DOCUMENT RESUME

ED 022 941 08 VT 006 897

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OCCUPATIONAL MATHEMATICS; DIVISION OF DECIMALS. REPORT NO. 16-L. FINAL REPORT.

Washington State Coordinating Council for Occupational Education, Olympia.; Washington State Univ., Pullman. Dept. of Education.
Spons Agency-Office of Education (DHEW), Washington, D.C.
Bureau No-BR-7-0031
Pub Date Jun 68
Grant-OEG-4-7-070031-1626
Note-131p.
EDRS Price MF-$0.75 HC-$5.32
Descriptors-*ARITHMETIC, *DECIMAL FRACTIONS, *DIVISION, *PROGRAMED TEXTS, *VOCATIONAL EDUCATION

This programed mathematics textbook is for student use in vocational education courses. It was developed as part of a programed series covering 21 mathematical competencies which were identified by university researchers through task analysis of several occupational clusters. The development of a sequential content structure was also based on these mathematics competencies. After completion of this program the student should be able to correctly divide decimal fractions. The material is to be used by individual students under teacher supervision. Twenty-six other programed texts and an introductory volume are available as VT 006 882-VT 006 909, and VT 006 975. (EM)

FINAL REPORT
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Occupational Mathematics

DIVISION OF DECIMALS

June 1968

U.S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE

Office of Education
Bureau of Research

Occupational Mathematics

DIVISION OF DECIMALS

Project No. 0E7-0031
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Report No. 16-L

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June 1968

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Washington State University, Department of Education, Pullman, Washington
State Coordinating Council for Occupational Education, Olympia, Washington

Greetings! You are about to begin improving your knowledge of basic mathematics. There are many important uses for the mathematics you are learning.

This booklet is not like your ordinary books. It is designed to help you learn as an individual. On the following pages you will find some information about mathematics. After the information is presented, you will be asked a question. Your answers to these questions will determine how you proceed through this booklet. When you have selected your answer to the question, turn to the page you are told to.

Do not write in this booklet. You may wish to have a pencil and some paper handy so you can write when you want to.

Remember this is not an ordinary book.

1. Study the material on the page.
2. Read the question on the page (you may want to restudy the material on the page).
3. Select the answer you believe is correct.
4. Turn to the page indicated by your answer.

Are you ready to begin?

(a) Yes — Turn to page 1

(b) No — Turn to page C

(c) HELP — Go see your teacher

Your answer was (b) No.

Well, this booklet is a little different.

Go back and read page B again. After you have read it, you will probably be ready to begin.

This booklet is designed to teach you how to divide with decimals. Here are a couple of suggestions which will make your work easier and cut down on mistakes:

1. Take time to be neat with your work.
2. It is very, very important that you line up your columns of numbers carefully. This is especially true in the division of decimals where moving a number over one column will give you an incorrect answer.

Okay, now let's begin. Our process for dividing decimals will always be to divide a decimal by an integer or whole number. Therefore, all we do is place the decimal point of the dividend in exactly the same place in the quotient and divide.

Example:
$$3\overline{)\,.36}$$
.12 ← quotient
.36 ← dividend
3 ↑ divisor

Remember: Line all of your work up neatly in columns.

Continued on next page

Here's a problem for you.

Find the quotient of $4\overline{).44}$

(a) 11 Turn to page 3

(b) 1.1 Turn to page 6

(c) .11 Turn to page 5

Correct! You are doing nicely.

Work this problem.

$6\overline{)64.8}$ = ?

(a) 1.8 Turn to page 8

(b) 108 Turn to page 26

(c) 10.8 Turn to page 14

I'm sorry, but you forgot the decimal point.

Always place the decimal point in the quotient <u>first</u>. Then divide.

Remember, before we divide, a problem like $6\overline{)13.6}$ becomes $6\overline{)\dot{1}3.6}$. Put that <u>decimal point</u> in the quotient.

Try this problem.

.248 ÷ 2 = ?

(a) 124 Turn to page 9

(b) 1.24 Turn to page 15

(c) .124 Turn to page 12

I'm sorry, but you forgot the decimal point.

Always place the decimal point in the quotient first. Then divide.

Remember, before we divide, a problem like $6\overline{)13.6}$ becomes $6\overline{)\dot{1}3.6}$. Put that decimal point in the quotient.

Try this problem.

.248 ÷ 2 = ?

(a) 124 Turn to page 9

(b) 1.24 Turn to page 15

(c) .124 Turn to page 12

Good! Your last answer was correct.

Try this one.

$5\overline{)15.5}$ = ?

(a) .31 Turn to page 16

(b) 3.1 Turn to page 14

(c) .031 Turn to page 11

Incorrect. You placed the decimal point incorrectly.

Remember, we always place the decimal point in the quotient <u>first</u>. And, we always place the decimal point directly above where it is in the dividend.

Example: For the problem $6\overline{)13.6}$, we place the decimal point in the quotient like this:

```
  .     <- quotient
6)13.6  <- dividend
```

Try this problem.

.248 ÷ 2 = ?

(a) .124 Turn to page 12

(b) 1.24 Turn to page 15

(c) 124 Turn to page 9

Excellent! Keep up the good work.

What is the quotient of $4/\overline{80.016}$?

