Beecham's help to scholars: containing arithmetical tables and signs, weights and measures, tables of the metric system, geographical & drawing definitions, and other useful information arranged progressively / Thos. Beecham.

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"READER-PERSEVER ..."

BEECHAM'S Help to Scholars,

(NEW AND ENLARGED EDITION)

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CONTAINING

ARITHMETICAL TABLES AND SIGNS,
WEIGHTS AND MEASURES,
TABLES OF THE METRIC SYSTEM,
GEOGRAPHICAL & DRAWING DEFINITIONS,

And other useful information arranged progressively.

Published by the Proprietor of "BEECHAM'S PILLS," with a view of rendering a small assistance to the Youth of the Country. The publication of Beecham's Help to Scholars commenced in July, 1889, since when 12,000,000 have been given away.—October, 1898.

PROPRIETOR:

THOS. BEECHAM, St. Helens, Lancashire.

INTRODUCTION.

THE Proprietor of Beecham's Pills hopes this revised and enlarged edition will be found to meet the requirements of the Education Code; that it will be accorded a hearty welcome in every school in the country; and be carefully preserved for reference.

HINTS TO PARENTS AS TO SCHOOL ATTENDANCES, &c.

(Applicable to England and Wales only).

Every child between the ages of 5 and 14 must receive efficient elementary instruction in reading, writing, and arithmetic. A child between the ages of 11 and 14 may be partially or totally exempted from attendance at school, provided he has reached the standard of proficiency fixed by the Bye-Laws of the district.

No child under II years of age may be taken into employment, and no child under I2 may be employed in a mine, and no girl may work underground.

A child between the ages of 11 and 13 may be employed halftime, provided he has reached the standard of proficiency fixed by the Bye-Laws of the district.

No child under 13 may be employed full time under the Factory and Workshop Act, 1878, nor can a child of 13 be so employed unless he has passed the fifth standard, or has made 250 attendances for each of 5 years.

A child between the ages of 13 and 14 years may be employed half-time even though he has not yet reached the standard of proficiency, or made the requisite number of attendances.

Parents should apply to the School Board or School Attendance Committee for a copy of the Bye-Laws of the district, and read them carefully.

Children suffering from sore eyes, mumps, fever, whoopingcough, measles, smallpox, chickenpox, or diptheria; or who live in the same house as someone who is suffering from any of these infectious diseases, must not attend school without the express permission of the Head Teacher and Medical Officer, to both of whom a note should be sent.



ARITHMETICAL TERMS, SIGNS, &c.

All computations in Arithmetic are performed by one of the processes known as

ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION.

The terms used in Multiplication are:-

(a) The Multiplier, or number that Multiplies.

(b) The Multiplicand, or number to be Multiplied

(c) The Product, or result of the Multiplication.

The terms used in Division are:-

(a) The Dividend, or number to be divided.

(b) The Divisor, or number by which you divide.

(c) The Quotient, or result of the division.

```
To find the Sum, add the numbers.
,, ,, ,, DIFFERENCE, subtract.
        ,, PRODUCT, multiply.
       ,, QUOTIENT, divide.
+ plus or more signifies addition,
                                      as 6 + 3 = 9
                   " subtraction
— minus or less
                                       ,, 8-5=3
                 " multiplication
× multiplied by
                                          4 \times 2 = 8
                                       ,,
- divided by
                  " division
                  ,, equality
= equal to
                                          3 + 2 = 5
                                       ,,
signifies therefore. signifies because.
              are the signs of proportion.
6: 14:: 18: 42 means, as 6 is to 14 so is 18 to 42.
\sqrt{\text{ sign of square root, as } \sqrt{9} = 3}
       ,, cube
                  ", ", \sqrt[3]{27} = 3
                         ] are brackets, all quantities
between them are treated as one.
D or d signifies Denarii or pence.
S or s ,,
              Solidi or shillings.
              Libræ or pounds.
L or £
              per cent.
```



NUMERATION TABLE.	N	IIM	FRA	TIO	NTA	ARIF
-------------------	---	-----	-----	-----	-----	------

Units,	One
Tens21,	Twenty-one.
Hundreds321,	Three Hundred and Twenty-one.
Thousands4,321,	Four Thousand, Three Hundred and Twenty- one.
Tens of Thousands54,321,	Fifty-four Thousand, Three Hundred and Twenty-one.
Hundreds of Thousands654,321,	Six Hundred and Fifty-four Thousand, Three Hundred and Twenty-one.
Millions	Seven Millions, Six Hundred and Fifty-four Thousand, Three Hundred and Twenty- one.
Tens of Millions87,654,321,	Eighty-seven Millions, Six Hundred and Fifty-four Thousand, Three Hundred and Twenty-one.
Hundreds of Millions 987,654,321,	Nine Hundred and Eighty-seven Millions,

Six Hundred and Fifty-four Thousand,
Three Hundred and Twenty-one.

A Billion is a Million of Millions thus expressed 1,000,000,000 A Trillion

A Billion is a Million of Millions, thus expressed, 1,000,000,000,000. A Trillion, a Million of Billions, expressed by adding six more ciphers.

