# Short-cut calculations with
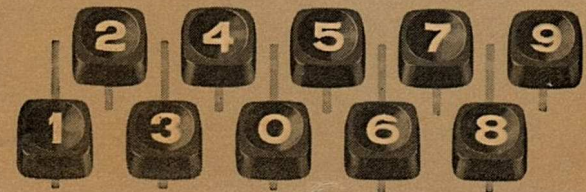
## FACIT

# Short-cut calculations
## with

**FACIT**

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# Preface

The red symbols at the top of each page refer to a trade or trades for which the following example is particularly applicable.

MEANING OF THE SYMBOLS

Retailers

Wholesalers

Agents

Import and export firms

Building firms

Banks

Insurance houses

Engineers

Statistics in various trades

All trades

In calculating with C1—13, CS1—13 and CA1—13

E X A M P L E :

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 = ?

Set up the constant number 125.32 and transfer it to the product register.
Set up 989.89 and add. On the CS1—13 the addition is performed with the × key, on the CA1—13 with the + key, in both cases with the main control lever in its centre position.
**The first wage is 1,115.21.**

Do not clear the registers.
Make a negative turn, which will subtract the last figure set up, 989.89.
The constant figure, 125.32, will remain in the product register.
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.
**The second wage is 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.
Clear the setting register, and add 959.43.
**The third wage is 1,084.75.**

THE OPERATION IN FIGURES:

125.32

+ 989.89

(= 1,115.21)

— 989.89

(= 125.32)

+1,251.23

(= 1,376.55)

—1,251.23        (= 125.32)

+ 959.43

= 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.

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In calculating with C1—13, CS1—13 and CA1—13

E X A M P L E :

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    (= 9999999987468)

+989.89

(= 864.57)

—989.89

+1,251.23

(= 1,125.91)

—1,251.23

+959.43

= 834.11

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.
Set up 989.89 and add. On the CS1—13 the addition is performed with the × key, and on the CA1—13 with the + key, in both cases with the main control lever in its centre position.
**The first net weight is 864.57 kg.**

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.
Set up 1,251.23 and add in the same manner as before.
**The second net weight is 1,125.91 kg.**

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.
**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.

In hand-operated multiplication with C1—13

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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 constant factor is 4.18. Set it up in the setting register, and multiply by 31.1.
**The first worker's pay is 130.00.**

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.
**The second worker's pay is 168.45.**

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

THE OPERATION IN FIGURES:

$4.18 \times 31.1$

$(= 129.998)$

$4.18 \times 41.1$
$4.18 \times 40.1$
$4.18 \times 40.3$

$(= 168.454)$

$4.18 \times 40.1$
$4.18 \times 42.1$
$4.18 \times 52.1$

$= 217.778$

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

In semi-automatic multiplication with CS1—13

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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:

$04.18 \times 31.1$

$(= 129.998)$

$04.18 \times 40.3$

$(= 168.454)$

$04.18 \times 52.1$

$= 217.778$

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

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.
Multiply by 31.1, taking the digits from the left to right.
**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.
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.
**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.
**The third worker's pay is 217.78.**

PRINCIPLE: Do the whole operation with the constant factor in 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.

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.

In fully-automatic multiplication with CA1—13

In calculating with C1—13

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.**

**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 accessories .... | 2,944.00 | ? |
| Production labour ........ | 9,626.00 | ? |
| Transportation costs ...... | 1,245.00 | ? |
| Assembly labour .......... | 11,551.00 | ? |
| Miscellaneous expenses .. | 14,365.00 | ? |
| | 59,150.00 | 100 |

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

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

**The first worker's pay is 130.00.**

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

**The second worker's pay is 168.45.**

Clear registers I and II and press the $\times$ key.
Set up 52.1 and press the $=$ key.

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

THE OPERATION IN FIGURES:

$4.18 \times 31.1$

$(= 129.998)$

$4.18 \times 40.3$

$(= 168.454)$

$4.18 \times 52.1$

$= 217.778$

THE OPERATION IN FIGURES:

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

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

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

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

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.

Divide $\frac{1}{59150}$ in the usual manner.