(a)	20.4	Turn to page 13
(b)	20.04	Turn to page 21
(c)	20.004	Turn to page 23
(d)	2.4	Turn to page 27

Oh, oh! You forgot something. There should be a zero in your answer. Let's see where it should be. The problem begins as follows:

Step 1:
```
      1 .
6/64.8
   6
   ---
   4
```

Step 2:
```
      10.
6/64.8
   6
   ---
   4
   0
   ---
   4 8
```
Since 6 does not divide 4 evenly, we must place a zero in the quotient.

Step 3:
```
      10.8
6/64.8
   6
   ---
   4
   0
   ---
   4 8
   4 8
   ---
```
Thus, 10.8 is the correct answer.

Work this problem.

$12/\overline{39.6} = ?$

(a) 3.3 — Turn to page 2

(b) .33 — Turn to page 20

(c) .033 — Turn to page 26

Incorrect.

You are not paying attention to what is written. Go back to page 3 and read the material move carefully. Then work the problem on that page again.

Turn to page 3

Incorrect.

Let's look at the problem $3\overline{)3.69}$. First, take $3\overline{)3.69}$ and place the decimal point [$3\overline{)3.69}$]. Now divide like this:

Step 1:
$$3\overline{)3.69}\quad \begin{array}{r} 1. \\ 3 \\ \hline 6 \end{array}$$

Step 2:
$$3\overline{)3.69}\quad \begin{array}{r} 1.2 \\ 3 \\ \hline 6 \\ 6 \\ \hline 9 \end{array}$$

Step 3:
$$3\overline{)3.69}\quad \begin{array}{r} 1.23 \\ 3 \\ \hline 6 \\ 6 \\ \hline 9 \\ 9 \\ \hline \end{array}$$

Okay? Work this problem then.

16.8 ÷ 8 = ?

(a) 2.1 Turn to page 12

(b) .21 Turn to page 15

(c) 21 Turn to page 18

Your last answer was incorrect.

You have the decimal point in the wrong place. Did you place the decimal point in the quotient first? Did you keep your columns lined up?

The problem is worked like this:

$$\begin{array}{r} 3.1 \\ 5\overline{)15.5} \\ \underline{15} \\ 5 \\ \underline{5} \end{array}$$

Find the quotient of $6\overline{)24.66}$.

(a) 411 Turn to page 19

(b) 4.11 Turn to page 2

(c) .411 Turn to page 26

Your answer was correct. I think you are on the right track now.

Let's work this one.

Find the quotient of $3\overline{)3.69}$.

(a) 123 Turn to page 4

(b) 1.23 Turn to page 5

(c) 12.3 Turn to page 10

Incorrect. $4/\overline{80.016} = 20.004$.

You must keep everything lined up in your work.

Look at the solution this way:

```
     2| . |  |4
   4/8|0|.0|1|6
     8|   |  |
      |   |1 |6
      |   |1 |6
```

Look at the columns in the quotient between 2 and 4. A digit must occupy each space. For this problem that digit is zero. Remember that a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

You work this one. $6/\overline{72.0168} = ?$

(a) 12.0028 Turn to page 29

(b) 12.28 Turn to page 25

(c) 1228 Turn to page 30

Very good! Your last answer was correct.

Work this problem.

.707 ÷ 7 = ?

(a)	1.1	Turn to page 41
(b)	.11	Turn to page 33
(c)	10.1	Turn to page 28
(d)	1.01	Turn to page 24
(e)	.101	Turn to page 7

Incorrect.

The decimal point is in the wrong place. Let's work an example problem to show you how. .248 ÷ 2 becomes $2/\dot{.}\overline{248}$. Notice that I put the decimal point directly above where it was in the dividend. Now I divide one step at a time:

Step 1:
$$\begin{array}{r} .1 \\ 2/\overline{.248} \\ \underline{2} \\ 4 \end{array}$$

Step 2:
$$\begin{array}{r} .12 \\ 2/\overline{.248} \\ \underline{2} \\ 4 \\ \underline{4} \\ 8 \end{array}$$

Step 3:
$$\begin{array}{r} .124 \\ 2/\overline{.248} \\ \underline{2} \\ 4 \\ \underline{4} \\ 8 \\ \underline{8} \end{array}$$

Work this problem.

$3/\overline{.6} = ?$

(a) .2 Turn to page 12

(b) 2 Turn to page 17

Your last answer was incorrect. You have the decimal point in the wrong place.

Did you place the decimal point in the quotient first?

Did you keep your columns lined up?

The problem is worked like this:

$$\begin{array}{r} 3.1 \\ 5\overline{)15.5} \\ \underline{15} \\ 5 \\ \underline{5} \end{array}$$

Find the quotient of $6\overline{)24.66}$.

(a) 411 Turn to page 19

(b) 4.11 Turn to page 2

(c) .411 Turn to page 26

You seem to be having trouble with that decimal point.

Ask your teacher for help and then return to page 1 of this Unit.

I'm sorry, but you forgot the decimal point. Always place the decimal point in the quotient <u>first</u>.

Go back to page 10 and work the problem again.

Turn to page 10.

Whoops! You forgot the decimal point.

Return to page 16 and work the problem again. This time don't forget the decimal point.

Turn to page 16.

Doggone! That slippery decimal point just keeps getting in the wrong position.