THE ROMAN NOTATION TABLE.

1	I.	11	XI.	25	XXV.	300	CCC.	A line placed
2	II.	12	XII.	30	XXX.	400	CD.	over any letter
3	III.	13	XIII.	40	XL.	500	D.	increases the
4	IV.	14	XIV.	50	L.	600	DC.	value 1,000
5	V.	15	XV.	60	LX.	700	DCC.	times, as-
6	VI.	16	XVI.	70	LXX.	800	DCCC.	V - 5000:
7	VII.	1.7	XVII.	80	LXXX.	900	CM.	V — 5,000;
8	VIII.	18	XVIII.	90	XC.	1000	M.	D - 500,000;
9	IX.	19	XIX.	100	C.	1500	MD.	_ 5,,
10	X.	20	XX.	200	CC.	2000	MM.	M - 1,000,000.

ADDITION AND SUBTRACTION.

							1112			
I		II	 21	 31	 41	 51	 61	 71	 81	 91
2		12	 22	 32	 42	 52	 62	 72	 82	 92
						53				
4		14	 24	 34	 44	 54	 64	 74	 84	 94
5		15	 25	 35	 45	 55	 65	 75	 85	 95
6		16	 26	 36	 46	 56	 66	 76	 86	 96
7	4.	17	 27	 37	 47	 57	 67	 77	 87	 97
8		18	 28	 38	 48	 58	 68	 78	 88	 98
						59				
10		20	 30	 40	 50	 60	 70	 80	 90	 100

NOTE.—Add I to each number in top line; then 2, 3, 4, etc. Repeat the process with other lines, and deal similarly with Subtraction. Compare the results in each line.

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FOR MULTIPLICATION AND DIVISION.

1	FOR MULTIPLICATION AND DIVISION.											
	Twice		1	time	es		4 time	es		5 time	es	
I	are	2	I	are		I	are	4	I	are	5	
2	,,	4	2	,,	3 6	2	,,	4 8	2	,,	IO	
3	,,	4 6 8	3	,,	9	3	,,	12		"	15	
3 4 5 6	,,	8		,,	12		,,	16	4	,,	20	
5	,,	10	5 6	,,		5 6	,,	20	5	,,	25	
6	,,	12	6	,,	15 18	6	,,	24	6	,,	30	
7	,,	14	7	,,	21	7	,,	28	3 4 5 6 7 8	"	35	
7 8	,,	16	7 8	,,	24	7 8	,,	32	8	,,	40	
9	,,	18	9	,,	27	9	,,	36	9	,,	45	
9	,,	20	10	,,	30	10	,,	40	10	,,	50	
II	,,	22	11	,,	33	II	,,	44	II	,,	* 55	
12	,,	21	12	,,	36	12		48	12	,,	60	
	6 time		7		THE RESERVE OF THE PERSON NAMED IN	-	8 time	es	-	9 time		
I	are	6	1	are	7	1	are	8	I	are		
2	,,	12	2	,,	14	2	,,	16	2	,,	18	
3	,,	18	3	,,	21	3	,,	24	3	"	27	
4	,,	24		,,	28		,,	32	4	,,,	36	
5 6	,,	30	5 6	,,	35	4 5 6	,,	40	5 6	,,	45	
6	,,,	36	6	,,	42	6	,,	40 48	6	,,	54	
•	,,	12	7	,,	49	7 8	,,	56	7	,,	54 63	
8	,,	48	7 8	,,	56	8	,,	56 64	7 8	,,	72	
7 8 9 10	,,	54	9	,,	63	9	,,	72	9	,,	81	
10	,,	60	10	,,	70	10	,,	80	10	,,	90	
II	,,	66	II	,,	77	II	,,	88	II	,,	99	
12		72	12	,,	84	12	,,	96	12	,,	108	
100	o time		1	I tim			12 tim	es	1	3 tim	es	
I	are	10	I	are	II	I	are	12	I	are	13	
2	,,	20	2	,,	22	2	,,	24	2	,,	26	
3	,,	30	3	,,,	33	3	,,	36	3	,,	39	
3 4 5 6	,,	40	4	,,	44	4	,,	48	3 4 5 6	"	52	
5	,,	50	4 5 6	,,	55 66	4 5 6	- "	60	5	,,	65	
	,,	60		,,			,,	72	6	,,	52 65 78	
7 8	"	70 80	7 8	,,	77 88	7 8	,,	84	7	,,	6.1	
8	,,	80		,,	88		,,	96	7 8	,,	104	
9	,,	90	9	,,	99	9	,,	108	9	"	117	
10	,,	100	IO	,,	110	10	,,	120	10	,,	130	
II	,,	110	II	,,	121	II	.,,	132	II	,,	143	
12	.,	120	12	,,	132	12	••	144	12	,,	156	

FARTHINGS TABLE.