The reciprocal value is 0.00001690617 (refer to page 40 for placing of decimal points). Another rule for placing the decimal point is that there must be as many noughts preceding the reciprocal value of a number as there are integers in the number. The first nought is called the integral nought. (Another method of computing the reciprocal value is as follows: 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. An additional figure in the answer is obtained with this method.)

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.

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

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

In calculating with CS1–13 and CA1–13

In calculating with C1–13, CS1–13 and CA1–13

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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 labour ........ | 9,626.00 | ? |
| Transportation costs ...... | 1,245.00 | ? |
| Assembly labour ........ | 11,551.00 | ? |
| Miscellaneous expenses .. | 14,365.00 | ? |
| | 59,150.00 | 100 |

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

**For checking invoices and calculating different kinds of areas.**

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.

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

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.

Divide $\frac{1}{59150}$ in the usual manner.

The reciprocal value is 0.0000169017 (refer to page 40 for placing of decimal points). Another rule for placing the decimal point is that there must be as many noughts preceding the reciprocal value of a number as there are integers in the number. The first nought is called the integral nought. (Another method of computing the reciprocal value is as follows: Set the main control lever in its right-hand position. Press the NEG key; the direction indicator at the multiplier register will then show black. Set up 59150 and press the tabulator. Press the × key on the CS1—13, and the + key on the CA1—13. An additional figure in the answer is obtained with this method, but the last figure is always "1" too high.)

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 CS1—13 and on page 8 for CA1—13.

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 %.**

THE OPERATION IN FIGURES:

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

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 OPERATION IN FIGURES:

87.14 × 4.23

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

= 726.7512

$87.14 \times 4.23 + 27.16 \times 1.35 \text{ etc.} = ?$

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

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.

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.

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

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.

In calculating with **C1—13, CS1—13** and **CA1—13**

In calculating with **C1—13, CS1—13** and **CA1—13**

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?

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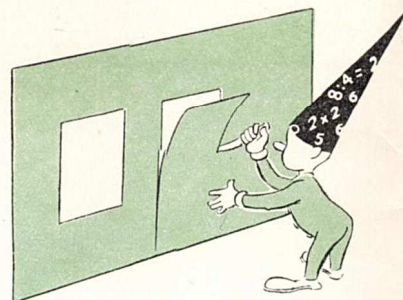
$8.25 \times 2.65 - 2.0 \times 1.4 - 2.15 \times 0.9 = ?$

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 |

THE OPERATION IN FIGURES:

| | |
|---|---|
| 0358.75 × 43 | (= 15426.25) |
| : 72 | = 214.2534 |
| 0358.75 × 43 | (= 15426.25) |
| : 72 | |
| | = 214.2534 |
| 043 × 358.75 | (= 15426.25) |
| : 72 | |
| | = 214.2534 |

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

a) **With C1—13.**

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 CS1—13 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.

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 CA1—13 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.

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

**The amount is 214.25.**

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.

PRINCIPLE: In the "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.

In calculating with **C1—13** and **CS1—13**

In calculating with **C1—13** and **CS1—13**

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> 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.**

**When various additions and deductions have to be made, which require intermediate computations, you should find a way to carry out the operations as a single unit, that is, without clearing the product register.**

> EXAMPLE:
>
> Check the entries in the following pay statement:
>
> | | |
> |---|---:|
> | Basic wage ................... | 725.00 |
> | Overtime, 7 hours at 4.75 per hour | 33.25 |
> | Taxable income ................ | 758.25 |
>
> Deductions:
>
> | | | |
> |---|---:|---:|
> | Withholding tax ........... | 160.00 | |
> | Tax arrears ................ | 30.00 | |
> | Union dues ............... | 2.50 | 192.50 |
> | | | 565.75 |

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

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 CS1—13 set the main control lever in its centre position and the secondary lever in the left-hand 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 CA1—13 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

**THE OPERATION IN FIGURES:**

4.75 × 7

              (= 33.25)

33.25 + 725.00

              (= 758.25)

(160.00 + 30.00   + 2.50)

— 192.50

              = 565.75

725.00 + (7 × 4.75 — (160.00 + 30.00 + 2.50) = 565.75.

