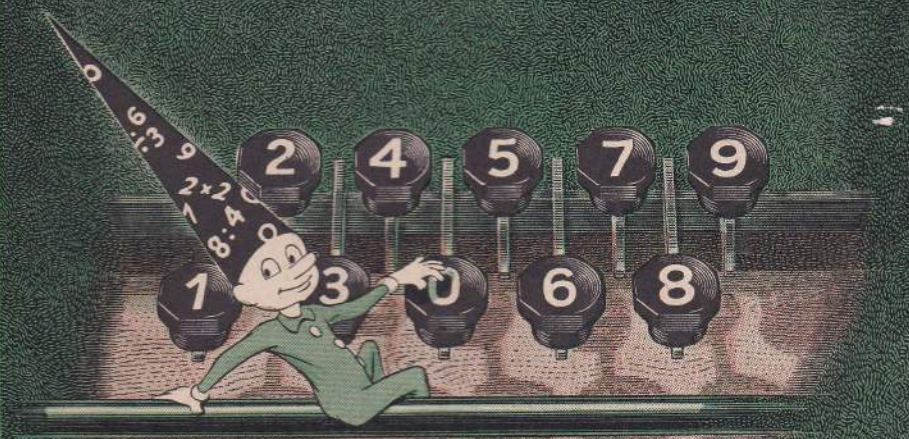
More ways
to get the *most*
out of your

FACIT



Note: Correction

On page 13 under the heading *The Operation in Figures,* move the decimal point one place to the right in the number 1542.625.

The number should then read 15426.25.

Note that this number occurs in three places.

Miss Bunton

Dou 9021.

More ways to get the most out of your FACIT

AKTIEBOLAGET ÅTVIDABERGS INDUSTRIER
ÅTVIDABERG • SWEDEN

TABLE OF CONTENTS

Preface

In this booklet is a collection of examples illustrating the simplest way to do various problems on the FACIT calculators.

Those who are thoroughly acquainted with the operation and capabilities of their machines will find here many examples of time-saving short cuts and fine points of calculating technique which go to make a master calculator.

Most of the examples apply to all models, but some have been worked out separately for hand or electric models. No special mention has been made of the Lx machine, as its construction is somewhat different.

A collection of examples such as this cannot, of course, include every possible kind of calculation. If you have a problem with recurrent calculations of an unusual type, though, we suggest you write us. We shall be glad to help you.

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The Same Figure Recurring in Several Additions

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

A bonus of $ 125.32 is to be added to each of the following wages:

$ 989.89, $ 1,251.23 and $ 959.43.

What will the final wages be?

For computing net wages, setting prices, and other calculations. In additions and subtractions of this kind, keeping the constant number in the product register saves time and makes for greater accuracy.

125.32 + 989.89 = ?

125.32 + 1,251.23 = ?

125.32 + 959.43 = ?

THE OPERATION IN FIGURES:

Set up the constant number 125.32 and transfer it to the product register. — 125.32

Set up 989.89 and add. On the NEA the addition is performed with the × key, on the ESA-O with the + key, in both cases with the main control lever in its centre position. + 989.89

The first wage is $ 1,115.21. (= 1,115.21)

Do not clear the registers.
Make a negative turn, which will subtract the last figure set up, 989.89. — 989.89
The constant figure, 125.32, will remain in the product register. (= 125.32)

Now clear the setting register and set up the next number to be added, 1,251.23, and add, in the same way as above. + 1,251.23

The second wage is $ 1,376.55. (= 1,376.55)

Do not clear the registers.
Subtract the figure last set up, 1,251.23, leaving 125.32 again in the product register. — 1,251.23 (= 125.32)

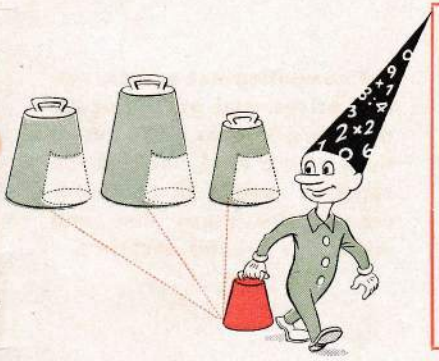
Clear the setting register, and add 959.43. + 959.43

The third wage is $ 1,084.75. = 1,084.75

PRINCIPLE: Set up the recurring number in the product register and add the first amount. Write down the sum, subtract the first amount and add the second, etc.

The Same Figure Recurring in Several Subtractions

In calculating with **TK, NEA** and **ESA-O**



EXAMPLE:

The gross weights of three lead chemical containers are: 989.89 kg, 1,251.23 kg and 959.43 kg. Each container weighs 125.32 kg.
What are the net weights of the chemicals in each container?

THE OPERATION IN FIGURES:

989.89 — 125.32 = ?
1,251.23 — 125.32 = ?
959.43 — 125.32 = ?

— 125.32

Set up the constant number 125.32 and make a negative turn.
The number appearing in the product register will be the complement of 125.32.
Clear the setting register.

(= 9999999987468)

+ 989.89

Set up 989.89 and add. On the NEA the addition is performed with the × key, and on the ESA-O with the + key, in both cases with the main control lever in its centre position.

(= 864.57) **The first net weight is 864.57 kg.**

— 989.89

Do not clear the registers. Make a negative turn, which will subtract the last figure set up, 989.89.
The complement of the recurring subtrahend, 125.32, will again appear in the product register.
Clear the setting register.

+ 1,251.23

Set up 1,251.23 and add in the same manner as before.

(= 1,125.91) **The second net weight is 1,125.91 kg.**

— 1,251.23

Do not clear the registers. Subtract the figure last set up, 1,251.23, leaving the complement of 125.32 again in the product register. Clear the setting register. Add the last figure, 959.43.

+ 959.43

= 834.11 **The third net weight is 834.11 kg.**

PRINCIPLE: Set up the complement of the recurring subtrahend in the product register, then add and subtract the various amounts as above.

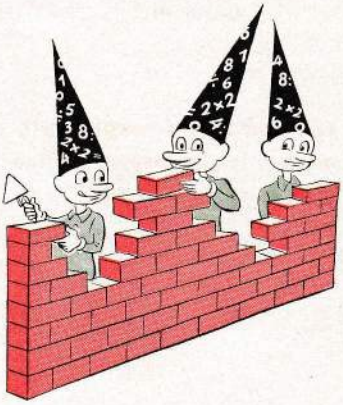
The Same Factor Recurring in Several Multiplications

In hand-operated multiplication with **TK**

EXAMPLE:

Three workers with the same hourly pay, $ 4.18, were employed on a job 31.1, 40.3 and 52.1 hours respectively.

How much did each receive in wages?



$31.1 \times 4.18 = ?$

$40.3 \times 4.18 = ?$

$52.1 \times 4.18 = ?$

THE OPERATION IN FIGURES:

The constant factor is 4.18. Set it up in the setting register, and multiply by 31.1.

4.18 × 31.1

The first worker's pay is $ 130.00. (= 129.998)

Do not clear the registers.
The constant factor, 4.18, must now be multiplied by 40.3. This can be done by changing the figure 31.1 in the multiplier register to 40.3.
Make a positive turn in the 100's-position, where the last multiplication ended. The figure in the multiplier register is now 41.1. Press the right-hand shift key and make a negative turn. Press once more on the right-hand shift key and make two positive turns. The figure in the multiplier register is now 40.3.

4.18 × 41.1
4.18 × 40.1
4.18 × 40.3

The second worker's pay is $ 168.45. (= 168.454)

Do not clear the registers.
Now the 40.3 in the multiplier register is to be changed to 52.1, by means of positive and negative turns and the left-hand shift key. Start with two negative turns, press the left-hand shift key, make two positive turns, press the left-hand shift key again and make one positive turn. The factor 52.1 now appears in the multiplier register.

4.18 × 40.1
4.18 × 42.1
4.18 × 52.1

The third worker's pay is $ 217.78. = 217.778

PRINCIPLE: Do the whole operation with the constant factor in the setting register. After each multiplication **the factor in the multiplier register is changed** to the new one, by positive and negative turns and use of the shift keys. If the various factors to be secured in the multiplier register differ very much from each other, it is recommended that the product and multiplier registers be cleared between multiplications.

The Same Factor Recurring in Several Multiplications

In semi-automatic multiplication with **NEA** and **ESA-O**

For computing wages, piece work, price increases, invoices, foreign exchange, etc.

EXAMPLE:

Three workers with the same hourly pay, $ 4.18, were employed on a job 31.1, 40.3 and 52.1 hours respectively.

How much did each receive in wages?

THE OPERATION IN FIGURES:

$31.1 \times 4.18 = ?$

$40.3 \times 4.18 = ?$

$52.1 \times 4.18 = ?$

Place the main control lever in its centre position and the secondary lever in the right-hand position. The constant factor is 4.18. Set it up with a nought in front and press the tabulator.

04.18 × 31.1

Multiply by 31.1, taking the digits from the left to right. (On the ESA-O this operation is performed with the + key.)

(= 129.998) **The first worker's pay is $ 130.00.**

Clear the product and multiplier registers and press the tabulator again, transferring the constant factor to the left of the setting register.

04.18 × 40.3

Carry out the next multiplication by 40.3 as before, from left to right. After multiplying by 4, press the right-hand shift key once for an extra step, so that the constant factor will be in the correct position to multiply by 3.

(= 168.454) **The second worker's pay is $ 168.45.**

Again clear the product and multiplier registers and press the tabulator key. Perform the multiplication by 52.1 as before.

04.18 × 52.1

217.778 **The third worker's pay is $ 217.78.**

PRINCIPLE: Do the whole operation with the constant factor preceded by a nought in the left end of the setting register. The multiplications are carried out from left to right.

The Same Factor Recurring in Several Multiplications

In fully automatic multiplication with **ESA-O**

EXAMPLE:

Three workers with the same hourly pay, $ 4.18, were employed on a job 31.1, 40.3 and 52.1 hours respectively.

How much did each receive in wages?

For computing wages, piece work, price increases, invoices, foreign exchange, etc.

$31.1 \times 4.18 = ?$
$40.3 \times 4.18 = ?$
$52.1 \times 4.18 = ?$

THE OPERATION IN FIGURES:

Move the main control lever to the left. The constant factor is 4.18. Set it up and press the × key.
Set up 31.1 and press the = key. 4.18 × 31.1

The first worker's pay is $ 130.00. (= 129.998)

Clear registers I and II and press the × key.
The constant factor, 4.18, now remains in the invisible register.
Set up 40.3 and press the = key. 4.18 × 40.3

The second worker's pay is $ 168.45. (= 168.454)

Clear registers I and II and press the × key.
Set up 31.1 and press the = key. 4.18 × 52.1

The third worker's pay is $ 217.78. = 217.778

PRINCIPLE: Do the whole operation with the constant factor in the invisible register. After each multiplication clear the setting register by pressing the × key.