Your last problem should have worked out like this:

$$
\begin{array}{r}
3.3 \\
12\overline{)39.6} \\
\underline{36} \\
3\,6 \\
\underline{3\,6}
\end{array}
$$

Try again.

$4\overline{)2.48} = ?$

(a) 6.2 Turn to page 26

(b) .62 Turn to page 2

(c) 62 Turn to page 31

Incorrect. $4/\overline{80.016} = 20.004$.

You must keep everything lined up in your work.

Look at the solution this way:

```
    2 | | .  |   | 4
  4/8 |0| .0 | 1 | 6
    8 | |    |   |
  ----+-+----+---+--
      | |    | 1 | 6
      | |    | 1 | 6
```

Look at the columns in the quotient between 2 and 4.

A digit must occupy each space. For this problem that digit is zero. Remember that a digit is an integer less than 10. The following integers are digits:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

You work this one.

$6/\overline{72.0168} = ?$

(a) 12.0028 Turn to page 29

(b) 12.28 Turn to page 25

(c) 1228 Turn to page 30

Incorrect. You didn't take time to make sure that every column in the quotient had an integer in it.

Let's do another problem and be more careful this time.

$8/\overline{9.92}$ = ?

(a) 1.14 Turn to page 42

(b) 12.4 Turn to page 25

(c) 1.24 Turn to page 29

You are doing fine. Your last answer was correct.

Work this problem now.

.022 ÷ 11 = ?

(a) .2 Turn to page 46

(b) .02 Turn to page 38

(c) .002 Turn to page 35

Incorrect. $.707 \div 7 = .101$.

Here's how it is worked.

$$
\begin{array}{r|lll}
 & .1 & 1 \\
\hline
7/. & 7 & 0 & 7 \\
 & \underline{7} & & \\
 & & & 7 \\
 & & & \underline{7}
\end{array}
$$

Notice the column between the two ones. It must be filled by some digit. That digit is the result of $0 \div 7$, which is 0. In case you have forgotten, a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Work this problem: $3/\overline{3.09} = ?$

(a) 1.03 Turn to page 37

(b) 1.003 Turn to page 36

(c) 1.3 Turn to page 32

Incorrect.

Let's line up the columns carefully this time and make sure we put the decimal point in the right place.

Here's your next problem.

$2\overline{)40.6} = ?$

(a) 2.3 Turn to page 32

(b) 20.3 Turn to page 29

That answer is wrong. The decimal point has been placed incorrectly. You must have been careless, huh?

Take your time and work this one.

$3/\overline{4.2}$ = ?

(a) 1.4 Turn to page 2

(b) .14 Turn to page 15

Incorrect. $4/\overline{80.016} = 20.004$.

You must keep everything lined up in your work.

Look at the solution this way:

```
    2   .   4
4/8 0 . 0 1 6
  8
  -------
      1 6
      1 6
```

Look at the columns in the quotient between 2 and 4. A digit must occupy each space. For this problem that digit is zero. Remember that a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

You work this one.

$6/\overline{72.0168} = ?$

(a) 12.0028 Turn to page 29

(b) 12.28 Turn to page 25

(c) 1228 Turn to page 30

Incorrect. $.707 \div 7 = .101$.

Here's how it is worked: Notice the column between the two ones. It must be filled by some digit. That digit is the result of $0 \div 7$, which is 0. In case you have forgotten, a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

$$\begin{array}{r} .1\ \ 1 \\ 7\overline{).7\ 0\ 7} \\ 7\ \ \ \ \ \\ \hline 7 \\ \underline{7} \end{array}$$

Work this problem.

$3\overline{)3.09} = ?$

(a) 1.03 Turn to page 37

(b) 1.003 Turn to page 36

(c) 1.3 Turn to page 32

Okay!

Work this one.

$14/\overline{28.14} = ?$

(a) 2.1 Turn to page 22

(b) 2.01 Turn to page 23

(c) 21 Turn to page 25

Whooops! You forgot that decimal point.

Rework the problem on page 13 again and this time put the decimal point in the correct place.

Turn to page 13.

Where does the decimal point go?

Go back to page 20 and put the decimal point in your answer this time.

Turn to page 20.

Incorrect.

You're having problems placing the decimal point. Take your time and be more careful. Maybe another example problem will help. Notice the columns that I have drawn on the example to help you. Remember, you should have one digit in each column in the quotient.

Example:

```
      1 | . 0 | 7
    ------------
5 / 5 | . 3 | 5
    5 |     |
    ------------
      |   3 | 5
      |   3 | 5
      ------------
```

You work this one.

$2/\overline{2.08}$ = ?

(a) 1.4 Turn to page 39

(b) 1.04 Turn to page 37

Incorrect. $.707 \div 7 = .101$.

Here's how it is worked.

$$\begin{array}{r|l|l} & .1 & 1 \\ \hline 7/. & 7\,0 & 7 \\ & 7 & \\ \hline & & 7 \\ & & 7 \end{array}$$

Notice the column between the two ones. It must be filled by some digit. That digit is the result of $0 \div 7$, which is 0. In case you have forgotten, a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Work this problem.

$3/\overline{3.09}$ = ?

(a) 1.03 Turn to page 37

(b) 1.003 Turn to page 36

(c) 1.3 Turn to page 32

Okay! Now you're getting it.

Work this one.

$7/\overline{.0728} = ?$

(a) .104 Turn to page 50

(b) .0104 Turn to page 40

(c) .014 Turn to page 57

Good!

