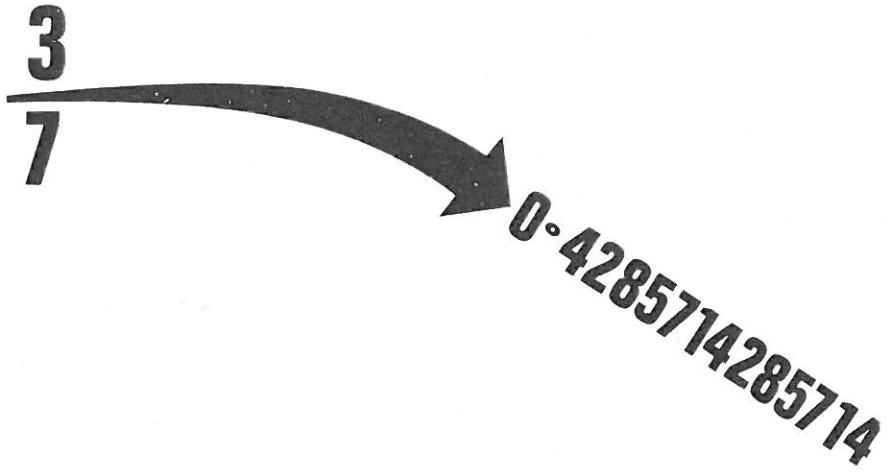
0754 SMILE

DECIMALS TO FRACTIONS AND BACK AGAIN



The answers to the questions in each section are given at the top of the following page. Check your work as you complete each section.

INTRODUCTION

This booklet is designed to consolidate your previous work on fractions and decimals and to show how they are related.

First of all, check that you can remember how to answer these basic questions. If you have any difficulties, look back at the work-card referred to after the question.

(1) $\frac{3}{10} = \frac{\blacksquare}{100}$ (0368)

(2) $\frac{3}{4} = \frac{\blacksquare}{100}$ (0368)

(3) $\frac{7}{10} + \frac{4}{5}$ (0402)

(4) $\frac{9}{10} - \frac{3}{4}$ (0402)

(5) $\begin{array}{r} 0.608 \\ \times \quad 9 \\ \hline \end{array}$ (0374)

(6) $4\overline{)6.348}$

DECIMAL NOTATION

0.1 is the decimal way of writing $\frac{1}{10}$

(a) How is $\frac{3}{10}$ written in decimal form?

(b) Write $\frac{9}{10}$ in decimal form

0.01 is the decimal way of writing $\frac{1}{100}$

Write in decimal form:

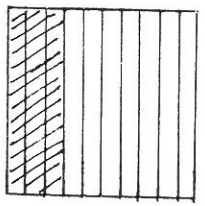
(c) $\frac{3}{100}$

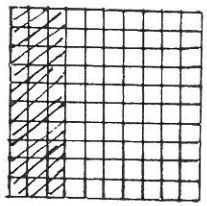
(d) $\frac{9}{100}$

(e) $\frac{30}{100}$

(f) Is there any difference to your answers for (a) and (e)?

Explain. These diagrams should help:





(g) Write 0.001 and 0.0001 as fractions

(h) How would you write $\frac{7}{10000}$ as a decimal?

Answers for Pages 1 and 2:

(1) $\frac{30}{100}$ (2) $\frac{75}{100}$ (3) $\frac{15}{10}$ or $1\frac{1}{2}$

(4) $\frac{6}{40}$ or $\frac{3}{20}$ (5) 5.472 (6) 1.587

(a) 0.3 (b) 0.9 (c) 0.03 (d) 0.09

(e) 0.30 (f) 0.3 = 0.30 The extra 0 simply says "no hundredths".

(g) $\frac{1}{1000}$; $\frac{1}{10000}$ (h) 0.0007

POSITION

You also need to understand the different values of digits according to their position in a number.

For example, in the number 3.78 the digit 8 represents $\frac{8}{100}$

What value does the digit 4 have in each of these numbers?