The Same Divisor Recurring in Several Divisions

In calculating with **TK**

For calculating distributions and in various kinds of interest and exchange computations.

EXAMPLE:

Find the percentage distribution of the grand total, $ 59,150.00, over the following subtotals.

	$	%
Castings	**5,676.00**	**?**
Other raw materials ..	**13,743.00**	**?**
Purchased accessoires	**2,944.00**	**?**
Production labor	**9,626.00**	**?**
Transportation costs ..	**1,245.00**	**?**
Assembly labor	**11,551:00**	**?**
Miscellaneous expenses	**14,365.00**	**?**
	59,150.00	**100**

THE OPERATION IN FIGURES:

$$\frac{5{,}676}{59{,}150} = \text{?} \text{ etc.}$$

The total, 59,150, is the constant number by which all the amounts should be divided. But it is easier to perform a series of divisions with a constant divisor by finding its reciprocal and multiplying.

$\frac{1}{59150} = 0.000016906170$

The simplest way to perform the division $\frac{1}{59150}$ is the following: Set up 59150. Press the tabulator key, moving the number to the left end of the setting register. Make positive turns until the bell rings, then make one negative turn, and move one step to the right. Continue in the same manner until the multiplier register is full of figures.
The reciprocal value is thus 0.000016906170.

Since we are computing percentages, we can immediately multiply this figure by 100, that is, move the decimal point two places to the right, making eight decimal places in the following multiplication. Now set up 169062 as the constant multiplicand, and perform the multiplications with the various amounts by the same method as in the example on page 6.

0.00169062 × 5,676 (= 9.60)
0.00169062 × 13,743 (= 23.23)
0.00169062 × 2,944 (= 4.98)
0.00169062 × 9,626 (= 16.27)
0.00169062 × 1,245 (= 2.10)
0.00169062 × 11,551 (= 19.53)
0.00169062 × 14,365 (= 24.29)

9.60 + 23.23 + 4.98 + 16.27 + 2.10 + 19.53 + 24.29 (= 100.00)

The correctness of the multiplications can be checked by adding the computed percentages, which should total 100.

The percentage distribution is thus 9.60 %, 23.23 %, 4.98 %, 16.27 %, 2.10 %, 19.53 % and 24.29 %.

PRINCIPLE: Find the reciprocal of the grand total. Multiply it by the various subtotals.

The Same Divisor Recurring in Several Divisions

In calculating with **NEA** and **ESA-O**

EXAMPLE:

Find the percentage distribution of the grand total $ 59,150.00, over the following subtotals.

	$	%
Castings	**5,676.00**	**?**
Other raw materials ..	**13,743.00**	**?**
Purchased accessories	**2,944.00**	**?**
Production labor	**9,626.00**	**?**
Transportation costs ..	**1,245.00**	**?**
Assembly labor	**11,551.00**	**?**
Miscellaneous expenses	**14,365.00**	**?**
	59,150.00	**100**

For calculating distributions and in various kinds of interest and exchange computations.

$$\frac{5{,}676}{59{,}150} = \text{etc.}$$

THE OPERATION IN FIGURES:

The total, 59,150, is the constant number by which all the amounts should be divided. But it is easier to perform a series of divisions with a constant divisor by finding its reciprocal and multiplying.

The simplest way to perform the division $\frac{1}{59150}$ is the following: Set the main control lever in its right-hand position. Turn the revolution direction knob to its plus position. Set up 59,150, press the tabulator. Press the × key on the NEA, and the + key on the ESA-O. When the machine has finished the calculation the figure 16906171 will appear in the multiplier register. The reciprocal of the divisor is thus 0.000016906171.

$$\frac{1}{59150} = 0.000016906171$$

Since we are computing percentages, we can immediately multiply this figure by 100, that is, move the decimal point two places to the right, making eight decimal places in the following multiplication. Now set up 169062 as the constant multiplicand and perform the multiplications with the various amounts by the same method as in the previous examples — on page 7 for NEA and on page 8 for ESA-O.

0.00169062 × 5,676 (= 9.60)
0.00169062 × 13,743 (= 23.23)
0.00169062 × 2,944 (= 4.98)
0.00169062 × 9,626 (= 16.27)
0.00169062 × 1,245 (= 2.10)
0.00169062 × 11,551 (= 19.53)
0.00169062 × 14,365 (= 24.29)

The correctness of the multiplications can be checked by adding the computed percentages, which should total 100.

9.60 + 23.23 + 4.98 + 16.27 + 2.10 + 19.53 + 24.29 (= 100.00)

The percentage distribution is thus 9.60 %, 23.23 %, 4.98 %, 16.27 %, 2.10 %, 19.53 % and 24.29 %.

PRINCIPLE: Find the reciprocal of the grand total. Multiply it by the various subtotals.

Addition of the Products of Several Multiplications

In calculating with **TK, NEA** and **ESA-O**

For checking invoices and calculating different kinds of surfaces.

EXAMPLE:

kg.	price	cost
87.14	$ 4.23	368.60
27.16	$ 1.35	36.67
31.19	$ 2.43	75.79
32.87	$ 1.97	64.75
18.13	$ 9.98	180.94
		$ 726.75

Check the grand total of the above calculation.

THE OPERATION IN FIGURES: $87.14 \times 4.23 + 27.16 \times 1.35$ etc. = ?

In checking a computation of the above type, it is not necessary to check the individual products. Just the grand total.

87.14 × 4.23

Do the first multiplication 87.14 × 4.23. Clear the setting and multiplier registers but leave the product in the product register. The results of the other multiplications will be added to it.

+ 27.16 × 1.35
+ 31.19 × 2.43
+ 32.87 × 1.97
+ 18.13 × 9.98

Multiply 27.16 by 1.35. Clear only the setting and multiplier registers and continue with the remaining multiplications in the same manner.

When the last operation is completed the product register shows the sum of all the multiplications, 726.7512.

= 726.7512 **The sum is $ 726.75.**

Some time can be saved by not clearing the multiplier register between multiplications. However it then becomes impossible to check each multiplication.

PRINCIPLE: Do not clear the product register between multiplications when the products obtained are to be added and do not need to be read off separately.

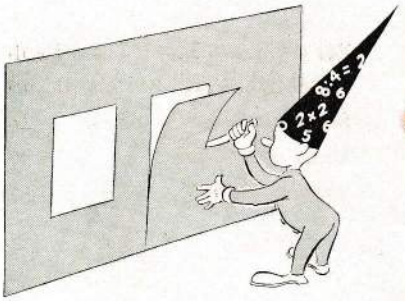
Negative Multiplication

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

On a wall 8.25 × 2.65 m. there is a window 2.0 × 1.4 m. and a door 2.15 × 0.9 m.

How large is the wallpaper surface?



$8.25 \times 2.65 - 2.0 \times 1.4 - 2.15 \times 0.9 = ?$

Be sure the separate products have the same number of decimals! Add noughts where necessary. The product register's decimal indicator should set off four decimal places since the factors have two.

Compute the size of the whole wall surface by multiplying 8.25 by 2.65. Clear the setting and multiplier registers but let 21.8625 remain in the product register.

The next multiplication, 2.00 × 1.40, is carried out with the multiplier register set to count negative turns, and as a result the new product is subtracted from the number in the product register.

Clear the multiplier and setting registers.

The product of the last multiplication, 2.15 × 0.90, is also to be subtracted from the number in the product register, so it should also be performed with the multiplier register set to count negative turns.

The wallpaper surface is 17.1275 m².

THE OPERATION IN FIGURES:

8.25 × 2.65 (= 21.8625)

— 2.00 × 1.40 (= 19.0625)

— 2.15 × 0.90

= 17.1275

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PRINCIPLE: Let the product of the first multiplication remain in the product register. Carry out the remaining multiplications with the multiplier register set to count negative turns, which will cause the new products to be subtracted from the first one.

The Rule of Three

In calculating with **TK, NEA** and **ESA-O**

For invoicing and statistical work and in certain kinds of interest computations.

EXAMPLE:

A firm sold 6 dozen pairs of stockings for $ 358.75, but 43 defective pairs were returned.

What amount should be credited to the customer?

$$\frac{358.75 \times 43}{72} = ?$$

THE OPERATION IN FIGURES:

0358.75 × 43 (= 1542.625)
÷ 72 = 214.2534

a) **With TK.**

Set up the bigger factor preceded by a nought. Press the tabulator key so that the product will appear in the left end of the product register. The following division can then be performed without clearing the product register.

b) **With NEA semi-automatic multiplication.**

Place the main control lever in the centre position and the secondary lever in the right-hand position. Set up the larger factor preceded by a nought. Press the tabulator, and perform the multiplication from left to right. The product now appears in the left end of the product register, in the correct position for the following division.

0358.75 × 43 (= 1542.625)
÷ 72
= 214.2534

Clear the setting and the multiplier registers. Set up the divisor, 72, press the tabulator and place the main control lever in the right-hand position before performing division.

c) **With ESA-O fully automatic multiplication.**

Place the main control lever in the left-hand position. Set up the smaller factor with a nought before it and press the tabulator, then the × key. Set up the next factor and add noughts until the first digit reaches the vertical white line across the setting register. In this case it is only one nought. Press the = key.

043 × 358.75 (= 1,542.625)
÷ 72
= 214.2534

The product is now in the correct position for the following division.

The amount is $ 214.25.

PRINCIPLE: In "rule of three" problems the multiplication is performed in the left end of the product register so that the product will be in the correct position for the division to follow.

Rule of Three in One Operation

In calculating with **TK** and **NEA**

EXAMPLE:

A dozen glasses cost $ 3.75. What is the price of 1, and what is the price of 7?

In estimates or invoices requiring both the unit price and the cost of a given quantity, it often saves time to do both calculations in a single operation.

$\frac{3.75}{12}$ = ? (each) $\frac{3.75 \times 7}{12}$ = ? (price of 7)

Both calculations can be performed at the same time in the following manner:

Set up both the 12 and the 7 in the setting register with six noughts between them, thus 120000007. On NEA set the main control lever in its centre position. Press the tabulator key and make positive turns, moving the set-up numerals from left to right, until the number 375 appears in the left end of the product register. The figure 3125 now appears in the multiplier register, and 375 on the left in the product register and 21875 on the right.

The dozen price, 3.75, has thus been divided by 12.

The price per piece $ 0.3125.

At the same time, this unit price was multiplied by the 7 on the right end of the setting register.

After four decimals have been marked off, the answer to the second part of the problem is:

7 glasses cost $ 2.19.

(On ESA-O this calculation is most easily done in two operations, calculating first the price of one glass and multiplying the result by 7.)

THE OPERATION IN FIGURES:

120000007 × 3125

= 375000021875

PRINCIPLE: The division is carried out by multiplication in the left end of the product register, giving the unit price in the multiplier register. At the same time the unit price is automatically multiplied by the number on the right in the setting register.