E	120 11 11	7	77	S TOP IS	
Far.	THE REAL	d.	Far.	S. Carlotte	d.
4	make	I	27	make	$6\frac{3}{4}$
5 6	99 8	14	28	"	7
6	"	15 134	29	"	74
7 8	99	14	30	"	72
8	"	2	31	"	7534 8 844 814 8234
9	99	24	32	"	8
10	22	22	33	,,,	81
II	,,	2534	34	33	81
12	92	3	35	"	834
13	"	34	35 36 37 38	"	9
14	"	3章	37	"	91/4
15 16	- 27	34	38	, ,,	91/2
10	9 99	4	39	"	9½ 9¾
17	"	44	40	99	IO
18	"	4章	41	"	101/4
19	"	43 5	42	. 97	101/2
20	"	5	43	"	103/4
21	"	51	44	"	II
22	"	53	45	"	111/4
23	99	534	46	22	111/2
24	"	6	47	"	113/4
25	"	61	48	"	12
26	"	$6\frac{1}{2}$	960	"	£I

PENCE TABLE.

A Calle							_
d.		s.	d.	d.		s. d.	
12	make	I	0	40	make	3 4	
13	"	I	I	48	,,	4 0	
14	"	I	2	50	,,	4 2	
15	"	I	3	60	,,	5 0	
16	"	I	4	70	"	5 10	
17	"	I		72	"	6 0	
18	"	I	5	80	,,	6 8	
19	"	I	7	84	"	7 0	
20	,,	I	7 8	90	,,	7 6	
21	,,	I	9	96	"	8 0	
22	"	I	10	100	,,,	8 4	
23	"	I	II	108	"	9 0	
24	"	2	0	IIO	5.5	9 2	
25	,,	2	I	120	"	10 0	
26	,,,	2	2	130	,,	10 10	
27	,,	2	3	132	"	II o	
28	"	2	4	140	,,	II 8	
29	"	2	5	144	,,	12 0	
30	70	-2	6	200	,,	16 8	
36	"	3	0	240	"	£I	
		THE PARTY		TO SE			
-		_	_				

SHILLINGS TABLE.

		10			-	
S.		£ S.	S.	A CONTRACTOR	た	S.
20	make	IO	150	make	7	IO
30	,,	I IO	160	,,	8	0
40	***	2 0	170	,,,	8	IO
50	"	2 10	180	"	9	0
60	"	3 0	100	"	9	IO
70 80	"	3 10	200	,,,	IO	0
	"	4 0	300	"	15	0
90	"	4 10	400	,,	20	0
100	"	5 0	500	"	25	0
IIO	,,	5 10	600	17	30	0
120	"	6 0	800	*,,	40	0
130	,,	6 10	1000	,,	50	0
140	"	170			- 70	

TABLE OF FACTORS.

-		-	_	-	_	_			
12	=	2	×	6	48	=	4	×	12
12	,,	3	,,	4	48	,,	6	"	8
14	"	2	,,	7	49	,,	7	,,	7
15	"	3	99	5 8	50	22	5.	,,	IO
16	22	2	,,	8	54	"	6	,,	9
16	"	4	,,	4	55	,,	5	,,	II
18	"	2	"	9	56	,,	7	,,	8
18	,,	-	,,	6	60	,,	5	27	12
20	,,	2	,,	IO	60	"	6	,,	IO
20	,,	4	"	5	63	,,	7 8	. 22	9
21	,,	3	,,	7	64	"		,,	9 8
22	,,	2	,,	II	66	,,	6	,,	II
24	,,	2	,,	12	70	,,	7	20	IO
24	"	3	,,	8	72	,,	6	,,	12
24	,,	4	"	6	72	"	8	"	9
25	,,	5	,,	5.	77	,,	7 8	,,	II
27	,,	3	,,	9	80	,,	8	"	IO
28	"	4	"	7	81	,,	9	"	9
30	"	3	,,	10	84	,,	78	12	12
30	"	5	,,	6	88	,,	8	,,	II
32	"	4	,,	8	90	,,	98	,,	IO
33	,,	3	,,	II	96	,.	8	,,	12
35	,,	5	"	7	99	,,	9	"	II
36	"	3	"	12	100	,,	10	"	IO
36	"	4	,,	9	108	,,	9	"	12
36	"	6	,,	6	IIO	"	IO	"	II
40	"	4	"	10	120	"	IO	,,	12
40	"	5	"	8	121	"	II	,,	II
42	19	6	,,	7	132	,,	II	,,	12
44	"	4	"	II	144	"	12	"	12
45	"	5	,,	9		_		and in	

TIME.

60 Seconds .. I Minute 60 Minutes .. I Hour 24 Hours .. I Day 7 Days .. I Week 365 Days .. I Year 366 Days .. I Leap Year 100 Years .. I Century

4 Weeks .. I Lunar month

13 Lunar months

and I day I Year

52 Weeks and

ı day .. ı Year

28, 29, 30 or

31 days I Calendar month

12 Calendar

months I Year

DAYS IN EACH MONTH.