(i) 476 (0160)

(ii) 34 671

(iii) 0.4 (see page 2)

(iv) 0.487

(v) 13.624

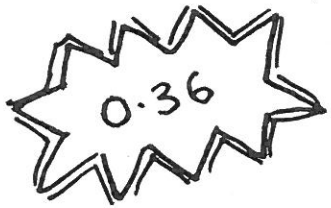
(vi) 97.342

DECIMALS TO FRACTIONS

$0.3 = \frac{3}{10}$

Write down whether these two statements are TRUE or FALSE:

(1) $0.3 = \frac{30}{100}$ (2) $0.3 = \frac{300}{1000}$



(3) In 0.36 what value does the digit 3 have?

(4) What value does the digit 6 have?

Write TRUE or FALSE for each of these statements:

(5) $0.36 = 0.3 + 0.06$

(6) $0.36 = \frac{3}{10} + \frac{6}{100}$

(7) $0.36 = \frac{3}{100} + \frac{6}{100}$

(8) $0.36 = \frac{30}{100} + \frac{6}{100}$

(9) $0.36 = \frac{36}{100}$

(10) $0.36 = 0.360$

Answers for Pages 3 and 4

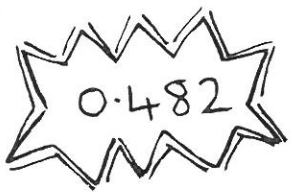
(i) 400 (iv) $\frac{4}{10}$

(ii) 4000 (v) $\frac{4}{1000}$

(iii) $\frac{4}{10}$ (vi) $\frac{4}{100}$

(1) and (2) are both TRUE because $0.3 = \frac{3}{10} \overset{\times 10}{=} \frac{30}{100} \overset{\times 10}{=} \frac{300}{1000}$

(3) $\frac{3}{10}$ (4) $\frac{6}{100}$ Question (7) is FALSE, all the others are TRUE.



(9) Copy and complete:

$$0.482 = \frac{\blacksquare}{10} + \frac{\blacksquare}{100} + \frac{\blacksquare}{1000}$$
$$= \frac{\blacksquare}{1000} + \frac{\blacksquare}{1000} + \frac{\blacksquare}{1000}$$
$$= \frac{\blacksquare}{1000}$$

(10) Change 0.729 to a fraction in the same way.

(11) Change these decimals to fractions.

(a) 0.47

(b) 6.91

(c) 0.2763 (d) 0.0063

(e) 0.63

(f) 0.630

By comparing your answers with the questions, can you find the quick method?

SIMPLIFYING

Occasionally the final fraction in these types of questions can be simplified.

For example: Change 8.064 to a fraction.

$$8.064 = 8 + \frac{0}{10} + \frac{6}{100} + \frac{4}{1000}$$
$$= 8 + \frac{0}{1000} + \frac{60}{1000} + \frac{4}{1000}$$
$$= 8\frac{64}{1000}$$
$$= 8\frac{8}{125}$$

(1) Change 0.36 to a fraction and simplify your answer.

Change these decimals to fractions, simplifying your answers wherever possible.

(2) 0.67

(3) 0.6623

(4) 4.29

(5) 0.88

(6) 3.6

(7) 25.64

(8) 0.062

(9) 0.25

(10) 0.125

Answers for Pages 5 and 6:

(9) $0.482 = \frac{4}{10} + \frac{8}{100} + \frac{2}{1000}$

$= \frac{400}{1000} + \frac{80}{1000} + \frac{2}{1000}$

$= \frac{482}{1000}$

(10) $0.729 = \frac{729}{1000}$

(11) (a) $0.47 = \frac{47}{100}$

(b) $6.91 = 6\frac{91}{100}$

(c) $0.2763 = \frac{2763}{10000}$

(d) $0.0063 = \frac{63}{10000}$

(e) $0.63 = \frac{63}{100}$

(f) $0.630 = \frac{63}{100}$ or $\frac{630}{1000}$ (see page 4, questions 1 and 2)