In calculating with **TK** and **NEA**

When various additions and deductions are to be made, requiring intermediate calculations, it is possible to do the operation continuously, that is, without clearing the product register.

EXAMPLE:

Check the amounts in the following pay statement:

Basic wage		**525.00**
Cost of living bonus, 25.7 %		
of 525.00		**134.93**
Taxable income		**659.93**
Deductions:		
Payroll deduction	**150.00**	
Final tax	**30.00**	
Union dues	**2.50**	**182.50**
Net payable		**$ 477.43**

THE OPERATION IN FIGURES:

$$525 + \frac{25.7 \times 525}{100} - (150 + 30 + 2.50) = ?$$

525 × 25.7

Set up 525 and multiply by 25.7.

(= 134.925) **The bonus is $ 134.93.**

The taxable income is 125.7 % of 525. Continue the multiplication by changing the number in the multiplier register to 125.7.

525 × 125.7 (= 659.925) **The taxable income is $ 659.93.**

Clear only the setting and multiplier registers.
The deductions can be added together without clearing the product register. They are added to the left of the figure now in the register.

Set up 150.00. Press once on the left-hand shift key and then on the tabulator. This procedure moves the number to the left, but only to the point where the machine can still handle an addition with four places to the left of the decimal.

(150.00 + 30.00 + 2.50 = 182.50) Now add in this manner 150.00, 30.00 and 2.50. Make sure each number has the same number of decimals, so it will fall in the right position.

— 182.50 **Total deductions are $ 182.50.**

Set up that number, move it one step to the left, and subtract the deductions from the total salary, which is still in the product register.

= 477.425 **The net amount is $ 477.43.**

PRINCIPLE: Let the computed total wage remain in the product register, and do a separate addition of the deductions on the left in the same register.

Payroll Calculations (Monthly Wages)

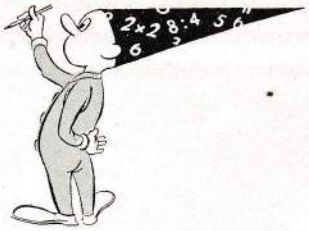
In calculating with **ESA-O**

EXAMPLE:

Check the amounts in the following pay statement:

Basic wage		**525.00**
Cost of Living bonus, 25.7 %		
of 525.00		**134.93**
Taxable income		**659.93**
Deductions:		
Payroll deduction	**150.00**	
Final tax	**30.00**	
Union dues	**2.50**	**182.50**
Net wage		**$ 477.43**

When various additions and deductions are to be made, requiring intermediate calculations, it is possible to do the operation continuously, that is, without clearing the product register.



$$525 + \frac{25.7 \times 525}{100} - (150 + 30 + 2.50) = ?$$

Place the main control lever in the left position. Set up 25.7 and multiply it by 525 by the fully automatic method.

The index is $ 134.93.

Taxable income is 125.7 % of 525. Continue the multiplication by changing the number in the multiplier register to 125.7, using the plus key, after moving the figure to the right.

The taxable income is $ 659.93.

Clear the setting and multiplier registers only. The deductions can be added together, and subtracted at the same time, without clearing the product register. They are added to the left of the figure now in the register. Set up seven 9's and press the × key. There are three decimals in the product register, so the deductions must also have three decimals. Set up 150.000 and press the = key, and the amount will be subtracted from the total income, then automatically transferred to the left end of the product register.

Clear the setting register with the × key. Set up 30.000 and press the = key, then the × key. Set up 2.500 and continue the same way.

The product register now shows both

total deductions, $ 182.50 and

the net wage, $ 477.43.

THE OPERATION IN FIGURES:

25.7 × 525

(= 134.925)

125.7 × 525

(= 659.925)

To the left in the product register:	To the right in the product register:
150.000	— 150.000
+ 30.000	— 30.000
+ 2.500	— 2.500
= 182.500	= 477.425

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PRINCIPLE: Let the computed total wage remain in the product register and carry out a simultaneous addition and subtraction of the deductions in the same register by entering seven 9's in the invisible setting carrier. If a number of wages are to be computed in succession, the first multiplication can be performed by the semi-automatic method to avoid setting up the 9's again.

Payroll Calculations (Hourly Wages)

In calculating with **TK** and **NEA**

In computing wages, the numbers used are generally small enough so that there is room in the product register to carry out two separate and simultaneous operations.

EXAMPLE:

Check the amounts in the following pay statement:

Working time hours		Hourly pay $		Total $
46	×	3.35	=	154.10

Deductions:

Payroll deduction	21.00	
Final tax	7.50	
Sickness insurance	2.00	
Life insurance	2.10	
Accident insurance	1.05	33.65
		$ 120.45

THE OPERATION IN FIGURES: $46 \times 3.35 - (21 + 7.5 + 2 + 2.1 + 1.05) = ?$

046 × 3.35

Multiply the number of hours by the hourly wage, performing the multiplication on the left end of the product register, with a nought before the multiplicand as usual.

(= 154.10) **The gross wage is $ 154.10.**

This figure is left in the product register. There is room on the right for adding the deductions. Remember that each figure must have the same number of decimals to fall in the correct position.

(21.00 + 7.50 + 2.00 + 2.10 + 1.05 = 33.65) **Total deductions are $ 33.65.**

— 033.65

Set up 033.65, press the tabulator key and then subtract the total deductions from the gross wage.

= 120.45 **The net wage is thus $ 120.45.**

PRINCIPLE: Perform the multiplication in the left end of the product register. Let the gross wage remain in the product register, and perform a separate addition of the deductions on the **right side** of the same register.

Payroll Calculations (Hourly Wages)

In calculating with **ESA-O**

EXAMPLE:

Check the amounts in the following pay statement:

Working time hours		Hourly pay $		Total $
46	×	3.35	=	154.10

Deductions:

Payroll deduction	21.00	
Final tax	7.50	
Sickness insurance	2.00	
Life insurance	2.10	
Accident insurance	1.05	33.65
		$ 120.45

In computing wages, the numbers used are generally small enough so that there is room in the product register to carry out two separate and simultaneous operations.

$46 \times 3.35 - (21 + 7.5 + 2 + 2.1 + 1.05) = ?$

Place the main control lever to the left and multiply 46 by 3.35 by the fully automatic method.

The gross wage is $ 154.10.

This figure is left in the product register. Clear registers II and III. Set up seven 9's and press the × key.

Set up the first deduction, 21.00, remembering that each figure must have the same number of decimals to fall in the correct position.

Press the = key. The number is now subtracted from the figure in the product register, and then automatically transferred to the left end of the register.

Clear the setting register by pressing the × key. Set up the next deduction, 7.50, and press the = key, then the × key. Continue in the same manner with the remaining deductions, and the product register will contain the

total deductions, $ 33.65 and
the net wage, $ 120.45.

THE OPERATION IN FIGURES:

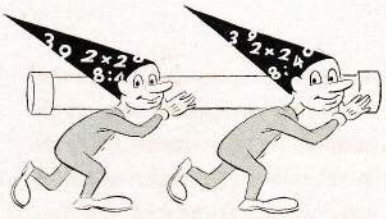
46 × 3.35

(=154.10)

To the left in the product register:	To the right in the product register:
21.00	— 21.00
+ 7.50	— 7.50
+ 2.00	— 2.00
+ 2.10	— 2.10
+ 1.05	— 1.05
= 33.65	= 120.45

PRINCIPLE: Let the gross wage remain in the product register and perform a separate addition of the deductions on the left in the same register by entering seven 9's in the invisible setting carrier. If a number of wages are to be computed in succession, the first multiplication can be performed by the semi-automatic method to avoid setting up the 9's again.

In calculating with **TK, NEA** and **ESA-O**



This type of piecework calculation is useful in the plumbing, electrical und building trades, or wherever work is done on contract.

EXAMPLE:
Four workers performed some labor for which they received a total of $ 650.00 in wages.
Check that the gross wages are divided in proportion to the hours worked and the hourly wage of each worker.

	Number of hours	Hourly Wage $	Net Wages $	Gross Wages $
A	48	3.10	148.80	178.21
B	46.5	2.75	127.88	153.16
C	43	2.95	126.85	151.92
D	48	2.90	139.20	166.71
			542.73	650.00

THE OPERATION IN FIGURES:

48 × 3.10 = 148.80
46.5 × 2.75 = 127.88
43 × 2.95 = 126.85
48 × 2.90 = 139.20

148.80 + 127.88 + 126.85 + 139.20 = 542.73

$$\frac{650.00}{542.73} = 1.1976489$$

1.19765 × 148.80 (= 178.21032)
1.19765 × 127.88 (= 153.155482)
1.19765 × 126.85 (= 151.9219025)
1.19765 × 139.20 = 166.71288

178.21 + 153.16 + 151.92 + 166.71 = 650.00

First check the net wages by multiplying the number of hours by the hourly wage. Add the net wages.

Total of net wages is $ 542.73.

What each worker will get for each dollar of his net wage is determined by dividing 650 by 542.73.

The result, 1.1976489, is the constant number by which each worker's net wage must be multiplied to get his gross wage.

Use five decimal places. Multiply each net wage by 1.19765 and write down the products.

Shorten the decimals and add the four products.

Total of gross wages is $ 650.00.

PRINCIPLE: The total wages to be distributed is divided by the sum of the net wages. The quotient is used as a constant factor and is multiplied by each of the net wages.

Percentage Calculations (Increase and Decrease Computed in Percentage Only)

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

Two firms report the following sales figures:

a) Last year's sales
$ 347,973.00
This year's sales
$ 421,557.00

What is the percentage increase?

b) Last year's sales
$ 562.820.00
This year's sales
$ 411,315.00

What is the percentage decrease?

In comparative statistics only the percentage change is of interest. This may apply to population figures, costs of operations, or sales.

a) $\frac{42,155,700}{347,973} - 100 = ?$

THE OPERATION IN FIGURES:

Transfer the number 421,557 to the left end of the product register. Multiply by 100 by moving the decimal indicator two places to the right.

Divide by 347,973 in the usual way. The quotient, 121.15, represents what percentage 421.557 is of 347,973. The percentage sought is thus 121.15—100.

$\frac{42,155,700}{347,973} = 121.14646$

The increase is 21.15 %.

b) $100 - \frac{41,131,500}{562,820} = ?$

NEA and ESA-O: Main control lever to the left.

Transfer the number 411,315 to the left end of the product register. Multiply by 100 by moving the decimal indicator two places to the right. Clear the setting register, but let the 1 remain in the multiplier register.

Divide by 562,820 with the multiplier register set to count positive turns. After the division the required number (100 minus the percentage) can be read directly from the multiplier register.

$100 - \frac{41,131,500}{562,820} = 26.91891$

The percentage decrease is 26.92 %.