NOTE OF THE PARTY		
January	 31	February 28
March	 31	but 29 in leap-year.
May	 31	April 30
July	 31	June 30
August	 31	September 30
October	 31	November 30
December	 31	

DAYS OF WEEK. QUARTER DAYS.

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

Lady Day March 25th Midsummer

June 24th

Michaelmas

September 29th

Christmas

December 25th

EASTER SUNDAY follows the first full moon, on or after March 21st; Whit-Sunday is the 7th Sunday after.

NOTE.—When the date is divisible by 4 without remainder, it is Leap-Year, as 1896; but with the even hundreds,—1600, 1800, 1900, the first two figures must be divisible by 4 if it is a Leap-Year.

SEASONS.

Spring begi	ins	 21st March		Spring Equinox	{ 12 hours day night
Summer	"	 21st June		Summer Solstice	longest day
Autumn	"	 23rd Sept.		Autumnal Equinox	12 hours day 12 ,, night
Winter	"	 21st Dec.	••••	Winter Solstice	shortest day

ASTRONOMICAL SIGNS.

SIX NORTHERN SIGNS.

Aries, th	e ram	Mar.	21	Spring
Taurus,	the bull	Apl.	20	Spring
Gemini,				Signs

Cancer, the crab June 21 Leo, the lion ... July 23 Virgo, the virgin Aug. 23 Signs

SIX SOUTHERN SIGNS.

Libra, the balance . Sep. 23 Autumn Scorpio, the scorpion Oct. 23 Signs

Capricornus, the goat Dec. 21
Aquarius, the water
bearer . . . Jan. 20
Signs
Pisces, the fishes . . Feb. 18

AVOIRDUPOIS WEIGHT.

16	Drams	4371/2 8	grain	s	I oz.
	Ounces				I lb.
14	Lbs.				Stone
	Pounds or				
	Quarters or				
20	Hundred-v	veights	or 2,2	40 lbs.	I ton

LONG MEASURE.

If Inches (in				
5 Yards	I	Rod, p	erch, or	pole
21 Yards, or 40 Poles or 10	Chains,	or 220	yards I	fur.
8 Furlongs	9r 80 Ch	ainsor		rds ml.
3 Miles 7'92 Inches			League .	
100 Links			I C	

SQUARE MEASURE.

144 Square Inches	I sq. ft.
9 Square Feet	I sq. yd.
301/4 Square Yards	I sq. pl.
40 Poles or 1,210 sq. yds.	I rd.
4 Roods, or 4,840 sq. yds.	I &C.
640 Acres	I sq. ml.
10,000 Square Links •	I sq. ch.
10 Square Chains	I Acre

CUBIC MEASURE.

1,728 Cubic Inches			IC	u. fit.
27 Cubic Feet			I cu	. yd.
Note.—Compare	square	a	nd e	ubic
measures with long				

144 ==	12 × 12	9	=	3 ×	3
1,728 =	12 × 12 × 12	27	=	3 X	3 × 3
301/4 ==	$12 \times 12 \times 12$ $5\frac{1}{2} \times 5\frac{1}{2}$	1			

MEASURE OF CAPACITY.

urg	menous	e use	a jor	erce	nemus of	Gratie.
4	Gills			I	Pint	pt.
	Pints				Quart	qt.
	Quarts,		pts.	I	Gallon	gal.
2	Gallons	3			Peck	pk.
	Pecks				Bushal	bush.
8	Fashels	3		1	Quarter	gr.

ANGULAR MEASURE.

	seconds ("')		make	I minute'
	minutes (')		,,	I degree o
90	degrees a right	angle	3 ,,	1 quadrant
180	//			1 semicircle
360	" or twelve	signs	"	1 circle

Apparent motion of the Sun.

Sun	moves	360	degrees	in	24	hours.
		TE			T	hour

"	"	15	"	"	I nour.
"	"		"	"	4 minutes.
"	"	1/4	"	"	I minute.

60 Geographical, or 69½ English Miles I degree (19) of Latitude.

A degree of Longitude varies in length according to the Latitude, because all the meridian circles meet at the poles.

In Latitude 50° a degree measures 44°35 English miles. In Latitude 60° a degree measures 34°5 English miles.

MISCELLANEOUS.

2	Articles		make I	Brac	e, C	ouple,
					0	r Pair
	Articles		"		1	Dozen
	Dozen		"			Gross
	Gross		,,	1 Gr	eat	Gross
	Articles		. "		I	Score
	Sheets of	Paper	• ,,		I	Quire
	Sheets		- 27		5 (Quires
20	Quires		99		I	Ream

OLD APOTHECARIES WEIGHT.

20	Grains			 I ser.
3	Scruples	60 8	grains	 I dr.
8	Drams	480	"	 I oz.
12	Ounces	5,760	,,	 I lb.

TROY WEIGHT.

Used in weighing gold, silver, jewels. &c.

24	Grains	(gr.)	I	Penny	weight	dwt.

20 Pennyweights . . 480 grains . . 1 oz. 12 Qunces . . 5,760 grains . . 1 lb.

PRACTICE TABLE.

Parts of a Pound.

