DECIMALS

PLEASE DO NOT USE A CALCULATOR FOR THIS PACK.

1000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$

The numbers **before the decimal point** are whole numbers (either ones, tens, hundreds, thousands etc. according to the place where the number is written).

The numbers **after the decimal point** are parts of a whole number and are called decimal fractions (tenths, hundredths, thousandths etc.)

You have just completed a chapter of fractions, and the knowledge you have on these can be used to help you understand decimals.

	1000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
$12\frac{3}{10} =$			1	2	.	3		
$2\frac{3}{10} =$				2	.	3		
$\frac{3}{10} =$				0	.	3		
$1306\frac{1}{10} =$	1	3	0	6	.	1		

	1000	100	10	1	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
$1024\frac{23}{100} =$	1	0	2	4	.	2	3	
$\frac{23}{100} =$				0	.	2	3	
$\frac{3}{100} =$				0	.	0	3	
$1042\frac{743}{1000} =$	1	0	4	2	.	7	4	3
$1042\frac{3}{1000} =$	1	0	4	2	.	0	0	3

Be very careful in putting numbers in columns, as the value of each column is different. The position of the number gives it its value.

Example

30.0 means three tens
3.4 means ones and four tenths

0.06 means six hundredths or $\dfrac{6}{100}$

Exercise 1

Copy out the headings on your paper, write these fractions as decimals, using the columns to help you.

1. $24\dfrac{7}{10}$ 2. $120\dfrac{79}{100}$ 3. $6\dfrac{23}{100}$

4. $47\dfrac{127}{1000}$ 5. $7\dfrac{307}{1000}$

Remember for whole numbers:

12 means	12.0
137 means	137.0
5 means	5.0

Exercise 2

Write these whole numbers as decimals:

1. 7 =
2. 13 =
3. 127 =
4. 1000 =
5. 2300 =

CONVERSION OF DECIMALS TO FRACTIONS

Example

0.7   means $\dfrac{7}{10}$

1.7   means $1\dfrac{7}{10}$

24.63 means $24\dfrac{63}{100}$

3.2   means $3\dfrac{2}{10} = 3\dfrac{1}{5}$

126.24 means $\quad 126\dfrac{24}{100} = 126\dfrac{6}{25}$

Remember to "cancel" where possible. In general, there are as many noughts in the denominator as digits after the decimal point.

Exercise 3

Convert these decimals to fractions:

1.   0.4

2.   5.6

3.   17.04

4.   402.25

5.   0.001

6.   0.006

7.   1010.045

8.   300.031

9.   147.101

10.   13.055

ADDITION AND SUBTRACTION OF DECIMALS

Adding and subtracting decimals is done in the same way as adding and subtracting whole numbers. You must be careful to keep the decimal points in line underneath each other.

Example 1

12.36 + 324.962 should be written like this:

```
  12.36
+324.962
 337.322
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After you have written down the sum, write in the decimal point before you start adding (or subtracting).

Example 2
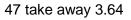
3 + 12.639 + 0.027

```
  3.0
 12.639
  0.027
 15.666
```

Example 3

Subtract 8.357 from 20.162

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  20.162
-  8.357
  11.805
```

Example 4

47 take away 3.64

     47.00 (NOTE put noughts here)
- 3.64
   43.36

Exercise 4

1.   62.34 + 41.11   2.   12.11 + 8.71 + 29.12

3.   862.3 + 298.4   4.   18.352 + 17.265

5.   67.105 + 18.031 + 24   6.   16.38 – 11.97

7.   1.43 – 1.38   8.   13 – 0.16

9.   6003.5 – 830.16   10.   62.56 – 19

MULTIPLICATION OF DECIMALS

Use the same method as for long multiplication, ignoring the decimal point in the multiplying out. The decimal point is "put into position" at the end of the sum.

Example 1

6.7 x 2

is written: 67
          x2
         134

There is one figure after the decimal point in the question so there must be only one after the point in the answer, so the answer to this example is: 13.4

Example 2

30.6 x 2.1

is written   306
         x21
        306
      6120
      6426

Now the decimal point must be placed in the number to give the correct answer.

Count the number of figures **after** the decimal points in the question.

With 30.6 there is one figure after the "."
With 2.1 there is one figure after the "."