Set up 4.75 and multiply by 7.

**Overtime pay is 33.25.**

Clear the setting and multiplier registers. Add 725.00.

**Taxable income is 758.25.**

Clear setting and multiplier registers only.

The deductions can be added without clearing the product register. Perform the addition to the left of the figures that already appear in this register. Set up 160.00, then subtract once (do not clear the machine), tabulate and add. Now subtract and add 30.00 and 2.50 in the same way. Make sure that all numbers have the same amount of decimals. This is necessary if the numbers are to come in the correct computing position.

**Total deductions amount to 192.50**

(the number appears to the left in the product register).

The *net wage* is 565.75 (the number appears to the right in the product register).

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 unit price is automatically multiplied by the number on the right in the setting register.

PRINCIPLE: Let the computed gross wage remain in the product register and add the deductions separately to the left in the same register; the net wage appears simultaneously at the right in the product register.

In calculating with **CA1—13**

> EXAMPLE:
>
> Check the amounts in the following pay state-ment:
>
> Basic wage ......................... 725.00
> Overtime, 7 hours at 4.75 per hour .. 33.25
> Taxable income ..................... 758.25
> Deductions
> Withholding tax ............ 160.00
> Tax arrears ................. 30.00
> Union dues ................. 2.50   192.50
>                                      565.75

**When various additions and deductions have to be made, which require intermediate computations, you should find a way to carry out the operations as a single unit, that is, without clearing the product register.**

725.00 + (7 x 4.75) — (160.00 + 30.00 + 2.50) = 565.75.

Set up 7 and multiply by 4.75 fully automatically.

**Overtime pay is 33.25.**

Clear the setting register.
Set up 725.00 and press the ADD key.

**Taxable income is 758.25.**

Clear the multiplier register.

Addition and simultaneous subtraction of the deducted amounts can be performed without clearing the product register. Perform the addition to the left of the figures that already appear in this register. To do this, set up seven 9's and press the × key. Since we have two decimals in the product register, two decimals must also be pointed off in the deducted amounts. Set up 160.00 and depress the = key. The amount is now subtracted from the gross wage and is automatically moved to the left in the product register. Clear the setting register with the × key. Set up 30.00. Press the = key first and then the × key. Lastly, set up 2.50 and proceed in the same manner. The product register now shows both:

Total deductions of 192.50 and
Net wage of 565.75.

**THE OPERATION IN FIGURES:**

$7 \times 4.75$

(= 33.25)

33.25 + 725.00

(= 758.25)

(160.00 + 30.00  + 2.50)

— 192.50

= 565.75

---

PRINCIPLE: Let the computed gross wage remain in the product register and with the help of seven 9's in the invisible mechanism perform simultaneous addition and subtraction of deducted amounts in the same register.

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In calculating with **CA1—13**

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

> EXAMPLE:
>
> Four workers completed a job for which they received a total of 1,200.00 in wages.
>
> Check that the surplus pay is divided in proportion to the hours worked and the hourly wage of each worker.
>
> | | Number of hours | Hourly wages | Net wages | Gross wages | Surplus pay |
> |---|---|---|---|---|---|
> | A | 48 | 4.75 | 228.00 | 348.65 | 120.65 |
> | B | 46.5 | 4.05 | 188.33 | 287.98 | 99.65 |
> | C | 43 | 3.98 | 171.14 | 261.70 | 90.56 |
> | D | 48 | 4.11 | 197.28 | 301.67 | 104.39 |
> | | | | 784.75 | 1,200.00 | 415.25 |

**THE OPERATION IN FIGURES:**

$48 \times 4.75 = 228.00$
$46.5 \times 4.05 = 188.33$
$43 \times 3.98 = 171.14$
$48 \times 4.11 = 197.28$
$228.00 + 188.33 + 171.14 + 197.28 = 784.75$

$1,200.00 — 784.75$

(= 415.25)

$$\frac{415.25}{784.75} = 0.5291494$$

First check the net wages by multiplying the number of hours by the hourly wage. Add the net wages, which yields a sum of 784.75.

