

# UNIT 17 *Arithmetic: Decimals, Fractions and Percentages*

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## Activities

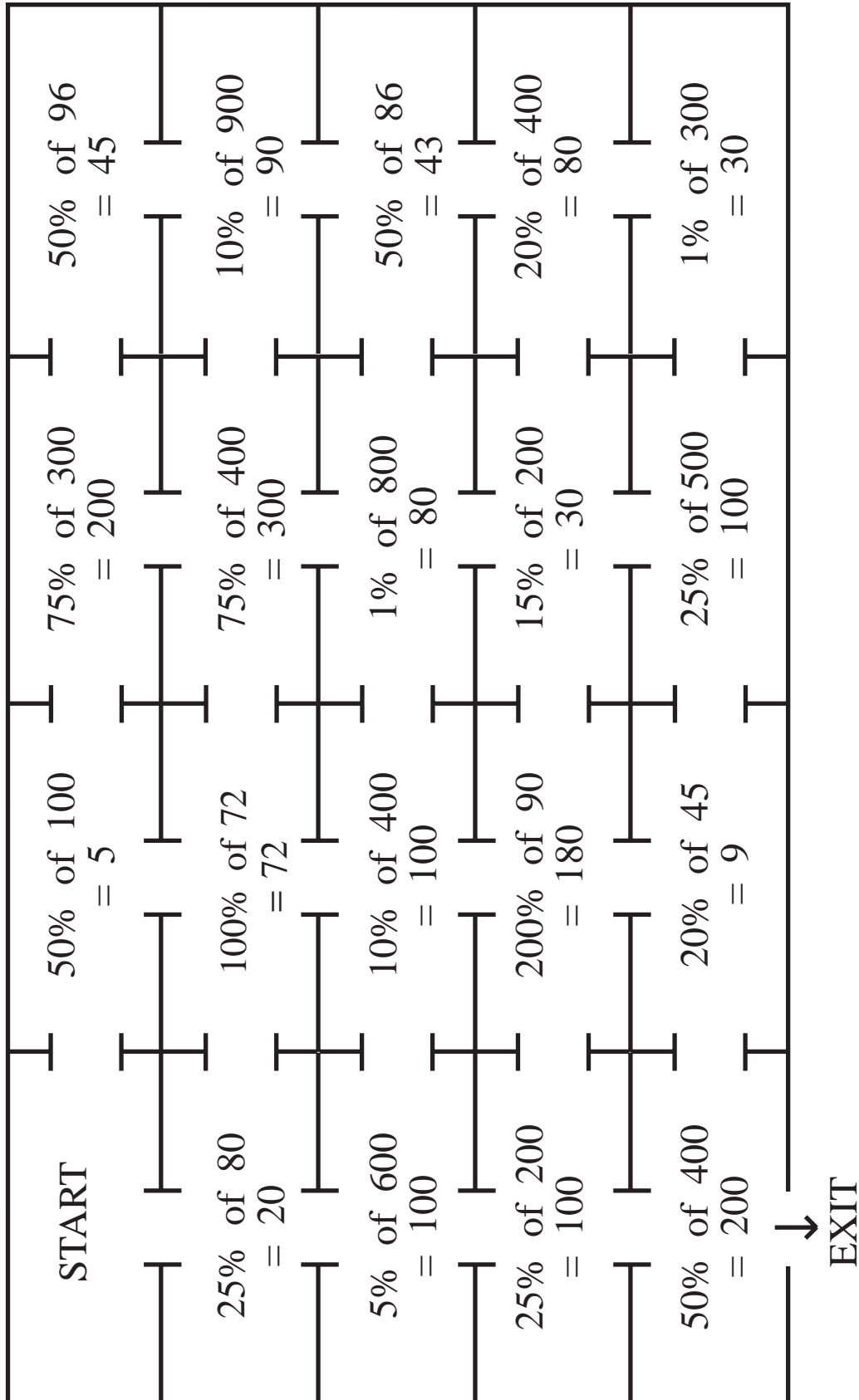
### Activities

- 17.1 Percentages of Quantities
  - 17.2 Currency Exchange
  - 17.3 VAT Problems
  - 17.4 Card Games with Decimals, Fractions  
and Percentages
- Card Templates (6 pages)
- Notes and Solutions (2 pages)

# ACTIVITY 17.1

## Percentages of Quantities

Look at the diagram below. START from the top left box and enter the next box which displays a correct statement. Carry on in the same manner until you EXIT.