So there are 2 figures after the decimal point in the questions and therefore in the answer. This means that the point goes here: Answer = 64.26

Example 3

2.9 x 0.0351

is written   351
         x29
       3159
       7020
    10179

There are 5 figures after the decimal points in the question, so the point must be inserted in the answer where there are also 5 figures after the point.

Answer = 0.10179

(If there are no whole numbers in the answer, put 0 in front of the decimal point to show this).

Example 4

1.2 x 0.0034

write it   34
       x 12
         68
      340
      408

5 figures after decimal point in question, the answer is 0.00408

Two noughts were added in this case, so that there were 5 figures after the decimal point in the answer.

Exercise 5

1.   4.2 x 6   2.   1.25 x 0.6   3.   3.15 x 18

4.   10.09 x 0.3   5.   0.46 x 0.023   6.   7.31 x 3.2

7.   186.41 x 0.27   8.   3.006 x 0.1   9. 27.6 x 0.01

10.   0.007 x 0.0002

MULTIPLYING A NUMBER BY 10

e.g.   27.6 x 10

may be written   276
                  x 10
              2760

As there is one figure after the decimal point in the question, the answer must be: 276.0.

You have probably been taught that a quick method of multiplying by 10 is to move the decimal point 1 place to the right. In actual fact, what really happens is that you move the number one place to the left. Whatever you do the effect is the same – the number is made ten times bigger!

Look at these examples

1. 6.43   x 10 = 64.3
2. 32.1   x 10 = 321 or 321.0
3. 0.832 x 10 = 8.32
4. 0.091 x 10 = 0.91
5. 231.34 x10 = 2313.4 or 23134.0

The following examples are slightly different because you have to add 0 after the last number to obtain the right answer:

6. 6.2   x 100 = 620 or 620.0
7. 0.1   x 100 =   10 or 10.0

If you add 0 in this way, the value of the number does not alter –

e.g. 6.2 = 6.2000 so 6.2000 x 100 = 620.00

8. 0.2   =   0.2000 so 0.2 x 100 =   20.00
9. 7.2   =   7.2000 so 7.2 x 100 =   720.00
10. 134.6 = 134.6000 so 134.6x 100 = 13460.00

You will by now have seen a pattern when multiplying by 10, 100 and 1000.

x by   10 (number moves or point moves **one place**)
x by   100 (number or point moves **two places**)
x by 1000 (number or point moves **three places**)

Exercise 6

Multiply each number by   a) 10   b) 100   c) 1000

1. 5.7   2.   0.47   3.   0.0065   4.   12.01   5. 180.02

DIVISION OF DECIMALS

The important points to remember are:

1.   The number you are dividing by **must** be a whole number. To do this you will need to multiply the number which you are **dividing by**, by 10 or 100 or 1000.

2.   Whatever you do to that number, you must do the same to the number which you are **dividing**.

3.   The number you are dividing by is the denominator, the number which is being divided is the numerator.

Example 1

$$\frac{4.48}{0.4} \text{ becomes } \frac{44.8 \times 10}{0.4 \times 10} = \frac{44.8}{4}$$

Now that the denominator is a whole number, the division can be made.

$$4\overline{)44.8}$$

Put the decimal point on the 'answer line' directly above the other decimal point as soon as you have written out the question in this form.

$$4\overline{)44.8}^{\;\;.}$$

Then do the sum

$$4\overline{)44.8}^{\;11.2} \quad \text{So 11.2 is the answer}$$

Example 2

$$0.36 \div 0.6 \;=\; \frac{0.36}{0.6} \text{ which becomes } \frac{3.6}{6}$$

Now write it as follows:

$$6\overline{)3.6}^{\;0.6} \qquad \text{Answer } = 0.6$$

Example 3

$$42.82 \div 0.002 = \frac{42.82}{0.002} \text{ which becomes } \frac{42820}{2} \quad \text{Answer } = 21410.0$$

Example 4

$$0.175 \div 0.25 \;=\; \frac{0.175}{0.25} \text{ which becomes } \frac{17.5}{25}$$

$$= 25\overline{)17.5}^{\;00.7} \qquad \text{Answer } = 0.7$$

Exercise 7

1.   6.25 ÷ 0.5
2.   54.63 ÷ 0.3
3.   9.9   ÷ 0.11
4.   16.86 ÷ 0.2
5.   10.25 ÷ 1.25

DIVIDING BY 10, 100 AND 1000

When you are dividing a number you are making it smaller. You may have been taught to move the decimal point to the left when dividing. This has the same effect as moving the number to the right.