Your last answer worked out to three decimal places or thousandths. That was correct.

Your next problem is $2/\overline{.00208}$ = ?

(a) .0014 Turn to page 59

(b) .00104 Turn to page 40

(c) .104 Turn to page 45

Incorrect. You're having problems placing the decimal point.

Take your time and be more careful. Maybe another example problem will help. Notice the columns I have drawn on the example to help you. Remember, you should have one digit in each column in the quotient.

Example:

```
      1 . 0 7
    ---------
5 / 5 . 3 5
    5
    ---------
        3 5
        3 5
    ---------
```

You work this one.

$2/\overline{2.08}$ = ?

(a) 1.4 Turn to page 39

(b) 1.04 Turn to page 37

Okay!

Try this one.

12.018 ÷ 6 = ?

(a) 2.3 Turn to page 44

(b) 2.03 Turn to page 47

(c) 2.003 Turn to page 7

Incorrect. $.022 \div 11 = .002$.

Let's look at the solution to the problem.

$$
\begin{array}{r|l}
11 & .002 \\
\hline
.022 & \\
0 & \\
\hline
22 & \\
22 & \\
\hline
\end{array}
$$

It's very important to keep your columns lined up and place a digit in each column in the quotient.

Work this problem.

$3/\overline{.09} = ?$

(a) .3 Turn to page 49

(b) .03 Turn to page 56

(c) .003 Turn to page 52

Your last answer was incorrect.

You seem to be having trouble with the place value concept of decimals. Go review Unit 8 and then return to page 1 of this Unit.

Go to Unit 8, Concept of Decimals and Fractions, page 1.

Correct! You are doing very well.

Let's continue.

$300/\overline{.9} = ?$

(a) .003 Turn to page 70

(b) .03 Turn to page 77

(c) .3 Turn to page 66

(d) .0003 Turn to page 63

Incorrect. $.707 \div 7 = .101$.

Here's how it is worked.

```
   .1  1
7/.7 0 7
  7
  --
    7
    7
```

Notice the column between the two ones. It must be filled by some digit. That digit is the result of $0 \div 7$, which is 0.

In case you have forgotten, a digit is an integer less than 10. The following integers are digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

Work this problem.

$3/\overline{3.09} = ?$

(a) 1.03 Turn to page 37

(b) 1.003 Turn to page 36

(c) 1.3 Turn to page 32

Incorrect.

You made a mistake in your division. $8/\overline{9.92} = 1.24$.

Work this problem.

$30/\overline{6.090} = ?$

(a) 2.3 Turn to page 51

(b) .23 Turn to page 48

(c) .023 Turn to page 25

(d) .203 Turn to page 29

My goodness! Where is that decimal point?

Go back to page 47 and find it.

Turn to page 47.

Whoops! You forgot some zeroes in your answer.

Turn back to page 37 and try again. Turn to page 37.

Incorrect.

All the <u>zeroes</u> in .00208 are significant figures and can't be discarded or ignored. Each one of those <u>zeroes</u> is a place holder and will have a digit in their position in the quotient.
.00208 ÷ 2 = .00104.

Let's try again.

.0168 ÷ 6 = ?

(a) .28 Turn to page 53

(b) .028 Turn to page 50

(c) .0028 Turn to page 34

Incorrect. .022 ÷ 11 = .002.

Let's look at the solution to the problem.

$$
\begin{array}{r|l}
 & 0\,0\,2 \\
\hline
11/. & 0\,2\,2 \\
 & 0 \\
\hline
 & 2\,2 \\
 & 2\,2 \\
\hline
\end{array}
$$

It's very important to keep your columns lined up and place a digit in each column in the quotient.

Work this problem.

$3/\overline{.09}$ = ?

(a) .3 Turn to page 49

(b) .03 Turn to page 56

(c) .003 Turn to page 52

Incorrect. You didn't take enough time to make sure that every column in the quotient had a digit in it.

Let's try another problem.

7.35 ÷ 7 = ?

(a) 1.05 Turn to page 37

(b) 1.5 Turn to page 32

(c) 15 Turn to page 43

Doggone!

You lost a zero that was supposed to have been in your quotient.

Go back to page 42 and find it. Turn to page 42.

Incorrect. You seem to be having difficulty in locating the decimal point. Perhaps a sample problem worked in detail will help. Let's work .04 ÷ 2.

Now the zero in .04 is a <u>significant</u> figure as it shows what decimal place the 4 is in. You must always allow a column for significant figures like this.

$$2/\overline{.\,|\,0\,|\,4}$$

Now 2 divides 0, 0 times, hence ... $2/\overline{.\,|\,0\,|\,4}$ or a 0 in the <u>tenths</u> position. Then 2 divides 4, 2 times and we get ... $2/\overline{.\,0\,|\,4}$. Thus, .04 ÷ 2 = .02.

You try one now.

$2/\overline{.008}$ = ?

(a) .04 Turn to page 55

(b) .004 Turn to page 56

Incorrect. You do seem to be having problems when zero is a significant figure.

As a decimal, there is a great difference between .2 and .02. Just ask yourself which would you would rather have, 2/10 (.2) of a dollar or 2/100 (.02) of a dollar? I hope you see that 2/10 of a dollar is 20¢ and 2/100 of a dollar is but 2¢.