8.	d.		
10	0		1/2
6	8		$\frac{1}{3}$
8. 10 6 5 4 3 2 2 1 1 1 0 0 0 0 0	d. 0 8 0 0 4 6 0 8 4 3 0 8 7 1 2 1 1 2 1		$\frac{1}{4}$
4	0	14.	$\frac{1}{5}$
3	4		$\frac{1}{6}$
2	6		18
2	0		1
I	8		1
T	1	No.	1
	+		1.5
I	3		16
. I	0		$\frac{1}{20}$
0	8		$\frac{1}{30}$
0	$7\frac{1}{2}$		$\frac{1}{32}$
0	6		$\frac{1}{40}$
0	4		$\frac{1}{60}$
0	3		1 80
0	2		$\frac{1}{120}$
0	11/2		$\frac{1}{160}$
0	1		$\begin{array}{c} \frac{1}{2} \\ \frac{1}{3} \\ \frac{1}{4} \\ \frac{1}{5} \\ \frac{1}{6} \\ \frac{1}{8} \\ \frac{1}{10} \\ \frac{1}{12} \\ \frac{1}{15} \\ \frac{1}{16} \\ \frac{1}{20} \\ \frac{1}{30} \\ \frac{1}{20} \\ \frac{1}{160} \\ \frac{1}{240} \\ \frac{1}{240} \\ \end{array}$

Parts of a Shilling.

		O.
d.		
9	 	34
8	 	2 3
6		1
4	 	13
3		$\frac{1}{4}$
2	 	16
11/2	 	1/8
I		$\frac{1}{12}$
1/2	 	24
d. 98643211214	 	3423 1213 1416 18 1214 148
AND THE		1 OF S

Parts of a Year.

292	days	 45
219	,,	 $\frac{3}{5}$
146	,,	25
73	,,	 $\frac{1}{5}$

Parts of a Ton.

cwts.qrs.

ars The

10	0	 1/2
5	0	 12 14 15 18
4	0	$\frac{1}{5}$
2	2	 1/8
2	0	 $\frac{1}{10}$
I	I	 $\frac{1}{16}$
I	0	 $\frac{1}{20}$
0	2	1 40
0	I	 100

Parts of a Cwt.

4,0.					
2	0	or	56	lbs.	$\frac{1}{2}$
	0		28	,,	$\frac{1}{4}$
0	16				7
0	14				1/8
0	8				14
0	7				16

Parts of a Quarter.

lbs.		
14		$\frac{1}{2}$
7 4 3½ 2		12 14 17 18 11 16 18 18
4		7
31/2		18
2		11
134	8 6 x 3 8	1 16
1 3/4 I		1
		20

Parts of an Acre.

ras	.pls.		
2	0 01	80 pl.,	1/2
I	0,,	40 ,	$\frac{1}{4}$
	32		1/5
0	20		18
0	16		10
0	10		$\frac{1}{16}$

Parts of a Mile.

4	fur.	(880	yds)	$\frac{1}{2}$
2	,,	(440	,,)	1/4
I	,,	(220	,,)	18
32	poles	s(176	,,)	$\frac{1}{10}$
20	,,	(110	,,)	16
16	,,	(88	,,)	20
8	,,	(44	',,)	10
4	,,	(22	,,)	80

TABLES OF THE "METRIC SYSTEM."

LENGTH.

Myriametre = 10,000 metres
Kilometre = 1,000 ,,
Hectometre = 100 ,,
Decametre = 10 ...

METRE = The 10 millionth part of a quarter of a meridian circle.

Decimetre = '1 metres
Centimetre = '01 ,,
Millimetre = '001 ,,

A Metre = 39'37 inches.

SURFACE MEASURE

For Walls, Floors, Paper, Glass, &c.

The SQUARE METRE contains—
100 Square Decimetres.
10,000 ,, Centimetres.

1,000,000 ,, Millimetres.

SURFACE MEASURE

for Fields, Woods, &c.

Hectare = 100 ares.

ARE = 100 Square Metres

Centiare = '01 of an are.

An Are = 119.6033 Square Yards.

VOLUME MEASURE

For Wine, Oil, Wheat, Apples, &c.

The Kilolitre = 1,000 litres

" Hectolitre = 100 "

" Decalitre = 10 "

LITRE = 1 Cubic Decimetre

The Decilitre = '1 litres

" Centilitre — or "

" Millilitre = 'ooi "

A Litre of distilled water weighs
I Kilogramme, and equals 1.76077
pints.

MEASURE OF SOLIDITY

For Masonry, Capacity of Docks, &c.

The Unit is the CUBIC METRE

which contains—

1,000 cubic Decimetres. 1,000,000 ,, Centimetres. 1,000,000,000 ,, Millimetres.

MEASURE OF SOLIDITY

For Firewood, Ropes, Dye-woods, &c.

The Decastere == 10 steres.

STERE == 1 Cubic Metre

The Decistere == '1 "teres.

The Stere = 1 cub. yd. 8.31655 cub. ft.

WEIGHT.