The amount of surplus pay is arrived at by subtracting 784.75 from 1,200.00. This operation should be performed to the left in the product register: set up 1,200, tabulate and add. Set up 0784.75, tabulate and strike the ÷ key.

Now divide the difference, 415.25, by 784.75. Do not clear the machine, but set the main control lever at DIV and go right into the division. The quotient is 0.5291494. This number is the constant by which each worker's net pay must be multiplied in order to determine surplus pay. Use five decimal places.

Set the main control lever at MULT. After setting up 0.52915 as your multiplication constant, multiply it first by the net wage, 228.00. The surplus is 120.65. To get the gross wage, 348.65, press the ➤ key once, then strike the + key. Clear with the × key, I and II. Set up 188.33 and press the = key. Surplus pay for the second worker is 99.65. Press the ➤ key once, then strike the + key. This man's gross wage is 287.98. Proceed similarly with the wages of the other workers.

Total surplus pay is 415.25.

Total gross wages is 1,200.00.

---

PRINCIPLE: The surplus pay to be distributed must be divided by the sum of the net wages. Use the quotient as the constant factor and multiply by the various net wages. To obtain gross wages, multiply semi-automatically with a further one.

In calculating with **CA1—13**

EXAMPLE:

a) Compute the square of 179.

b) Compute the cube of 472.

a) Set up 179 and press the = key.

The answer is 32041.

b) Set up 472 and press the = key.

The answer is 222784.

Clear with the × key. Set up 222784, clear the product and multiplier registers, and press the = key.

The answer is 105154048.

THE OPERATION IN FIGURES:

179 × 179
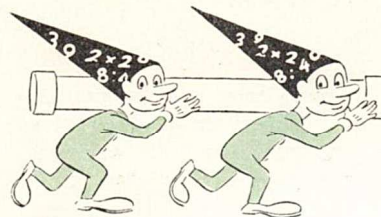
$\qquad$ (= 32041)

472 × 472

$\qquad$ (= 222784)

472 × 222784

$\qquad$ (= 105154048)

PRINCIPLE: In squaring numbers, the number has to be set up once only; in cubing numbers, first compute the square, which is then set up to produce the cube.

---

In calculating with **CA1—13**

**Multiplication by a Constant Factor, interrupted by separate (a) Multiplication, (b) Division, or (c) Addition. (This method recommends itself for payroll calculations.)**

EXAMPLE:

a) 1789 × 6251 = 11183039
   1789 × 58  = 103762
   245 × 431  = 105595
   1789 × 657 = 1175373

b) 1789 × 913 = 1633357
   755 + 25   = 30.2
   1789 × 72  = 128808

c) 1789 × 418 = 747802
   532 + 169  = 701
   1789 × 16  = 28624

THE OPERATION IN FIGURES:

1789 × 6251     (= 11183039)
1789 × 58
$\qquad$ (= 103762)
245 × 431
$\qquad$ (= 105595)
1789 × 657
$\qquad$ (= 1175373)
1789 × 913
$\qquad$ (= 1633357)

755 + 25
$\qquad$ (= 30.2)
1789 × 72
$\qquad$ (= 128808)
1789 × 418
$\qquad$ (= 747802)
532 + 169
$\qquad$ (= 701)
1789 × 16
$\qquad$ (= 28624)

a) Set up 1789 and press the × key. Set up 6251 and press the = key. The answer is 11183039.

Clear with × key, I and II. Set up 58 and press the = key.

The answer is 103762.

Clear with the × key, I and II. Set up 245 and multiply semi-automatically by 431. The answer is 105595.

Clear with the × key, I and II. Set up 657 and press the = key. The answer is 1175373.

b) Clear with the × key, I and II. Set up 913 and press the = key. The answer is 1633357.

Clear with the × key, I and II. Set up 755, tabulate and press once on the + key. Clear with × key and II. Set the main control lever at DIV. Set up 25, tabulate and begin division with the ÷ key. The answer is 30.2. (Do not break off division with the SUB-STOP.)

Set the main control lever at MULT and clear with the × key, I and II. Set up 72 and press the = key. The answer is 128808.

c) Clear with the × key, I and II. Set up 418 and press the = key. The answer is 747802.