Let's try again and be especially careful with those zeroes.

$8/\overline{.0008} = ?$

(a) .01 Turn to page 54

(b) .0001 Turn to page 34

(c) .1 Turn to page 49

Your answer was incorrect. $6.090 \div 30 = .203$.

Turn to page 25.

Incorrect. You seem to be having difficulty in locating the decimal point. Perhaps a sample problem worked in detail will help. Let's work .04 ÷ 2.

Now the zero in .04 is a <u>significant</u> figure as it shows what decimal place the 4 is in. You must always allow a column for signficiant figures like this. $2/\overline{.04}$.

Now, 2 divides 0, 0 times, hence ... $\begin{array}{r} .0 \\ 2/\overline{.04} \end{array}$ or a 0 in the <u>tenths</u> position. Then 2 divides 4, 2 times and we get ... $\begin{array}{r} .02 \\ 2/\overline{.04} \\ \underline{4} \end{array}$. Thus, .04 ÷ 2 = .02.

You try one now.

$2/\overline{.008}$ = ?

(a) .04 Turn to page 55

(b) .004 Turn to page 56

Incorrect.

Why don't you draw some columns on your paper like this, $6\overline{).\,0\,1\,6\,8}$, and then make sure a digit appears in every column of the quotient.

Go back to page 45 and try again.

Incorrect. You seem to be having difficulty in locating the decimal point. Perhaps a sample problem worked in detail will help. Let's work .04 ÷ 2.

Now the zero in .04 is a <u>significant</u> figure as it shows what decimal place the 4 is in. You must always allow a column for significant figures like this. $2/\overline{.04}$.

Now 2 divides 0, 0 times, hence ... $2/\overline{.\ 0\ 4}$, or a 0 in the <u>tenths</u> position. Then 2 divides 4, 2 times and we get ... $2/\overline{.\ 0\ 4}$. Thus, .04 ÷ 2 = .02.

You try one now.

$2/\overline{.008}$ = ?

(a) .04 Turn to page 55

(b) .004 Turn to page 56

Your last answer was incorrect.

You seem to be having trouble with the place value concept of decimals. Go review Unit 8 and then return to page 1 of this Unit.

Go to Unit 8, Concept of Decimals and Fractions, page 1.

Okay!

Let's work another one.

.018 ÷ 6 = ?

(a) 3.00 Turn to page 61

(b) .03 Turn to page 60

(c) .003 Turn to page 35

Incorrect.

When your divisor does not divide the first digit in the dividend, you place a zero in the quotient.

Try again.

$4/\overline{.228}$ = ?

(a) .056 Turn to page 62

(b) .57 Turn to page 50

(c) .057 Turn to page 34

Nope!

Try again. You forgot the decimal point.

Turn to page 60.

Incorrect.

All the zeroes in .00208 are significaht figures and can't be discarded or ignored. Each one of those zeroes is a place holder and will have a digit in their position in the quotient. .00208 ÷ 2 = .00104.

Let's try again.

.0168 ÷ 6 = ?

(a) .28 Turn .o page 53

(b) .028 Turn to page 50

(c) .0028 Turn to page 34

Incorrect. The zero in the dividend seems to be bothering you.

You should know that any zeroes to the right of the decimal point that precede (go before) a non-zero digit are significant figures. I'm not sure you recall from previous work that significant figures cannot be dropped from mathematical operations.

Let's try a little easier problem and see if you can get back on the track.

What is .35 ÷ 7?

(a)	5	Turn to page 58
(b)	.5	Turn to page 49
(c)	.05	Turn to page 56

Aw, come on. You're not trying.

Go back to page 56 and be more careful this time.

Turn to page 56.

Incorrect. You made a mistake in arithmetic.

Let's do another one and get back on the right track.

.1326 ÷ 13 = ?

(a) .0102 Turn to page 34

(b) .012 Turn to page 47

(c) .102 Turn to page 50

Incorrect.

When an integer will not divide a number, you annex zeroes until it does. For example, 100 will not divide .3, so we add a zero and get .30. However, 100 still will not divide it, so we add still another zeroe making .300. (You should remember from our other units that .3 and .300 are equivalent decimals, as the zeroes we add to the right of a decimal do not change its value.)

Now, 100 will divide the decimal evenly, and we have a quotient of .003 for .3 ÷ 100.

You try one now.

.04 ÷ 8 = ?

(a)	20	Turn to page 94
(b)	200	Turn to page 88
(c)	.05	Turn to page 97
(d)	.005	Turn to page 80

Correct! $15 \div 5 = 5/\overline{15}$.

Go to page 70 and continue.

Correct again!

Round off 13.45 to the nearest whole number.

(a) 13 Turn to page 102

(b) 13.5 Turn to page 78

(c) 14 Turn to page 73

Incorrect.

When an integer will not divide a number, you annex zeroes until it does. For example, 100 will not divide .3, so we add a zero and get .30. However, 100 still will not divide it so we add still another zeroe making .300. (You should remember from our other units that .3 and .300 are equivalent decimals as the zeroes we add to the right of a decimal do not change its value.)

Now 100 will divide the decimal evenly, and we have a quotient of .003 for .3 ÷ 100.

You try one now.

.04 ÷ 8 = ?