20 PRINCIPLE: To obtain the increase computed in percentage only, use the formula:

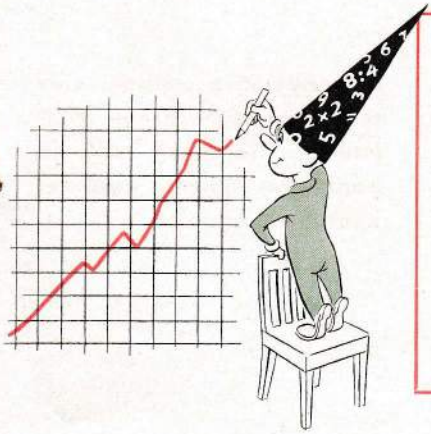
$$\frac{100 \times \text{the higher figure}}{\text{the lower figure}} - 100$$

To obtain the decrease computed in percentage only, use the formula:

$$100 - \frac{\text{the lower figure} \times 100}{\text{the higher figure}}$$

Percentage Calculations (Mark-up in Money and in Percent of the Sales Price)

In calculating with **TK, NEA** and **ESA-O**



EXAMPLE:

Goods costing $ 260.00 were sold for $ 575.00.

What is the mark-up, and what percent of the sales price is it?

THE OPERATION IN FIGURES:

575 — 260 = ? (mark-up in $).

$$\frac{100 \times (575 - 260)}{575} = \text{? (mark-up in percent)}$$

— 260 (= 740)

Set up 260, press the tabulator and make a negative turn. The complement of 260, that is, 740, appears in the product register.

+ 575

Clear the setting register and set up 575. Press the tabulator and make a positive turn, and the answer to the first part of the problem will appear in the left end of the product register.

(= 315) **The mark-up is $ 315.00.**

÷ 575

Do not clear the registers.
575 is still in the setting register from the last operation. The division can therefore be done directly, without setting up a new number.

= 54.7826 **The mark-up in percent is 54.78 %.**

(If only the mark-up in percent is needed, divide 260 by 575 with the multiplier register set to count positive turns and with the 1 remaining in it.)

PRINCIPLE: When computing percentages always divide by the number the percentage refers to.

Percentage Calculations (Mark-up in Money and in Percent of the Cost Price)

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

Goods costing $ 630.45 were sold for $ 894.30.

What is the mark-up in $ and in percent over the cost price?

$894.30 - 630.45 = ?$ (mark-up in $).

$$100 \times \frac{(894.30 - 630.45)}{630.45} = \text{(mark-up in percent).}$$

Set up 894.30, press the tabulator, and transfer it to the product register.

Clear the setting register and set up 630.45. Press the tabulator and make a negative turn.

The mark-up is $ 263.85.

630.45 remains in the setting register, so the division can be performed directly, without clearing the register or setting up a new figure. (On the TK the multiplier register must be cleared, as it was set to count positive turns when 894.30 was registered.)

The mark-up is 41.85 %.

(If the mark-up is to be worked out in percent only, divide 894.30 by 630.45 and reduce the quotient by 100. See example a) on page 20.)

THE OPERATION IN FIGURES:

894.30 — 630.45

(= 263.85)

÷ 630.45

= 0.4185105

PRINCIPLE: When computing percentages always divide by the number of which you want the percentage.

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

a) At what price must an article costing $ 725.00 be sold to realize a mark-up of 30 % on the selling price?

b) The following prices are to be increased 12 %: $ 3.45, 5.75 and 4.60. Compute the new prices.

c) The following prices are to be reduced 15 %: $ 2.76, 4.60 and 5.75. Compute the new prices.

THE OPERATION IN FIGURES:

$\frac{72500}{70} = 1{,}035.71$

a) $\frac{725 \times .100}{70} =$ **? (the selling price)**

30 % of the sales price is to be mark-up; the remaining 70 % represents the cost. Multiply 725 by 100 and divide by 70 in the usual way.

The sales price is $ 1,035.71.

b) $\frac{112 \times 3.45}{100} =$ **? (new price) etc.**

112 × 3.45 (= 386.40)
112 × 5.75 (= 644.00)
112 × 4.60 = 515.20

Raising the prices by 12 % means that the new prices will be 112 % of the old ones. Therefore use 112 as a constant number and multiply it by each of the old prices.

The sales prices are, $ 3.86, $ 6.44 and $ 5.15.

c) $\frac{(100 - 15) \times 2.76}{100} =$ **? (new price) etc.**

85 × 2.76 (= 234.60)
85 × 4.60 (= 391.00)
85 × 5.75 = 488.75

Reducing the price by 15 % means that the new price will be 85 % of the old.
Use 85 as a constant number and multiply it by each of the old prices.

The new prices are, $ 2.35, $ 3.91 and $ 4.89.

PRINCIPLE: To realize a fixed profit on the selling price, use the following formula:

$$\text{Selling price:} \frac{100 \times \text{cost}}{100 - \text{percentage of mark-up}}$$

When several prices are to be increased by the same percent, use the sum **100 plus the percent,** as a constant factor and multiply it by each of the old prices.

When several prices are to be reduced by the same percent, use the difference of **100 minus the percent** as a constant factor and multiply it by each of the old prices.

Practical Shortcuts in Computing Discounts

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

a) An article sells for $ 1,675.00 less 5 % discount.
Determine the discount and the net price.

b) An article sells for $ 125.25 plus 5 % service charge.
Find the service charge and the total price.

c) An article sells for $ 1,002.25 less 11 % discount.
Find the net price.

Since discounts and net prices must be computed in all kinds of businesses, every means of simplifying this work should be used.

a) $\frac{1{,}675 \times 5}{100} = ?$ (discount)

$\frac{1{,}675 \times 95}{100} = ?$ (net price)

Multiply 1675 by 5; by fully automatic method on ESA-O.
The discount is thus $ 83.75.

Do not clear the registers. Continue the multiplication by changing the figure in the multiplier register to 95. On ESA-O use the semi-automatic method.
The net price is $ 1,591.25.

b) $\frac{5 \times 125.25}{100} = ?$ (service charge)

$\frac{105 \times 125.25}{100} = ?$ (total price)

Multiply 125.25 by 5 and divide by 100.
The service charge is thus $ 6.26.

Do not clear the registers. Continue the multiplication by changing the number in the multiplier register to 105. On ESA-O the operation is carried out as above: the first multiplication by the fully automatic method, the second semi-automatically.
The total price is thus $ 131.51.

c) $\frac{89 \times 1002.25}{100} = ?$ (net price)

When the discount is not needed, but only the net price, the selling price is multiplied directly by the complement of the discount.
The net price is thus $ 892.00.

THE OPERATION IN FIGURES:

$\frac{1675 \times 5}{100}$ (= 83.75)

$\frac{1675 \times 95}{100}$ = 1,591.25

$\frac{125.25 \times 5}{100}$ (= 6.2625)

$\frac{125.25 \times 105}{100}$ = 131.5125

$\frac{1002.25 \times 89}{100}$ = 892.0025

24

PRINCIPLE: When both the discount and the net amount are required, the gross amount is multiplied by the discount and by its complement.
When both the surcharge and the total price are required, the initial price is multiplied by the percent added and by the percent plus 100.
When only the net price is required, the initial price is multiplied by the complement of the discount.

Computing the Equivalent of a Series of Discounts

In calculating with **TK, NEA** and **ESA-O**

In practice there are sometimes a series of bonuses and discounts (so called chain-discount factors) applied to an amount. It saves time to compute a single factor equivalent to the whole series.

EXAMPLE:

Find the net amounts:

1.150 — 25 % + 5 % — 2.5 % = ?
2.250 — 25 % + 5 % — 2.5 % = ?
5.300 — 25 % + 5 % — 2.5 % = ?
725 — 25 % + 5 % — 2.5 % = ?

THE OPERATION IN FIGURES:

The chain-discount factor is found by the following method:

Subtract the discounts from 100.

Add the bonuses to 100.

Multiply the new numbers by each other.

In the product mark off two decimal places for each factor, in addition to the decimals already contained in the factors.

0.75 × 1.05 × 0.975 — Multiply: 75 × 105 × 97.5.

(= 0.7678125) — The product is 767812.5. Mark off six more decimal places. The chain-discount factor is 0.7678125.

0.7678125 × 1,150 (= 882.98)
0.7678125 × 2,250 (= 1,727.58)
0.7678125 × 5,300 (= 4,069.41)
0.7678125 × 725 = 556.66

Use this number as a constant factor and multiply it by each of the initial amounts.

The net amounts are: $ 882.98, $ 1,727.58, $ 4,069.41 and $ 566.66.

Work can be simplified considerably by making out a table of the most usual chain-discounts.

Table of some common chain-discount factors:

	— 5	— 6	— 20	+ 5	+ 7	+ 20
+ 10—20	0.836	0.8272	0.704	0.924	0.9416	1.056
+ 15—10	0.98325	0.9729	0.828	1.08675	1.10745	1.242
— 3—20	0.7372	0.72944	0.6208	0.8148	0.83032	0.9312
— 5—40	0.5415	0.5358	0.456	0.5985	0.6099	0.684
— 13—17	0.685995	0.678774	0.57768	0.758205	0.772647	0.86652
— 20—30	0.532	0.5264	0.448	0.588	0.5992	0.672

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

What is the interest on $ 2,784.45 for 147 days at 3 ½ % ?

$$\frac{2784.45 \times 147 \times 3.5}{360 \times 100} = \text{? (interest).}$$

Multiply the two smaller figures, 147 × 3.5. The product is 514.5. Clear the setting register.

The next multiplication is to be carried out on the left end of the product register. Set up the number preceded by a nought, 0514.5, so as not to exceed the capacity of the machine. Clear the product and multiplier registers.

Move the number to the left with the tabulator. On TK and NEA the multiplication is performed from left to right, by the number 2784.45. On ESA-O the multiplication is done by the fully automatic method. The product is 1432599.525.

This figure appears at the left end of the product register, in the correct position for the division to follow. Clear the setting and multiplier registers and divide by 36000.

The result appears in the multiplier register.

The interest is thus $ 39.79.

THE OPERATION IN FIGURES:

147 × 3.5 (= 514.5)

0514.5 × 2784.45

(= 1432599.525)

÷ 36000

= 39.79443

PRINCIPLE: When a multiplication is to be followed immediately by a division, use the tabulator and carry it out at the left end of the product register. The number to be multiplied must be set up with a nought in front of it, so that the capacity of the machine will not be exceeded.

Interest Calculations Using the Interest Divisor

In calculating with **TK, NEA** and **ESA-O**

When several interest computations are to be done with the same interest rate, it saves time to determine the interest divisor first by dividing the interest rate into 360.

EXAMPLE:

What is the interest on $ 4,735.00 for 156 days at 3 ¼ % ?