Examples

$$\frac{32.6}{10} = 3.26 \textbf{ AND } \frac{32.6}{100} = 0.326$$

$$\frac{1.2}{10} = 0.12 \textbf{ AND } \frac{1.2}{100} = 0.012$$

$$\frac{0.6}{10} = 0.06 \textbf{ AND } \frac{0.6}{100} = 0.006$$

Exercise 8

Divide by: a)   10   b) 100   c) 1000

1.   246.3   2.   8.2   3.   73.1   4.   0.07   5.   250.04

DECIMAL CURRENCY

Our monetary system is based on the decimal system, (operating in 10's).

5p =	£0.05
10p =	£0.10
50p =	£0.50
75p =	£0.75
100p =	£1.00
150p =	£1.50 etc.

What is 358p in £'s? $\frac{358}{100}$ =   £3.58

How many p's in £5.46?   £5.46 x 100 = 546p

Exercise 9

Express the following amounts in p's.

1.   £1.42   2.   £13.64   3.   £7 (or £7.00)   4.   £0.38   5.   £0.76

Exercise 10

Express these in £'s

1.   123p   2.   479p   3.   53p 4.   6p   5.   600p

Remember – when adding, subtracting, multiplying and dividing, use the same rules as for numbers.

Exercise 11

Do these:-

1.   £4.96 + £14.21   2.   £53.47 + 53p   3.   £74.20 - £9.38

4.   £100   - £68.35   5.   £14.27 x 3   6.   £1.98 x 7

7.   £15.60 ÷ 12   8.   £65.50 ÷ 50

9.   Find the cost of 8 articles at 14p each.

10.   Find the cost of 24 articles at £8.15 each.

11.   What is the change from £1 after buying 15 sweets at 3p each?

12.   Divide £3.60 among 9 people.

WAGES

If you are in employment, you receive a wage (paid weekly) or a salary (paid monthly). Many people are paid on an hourly basis i.e. they receive a certain amount of money for every hour they work.

Example 1

A man works 30 hours and his basic rate is £3.50 per hour. Calculate his total weekly wage. For 1 hour he gets £3.50.   For 30 hours he gets £3.50 x 30 = £105.00 per week.

Example 2

A woman is paid £12.50 for 5 hours cleaning. What is the rate per hour?

5 hours = £12.50

1 hour $= \dfrac{£12.50}{5} = £2.50$

Exercise 12

Calculate the weekly rate for:-

1.   38 hours at £2.75 per hour

2.   40 hours at £3.50 per hour

Calculate the pay per hour (hourly rate) for:-

3.   Weekly wage of £128 for 40 hours

4.   Weekly wage of £72 for 36 hours.

OVERTIME

When someone works more hours than the basic week you are paid overtime. (This varies from job to job).

Overtime is usually paid at a higher rate than the normal (basic) pay:

e.g. Time and a half = one and a half times the basic rate **OR**
       double time = two times the basic rate.

Example 1

The basic rate per hour is £2.50. What is a) Double time **and** b) Time and a half.

a)   Basic pay = £2.50 Overtime pay (double) = £2.50 x 2 = £5.00

b)   Basic pay = £2.50 Overtime pay (time and a half) = 1.5 x £2.50 = £3.75

Example 2

Sam Smith works a 30 hour week. His basic rate is £3.00 per hour. One week after working overtime at time and a half, his take home pay is £108.00. How many hours did he work overtime?

30 hours at £3.00	= £90.00
Overtime pay	= take home pay – basic week
	= £108 - £90 = £18
Overtime rate	= time and a half
	= £3.00 x 1.5
	= £4.50
Number of hours overtime	= $\dfrac{\text{o/t pay}}{\text{o/t rate}}$
	= $\dfrac{£18}{£4.5}$

= The amount of overtime is 4 hours

Exercise 13

1.   A girl is paid a basic rate of £2.25 per hour. Find the rate of pay for overtime at:-

      a)   double rate
      b)   time and a half to the nearest p
      c)   time and a quarter to the nearest p

2.   A man works a 30 hour week for which he is paid £120. He then works 6 hours overtime for which he is paid time and a half. How much did he earn in that week?