Clear with the × key, I and II. Set up 532 and press the + key. Clear with the × key. Set up 169 and repeat as above. The answer is 701.

Clear with the × key, I and II. Set up 16 and press the = key. The answer is 28624.

PRINCIPLE: The keys III, ADD and SUB-STOP automatically clear a constant factor.

In calculating with **C1—13, CS1—13** and **CA1—13**

In calculating with **C1—13, CS1—13** and **CA1—13**

---

EXAMPLE:

a) Company A now has total sales of 150,000 as compared with previous sales of 125,000. What is the percent of increase?

b) Company B now has total sales of 90,000 as compared with previous sales of 125,000. What is the percent of decrease?

**In many cases only the percentage change is of interest in comparative statistics on sales, running costs, population, etc.**



EXAMPLE:

Goods costing $ 260.00 were sold for $ 575.00. What is the mark-up, and what percent of the sales price is it?

---

a) $\frac{150,000}{125,000} - 100 = ?$

Set the main control lever at DIV.

Move up 150,000 to the left in the product register. Multiply by 100 by moving the decimal point indicator two places to the right.

Divide by 125,000 in the usual manner. The quotient, 120.00 shows the relation of 150,000 to 125,000 in percent. The percent sought is the difference between 120 and 100.

The increase is 20 %.

b) $\frac{90,000}{125,000} = ?$

If you're using an electric machine, set the multiplier register for plus operation before beginning. Move 090000 up to the left in the product register (the zero is needed in front of the number so that dividend and divisor will have the same amount of integers) and multiply by 100 by moving the decimal point indicator two places to the right. Clear the setting register but let the "1" remain in the multiplier register.

Divide by 125,000 with the multiplier register set for plus. The sought-after presentage (100 minus the percent) will then appear directly.

The decrease is 28 %.

**THE OPERATION IN FIGURES:**

$\frac{150,000}{125,000}$

$(= 120)$
$120 - 100$
$(= 20)$

$100 - \frac{90,000}{125,000}$

$(= 28)$

**THE OPERATION IN FIGURES:**

$- 260$
$(= 740)$

$+ 575$

$(= 315)$

$: 575$

$= 54.7826$

$575 - 260 = ?$ (mark-up in $).

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

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

Always make sure that both numbers contain the same amount of integers. Any differences are made up by placing the required amount of noughts ahead of the smaller number.

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.

**The mark-up is $ 315.00.**

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.

**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: An increase in terms of percent is derived from the formula:

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

A decrease in terms of percent is derived from the formula:

$100 - \frac{\text{The lower number} \times 100}{\text{The higher number}}$

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

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 C1—13 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

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

---

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) At what price must an article costing 550.00 be sold to realize a mark-up of 25 % on the selling price, and at the same time permit a discount of up to 15 %?

THE OPERATION IN FIGURES:

$$\frac{7250}{7} = 1{,}035.7142$$

0.75 × 0.85

= 0.6375

550. : 0.6375

a) $\dfrac{725 \times 100}{70} = ?$ (selling price)

30 % of the selling 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 selling price is 1,035.71.**

b) First work out a factor which will let you compute the price directly. Multiply 75 % by 85 %.
Divide the cost price by the factor obtained: 0.6375.

**The selling price is 862.75.**

A computation of this kind can be very useful if the same rates of percent occur regularly. In that case, it is best to work out the reciprocal of the constant divisor and multiply by this.

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PRINCIPLE: To set prices based on a fixed mark-up of the selling price, use the following formula:
$$\frac{100 \times \text{cost}}{100 \times \text{precentage of mark-up}}$$

EXAMPLE:

a) An article sells for 1,675 less 5 % discount. Find the amount of discount and the net price.

b) An article sells for 125.25 + an extra charge of 5 %. Find the amount of extra charge and the final price.