# ACTIVITY 17.2

## Currency Exchange

The chart shows the exchange rate between the pound and various foreign currencies on Monday 10 March 1997.

| THE £ ABROAD |       |         |
|--------------|-------|---------|
| Australia    | A \$  | 2.03    |
| Canada       | C \$  | 2.20    |
| Denmark      | D Kr  | 10.41   |
| France       | F Fr  | 9.20    |
| Germany      | DM    | 2.73    |
| Hong Kong    | HK \$ | 12.40   |
| Ireland      | IR£   | 1.03    |
| Italy        | L     | 2712.00 |
| Japan        | Y     | 194.91  |
| Spain        | Pes   | 231.40  |
| Switzerland  | S Fr  | 2.36    |
| U.S.         | \$    | 1.60    |

- How many
  - \$ can you obtain for £10,
  - DM can you obtain for £5,
  - A\$ can you obtain for £20,
  - L can you obtain for £2.50?

You can also use the table for converting foreign currency to pounds.

- How many pounds can you obtain for
  - 24 F Fr
  - 47 DM
  - 101000 L
  - 100 \$
  - 4000Y?

In practice, most currency exchanges charge commission, either a percentage or a fixed amount.

- Find how much you can obtain for £200 in
  - \$ with a commission charge of 2%,
  - DM with a commission charge of 1.5%,
  - F Fr with a fixed commission charge of £2.50.

Banks have different rates for buying and selling foreign currency, as well as commission charges.

| MEP BANK          |         |         |
|-------------------|---------|---------|
|                   | BUY     | SELL    |
| £1                | 2.90 DM | 2.73 DM |
| Commission charge | 3%      | 2%      |

- How many DM do you get for £1000 at the *MEP Bank*? (Use selling rates.)
- After changing your £1000 into DM, you find that your trip is cancelled.
  - How many pounds do you get back, using the buying and commission rates shown opposite?
  - How much money have you lost?
- Suppose you change £1000 to U.S.\$ at the *SELL* rate above in 'The £ Abroad' table, with 2% commission charge. To what level does the *BUY* rate of the pound have to fall in order to break even when you change back to pounds? (Assume a 3% commission charge.)

## ACTIVITY 17.3

## VAT Problems

In the UK most articles are sold at the basic price plus

*Value Added Tax* (VAT) at  $17\frac{1}{2}\%$ .

Some goods such as cars and fuel, have an extra tax, whilst others such as food and children's clothes are exempt from VAT.

For example, a portable music centre of basic price £200, will also have VAT of

$$£200 \times \frac{17.5}{100} = £35$$

added, to give a total price of £235.

Finding the VAT to be charged using a calculator is relatively straightforward. However, even *without* a calculator, VAT is easy to find by calculating 10%, 5% and  $2\frac{1}{2}\%$ , and then adding them up.

|                       |                           |                     |
|-----------------------|---------------------------|---------------------|
| So, for £200, we have | 10% → £ 20                |                     |
|                       | 5% → £ 10                 | (divide by 2)       |
|                       | $2\frac{1}{2}\%$ → £ 5    | (divide again by 2) |
|                       | 17 $\frac{1}{2}\%$ → £ 35 | (add up)            |

1. *Without* using a calculator, find the VAT to be added for articles at a basic price of:
- (a) £120                      (b) £80                      (c) £500.

Businessmen and companies can often claim back VAT. For example, if the total price is £235, they can claim back £35.

2. What is the VAT when the total price is:                      (a) £117.50                      (b) £470 ?
3. If £17.50 is the VAT portion of a total price of £117.50,
- (a) what is the VAT portion of a total price of £1.00 ?
- (b) what is the VAT portion of a total price of £x ?
4. (a) Explain why dividing the *total* price by approximately 6.71 gives the VAT .
- (b) Give the values of the divisor (correct to 5 significant figures), which should be used for more accurate calculations.
5. (a) Suppose VAT is increased to 19%. What divisor (correct to 5 significant figures) is now needed to find the VAT part of the *total* price?
- (b) Use this divisor to find the VAT included in these total prices:
- (i) £119                      (ii) £50                      (iii) £80.

### Extension

Generalise the formula for the divisor for VAT at a rate of  $r\%$ .

## ACTIVITY 17.4

## Card Games with Decimals, Fractions and Percentages

The templates that follow consist of

- *decimal* cards      0.65 to 1.0 in steps of 0.5
- *fraction* cards      0.05 to 1 in steps of  $\frac{1}{20}$
- *percentage* cards      5% to 100% in steps of 5%
- *blank* cards      for other numbers.

The cards can be used for a variety of games, both as whole class activities and for both paired or individual tasks. Some suggestions are given below:

### (A) Conversions

Here the teacher shows, at speed, one card (say, *fractions*), and asks pupils for the conversion (to *decimal* or *percentage*). (A good competition between pairs or rows, etc. of pupils.)