Simplifying

(1) $\frac{36}{100} = \frac{9}{25}$

(2) $\frac{67}{100}$

(3) $\frac{6623}{10000}$

(4) $4\frac{29}{100}$

(5) $\frac{88}{100} = \frac{22}{25}$

(6) $3\frac{6}{10} = 3\frac{3}{5}$

(7) $25\frac{64}{100} = 25\frac{16}{25}$

(8) $\frac{62}{1000} = \frac{31}{500}$

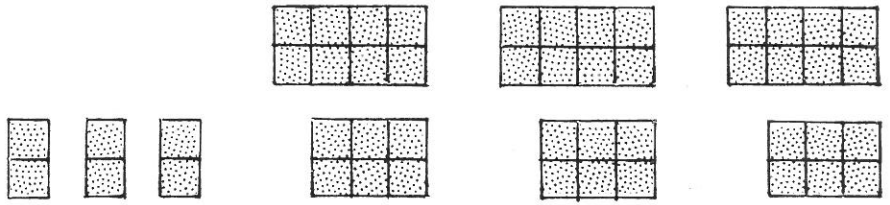
(9) $\frac{25}{100} = \frac{1}{4}$

(10) $\frac{125}{1000} = \frac{1}{8}$

FRACTIONS TO DECIMALS

To change $\frac{3}{4}$ to a decimal you will need to remember that $\frac{3}{4}$ is equal to $3 \div 4$

For example: If 3 bars of chocolate are divided equally amongst 4 people



each person will get $\frac{3}{4}$ of a bar. So $3 \div 4 = \frac{3}{4}$

(1) Show that $4 \div 5 = \frac{4}{5}$ in the same way.

(2) a) How many minutes are there in $\frac{3}{10}$ of an hour?

b) What is the total number of minutes in 3 hours? Share the total into ten parts; how big is each part?

c) Do your answers to (a) and (b) show that

$$\frac{3}{10} = 3 \div 10 \quad ?$$

The next step is straight forward.

If $\frac{3}{4}$ is equal to $3 \div 4$ then we shall do the division:

$$4\overline{)3}$$

Only one difficulty!

Solve this by rewriting 3 as 3.00

$$4\overline{)3.00}$$

How many 0's? This you can only know through practice but the next few pages will teach you.

Now follow the division through each stage:

$$4\overline{)3.00}\quad 0.$$

$$4\overline{)3.^{3}00}\quad 0.$$

$$4\overline{)3.^{3}00}\quad 0.7$$

$$4\overline{)3.^{3}0^{2}0}\quad 0.7$$

$$4\overline{)3.^{3}0^{2}0}\quad 0.75$$

therefore

$\frac{3}{4} = 0.75$

(3) Copy and complete:

$\frac{1}{4} = 1 \div 4$ → $4\overline{)1.00}$

$\frac{1}{4} = \blacksquare.\blacksquare\blacksquare$

(4) Copy and complete:

$\frac{3}{8} = 3 \div 8$ → $8\overline{)3.000}$

$\frac{3}{8} = \blacksquare.\blacksquare\blacksquare\blacksquare$

(5) Change $\frac{1}{8}$ to a decimal in the same way.

HOW MANY 0's

Changing fractions to decimals is one way of dealing with division questions which would otherwise have a remainder.

(1) a) Try $243 \div 4$

b) When you have reached this stage: $4\overline{)\begin{array}{r}60\\243\end{array}}$ there is a remainder of 3 and you have probably written 60 r3 or $60\frac{3}{4}$ for your answer to (a). Rewrite 243 as 243.00

$$4\overline{)\begin{array}{r}60\\243.00\end{array}}$$

Now complete the division.

Answers for Page 10

(3) 0.25

(4) 0.375

(5) 0.125

(2) Work out 395 ÷ 4

(3) Now try 6 ÷ 4

$$4\overline{)\,6.00} \qquad \frac{6}{4} = \blacksquare$$

Did you use both 0's ?

Did you get 1.5 or 1.50 ? Is there any difference?

Let us take a fresh look at $\frac{7}{8}$.