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

**Virtually every kind of business is concerned with discounts and net prices. It is therefore good business to simplify this work as much as possible.**

EXAMPLE:

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

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

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

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

(C1—13 and CS1—13) Multiply 1675 by 5.
(CA1—13) Set up 95 and press the × key.
Then set up 1675 and multiply semi-automatically by 5.
**The discount is 83.75.**

(C1—13 and CS1—13) Do not clear the registers. Continue to multiply until the number in the multiplier register changes to 95. (CA1—13) Clear the product and multiplier registers. Press the = key (the "95", of course, has already been set up for multiplication).
**The net price is 1,591.25.**

b) $\dfrac{5 \times 125.25}{100} = ?$ (extra charge)

$\dfrac{105 \times 125.25}{100} = ?$ (final price)

Multiply 125.25 by 5 and divide by 100.
**The extra charge is 6.26.**

Do not clear the registers. Continue to multiply until the number in the multiplier register changes to 105. On CA1—13 the first multiplication is performed automatically and the second semi-automatically, as in the above example.
**The final price is 131.51.**

c) $\dfrac{89 \times 1{,}002.25}{100} = ?$ (net price)

If the net price is all that is needed, multiply the gross amount straightaway by the complement of the discount.
**The net price is 892.**

THE OPERATION IN FIGURES:

$\dfrac{1675 \times 5}{100}$

$(= 83.75)$

$\dfrac{1675 \times 95}{100}$

$1{,}591.25$

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

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

$\dfrac{1{,}002.25 \times 89}{100}$   $= 892.0025$

THE OPERATION IN FIGURES:

$1.12 \times 3.45$   $(= 3.8640)$
$1.12 \times 5.75$   $(= 6.4400)$
$1.12 \times 4.60$   $(= 5.1520)$

$0.85 \times 2.76$   $(= 2.3460)$
$0.85 \times 4.60$   $(= 3.9100)$
$0.85 \times 5.75$   $(= 4.8875)$

a) $\dfrac{112 \times 3.45}{100} = ?$ (new price) etc.

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 new prices are 3.86, 6.44 and 5.15.**

b) $(100-15) \times 2.76 = ?$ (new price) etc.

Reducing the prices 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 find both the amount of discount and the net price, multiply the gross amount by: (1) the rate of discount; (2) the complement of the discount.

To find both the amount of extra charge and the final price, multiply the net price by: (1) the rate of extra charge; (2) this rate + 100.

If net price is all that is needed, multiply the gross price by the complement of the discount.

PRINCIPLE: 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.

EXAMPLE:

Find the net amounts:

$$1,150 - 25\% + 5\% - 2.5\% = ?$$
$$2,250 - 25\% + 5\% - 2.5\% = ?$$
$$5,300 - 25\% + 5\% - 2.5\% = ?$$
$$725 - 25\% + 5\% - 2.5\% = ?$$

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.

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.**

Multiply: $75 \times 105 \times 97.5$.

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

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 556.66.**

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

THE OPERATION IN FIGURES:

$0.75 \times 1.05 \times 0.975$

$(= 0.7678125)$

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

**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 |

SAVING ACCOUNTS

EXAMPLE:

What is the interest on 2,784.45 for 147 days at $3\frac{1}{2}\%$?

THE OPERATION IN FIGURES:

$147 \times 3.5$

$(= 514.5)$

$0514.5 \times 2,784.45$

$(= 1432599.525)$

$: 36000$

$= 39.79443$

$$\frac{2,784.45 \times 147 \times 3.5}{360 \times 100} = ? \text{ (interest)}.$$

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

The next multiplication is to be carried out at 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 C1—13 and CS1—13 the multiplication is performed from left to right, by the number 2784.45. On CA1—13 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.**

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.

In calculating with **C1—13, CS1—13** and **CA1—13**

In calculating with **C1—13** and **CS1—13**

E X A M P L E :

**What is the interest on 4,735.00 for 156 days at 3¼ % ?**

**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.**



E X A M P L E :

**105 × 783,658,002.16**

---

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

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:

$$\frac{4{,}735 \times 156}{11{,}076.923}$$

which is an ordinary rule-of-three problem.