An exercise best done at pace, involving at some stage all the pupils.

### (B) Sequences

Put cards on the board (using Blu-Tack), e.g.

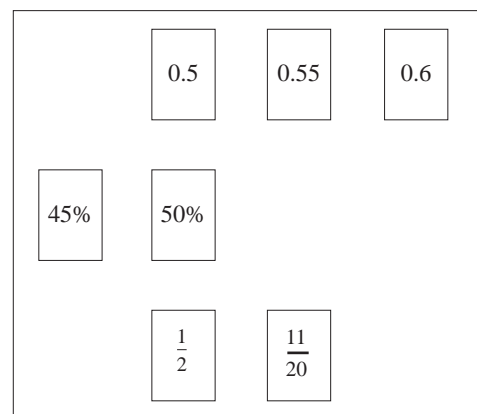
|     |
|-----|
| 0.5 |
|-----|

Deal out all the other cards to the class.

|     |
|-----|
| 50% |
|-----|

|               |
|---------------|
| $\frac{1}{2}$ |
|---------------|

Taking turns around the class, pupils place a card in order on the board: they must forego their turn if they cannot place a card in sequence. After 4 turns the board might look like this:



### (C) Ordering

Give out 6 cards at random to each pupil (you will need more copies of each sheet) and ask them to order them – quickest wins. (You could play this as a knockout competition, with an overall winner or winning team.)

# ACTIVITIES Unit 17

## *Decimal Cards 1*

0.25

0.5

0.2

0.45

0.15

0.4

0.1

0.35

0.05

0.3

# ACTIVITIES Unit 17

## *Decimal Cards 2*

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0.75

1.0

0.7

0.95

0.65

0.9

0.6

0.85

0.55

0.8

## ACTIVITIES Unit 17

*Fraction Cards 1*

$$1 \frac{1}{4}$$

$$1 \frac{1}{2}$$

$$1 \frac{1}{5}$$

$$9 \frac{9}{20}$$

$$3 \frac{3}{20}$$

$$2 \frac{2}{5}$$

$$1 \frac{1}{10}$$

$$7 \frac{7}{20}$$

$$1 \frac{1}{20}$$

$$3 \frac{3}{10}$$



## ACTIVITIES Unit 17

*Fraction Cards 2*

$$3 \frac{3}{4}$$

$$1$$

$$7 \frac{7}{10}$$

$$19 \frac{19}{20}$$

$$13 \frac{13}{20}$$

$$9 \frac{9}{10}$$

$$3 \frac{3}{5}$$

$$17 \frac{17}{20}$$

$$11 \frac{11}{20}$$

$$4 \frac{4}{5}$$

# ACTIVITIES Unit 17

## *Percentage Cards 1*

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25%

50%

20%

45%

15%

40%

10%

35%

5%

30%

# ACTIVITIES Unit 17

## *Percentage Cards 2*

75%

100%

70%

95%

65%

90%

60%

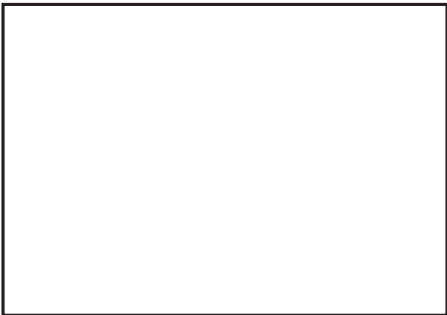
85%

55%

80%

# ACTIVITIES Unit 17

# *Blank Cards*



## ACTIVITIES 17.2 and 17.3

## *Notes for Solutions*

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*Notes and solutions given only where appropriate.*

- 17.2**
- (a) 16 \$                      (b) 13.65 DM      (c) 40.6 A\$      (d) 6780 L
  - (a) £2.61                      (b) £17.22              (c) £37.24              (d) £62.50              (e) £20.52
  - (a) 313.6 \$                      (b) 537.81 DM      (c) 1817 F Fr
  - 2675.4 DM
  - (a) £894.88                      (b) £105.12
  - 1.52

- 17.3**
- (a) £21                      (b) £14                      (c) £87.50
  - (a) £17.50                      (b) £70
  - (a) £0.1489 or 14.89p (to 2 d.p.)      (b) £0.1489<sub>x</sub> or 14.89<sub>x</sub> p (to 2 d.p.)
  - (b) 6.7143
  - (a) 6.2632                      (b) (i) £19      (ii) £7.98      (iii) £12.77