The Millier =1,000 kilogrammes

" Metric Quintal = 100 ,

"Myriagramme = 10 "
"Kilogramme = 1,000 grammes

"Hectogramme = 100

" Decagramme = 10 "

GRAMME = a Cubic Centimetre of distilled water at 39½° F, weighed in a vacuum.

The Decigramme = 'I grammes

" Centigramme = oi ,

"Milligramme = 'oor "

A Gramme = '56438 drams

The Monetary Unit is the FRANC = 93 pence.

The Franc = 10 Decimes.

20 one-franc pieces and 20 two-franc pieces placed in line measure a metre.

MENTAL ARITHMETIC AIDS.

A NUMBER WILL DIVIDE BY

- 2 when last figure is even or a cypher.
- 3 when the sum of the digits can be divided by 3.
- 4 when the last two figures can be divided by 4 or are cyphers.
- 5 when last figure is 5 or o.
- 6 when last figure is even or o and sum of digits will divide by 3.
- 8 when the last 3 figures can be divided by 8 or are cyphers.
- 9 when the sum of the digits can be divided by 9.
- 25 when last 2 figures are o's or will divide by 25.
- 125 when last 3 figures are o's or will divide by 125.
- 37 and III when the No. is composed of the same 3 digits e.g., 333III.

```
To divide bu
         To multiply by
  5 add 1 cypher and divide by 2
                                    5 multiply by 2 and place a • before last figure.
 25
                              4 8
                          99
                                       ", ", 4 ", ", ", 2 figures.
", 8 ", ", ", 3 figures.
                                   25
125
      ,, 3 ,,
                         99
                                  125 ,,
                             16
625
      ,, 4
                         "
                                   10 cut off last figure for a remainder.
        I cypher.
 10
                                  100 ,,
                                                  2 figures for a remainder.
                                              "
        2 cyphers.
100
                                  1,000 ,,
                                                   3
1,000 ,, 3
```

To nultiply a number consisting of two digits by 11, add the figures together and place the result between them as $71 \times 11 = 781$.

To find a year's income (Sundays included) at a given rate per day:—Take a sovereign, a half-sovereign, and fivepence as many times as there are pennies in the given rate. To find a year's income (excluding Sundays):—Take a sovereign and six shillings and a penny as many times as there are pennies in the given rate.

To find the cost of any number of articles when the price is an aliquot part of a sovereign:—Take the number as sovereigns and divide by the aliquot part.

2,786 at 3/4 each: 2,786 divided by 6 = £464 6s. 8d.

Simple Interest Formulæ. 1.—Interest — Principal × Rate × Time - 100. 2.—Principal — Interest × 100 - Rate and Time. 3.—Rate — Interest × 100 - Principal and Time. 4.—Time — Interest × 100 - Principal and Rate.

Mensuration Formulæ. 1.—Area of square, rectangle, rhombus or rhomboid = base X height. Base = area - height. Height = area - base. 2.—Area of Triangle = ½ base X height. 3.—Area of circle = diameter squared X '7854, or = radius squared X 3'1416. 4.—Circumference = diameter X 3'1416. 5.—Cubical contents of a box or volume of a solid = length X breadth X height. Length = volume - breadth and height. Breadth = volume - length and height. Height = volume - length and breadth.

Vulgar & Decimal Fractions. . 5 14 34 1838 58 78 1525 35 45 13 23 19 .25 .122 22 .625 22 99 99 4 .6 ·8 ·3 ·6 ·1 99 29 .16

1015.		
£	s.	1
2,061,562	18	C

1. .. 2,061,562 18 $9\frac{3}{4}$ 2. .. 907,029 6 4 3. .. 7,650,090 19 $0\frac{1}{4}$ 4. .. 940,208 3 $2\frac{1}{2}$

8. .. 908,090 14 11
$$\frac{3}{4}$$

9. .. 9,016,904 11 9 $\frac{1}{2}$
10. .. 290,230 11 2 $\frac{1}{4}$
11. .. 6,780,129 9 6

12. ..
$$72,111$$
 8 6
13. .. $560,180$ 2 0
14. .. $58,118$ 15 $0\frac{1}{2}$

15. ..
$$8,040,177$$
 16 $0\frac{1}{4}$
16. .. $8,231,960$ 1 $8\frac{1}{2}$
17. .. $9,901,855$ 19 5
18. .. $121,700$ 7 5

22. ..
$$4,859,008$$
 13 $7\frac{3}{4}$ 23. .. 143,904 6 2 24. .. $702,700$ 4 $9\frac{1}{4}$

25. ..
$$67,890,123$$
 11 8 26. .. $2,030,405$ 17 $9\frac{3}{4}$ 27. .. 60 0 $0\frac{1}{2}$

30. . . 999,008 12 2 31. . .
$$42,120,232$$
 13 $5\frac{3}{4}$

$$32. .. 6,600,001 7 7 7 33. .. 555,506 14 $3\frac{1}{2}$$$

Add or subtract the lines named by your teacher and use the pounds column only for simple tots.

INVOLUTION.