THE OPERATION IN FIGURES:

$\frac{360 \times 100}{3.25}$ = 11,076.923
(found in table 8)

4,735 × 156 (= 738,660)

÷ 11076.923

= 66.6845

$$\frac{4{,}735 \times 156 \times 3.25}{100 \times 360} = \text{? (interest).}$$

In the table on page 46 the interest divisor for 3¼ % appears as 11076.923. By using this divisor the computation is simplified to the following:

$$\frac{4{,}735 \times 156}{11076.923}$$

which is an ordinary rule-of-three problem.

Do the multiplication in the left end of the product register, and then divide.

The interest is $ 66.68.

PRINCIPLE: Compute interest with the interest divisor by this formula:

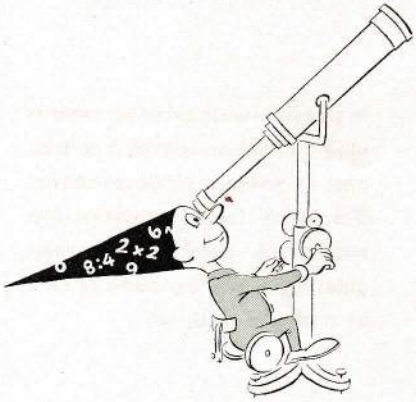
$$\frac{\text{capital} \times \text{days}}{\text{interest divisor}}$$

Multiplication of a Number by a Very Large Factor

In calculating with **TK** and **NEA**

EXAMPLE:

105 × 783,658,002.16 = ?



105 × 783,658,002.16 = ?

Set up the last six figures of the multiplicand, 8002.16, and multiply by 105. 840226.80 appears in the product register. Write down the last six of these figures (that is, as many figures as there are in the multiplicand), 0226.80.

Clear the setting register and set up the remaining figures, 84. Clear the product and multiplier registers.

Transfer 84 to the product register. Clear the setting and multiplier registers and set up the rest of the figures in the original multiplicand, 78365. Multiply again by 105. In the product register the figure 8228409 appears, which is noted to the left of the six figures previously written down.

The product is 82,284,090,226.80.

THE OPERATION IN FIGURES:

8002.16 × 105 (= 840226.80)

84 +

78365 × 105 = 8228409

PRINCIPLE: In multiplying a number too large to fit into the setting register, the number can be multiplied in sections.

Multiplication of a Number by a Very Large Factor

In calculating with **ESA-O**

In physics, mathematics, astronomy and other scientific fields, and in various kinds of statistics, such large numbers are sometimes used that a calculation has to be done in two or more operations.

EXAMPLE:

105 × 783,658,002.16 = ?

THE OPERATION IN FIGURES:

105 × 783,658,002.16 = ?

105 × 8002.16 (= 840226.80)

Set up 105 and multiply by the last six figures of the multiplicand, 8002.16. The number 840226.80 appears in the product register. Write down the last six of these figures (that is, as many as are in the multiplicand), 0226.80.

84 +

Clear the setting register with the × key and set up the remaining figures, 84. Clear the product and multiplier registers.

105 × 78365

Press the + key. Clear the setting register with the × key and set up the rest of the figures in the original multiplicand, 78365. Multiply by 105, which is still in the inivisible register, by pressing the = key.

= 8228409

The number in the product register is 8228409, which is noted to the left of the six figures previously written down.

The product is 82,284,090,226.80.

PRINCIPLE: In multiplying a number too large to fit into the setting register, the number can be multiplied in sections.

Division by Large Numbers

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

a) $\frac{267536}{712652} = ?$

b) $\frac{24.8916275}{4.39732561} = ?$

In physics, mathematics, astronomy and other scientific fields, and in various kinds of statistics, such large numbers are sometimes used that a calculation has to be done in two or more operations.

a) $\frac{267536}{712652} = ?$

Do the division in the usual way, and write down the quotient 0.3754090. Leave the remainder, 253320, in the product register. Clear the multiplier and setting registers.

Set up the divisor shortened to four figures, that is, 7127. Move the number one step to the left so that it will be in the correct position for division into the number in the product register. This division adds two more decimals, 35, to the quotient above.

The quotient is 0.375409035.

b) $\frac{24.8916275}{4.39732561} = ?$

Do the division in the usual way. Write down the quotient, 5.660, and leave the remainder, 276454740, in the product register. Divide the remainder by a shortened divisor, as in the above example. If four more decimals are needed, the divisor must be reduced to five figures, or 4.3973.

The quotient is 5.6606287.

If this method does not produce a large enough number of decimals, the longer method must be used. That is, do the first division in the same way and write down the quotient, and then set up the remainder in the left end of the product register and continue the division with the original divisor. This process can be repeated, adding further decimals, as long as there is a remainder.

THE OPERATION IN FIGURES:

$\frac{267536}{712652}$ (= 0.3754090)

$\frac{253320}{7127}$ = 35

$\frac{24.8916275}{4.39732561}$ (= 5.660)

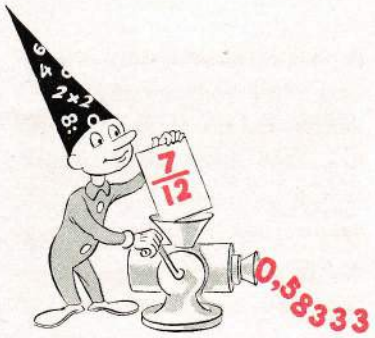
$\frac{0.00276454740}{4.3973}$ = 0.0006287

30

PRINCIPLE: After dividing in the usual way, further decimals can be secured in the quotient by dividing the remainder by a shortened divisor. This only needs to have one figure more than the number of digits to be added in the quotient.

Ordinary Fractions Converted to Decimal Fractions

In calculating with **TK, NEA** and **ESA-O**



EXAMPLE:

a) What is the price of 7 pens when a dozen cost $ 3.80?

b) Compute the following prices:

5	**pieces at**	**$**	**4.65**	**a**	**dozen**	**= ?**
8	**„**	**„**	**$ 1.38**	**„**	**„**	**= ?**
11	**„**	**„**	**$ 12.50**	**„**	**„**	**= ?**
1	**„**	**„**	**$ 8.40**	**„**	**„**	**= ?**

THE OPERATION IN FIGURES:

a) $\frac{7 \times 3.80}{12} = ?$

It is helpful to convert frequently recurring common fractions to decimals. The table of twelfths below contains the decimal values of $\frac{1}{12}$ multiplied by 1 to 11.

$\frac{7}{12} = 0.58333$ (see table)

This shows the decimal value of $\frac{7}{12}$ to be 0.58333.

Multiply that number by 3.80.

$0.58333 \times 3.80 = 2.216654$

Seven pens cost $ 2.22.

b) $\frac{5 \times 4.65}{12} = ?$ etc.

$0.41667 \times 4.65 = 1.9375155$
$0.66667 \times 1.38 = 0.9200046$
$0.91667 \times 12.50 = 11.458375$
$0.08333 \times 8.40 = 0.699972$

Do the computations by the same method as above, using the table.

The prices are, $ 1.94, $ 0.92, $ 11.46 and $ 0.70.

Table of twelfths converted to decimals

1	0.08333	5	0.41667	9	0.75
2	0.16667	6	0.5	10	0.83333
3	0.25	7	0.58333	11	0.91667
4	0.33333	8	0.66667		

PRINCIPLE: Common fractions which recur frequently should be converted to decimals. The decimal equivalents of various familiar fractions will be found on page 45.

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

The probable number of people still alive at 41 years of age out of a group of 100,000 live births (the known whole-year value of the function 1_{41}) is 81,903. The whole-year value of the function 1_{42} is 80,897. Find the value for 41 years and 5 months, that is, the function $1_{41\ 5/12}$.

In insurance mathematics, linear interpolation of a function given in the insurance tables for whole years is often necessary. This is required when seeking the value of the function for some arbitrary time between two whole-year ages reported in the table.

$7/12 \times 81{,}903 + 5/12 \times 80{,}897 = ?$

THE OPERATION IN FIGURES:

The rule is that the **younger** whole-year value is multiplied by the interval from the required age to the **older** whole-year age, and that the **older** whole-year value is multiplied by the interval from the **younger** whole-year age to the required age. The intervals must always be measured in fractions of the total interval between the two whole-year ages for which the functions are given. In this case it is fractions of one year.

Find the decimal values of 7/12 and 5/12 in the table on page 31.

Multiply 81,903 by 0.58333, using the latter number as the multiplier.
Clear only the setting register.

81,903×0.58333 (= 47,776.47699)

Multiply 80,897 by 0.41667, using the latter number as the multiplier.

+ 80,897 × 0.41667

The result appears in the product register.

The function $1_{41\ 5/12}$ is thus = 81,484.

= 81,483.82998

PRINCIPLE: Using the decimal values for the intervals as the multipliers provides a check in the multiplier register that their sum is 1.

Extracting Square Roots

In calculating with **TK, NEA** and **ESA-O**

In extracting the square root of a number, first divide it into groups of two digits each. Start from the decimal point and divide the whole numbers from right to left and the decimal numbers from left to right.

EXAMPLE:

Compute $\sqrt{453278}$ in 6 figures.

THE OPERATION IN FIGURES:

$\sqrt{453278} = ?$

First divide the number into two-digit groups from right to left, in this case 45-32-78.

Find the number whose square is equal or nearly equal to the first two number groups, 4532, in table 9 on page 48. 4532 does not appear in the table. The nearest lower number is 4529, the square of 67.3. The first three figures in our square root are thus 673.

$\frac{453278}{673} = 673.5185$

Now divide 453278 by 673. 673.5185 appears in the multiplier register. The first three figures in the setting register and in the multiplier register correspond. To get an answer in six figures, the three following figures in the multiplier register, 518, are divided by 2.

The answer is 673.259.

If greater accuracy is required, the fourth figure (3) can be interpolated from the table. Or one can start with five figures of the new value, that is, 67326. Set this up as the divisor with a nought before it so all the spaces in the multiplier register will be used. Do a new division and take the average of the new quotient and the number used as divisor.

The method for extracting cubic roots (with 5 correct figures), fourth and higher roots is given on page 40.

PRINCIPLE: Use table 9 on page 47 in extracting square roots.

Extracting Square Roots (Placing the Decimal Point)

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

Compute $\sqrt{453278}$ in 8 figures.

$\sqrt{453278} = ?$

The root always contains as many digits to the left of the decimal point as there are number groups in the square to the left of the decimal point. In this case it is three.

Find the two squares in the table between which 4532.8 lies (note the decimal).

$4529 = 67.3^2$ and $4543 = 67.4^2$. The first three figures of the root are thus 673, and the fourth is determined as follows:

$$4543 - 4529 = 14 \text{ ("large difference")}$$
$$4532.8 - 4529 = 3.8 \text{ ("small difference")}$$

The fourth figure is $\frac{3.8 \times 10}{14}$ = about 3.

