325 000 (b) 374 999 (as 375 000 would round up to 380 000)

Extension - The comment is not necessarily justified

Year 1 - actual number of complaints are in the range 5450 to 5549

Year 2 - actual number of complaints are in the range 4500 to 5499

So, for example, Year 1: 5475

Year 2: 5490

are compatible with these ranges and these show an increase!

2.2 Whilst these could be used as an individual (or group) worksheet it gives an opportunity for the class to work together (or if appropriate, in teams). For the whole class approach you will need large digit cards.

1. (a) (i) 976 (ii) 9763 (iii) 97631
- (b) (i) 136 (ii) 1367 (iii) 13679
2. (a) (i) 655 (ii) 6554 (iii) 65540
- (b) (i) 405 (ii) 4055 (iii) 40556
- (N.B. you cannot start a whole number with 0)
3. (a) (i) 432 (ii) 4320 (iii) 43200
- (b) (i) 200 (ii) 2003 (iii) 20034

2.3 This is again intended as a teacher led discussion for all questions here.

1. (a) Yes (b) 4.75445 to 4.75454
2. (a) 123.35 (b) 123.44 (actually 123.44999...)

Extension - It does not work; e.g. $4.3476 \longrightarrow 4.348 \longrightarrow 4.35 \longrightarrow 4.4$
 (to 3.d.p.) (to 2.d.p.) (1 d.p.)
 but 4.3475 is closer to 4.3 than 4.4.

ACTIVITIES 2.4 - 2.5

Notes and Solutions

2.4 A with A 2.2, this is intended as a whole class very interactive activity. You must be very careful with the 0's (in Q2 and Q3) and suggest that a number like 0.45 cannot be written as .45 and 976. is not allowed for the whole number 976.

1. (a) (i) 97.6 (ii) 976.3 (iii) 9763.1
(b) (i) 13.6 (ii) 136.7 (iii) 1367.9
2. (a) (i) 65.5 (ii) 655.4 (iii) 6554.0 (this is allowed!)
(b) (i) 0.02 (ii) 0.023 (iii) 0.00234

2.5 For a whole class activity you will need to prepare the number cards to be used, or alternatively, get pupils to write their own.

1. 0.5, 0.509, 0.59, 0.9, 0.908, 0.99
2. 0.019, 0.089, 0.101, 0.18, 0.809, 0.81
3. 0.019, 0.089, 0.101, 0.18, 0.5, 0.509, 0.59, 0.809, 0.81, 0.9, 0.908, 0.99