(a)	20	Turn to page 94
(b)	200	Turn to page 88
(c)	.05	Turn to page 97
(d)	.005	Turn to page 80

Incorrect.

Round off to <u>hundredths</u> means to round off to <u>two</u> decimal places.

EXAMPLE .1 tenths

.01 hundredths

.001 thousandths

What is 7.7777 rounded off to the nearest hundredth?

(a) 7.77 Turn to page 115

(b) 7.778 Turn to page 110

(c) 8 Turn to page 106

(d) 7.78 Turn to page 104

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads <u>divided by</u>. So 1.1 ÷ 55 means 1.1 <u>divided by</u> 55.

$15 \div 5 = ?$

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads <u>divided by</u>. So 1.1 ÷ 55 means 1.1 <u>divided by</u> 55.

$15 \div 5 = ?$

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

Good! You're doing fine!

Here's another one.

1.1 ÷ 55 = ?

(a) 2.0 Turn to page 75

(b) .20 Turn to page 91

(c) 5.0 Turn to page 87

(d) .02 Turn to page 84

(e) 50 Turn to page 69

Incorrect.

Round off to <u>hundredths</u> means to round off to <u>two</u> decimal places.

EXAMPLE: .1 tenths

.01 hundredths

.001 thousandths

What is 7.7777 rounded off to the nearest hundredth?

(a) 7.77 Turn to page 115

(b) 7.778 Turn to page 110

(c) 8 Turn to page 106

(d) 7.78 Turn to page 104

Correct!

Do this one.

6.08 rounded off to the nearest whole number is:

(a)	7	Turn to page 98
(b)	6.1	Turn to page 78
(c)	6	Turn to page 65

Incorrect. You made a common mistake.

We <u>don't</u> start at the extreme right and round off until we get to the place we want, but rather, we pick the number <u>immediately</u> to the <u>right</u> of the place we want to round off to and see if that number is larger or smaller than 5. If it is equal to or larger than 5, we increase the number immediately to the left by 1. If it is smaller than 5, we leave the number immediately to the left the same.

Example: Rounded off to the nearest whole number, 1.54 becomes 2 while 1.45 becomes 1.

Go back to page 65 and work the problem again.

You are having trouble with basic division.

Go back and review Unit 7 on division of fractions and then return to page 40 of this Unit.

Go to Unit 7.

Incorrect. 1.1 ÷ 55 = .02.

Let's look at the solution. $55\overline{)1.10}$. Just place the decimal point correctly

$$\begin{array}{r} .02 \\ \hline 1\ 10 \end{array}$$

and keep your columns lined up, and you'll be okay.

Let's try another one.

.2 ÷ 4 = ?

(a) 20 Turn to page 83

(b) .2 Turn to page 95

(c) .05 Turn to page 99

Correct! You are doing very well. Keep up the good work.

Work this problem now.

Divide 5 by 7 and round off to the nearest hundredth.

(a)	.71	Turn to page 93
(b)	.714	Turn to page 67
(c)	.7	Turn to page 71
(d)	1	Turn to page 89

Incorrect.

When an integer will not divide a number, you annex zeroes until it does. For example, 100 will not divide .3, so we add a zero and get .30. However, 100 still will not divide it so we add still another zero making .300. (You should remember from our other Units that .3 and .300 are equivalent decimals as the zeroes we add to the right of a decimal do not change its value.)

Now, 100 will divide the decimal evenly; and we have a quotient of .003 for .3 ÷ 100.

You try one now.

.04 ÷ 8 = ?

(a)	20	Turn to page 94
(b)	200	Turn to page 88
(c)	.05	Turn to page 97
(d)	.005	Turn to page 80

Wait a minute. You were supposed to round off your answer to the nearest whole number.

A whole number is a number where <u>every</u> digit to the right of the decimal point is a zero.

EXAMPLE: (a) 36 is a whole number

(b) 360.0000 is a whole number

but

(c) 3.60000 is <u>not</u> a whole number

(d) 3.00006 is <u>not</u> a whole number

Go to page 82 and continue from there.

Whoa! Take your time and be more careful. You left out some zeroes.

Go back to page 86 and work the problem again.

Turn to page 86.

Correct!

Let's try one more to make sure you have it.

$25/\overline{.01} = ?$

(a) .004 Turn to page 85

(b) .0004 Turn to page 70

(c) .04 Turn to page 86

Your answer is incorrect.

There are many situations in which answers may be stated in round numbers. We should learn how to round numbers correctly.

When rounding off numbers, we replace certain digits in the number by zeroes. If we wanted to round off 3728 to the nearest hundred, for example, our answer would be 3700. You can see that 728 is nearer 700 than 800. Therefore, we replace the 2 and the 8 by integers.

In general, we will follow this rule: If the "first" number discarded (which means changed to zero) is 5 or larger, we shall increase the number immediately to the left of this first number by 1. If the first number discarded is less than 5, we shall not change any of the numbers which are retained or kept.

Continued on next page

Here are some examples:

	Number	Place	Rounded Number
(a)	1.365	hundredths	1.37
(b)	1.3647	hundredths	1.3600
(c)	1.365	whole number	1.000
(d)	1.365	tenths	1.400
(e)	1.3647	thousandths	1.3650

If any of the examples seem unclear, go back and read the explanation again.

Now turn to page 82.

Round off 6.85 to the nearest whole number.