The approximate value of the root is thus 673.3. Carry out the division $\frac{453278}{06733} = 673.21847$

The next figure is then determined mentally as follows:

$$673.2 + \frac{0.11847}{2} = 673.25924.$$

The first decimal in the numerator is an extra 1 from 673.3 (above 673.2) and the rest of the decimals, 0.01847, are the remainder of the quotient in the last division.

The square root is thus: 673.25924.

Of this result seven figures are known to be correct, whereas the eighth may contain some error.

THE OPERATION IN FIGURES:

$\frac{453278}{06733} = 673.21847$

PRINCIPLE: Use table 9 on page 47 in extracting square roots.

English Currency (Addition)

In calculating with **TK, NEA** and **ESA-O**

Although the Facit machines work by the decimal system, it is possible to do all four arithmetic operations with English currency.

EXAMPLE:

Check the following addition:

	£	s	d
	43	19	11
+	7	9	10
+	8	10	10
+	17	18	9
+	16	15	11
	£94	15s	3d

THE OPERATION IN FIGURES:

43,019,011
7,009,010
8,010,010
17,018,009
16,015,011
91,071,051

\+ 988
\+ 988
\+ 988
\+ 988
\+ 980 000
\+ 980 000
\+ 980 000
= 94 015 003

First divide the product register into three number groups, using the decimal indicators. The two groups on the right, of three digits each, are for shillings and pence; the remainder is for pounds.

In setting up the various figures, noughts must be placed before the shilling and pence amounts so they will fall in the correct position. Set up 43,019,011 and add the other amounts, setting them up in the same manner. The sum appears in the product register, 91,071,051.

This amount now has to be converted to its proper equivalent in pounds, shillings and pence.

There are twelve pence in a shilling; set up the complement of 12 preceded by 9, that is, 988. Make positive turns, observering that with each one the number of pence is reduced by 12 and the number of shillings increased by 1. Three pence will remain when the shilling value has been taken out of the pence column. Clear the setting register.

There are 20 shillings in a pound; set up the complement of 20 preceded by 9, that is, 980. Add three noughts so the number will fall in the shilling column, thus: 980000.

Make positive turns the same as before, until the number of shillings is less than 20. Finally 15 shillings will remain and the pound column be increased by 3.

The final sum is £ 94 15s. 3d.

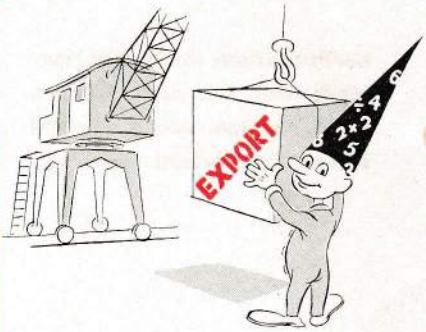
PRINCIPLE: In adding English currency, divide the product register into three number groups, using the decimal indicators.

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

The total cost of a shipment of tea is £ 94. 15. 3. Freight and other costs amounted to £ 12. 17. 8.

What is the net price?



£ 94 15s. 3d.
£ 12 17s. 8d.
£ ? ? ?

THE OPERATION IN FIGURES:

Divide the product register as in the previous example, using the decimal indicators. Then set up 94,015,003 in the product register.

94,015,003
— 12,017,008
(= 81,997,995)

Subtract £ 12. 17. 8 set up in the same manner, that is, 12,017,008. The product register contains 81,997,995.

Set up the complements of 20 and 12 together, with a 9 before each, that is, 980,988, and make a negative turn.

— 980,988
= 81,017,007

A negative turn must be made for each pound or shilling which has been borrowed. In repeated subtractions several negative turns may be required with one or both of the above complements set up.

The amount which then appears in the product register shows that

the net price is £ 81 17s. 7d.

PRINCIPLE: In subtracting English currency amounts, divide the product register into three number groups, using the decimal indicators.

English Currency: Multiplication by the Pence Method

In calculating with **TK, NEA** and **ESA-O**

Multiplication of English currency can be done in two ways: by the pence method and by the decimal method.

EXAMPLE:

An English firm delivered 3 lb. 12 oz. of goods at a price of £5.7.10 per lb.

What did the shipment cost?

THE OPERATION IN FIGURES:

$3.75 \times (5 \times 240 + 7 \times 12 + 10) = ?$

Convert the amount to pence, performing the operation without clearing the product register between multiplications.

```
   5 × 240
+  7 × 12
+ 10              = 1,294
```

The result is 1,294.

Multiply in the usual way by 3.75. The product, 4852.50, is to be converted to pounds and shillings by dividing.

```
3.75 × 1,294      (= 4,852.50)
```

One decimal is required in the quotient, and since there are two in the product register there must be one in the setting register.

There are 240 pence in a pound. Set up 240.0 and move the number two places to the left so the 2 will be under the first figure of the number in the product register.

```
÷ 240.0 = 20.2 (remainder 4.50)
```

After dividing in the usual way, 20.2 appears in the multiplier register and 4.50 remains in the product register.

This gives the answer, **£20 4s. 4½d.**

Note: The number of shillings is found by doubling the first decimal in the pound figure.

If the remainder in the product register is more than 12, the shillings are increased by 1 and the pence are reduced by 12.

PRINCIPLE: In the pence method the whole amount is converted to pence before carrying out the computation.

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

a) Multiply: 3.75 × £ 5. 7. 10.

b) A shipment of cotton valued at £ 148. 16. 5 cost £ 17. 10. 10 in freight charges.

What percent of the value are the freight charges?

a) $3.75 \times £5.7.10 = ?$

The decimal value in pounds of 7 shillings and 10 pence may be found in table 2 on page 42. The total amount expressed in decimals is thus £ 5.39167.
Multiply this by 3.75 in the usual way.
The product is 20.2187625.

The number 20 is whole pounds. The decimals are to be converted to shillings and pence, again using the table. Find the value nearest to 0.2187625. This is 0.21667, corresponding to 4 shillings and 4 pence.
The answer is £ 20 4s. 4d.

A more accurate value can be secured by subtracting:

$$0.2187625 - 0.21667 = 0.0020925.$$

The difference is compared with the decimals below the table which give parts of pence.
The more accurate value is thus £ 20 4s. 4½d.

THE OPERATION IN FIGURES:

5.39167×3.75

$= 20.2187625$

b) $\dfrac{£17.10.10 \times 100}{£148.16.5} = ?$

Use table 2 to convert the shillings and pence to decimals of pounds:

$$\frac{17.54167 \times 100}{148.82083}$$

Carry out the division as usual.
The percentage is 11.8 %.

$$\frac{1754.167}{148.82083}$$

$= 11.787$

PRINCIPLE: Division with English currency amounts is done by the decimal method. Use table 2 to convert shillings and pence to decimals of a £.

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

a) Convert £ 27. 3. 8 to Sw. Cr. at the rate of 14.50.

b) Convert Sw. Cr. 1,286.75 to English currency at the rate of 14.50.

THE OPERATION IN FIGURES:

a) £ 27. 3. 8 × 14.50 = ?

In table 2 on page 42 find the decimal value in pounds of 3s. 8d. The total amount in decimals is thus 27.18333; multiply by 14.50 in the usual way.

27.18333 × 14.50

= 394.16

The answer is Sw. Cr. 394.16.

b) $\frac{1{,}286.75}{14.50} = ?$

$\frac{1{,}286.75}{14.50}$

= 88.74137

Divide in the usual way; the quotient is £ 88.74137.

Use table 2 on page 42 to convert the decimals to shillings and pence.

The answer is £ 88 14s. 8d.

PRINCIPLE: In converting foreign currency to your own money, **multiply the amount by the exchange rate.**

In converting your own money to foreign currency, **divide the amount by the exchange rate.**

Extraction of Cube Roots to Five Correct Figures

In calculating with **TK, NEA** and **ESA-O**

EXAMPLE:

$\sqrt[3]{145129375}$

With a slide rule or a table of cubes, find the largest number whose cube is equal to or less than the given number. In this case it will be 525.
Divide the given number, 145129375, by the square of the value found.

$$\frac{145129375}{525^2} = 526.5464$$

Subtract the found value, 525, from the quotient obtained, and divide the difference by 3, adding the result to 525 to obtain a cube root with five correct figures.

$$525 + \frac{526.5464 - 525.0}{3} = 525 + 0.5154$$

The cube root is: 525.5154.

Extraction of Fourth and Higher Roots

The fourth root is calculated as the square root of the square root, the sixth root as the square root of the cube root. This method can be used in all cases where the root exponent is not a prime number.

If the root exponent, however, is a prime number, a method similar to that used for cube roots is used, although the root value $x + h$ cannot as a rule be obtained direct in the multiplier register.

For the fifth root, apply the following:

$$y = (x + h)^5 = x^5 + 5x^4 \left(h + \frac{2h^2}{x} + 2\frac{h^3}{x^2} + \frac{h^4}{x^3} + \frac{h^5}{5x^4}\right)$$

$$\text{thus: } \frac{y - x^5}{5x^4} = h + 2\frac{h^2}{x} + \text{ etc.}$$

In the manner, for the seventh root, apply:

$$\frac{y - x^7}{7x^6} = h + 3\frac{h^2}{x} \text{ etc.}$$

Fourth, sixth, eighth, etc. roots can be calculated according to a similar formula, but this tends to be difficult on calculating machines with relatively small capacity.

TABLES

TABLE 1 Conversion of pence (inches) to decimals of 1 shilling (1 foot)

1 pence (inch) = 0.083333 shilling (foot)

pence (inches)	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
0	0.00000	0.01042	0.02083	0.03125	0.04167	0.05208	0.06250	0.07292
1	08333	09375	10417	11458	12500	13542	14583	15625
2	16667	17708	18750	19792	20833	21875	22917	23958
3	25000	26042	27083	28125	29167	30208	31250	32292
4	33333	34375	35417	36458	37500	38542	39583	40625
5	41667	42708	43750	44792	45833	46875	47917	48958
6	50000	51042	52083	53125	54167	55208	56250	57292
7	58333	59375	60417	61458	62500	63542	64583	65625
8	66667	67708	68750	69792	70833	71875	72917	73958
9	75000	76042	77083	78125	79167	80208	81250	82292
10	83333	84375	85417	86458	87500	88542	89583	90625
11	91667	92708	93750	94792	95833	96875	97917	98958

1/32 pence = 0.00260 shillings 1/16 pence = 0.00521 shillings 3/32 pence = 0.00781 shillings

TABLE 2 Conversion of shillings and pence to decimals of £1.