13 is 169 I is I 14 196 2 8 15 225 3 27 16 256 4 64 17 289 5 125 18 324 6 216 19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000 50 2,500 11 1,331	Square of			1		Cub	e of
15 225 3 27 16 256 4 64 17 289 5 125 18 324 6 216 19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000	13	is	169		I	is	1
16 256 4 64 17 289 5 125 18 324 6 216 19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000	14		196	1	2		8
17 289 5 125 18 324 6 216 19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000	15		225		3		27
18 324 6 216 19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000	16		256		4		64
19 361 7 343 20 400 8 512 30 900 9 729 40 1,600 10 1,000	17	1.5	289	1			125
20 400 8 512 30 900 9 729 40 1,600 10 1,000	18		324		6		216
30 900 9 729 40 1,600 10 1,000	19		361		7		343
40 1,600 10 1,000	20		400	1	8		512
	30		900	1	9		729
50 2,500 11 1,331	40		1,600	1	IO		1,000
	50		2,500		II		1,331

Reverse these for Square and Cube Roots.

DISCOUNTS.

Page 1		s.	d.			
11/4	% is	0	3	in	the	£.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$,,	0 0 0 0 0 0 0 0 0 1 1 1 2 2 3 3 4 4 5 10 15	33546 75253545 0 25 0 6 0 6 0 6 0 0 0		,,	
2	,,	0	45		,,	
21/2	,,	0	-6		,,	
3	,,	0	75		"	
31/2	,,	0	82		"	
4	,,	0	93		,,	
41/2	,,	0	105		,,	
5		I	0		,,	
- 6	,,	I	22		"	
71	;; ;;	I	6		,,	
10	,,	2	0		"	
121	,,	2	6		,,	
15	,,	3	0		,,	
171	,,	3	6		"	
20	"	4	0		,,	
221		1	6		"	
25	"	7	0		"	
50		TO	0			
75	,,	TE	0		"	
13	"	12			"	

ON THE USE OF CAPITAL LETTERS.

Capitals, or great letters, should be used :-

1. At the beginning of every piece of writing, and after every full stop.

2. The names and titles of persons, and the names of countries, provinces, cities, towns, villages, hamlets, streets, mountains, rivers, seas, ships, feasts and great events must begin with capitals.

3. The pronoun I, and the interjection O! must be written in capitals.

4. Quotations must begin with capitals.

5. The first word of every line in poetry must begin with a capital.

6. All the names of God must be written in capitals, e.g., The Almighty; The Saviour.

7. Adjectives derived from the names of persons or places must begin with capitals, as English, Scottish.

8. The names of the principal articles in catalogues, bills of parcels, handbills, direction of letters, titles of books, &c., should begin with capitals.

FULL STOPS (or periods) must be placed-

- I. At the end of every sentence.
- 2. After every abbreviation.
- QUOTATION MARKS OR INVERTED COMMAS. The exact words spoken by someone, or quoted from a book, must be placed within quotation marks,—e.g.:—The boy cried, "Mary is here."
- A point of INTERROGATION is placed after every question,—e.g., Where are you?

An EXCLAMATION point follows such words as Oh! Alas! Hurrah! Hush!

The APOSTROPHE denotes ownership or else the omission of a letter,—

John's; Boys'; I'll; Can't; O'er; E'er; Didn't; Musn't.

The letter H is not ASPIRATED in these words:—herb, hour, heir, heiress, honest, honour, hospital, hostler, humour, humble, humility, and in other words formed from these.

When writing a letter, put the address and date in the top right hand corner and sign your full name at the end.

Envelopes should be addressed in this manner:-

Wr. Thomas Beecham,

Stamp in this Corner

Proprietor of Beecham's Pills,

St. Helens,

Lancashire.

GEOGRAPHICAL DEFINITIONS.

Geography teaches about the surface of the earth. This surface is composed of Land and Water. If we were to divide it into four parts, three would be

water, and one land.

The Earth is a planet or moving star. In shape it is like an orange. It moves in two ways: 1st, round itself, in 24 hours, causing Day and Night; 2nd, round the Sun, in 3654 days, causing the Four Seasons, Spring, Summer, Autumn, Winter.

A map of a Hemisphere is a plan of half the earth. It may be Northern, lying North of the Equator; Southern, lying South; Eastern, containing Europe, Asia, Africa, and Australia; Western, containing North and South America.

The Axis is the supposed line round which the earth turns. Its ends are called the N. and S. Poles. The diameter, or distance through the earth, is The circumference, or the distance round the outside, is 25,000 miles. The Equator is a supposed line passing round the earth, midway

between the Poles.

Latitude is distance North or South of the Equator, measured in degrees up to 900, each $= 69\frac{1}{2}$ English miles. A Meridian is a line passing half way round the earth from the N. Pole to the S. Pole. The line passing through Greenwich is called our First Meridian, and is marked oo on English maps. Longitude is distance East or West of the First Meridian. In Great Britain the length of degree of longitude varies from 34 miles in the N., to 45 miles in the S. A Zone is a belt or girdle passing round the earth. There are 5; one Torrid, very hot round about the Equator; two Frigid, very cold, one surrounding each Pole; and two Temperate, between the Torrid and Frigid zones.