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

**The interest is 66.68.**

### THE OPERATION IN FIGURES:

$$\frac{360 \times 100}{3.25} \qquad = 11{,}076.993$$

(found in table 8)

$$(= 738.660)$$

4,735 × 156

: 11076.923     = 66.6845
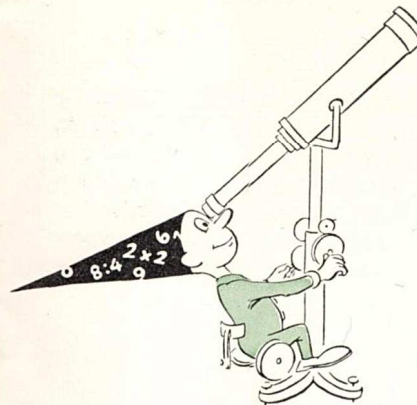
### THE OPERATION IN FIGURES:

8002.16 × 105    (= 840226.80)

84 +

78365 × 105     = 8228409

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.**

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

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

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

⬤

⬤

In calculating with CA1—13

In calculating with C1—13, CS1—13 and CA1—13

---

EXAMPLE:

105 × 783,658,002.16

---

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.

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.

---

105 × 783,658,002.16 = ?

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.

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

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

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.**

THE OPERATION IN FIGURES:

$\frac{105 \times 8002.16}{}$ (= 840226.80)

84 +

105 × 78365 = 8228409

---

THE OPERATION IN FIGURES:

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

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

$\frac{24.8916275}{4.39732561}$

(= 5.660)

$\frac{0.00276454740}{4.3973}$ = 0.0006286

---

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 5.6606286.**

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.

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

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.

EXAMPLE:

a) What is the price of 7 pieces 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 „ „ = ?

0.58333

a) $\dfrac{7 \times 3.80}{12}$ = ? etc.

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

This shows the decimal value of $\dfrac{7}{12}$ to be 0.58333.
Multiply that number by 3.80.
**Seven pieces cost 2.22.**

b) $\dfrac{5 \times 4.65}{12}$ = ?

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

**THE OPERATION IN FIGURES:**

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

0.58333 × 3.80 = 2.216654

0.41667 × 4.65 = 1.9375155
0.66667 × 1.38 = 0.9200046
0.91667 × 12.50 = 11.458375
0.08333 × 8.40 = 0.699972

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 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.

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 $1_{41\ 5/12}$.

**THE OPERATION IN FIGURES:**

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

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.

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

The result appears in the product register.

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

81,903 × 0.58333
(= 47,776.47699)

+ 80,897 × 0.41667

= 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.

EXAMPLE:

Compute

$$\sqrt{689.75}$$

with 6 digits.

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.

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 |

$\sqrt{689.75} = ?$

First divide the number into two-digit groups, beginning at the decimal point: the integers from right to left, the decimal numbers from left to right. The groups thus obtained read 6—89—75.

Consult Table 9 on page 47 to find a lower number whose square comes closest to the first two number groups, 6—89. This number is 686.4, which is the square of 26.2.

Now divide 68975 by 262. 26326335 appears in the multiplier register. The first two figures, 26, correspond to the divisor, but the third figure is a "3" instead of a "2".

Since you divided by 262, you must get 262 in the answer. Divide the excess "1" and the following figures by 2, which is easiest to do mentally.

(263263 — 262000 = 1263) divide 1263 by 2, which gives you 631 preceded by 262, or 262631 (you want six digits in the answer).

As many integers are obtained in the root as there are groups of integers in the number, in this case 2.

**The answer: 26.2631.**

THE OPERATION IN FIGURES:

$$\frac{68975}{262} = 26326335$$

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, observing 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: Use table 9 on pages 47 and 48 in extracting square roots.

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

In calculating with C1—13, CS1—13 and CA1—13

> 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.

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.

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.**

```
    94,015,003

 — 12,017,008
 = 81,997,995



 —    980,988
 = 81,017,007
```

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

---

In calculating with C1—13, CS1—13 and CA1—13

**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:**

```
   5 × 240
 + 7 × 12


 + 10              = 1,294
 3.75 × 1,294    (= 4,852.50)




 : 240.0 = 20.2 (remainder  4.50)
```

Convert: 3 lbs. 12 ozs. to decimals = 3.75 (see table 5, page 44).

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

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

The result is 1,294.

Multiply in the usual way by 3.75. The product, 4,852.50, is to be converted to pounds and shillings by dividing.

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.

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 **C1—13, CS1—13** and **CA1—13**

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 × £5.7.10 = ?