£1 = 20 shillings, 1 shilling = 12 pence
¼ pence = £0.00104, ½ pence = £0.00208, ¾ pence = £0.00312.

d. → / Sh. ↓	0	1	2	3	4	5	6	7	8	9	10	11
0	0.00	0.00417	0.00833	0.01250	0.01667	0.02083	0.02500	0.02917	0.03333	0.03750	0.04167	0.04583
1	05	05417	05833	06250	06667	07083	07500	07917	08333	08750	09167	09583
2	10	10417	10833	11250	11667	12083	12500	12917	13333	13750	14167	14583
3	15	15417	15833	16250	16667	17083	17500	17917	18333	18750	19167	19583
4	20	20417	20833	21250	21667	22083	22500	22917	23333	23750	24167	24583
5	25	25417	25833	26250	26667	27083	27500	27917	28333	28750	29167	29583
6	30	30417	30833	31250	31667	32083	32500	32917	33333	33750	34167	34583
7	35	35417	35833	36250	36667	37083	37500	37917	38333	38750	39167	39583
8	40	40417	40833	41250	41667	42083	42500	42917	43333	43750	44167	44583
9	45	45417	45833	46250	46667	47083	47500	47917	48333	48750	49167	49583
10	50	50417	50833	51250	51667	52083	52500	52917	53333	53750	54167	54583
11	55	55417	55833	56250	56667	57083	57500	57917	58333	58750	59167	59583
12	60	60417	60833	61250	61667	62083	62500	62917	63333	63750	64167	64583
13	65	65417	65833	66250	66667	67083	67500	67917	68333	68750	69167	69583
14	70	70417	70833	71250	71667	72083	72500	72917	73333	73750	74167	74583
15	75	75417	75833	76250	76667	77083	77500	77917	78333	78750	79167	79583
16	80	80417	80833	81250	81667	82083	82500	82917	83333	83750	84167	84583
17	85	85417	85833	86250	86667	87083	87500	87917	88333	88750	89167	89583
18	90	90417	90833	91250	91667	92083	92500	92917	93333	93750	94167	94583
19	95	95417	95833	96250	96667	97083	97500	97917	98333	98750	99167	99583

TABLE 3 Conversion of cwts., qrs. and lbs. to decimals of 1 long ton

1 lb. = 0.000 446 429 tons, ½ lb. = 0.000 223 tons.
The table shows 6 decimal places.

	Cwts.	2	4	6	8	10	12	14	16	18	
	Tons	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	
	0 cwt.					1 cwt.					
lb.	0 qr.	1 qr.	2 qrs.	3 qrs.		0 qr.	1 qr.	2 qrs.	3 qrs.		
0	0.000000	0.012500	0.025000	0.037500		0.050000	0.062500	0.075000	0.087500		
1	00446	12946	25446	37946		50446	62946	75446	87946		
2	00893	13393	25893	38393		50893	63393	75893	88393		
3	01339	13839	26339	38839		51339	63839	76339	88839		
4	01786	14286	26786	39286		51786	64286	76786	89286		
5	02232	14732	27232	39732		52232	64732	77232	89732		
6	02679	15179	27679	40179		52679	65179	77679	90179		
7	03125	15625	28125	40625		53125	65625	78125	90625		
8	03571	16071	28571	41071		53571	66071	78571	91071		
9	04018	16518	29018	41518		54018	66518	79018	91518		
10	04464	16964	29464	41964		54464	66964	79464	91964		
11	04911	17411	29911	42411		54911	67411	79911	92411		
12	05357	17857	30357	42857		55357	67857	80357	92857		
13	05804	18304	30804	43304		55804	68304	80804	93304		
14	06250	18750	31250	43750		56250	68750	81250	93750		
15	06696	19196	31696	44196		56696	69196	81696	94196		
16	07143	19643	32143	44643		57143	69643	82143	94643		
17	07589	20089	32589	45089		57589	70089	82589	95089		
18	08036	20536	33036	45536		58036	70536	83036	95536		
19	08482	20982	33482	45982		58482	70982	83482	95982		
20	08929	21429	33929	46429		58929	71429	83929	96429		
21	09375	21875	34375	46875		59375	71875	84375	96875		
22	09821	22321	34821	47321		59821	72321	84821	97321		
23	10268	22768	35268	47768		60268	72768	85268	97768		
24	10714	23214	35714	48214		60714	73214	85714	98214		
25	11161	23661	36161	48661		61161	73661	86161	98661		
26	11607	24107	36607	49107		61607	74107	86607	99107		
27	12054	24554	37054	49554		62054	74554	87054	99554		

TABLE 4 Conversion of qrs. and lbs. to decimals of 1 cwt.

1 lb. = 0.00892857 cwt.

lb.	0 qr.	1 qr.	2 qrs.	3 qrs.
0	0.00000	0.25000	0.50000	0.75000
1	00893	25893	50893	75893
2	01786	26786	51786	76786
3	02679	27679	52679	77679
4	03571	28571	53571	78571
5	04464	29464	54464	79464
6	05357	30357	55357	80357
7	06250	31250	56250	81250
8	07143	32143	57143	82143
9	08036	33036	58036	83036
10	08929	33929	58929	83929
11	09821	34821	59821	84821
12	10714	35714	60714	85714
13	11607	36607	61607	86607
14	12500	37500	62500	87500
15	13393	38393	63393	88393
16	14286	39286	64286	89286
17	15179	40179	65179	90179
18	16071	41071	66071	91071
19	16964	41964	66964	91964
20	17857	42857	67857	92857
21	18750	43750	68750	93750
22	19643	44643	69643	94643
23	20536	45536	70536	95536
24	21429	46429	71429	96429
25	22321	47321	72321	97321
26	23214	48214	73214	98214
27	24107	49107	74107	99107

½ lb. = 0.00446 cwt.

TABLE 5 Conversion of oz. to decimals of 1 lb.

1 oz. = 0.062500 lb.

oz.	lb.	oz.	lb.
		8	0.500000
¼	0.015625	8¼	515625
½	031250	8½	531250
¾	046875	8¾	546875
1	062500	9	562500
1¼	078125	9¼	578125
1½	093750	9½	593750
1¾	109375	9¾	609375
2	125000	10	625000
2¼	140625	10¼	640625
2½	156250	10½	656250
2¾	171875	10¾	671875
3	187500	11	687500
3¼	203125	11¼	703125
3½	218750	11½	718750
3¾	234375	11¾	734375
4	250000	12	750000
4¼	265625	12¼	765625
4½	281250	12½	781250
4¾	296875	12¾	796875
5	312500	13	812500
5¼	328125	13¼	828125
5½	343750	13½	843750
5¾	359375	13¾	859375
6	375000	14	875000
6¼	390625	14¼	890625
6½	406250	14½	906250
6¾	421875	14¾	921875
7	437500	15	937500
7¼	453125	15¼	953125
7½	468750	15½	968750
7¾	484375	15¾	984375

TABLE 6 Conversion of ordinary fractions to decimal fractions

a) 4ths, 8ths, 16ths, 32nds

1/4	1/8	1/16	1/32		1/4	1/8	1/16	1/32	
					2				0.50000
			1	0.03125				17	53125
		1		06250			9		56250
			3	09375				19	59375
	1			12500		5			62500
			5	15625				21	65625
		3		18750			11		68750
			7	21875				23	71875
1				25000	3				75000
			9	28125				25	78125
		5		31250			13		81250
			11	34375				27	84375
	3			37500		7			87500
			13	40625				29	90625
		7		43750			15		93750
			15	46875				31	96875

b) 6ths, 12ths

1/6	1/12	
	1	0.08333
1	2	16667
	3	25000
2	4	33333
	5	41667
3	6	50000
	7	58333
4	8	66667
	9	75000
5	10	83333
	11	91667

c) 30ths

1/30	
1	0.03333
2	6667
3	10000
4	3333
5	6667
6	20000
7	3333
8	6667
9	30000
10	3333
11	6667
12	40000
13	3333
14	6667
15	50000
16	3333
17	6667
18	60000
19	3333
20	6667
21	70000
22	3333
23	6667
24	80000
25	3333
26	6667
27	90000
28	3333
29	6667

TABLE 7 Table of Interest Factors

1 year = 360 days

%	0	¼	½	¾
0	0.0000000 000	0.0000069 444	0.0000138 889	0.0000208 333
1	0277 778	0347 222	0416 667	0486 111
2	0555 555	0625 000	0694 444	0763 889
3	0833 333	0902 778	0972 222	1041 667
4	1111 111	1180 556	1250 000	1319 444
5	1388 889	1458 333	1527 778	1597 222
6	1666 667	1736 111	1805 556	1875 000
7	1944 444	2013 889	2083 333	2152 778
8	2222 222	2291 667	2361 111	2430 556
9	2500 000	2569 444	2638 889	2708 333
10	2777 778	2847 222	2916 667	2986 111
11	3055 556	3125 000	3194 444	3263 889
12	3333 333	3402 778	3472 222	3541 667
13	3611 111	3680 556	3750 000	3819 444
14	3888 889	3958 333	4027 778	4097 222
15	4166 667	4236 111	4305 556	4375 000

TABLE 8 Table of Interest Divisors

1 year = 360 days

%	0	¼	½	¾
0		144 000.000	72 000.000	48 000.000
1	36 000.000	28 800.000	24 000.000	20 571.429
2	18 000.000	16 000.000	14 400.000	13 090.909
3	12 000.000	11 076.923	10 285.714	9 600.000
4	9 000.000	8 470.588	8 000.000	7 578.947
5	7 200.000	6 857.143	6 545.455	6 260.870
6	6 000.000	5 760.000	5 538.462	5 333.333
7	5 142.857	4 965.517	4 800.000	4 645.161
8	4 500.000	4 363.636	4 235.294	4 114.286
9	4 000.000	3 891.892	3 789.474	3 692.308
10	3 600.000	3 512.195	3 428.571	3 348.837
11	3 272.727	3 200.000	3 130.435	3 063.830
12	3 000.000	2 938.776	2 880.000	2 823.529
13	2 769.231	2 716.981	2 666.667	2 618.182
14	2 571.429	2 526.316	2 482.759	2 440.678
15	2 400.000	2 360.656	2 322.581	2 285.714

TABLE 9

Table of Squares, correct to the nearest fourth figure. The first three figures of the square root can be read from the table, and the fourth interpolated. Then by dividing, the desired root is secured in 7 or 8 figures.