(a)	6	Turn to page 96
(b)	7	Turn to page 72
(c)	6.9	Turn to page 78

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads divided by. So 1.1 ÷ 55 means 1.1 divided by 55.

$15 \div 5 = ?$

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

Your answer is correct.

Let's continue.

Divide 20 by 6 and round off the quotient to the nearest whole number.

(a)	4	Turn to page 103
(b)	3	Turn to page 100
(c)	.33	Turn to page 81

Not quite.

Go back to page 80 and work the problem again.

Incorrect.

Here's how the problem is worked.

25 does not divide 1 so we add a zero. Now 25 doesn't divide 10 either so we add a second zero, making .0100.

25 divides 100 evenly, thus our answer is .0004.

$$
\begin{array}{r|l}
25 & .0004 \\
\hline
 & 0100 \\
 & 0 \\
\hline
 & 100 \\
 & 100 \\
\hline
 & 0
\end{array}
$$

Try another one, but remember to keep your columns straight and your decimal point in the right place.

$16/\overline{1.2} = ?$

(a) .0075 Turn to page 97

(b) .75 Turn to page 79

(c) .075 Turn to page 80

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads <u>divided by</u>. So 1.1 ÷ 55 means 1.1 <u>divided by</u> 55.

15 ÷ 5 = ?

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads <u>divided by</u>. So 1.1 ÷ 55 means 1.1 <u>divided</u> <u>by</u> 55.

$15 \div 5 = ?$

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

Incorrect.

Round off to <u>hundredths</u> means to round off to <u>two</u> decimal places.

EXAMPLE: .1 tenths

.01 hundredths

.001 thousandths

What is 7.7777 rounded off to the nearest hundredth?

(a) 7.77 Turn to page 115

(b) 7.778 Turn to page 110

(c) 8 Turn to page 108

(d) 7.78 Turn to page 104

Correct again:

Round off 1.004 to the nearest hundredth.

(a)	1.01	Turn to page 107
(b)	1.004	Turn to page 67
(c)	1	Turn to page 76

Incorrect. 1.1 ÷ 55 = .02. Let's look at the solution.

```
   .02
55/1.10
   1 10
```

Just place the decimal point correctly and keep your columns lined up, and you'll be okay.

Let's try another one.

.2 ÷ 4 = ?

(a) 20 Turn to page 83

(b) .2 Turn to page 95

(c) .05 Turn to page 99

Incorrect. You put your decimal point in the wrong column.

Let's try again.

$16/\overline{.4} = ?$

(a) 40 Turn to page 68

(b) .4 Turn to page 83

(c) .025 Turn to page 99

.71 is correct!

What is 7.8 divided by 9 when it is rounded off to the nearest hundredth?

(a) .860 Turn to page 113

(b) .866 Turn to page 117

(c) .870 Turn to page 119

(d) .900 Turn to page 122

(e) none of the above answers Turn to page 126

Incorrect.

You seem to be having trouble recognizing what to divide. The symbol "÷" reads <u>divided by</u>. So 1.1 ÷ 55 means 1.1 <u>divided by</u> 55.

15 ÷ 5 = ?

(a) $15/\overline{5}$ Turn to page 74

(b) $5/\overline{15}$ Turn to page 64

!((*$*)(!

Don't just look at the problems. Work them! To get this answer, you would have divided by the wrong number AND placed the decimal incorrectly.

Go back to page 91 and try again.

Incorrect.

Go back to page 81 and read the material again. Then continue from there, but be more careful this time.

Turn to page 81.

Incorrect. You surely are having trouble with that decimal point. I think if you drew columns on your paper and placed a digit in each column in the quotient, you would do away with this problem.

Example: For 3.781 ÷ 2 we would set up the problem like this: $2\overline{)3.781}$.

Try this method with the following problem.

$6\overline{).3} = ?$

(a) .5 Turn to page 101

(b) .05 Turn to page 80

Incorrect.

You seem to be having trouble approximating or rounding off numbers.

Go see your teacher for help and then return to page 84 of this Unit.

Okay, I think you have it now.

Let's do one more to make sure.

$96/\overline{1.2}$ = ?

(a) .8 Turn to page 83

(b) .125 Turn to page 92

(c) .0125 Turn to page 84

Correct!

Here's your next problem.

Divide and round off to the nearest whole number.

1100 ÷ 16 = ?

(a)	67	Turn to page 120
(b)	70	Turn to page 116
(c)	68	Turn to page 109
(d)	69	Turn to page 76

Incorrect.

You are still having trouble with decimal place notation. Go review Unit 8 on the "Concept of Decimals and Fractions" and then return to page 40 of this Unit.

Go to page 1 of Unit 8.

Your answer is correct!

What is 7.832 rounded off to the nearest whole number?

(a) 7	Turn to page 81
(b) 8	Turn to page 84
(c) 7.83	Turn to page 105

Your answer is incorrect.

Did you divide 20 by 6 and get the decimal 3.33333...?

(a)	Yes	Turn to page 81
(b)	No	Turn to page 84 and divide the problem again

Okay! 7.78 is correct.

What is 1.0547 rounded off to the nearest hundredth?

(a) 1.05 Turn to page 111

(b) 1.06 Turn to page 108

(c) 1.1 Turn to page 115

Incorrect.

You were supposed to round off to the nearest whole number. I'm sure you remember that a whole number has no significant figures to the right of the decimal point.