The decimal value in pounds of 7 shillings and 10 pence may 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.**

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

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 %.**

THE OPERATION IN FIGURES:

5.39167 × 3.75

= 20.2187625

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

= 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 **C1—13, CS1—13** and **CA1—13**

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:

27.18333 × 14.50

= 394.16

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

= 88.74137

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.

**The answer is Sw. Cr. 394.16.**

b) $\frac{1,286.75}{14.40}$ = ?

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. 10d.**

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*.

## Placing the Decimal Point in Division

In calculating with C1—13, CS1—13 and CA1—13

EXAMPLE:

a) 304.50 : 15.4    = 19.772727
b) 98.67 : 1344.78 = 0.073372596
c) 18.09 : 0.003   = 6030
d) 0.0009 : 1.69   = 0.00053254437

a) Set up 30450 and 154 for division in the usual way, i.e. with the dividend appearing at the extreme left in the product register. However, do not begin the division. Place a decimal point after 304, which leaves room for 10 decimals in the product register. The setting register shows 154000, which leaves room for 4 decimals. Take the difference between 10 and 4, and mark off 6 decimal places in the multiplier register.
The answer is 19.772727.

b) Set up the numbers. 11 decimals appear in the product register and 2 in the setting register, which means that the answer must have 9 decimals. One decimal is missing, however, since the multiplier register only has room for 8. The missing decimals are always noughts, which are placed ahead of the decimals appearing in the multiplier register. Write down the missing noughts before starting the operation. (Do not forget the integer nought.)
The answer is 0.073372596.

c) Set up 18.09 and the 3 alone without the preceding noughts. 11 decimals appear in the product register, while the setting register will show 6 decimals plus the 2 noughts which are also to the right of the decimal point but haven't been set up, making 8 decimals in all. Mark off 3 decimal places in the multiplier register.
The answer is 6030.

d) Set up the 9 alone without the preceding noughts, and set up 1.69. The register will show 13 + 3 (the three noughts preceding 9) = 16 decimals. 5 decimals will appear in the setting register. 16—5 = 11 decimals in the multiplier register. Since this register only has room for 8 decimals, the answer will begin with 0.000. The answer is 0.00053254437.

**THE OPERATION IN FIGURES:**
304.50 : 15.4

                      (= 19.772727)
98.67 : 1344.78

                      (= 0.073372596)
18.09 : 0.003

                      (= 6030)
0.0009 : 1.69

(= 0.00053254437)

PRINCIPLE: Subtract the decimals in the setting register from the decimals in the product register to obtain the number of decimals in the multiplier register.

---

### 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. | 0. | 0. | 0. | 0. | 0. | 0. |
| 0 | 00000 | 01042 | 02083 | 03125 | 04167 | 05208 | 06250 | 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 penny = 0.00260 shilling     1/16 penny = 0.00521 shilling     3/32 penny = 0.00781 shilling

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

£1 = 20 s., 1 s. = 12 d.

| d. → <br> s. ↓ | 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 |

¼ penny = £ 0.00104.   ½ penny = £ 0.00208.   ¾ penny = £ 0.00312.

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

1 lb. = 0.000 446 429 ton.   ½ lb. = 0.000 223 ton.

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 |

| lb. | 0 cwt. | | | | 1 cwt. | | | |
|---|---|---|---|---|---|---|---|---|
| | 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 | 46329 | 58929 | 71429 | 83929 | 96529 |
| 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 | 01789 | 26789 | 51789 | 76789 |
| 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 ozs. 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 common fractions to decimal fractions

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

| ¼ | ⅛ | 1/16 | 1/32 | value | ¼ | ⅛ | 1/16 | 1/32 | value |
|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  | 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 | value |
|---|---|---|
|  | 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 | 1/4 | 1/2 | 3/4 |
|---|---|---|---|---|
| 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 | 1/4 | 1/2 | 3/4 |
|---|---|---|---|---|
| 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, corrrect 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.

| √ | .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 |

$\pi$ = 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 Measures)

| | | | |
|---|---|---|---|
| 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 | 0.946 3 |
| 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 |

# Even a champion

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