$\sqrt{}$	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
10	100.0	102.0	104.0	106.1	108.2	110.3	112.4	114.5	116.6	118.8
11	121.0	123.2	125.4	127.7	130.0	132.3	134.6	136.9	139.2	141.6
12	144.0	146.4	148.8	151.3	153.8	156.3	158.8	161.3	163.8	166.4
13	169.0	171.6	174.2	176.9	179.6	182.3	185.0	187.7	190.4	193.2
14	196.0	198.8	201.6	204.5	207.4	210.3	213.2	216.1	219.0	222.0
15	225.0	228.0	231.0	234.1	237.2	240.3	243.4	246.5	249.6	252.8
16	256.0	259.2	262.4	265.7	269.0	272.3	275.6	278.9	282.2	285.6
17	289.0	292.4	295.8	299.3	302.8	306.3	309.8	313.3	316.8	320.4
18	324.0	327.6	331.2	334.9	338.6	342.3	346.0	349.7	353.4	357.2
19	361.0	364.8	368.6	372.5	376.4	380.3	384.2	388.1	392.0	396.0
20	400.0	404.0	408.0	412.1	416.2	420.3	424.4	428.5	432.6	436.8
21	441.0	445.2	449.4	453.7	458.0	462.3	466.6	470.9	475.2	479.6
22	484.0	488.4	492.8	497.3	501.8	506.3	510.8	515.3	519.8	524.4
23	529.0	533.6	538.2	542.9	547.6	552.3	557.0	561.7	566.4	571.2
24	576.0	580.8	585.6	590.5	595.4	600.3	605.2	610.1	615.0	620.0
25	625.0	630.0	635.0	640.1	645.2	650.3	655.4	660.5	665.6	670.8
26	676.0	681.2	686.4	691.7	697.0	702.3	707.6	712.9	718.2	723.6
27	729.0	734.4	739.8	745.3	750.8	756.3	761.8	767.3	772.8	778.4
28	784.0	789.6	795.2	800.9	806.6	812.3	818.0	823.7	829.4	835.2
29	841.0	846.8	852.6	858.5	864.4	870.3	876.2	882.1	888.0	894.0
30	900.0	906.0	912.0	918.1	924.2	930.3	936.4	942.5	948.6	954.8
31	961.0	967.2	973.4	979.7	986.0	992.3	998.6	1005	1011	1018
32	1024	1030	1037	1043	1050	1056	1063	1069	1076	1082
33	1089	1096	1102	1109	1116	1122	1129	1136	1142	1149
34	1156	1163	1170	1176	1183	1190	1197	1204	1211	1218
35	1225	1232	1239	1246	1253	1260	1267	1274	1282	1289
36	1296	1303	1310	1318	1325	1332	1340	1347	1354	1362
37	1369	1376	1384	1391	1399	1406	1414	1421	1429	1436
38	1444	1452	1459	1467	1475	1482	1490	1498	1505	1513
39	1521	1529	1537	1544	1552	1560	1568	1576	1584	1592
40	1600	1608	1616	1624	1632	1640	1648	1656	1665	1673
41	1681	1689	1697	1706	1714	1722	1731	1739	1747	1756
42	1764	1772	1781	1789	1798	1806	1815	1823	1832	1840
43	1849	1858	1866	1875	1884	1892	1901	1910	1918	1927
44	1936	1945	1954	1962	1971	1980	1989	1998	2007	2016
45	2025	2034	2043	2052	2061	2070	2079	2088	2098	2107
46	2116	2125	2134	2144	2153	2162	2172	2181	2190	2200
47	2209	2218	2228	2237	2247	2256	2266	2275	2285	2294
48	2304	2314	2323	2333	2343	2352	2362	2372	2381	2391
49	2401	2411	2421	2430	2440	2450	2460	2470	2480	2490

√	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
50	2500	2510	2520	2530	2540	2550	2560	2570	2581	2591
51	2601	2611	2621	2632	2642	2652	2663	2673	2683	2694
52	2704	2714	2725	2735	2746	2756	2767	2777	2788	2798
53	2809	2820	2830	2841	2852	2862	2873	2884	2894	2905
54	2916	2927	2938	2948	2959	2970	2981	2992	3003	3014
55	3025	3036	3047	3058	3069	3080	3091	3102	3114	3125
56	3136	3147	3158	3170	3181	3192	3204	3215	3226	3238
57	3249	3260	3272	3283	3295	3306	3318	3329	3341	3352
58	3364	3376	3387	3399	3411	3422	3434	3446	3457	3469
59	3481	3493	3505	3516	3528	3540	3552	3564	3576	3588
60	3600	3612	3624	3636	3648	3660	3672	3684	3697	3709
61	3721	3733	3745	3758	3770	3782	3795	3807	3819	3832
62	3844	3856	3869	3881	3894	3906	3919	3931	3944	3956
63	3969	3982	3994	4007	4020	4032	4045	4058	4070	4083
64	4096	4109	4122	4134	4147	4160	4173	4186	4199	4212
65	4225	4238	4251	4264	4277	4290	4303	4316	4330	4343
66	4356	4369	4382	4396	4409	4422	4436	4449	4462	4476
67	4489	4502	4516	4529	4543	4556	4570	4583	4597	4610
68	4624	4638	4651	4665	4679	4692	4706	4720	4733	4747
69	4761	4775	4789	4802	4816	4830	4844	4858	4872	4886
70	4900	4914	4928	4942	4956	4970	4984	4998	5013	5027
71	5041	5055	5069	5084	5098	5112	5127	5141	5155	5170
72	5184	5198	5213	5227	5242	5256	5271	5285	5300	5314
73	5329	5344	5358	5373	5388	5402	5417	5432	5446	5461
74	5476	5491	5506	5520	5535	5550	5565	5580	5595	5610
75	5625	5640	5655	5670	5685	5700	5715	5730	5746	5761
76	5776	5791	5806	5822	5837	5852	5868	5883	5898	5914
77	5929	5944	5960	5975	5991	6006	6022	6037	6053	6068
78	6084	6100	6115	6131	6147	6162	6178	6194	6209	6225
79	6241	6257	6273	6288	6304	6320	6336	6352	6368	6384
80	6400	6416	6432	6448	6464	6480	6496	6512	6529	6545
81	6561	6577	6593	6610	6626	6642	6659	6675	6691	6708
82	6724	6740	6757	6773	6790	6806	6823	6839	6856	6872
83	6889	6906	6922	6939	6956	6972	6989	7006	7022	7039
84	7056	7073	7090	7106	7123	7140	7157	7174	7191	7208
85	7225	7242	7259	7276	7293	7310	7327	7344	7362	7379
86	7396	7413	7430	7448	7465	7482	7500	7517	7534	7552
87	7569	7586	7604	7621	7639	7656	7674	7691	7709	7726
88	7744	7762	7779	7797	7815	7832	7850	7868	7885	7903
89	7921	7939	7957	7974	7992	8010	8028	8046	8064	8082
90	8100	8118	8136	8154	8172	8190	8208	8226	8245	8263
91	8281	8299	8317	8336	8354	8372	8391	8409	8427	8446
92	8464	8482	8501	8519	8538	8556	8575	8593	8612	8630
93	8649	8668	8686	8705	8724	8742	8761	8780	8798	8817
94	8836	8855	8874	8892	8911	8930	8949	8968	8987	9006
95	9025	9044	9063	9082	9101	9120	9139	9158	9178	9197
96	9216	9235	9254	9274	9293	9312	9332	9351	9370	9390
97	9409	9428	9448	9467	9487	9506	9526	9545	9565	9584
98	9604	9624	9643	9663	9683	9702	9722	9742	9761	9781
99	9801	9821	9841	9860	9880	9900	9920	9940	9960	9980

TABLE FOR CONVERSION

Metric system to British measures, and vice versa

In each case multiply by the factor given

LENGTH

Millimetres to inches	0.039 370	Inches to millimetres	25.399 98
Centimetres to inches	0.393 701	Inches to centimetres	2.539 998
Metres to feet	3.280 399	Feet to metres	0.304 799
Metres to yards	1.093 614	Yards to metres	0.914 399
Kilometres to yards	1093.614 500	Yards to kilometres	0.000 91
Kilometres to miles	0.621 372	Miles to kilometres	1.609 342

AREA

Square centimetres to square inches	0.155 00	Square inches to square centimetres	6.451 59
Square metres to square feet	10.763 87	Square feet to square metres	0.092 90
Square metres to square yards	1.195 99	Square yards to square metres	0.836 13
Square kilometres to square miles	0.386 10	Square miles to square kilometres	2.589 98
Hectares to acres	2.471 04	Acres to hectares	0.404 684

π = Ratio of circumference to diameter = 3.141593654.

$1/\pi$ = Ratio of diameter to circumference = 0.318309886

VOLUME

Cubic centimetres to cubic inches	0.061 02	Cubic inches to cubic centimetres	16.387 16
Cubic metres to cubic feet	35.310 735	Cubic feet to cubic metres	0.028 32
Cubic metres to cubic yards	1.307 94	Cubic yards to cubic metres	0.764 56

CAPACITY

(Liquid Measure)

Litres to pints	1.760 718	Pints to litres	0.567 95
Litres to U.S. pints	2.113 628	U.S. pints to litres	0.473 12
Litres to quarts	0.880 359	Quarts to litres	1.135 90
Litres to U.S. quarts	1.0567	U.S. quarts to litres	0.9463
Litres to gallons	0.220 089	Gallons to litres	4.543 60
Litres to U.S. gallons	0.2642	U.S. gallons to litres	3.7850
Hectolitres to gallons	22.007 043	Gallons to hectolitres	0.045 44

WEIGHT

Grams to grains	15.432 337	Grains to grams	0.064 799
Grams to ounces	0.035 274	Ounces to grams	28.349 530
Grams to pounds	0.002 205	Pounds to grams	453.592 430
Kilograms to pounds	2.204 624	Pounds to kilograms	0.453 592
Kilograms to cwts.	0.019 684	Cwts. to kilograms	50.802 350
Kilograms to long tons	0.000 984	Long tons to kilograms	1016.047 00
Kilograms to short tons	0.000 815	Short tons to kilograms	907.184 00

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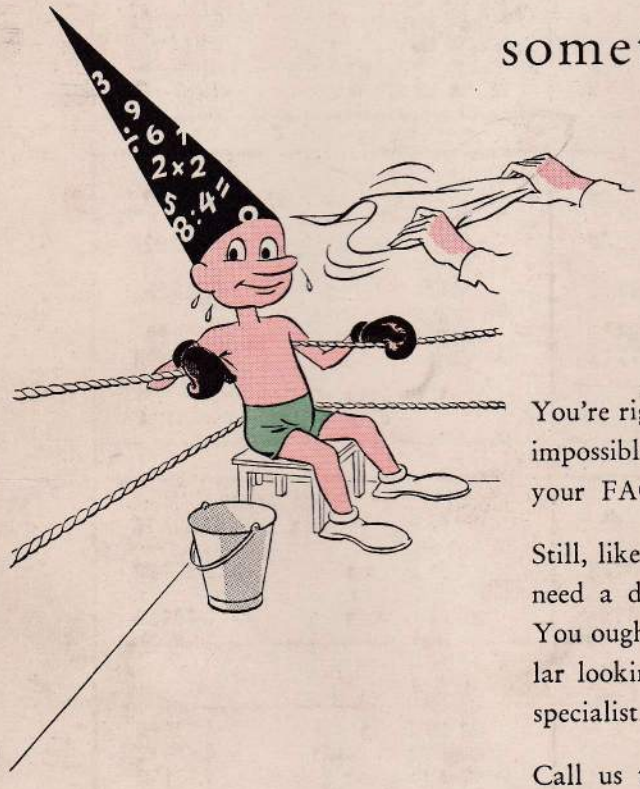

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