EXAMPLE: (a) 36.0000 is a whole number

(b) 36.0006000 is NOT a whole number.

Go back to page 102 and try again.

Ooops!

8 is a whole number. You were supposed to round off to hundredths.

Go back to page 67 and make another choice. Turn to page 67.

Wait a minute!

Is 4 larger than 5? Of course not. Then you <u>can't</u> change the number immediately to the left.

Go back to page 90 and be more careful this time.

Your answer is incorrect.

You made a common mistake. We DON'T start at the extreme right and round off until we get to the place we want, but rather we pick the number immediately to the RIGHT of the place we want to round off to and see if that number is larger or smaller than 5.

If it is equal to or larger than 5, we increase the number immediately to the left by 1. If it is smaller than 5, we leave the number immediately to the left the same.

EXAMPLE: Rounded off to the nearest hundredth,

(a) 2.3464 becomes 2.35

while

(b) 2.3446 becomes 2.34

Go back to page 104 and work the problem again.

Your last answer was incorrect.

1100 ÷ 16 = 68.75, which we must round off to the nearest whole number. The correct answer was then 69.

What is 11.2 rounded off to the nearest whole number?

(a) 12 Turn to page 81

(b) 11 Turn to page 114

Incorrect.

Hundredths is <u>two</u> decimal places, not three.

Go back to page 67 and try again.

Good. 1.05 is correct!

What is 0.448 rounded off to the nearest hundredth?

(a) .45 Turn to page 90

(b) 1 Turn to page 115

Incorrect. You misplaced the decimal point.

Let's divide one more and round our answer off to the hundredths place.

Be more careful this time.

11/.9372 = ?

(a) .1 Turn to page 121

(b) .94 Turn to page 124

(c) .09 Turn to page 125

Incorrect.

7.8 ÷ 9 = .86666... which rounded off to the nearest hundredth is .87.

Round off 11.2674 to the nearest hundredth.

(a) 11.267 Turn to page 118

(b) 11.3 Turn to page 121

(c) 11.27 Turn to page 125

11 is correct!

What is .81 rounded off to the nearest whole number?

(a) .8 Turn to page 78

(b) 0 Turn to page 81

(c) 1 Turn to page 100

You seem to be having trouble rounding off numbers.

Go to page 81 and read the material there carefully. Then continue your program from there. Turn to page 81.

Your last answer was incorrect.

1100 ÷ 16 = 68.75 which we must round off to the nearest whole number. The correct answer was then 69.

What is 11.2 rounded off to the nearest whole number?

(a) 12 Turn to page 81

(b) 11 Turn to page 114

Incorrect.

7.8 ÷ 9 = .86666... which rounded off to the nearest hundredth is .87.

Round off 11.2674 to the nearest hundredth.

(a) 11.267 Turn to page 118

(b) 11.3 Turn to page 121

(c) 11.27 Turn to page 125

Incorrect.

Hundredths is <u>two</u> decimal places, not three.

Go back to page 113 and work the problem again.

Your last answer was correct! This completes Booklet #1.

You are to continue this Unit by going to Booklet #II and starting on page 128. Good luck and keep up the good work.

Go to Booklet #II of Unit 11.

Your last answer was incorrect.

1100 ÷ 16 = 68.75, which we must round off to the nearest whole number. The correct answer was then 69.

What is 11.2 rounded off to the nearest whole number?

(a) 12 Turn to page 81

(b) 11 Turn to page 114

Your last answer was incorrect.

Let's try an easier problem to get you back on the track.

Round off 8.9898 to the nearest hundredth.

(a) 9 Turn to page 67

(b) 8.99 Turn to page 125

Incorrect.

7.8 ÷ 9 = .86666... which rounded off to the nearest hundredth is .87.

Round off 11.2674 to the nearest hundredth.

(a) 11.267 Turn to page 118

(b) 11.3 Turn to page 121

(c) 11.27 Turn to page 125

m)

Incorrect.

Hundredths is <u>two</u> decimal places, not three.

Go back to page 124 and try again. Turn to page 124.

Doggone! You missed it.

Let's look at how it's worked.

$$
\begin{array}{r}
.0852 \\
11/\overline{.9372} \\
0 \\
\hline
93 \\
88 \\
\hline
57 \\
55 \\
\hline
22 \\
22 \\
\hline
\end{array}
$$

Now, .0852 rounded off to hundredths is .09.

You try one.

$32/\overline{1.5}$ = ? (Round off your answer to hundredths.)

(a) .047 Turn to page 123

(b) .046875 Turn to page 127

(c) None of the above answers Turn to page 125

Okay!

Try this one.

$9\overline{)19.75}$ = ? (Round off your answer to the nearest hundredth.

(a) 2.19 Turn to page 119

(b) 2.20 Turn to page 121

(c) .22 Turn to page 112

Incorrect.

7.8 ÷ 9 = .86666... which rounded off to the nearest hundredth is .87.

Round off 11.2674 to the nearest hundredth.

(a) 11.267 Turn to page 118

(b) 11.3 Turn to page 121

(c) 11.27 Turn to page 125

Well, you almost had it.

1.5 ÷ 32 does equal .046875. However, you were supposed to round your answer off to the hundredths place.

Go back to page 124 and find the correct answer.
Turn to page 124.