$\frac{7}{8} = 7 \div 8$

$8\overline{)\,7}$ Can't do it. Write 7.0

$8\overline{)\,7.0}$

$8\overline{)\,7.70}$ That's better, but we get stuck again.

$8\overline{)\,7.70^{6}0}$ We've got a remainder. Write: 7.00

$8\overline{)\,7.00}$ We can continue - but we get a remainder.

$8\overline{)\,7.70^{6}0^{4}0}$ You guessed it! Write 7.000

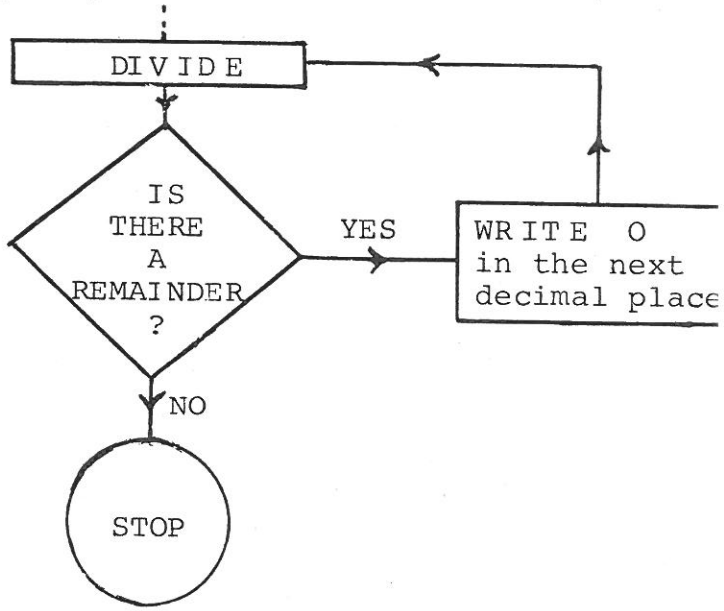
$8\overline{)\,7.70^{6}0^{4}0}$ $8\overline{)\,7.000}$

No remainder this time Stop!

$\frac{7}{8} = 0.875$

Q. How many 0's do you write?

A. Just as many as you need.



Answers for Page 11:

(2) 98.75

(3) 1.5 This is the same as 1.50 (see Page 2 question (f))

Change these fractions to decimals:

(4) $\frac{5}{8}$

(5) $\frac{13}{8}$

(6) $\frac{7}{10}$

(7) $\frac{15}{12}$

(8) $\frac{2}{3}$

(9) What problem did you find with question (8) ?

In fact, there are very few fractions which change to a decimal with no remainder.

For example:

$\frac{1}{9}$ = 0.11111 and the 1's go on for ever,

$\frac{1}{3}$ = 0.3333 and the 3's go on for ever,

no matter how many 0's you write in the calculation.

RECURRING DECIMALS

Every rational number written as a fraction can be divided out to give a decimal form of the number.

(1) Work out the following fractions as decimals.

(a) $\frac{14}{11}$

(b) $\frac{1}{6}$

(c) $\frac{7}{5}$

In (a) and (b) the digits recur. (They repeat over and over again)

$\frac{14}{11}$ is a recurring decimal

$\frac{14}{11}$ = 1.27272727....

We write this:

$\frac{14}{11} = 1.\dot{2}\dot{7}$

$\frac{1}{6}$ is also a recurring decimal.

$\frac{1}{6}$ = 0.166666.....

We write:

$\frac{1}{6} = 0.1\dot{6}$

In some rational numbers the recurring part is rather large.

(2) a) Work out $\frac{22}{7}$ to about eighteen decimal places.

b) Is this a recurring decimal? How can you write your answer to (a) without using up the world supply of paper?

Answers for page 13

(4) 0.625

(5) 1.625

(6) 0.7

(7) 1.25

(8) 0.6666.....

(9) The decimal does not stop. It is a recurring decimal.

$\frac{22}{7} = 3.\dot{1}42857\dot{}$ the dots show the first and the last of the digits which recur

You can now change any number written as a fraction into a decimal.

You also know what to do if the decimal is recurring.