3.   A home-help's basic hourly rate is £2.88. Overtime is paid at time and a half. If the basic week is 36 hours, how many hours of overtime must a home-help work to earn £120.96?

SALARIES

Professions such as civil servants, nurses, teachers, secretaries etc. are paid a fixed amount for one year's work.

They are not paid overtime and so their annual salary is divided into 12 equal parts, which they are paid on a particular day in the month.

Example 1

A nurse is paid £5640 per annum. What is her monthly salary?

Divide her annual salary by 12 i.e. monthly salary $\dfrac{£5640}{12} = £470$

Example 2

A teacher is paid £520 a month. How much is his annual salary?

Multiply the monthly payment by 12, £520 x 12 = £6240.

Exercise 14

1. Work out the monthly payment if the annual salary is:

    a) £8412   b) £12648

2. Work out the annual salary is the monthly payment is:

    a) £398   b) £564.25

TO CHANGE A FRACTION INTO A DECIMAL

Divide the numerator (top number) by the denominator (bottom number).

Examples

$$\frac{3}{4} \text{ becomes } 4\overline{)3.00}^{\,0.75} \quad \text{Remember you can put as many noughts as you like here.}$$

$$\frac{7}{8} \text{ becomes } 8\overline{)7.000}^{\,0.875}$$

$$\frac{1}{3} \text{ becomes } 3\overline{)1.000}^{\,0.333} \quad \text{This number keeps recurring (going on and on).}$$

We can write this as $0.\dot{3}$ but it is better written as $0.3\dot{3}$ (to 2 d.p.) or $0.333\dot{3}$ (to 4 d.p.) etc.

"˙" Above the 3 means that 3 is recurring i.e. $33333\dot{3}$ etc.

ANSWERS

Exercise 1

	1000	100	$\frac{1}{10}$	$\frac{1}{1}$	.	$\frac{1}{10}$	100	1000
1.			2	4	.	7		
2.		1	2	0	.	7	9	
3.				6	.	2	3	
4.			4	7	.	1	2	7
5.				7	.	3	0	7

Exercise 2

1. 7.0   2. 13.0   3, 127.0   4. 1000.0   5. 2300.0

Exercise 3

1. $\frac{2}{5}$ 2. $5\frac{3}{5}$ 3. $17\frac{1}{25}$ 4. $402\frac{1}{4}$ 5. $\frac{1}{1000}$

6. $\frac{3}{500}$ 7. $10\frac{9}{200}$ 8. $300\frac{31}{1000}$ 9. $147\frac{101}{1000}$ 10. $13\frac{11}{200}$

Exercise 4

1. 103.45   2. 49.94   3. 1160.7   4. 35.617   5. 109.136

6. 4.41   7. 0.05   8. 12.84   9. 5173.34   10. 43.56

Exercise 5

1. 25.2   2. 0.75   3. 56.7   4. 3.027   5. 0.01058

6. 23.392   7. 50.3307   8. 0.3006   9. 0.276   10. 0.0000014

Exercise 6

	a	b	c
1.	57	570	5700
2.	4.7	47	470
3.	0.065	0.65	6.5
4.	120.1	1201	12010
5.	1800.2	18002	180020

Exercise 7

1. 12.5   2. 182.1   3. 90   4. 84.3   5. 8.2

Exercise 8

	a	b	c
1.	24.63	2.463	0.2463
2.	0.82	0.082	0.0082
3.	7.31	0.731	0.0731
4.	0.007	0.0007	0.00007
5.	25.004	2.5004	0.25004

Exercise 9

1. 142p   2. 1364p   3. 700p   4. 38p   5. 76p

Exercise 10

1. £1.23   2. £4.79   3. £0.53   4. £0.06   5. £6.00

Exercise 11

1. £19.17   2. £54.00   3. £64.82   4. £31.65

5. £42.81   6. £13.86   7. £1.30   8. £1.31

9. £1.12   10. £195.60   11. £0.55 or 55p   12. £0.40 or 40p.

Exercise 12

1. £104.50   2. £140   3. £3.20   4. £2.00

Exercise 13

1. a) £4.50   b) £3.38   c) £2.81

2. £156

3. 4

Exercise 14

1. a) £701   b) £1054

2. a) £4776   b) £6771