A Continent is the largest division of land. There are 5; Asia, America,

Africa, Europe, Australia.

A Country is part of a continent, having a particular name. England, Scotland, Ireland, Wales, France, Spain, Germany.

A County or Shire is part of a country; sometimes called a Province, or Department, Canton, State, &c.

A Riding (Trything) is a third part of a county. Yorkshire is so divided.

An Island is a portion of land surrounded by water.

A Peninsula is a piece of land nearly surrounded by water.

An **Isthmus** is a narrow neck of land joining two large divisions.

A Cape is a point of land stretching into the sea. Other names are Head, Ness, Naze, Mull, Butt, Promontory, Foreland, Point, Bill.

A Coast or Shore is the land washed by the sea. A Beach is the portion of

a shore which is alternately covered and uncovered by the tide.

A Hill is a high mass of land, under 1,000 feet.

A Mountain is a mass of land over 1,000 feet high; an isolated mountain is a Peak; several peaks form a Group; connected mountains form a Chain or Range; a mountain flinging out steam, ashes, and melted rock or lava, is a

A Plain is a level portion of land, at no great height above the level of the sea. The plains in South Russia and Central Asia are termed Steppes, and are generally uncultivated. In North America, they are called Prairies and Savannahs; and in South America, Llanos and Pampas.

GEOGRAPHICAL DEFINITIONS .- continued.

A Table land or Plateau is a level portion of land at a considerable elevation. A Valley is low land, bounded on each side by hills. Other names are Vale, Dale, Glen, Gorge, Strath. A Ravine is a long hollow between hills.

A Desert is a barren tract of land. A Cliff is the vertical face of a mountain

or rocky sea-shore.

An Ocean is the largest division of salt water. There are 5; Pacific, Atlantic, Indian, Antarctic, Arctic. A Sea is part of an ocean; if studded with islands, it is called an Archipelago. A Gulf or Bay is a portion of water extending into the land. An Estuary is the wide mouth of a river, which is only filled with water when the tide flows in, and exhibits a long stretch of sand or mud when the tide ebbs. Other names are Aber and Firth. A Harbour or Haven is an inlet of the sea, where ships can shelter. A Creek or Cove is a small inlet of the sea. In Australia and America a river is often called a Creek. A place where ships can anchor near a coast is called a Roadstead or Road. A Strait is a narrow neck of water joining two large portions. A Channel is similar to a strait, but longer and wider.

A Lake is a portion of water surrounded by land; small lakes are termed Pools or Meres; if in high land or among mountains, Tarns; if shallow and filled with sea water, Lagoons. In Ireland, lakes are called Loughs; in Scotland, Lochs. A Lagoon is also the name given to the calm water inside a

ring-shaped coral island.

A Spring is water flowing out of the earth, and generally forms the beginning

of a river.

A River is a running stream of fresh water, issuing from a hill, or other high land, and generally flowing into the sea. The beginning is its Source; the ending, its Mouth; the sides, its Banks; little streams running into it, its Feeders, Tributaries or Affluents; where the water lies, its Bed. The land drained by one river and its tributaries is its Basin.

The high land dividing two basies is the Waterparting; and the slopes down which the streams run, form the Watershed. A Rivulet, Brook, or Streamlet, is a little river. A Confluence is a place where two rivers unite. The right and left Banks of a river take their names from the Course, or

direction in which the water runs. An artificial river is called a canal.

A Waterfall is a place where the water of a river falls from a higher to a lower level. A Cataract is a large waterfall. A Rapid is a place where the bed of a river slopes, causing the river to run swiftly. A Cascade is formed when the river runs down a steep, rocky bed.

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DRAWING DEFINITIONS.

A Point has position, but not size.

A Line has length, but not breadth.

A Straight (or right) Line is the shortest distance between two points, and is shorter than a curved line.

A Vertical line is upright. A Horizontal line is level. An Oblique line is sloping.

Perpendicular lines are those which form right angles; they are not always vertical. A line cannot be perpendicular by itself.

Parallel lines are the same distance apart everywhere: they never meet.

An Angle is a corner made by two lines which meet at a point.

A Right Angle is a square corner, and is formed of perpendicular lines.

An Obtuse Angle is greater than a right angle. An Acute Angle is less than a right angle.

A Superficies is a surface, flat or curved.

A Plane is a perfectly flat surface and is either vertical, horizontal, or slanting. A figure is a surface enclosed by three or more lines, straight or curved. Two straight lines cannot enclose a space.

Plane Figures, such as Squares, Triangles, Circles, and Hexagons, have only

length and breadth, and lie completely on one surface.

Triangles are figures with three angles: they are called Trilaterals also, because they have three sides.

An Equilateral (or Equiangular) Triangle has three equal sides and three equal angles.

An Isosceles Triangle has two equal sides and two equal angles.

A Scalene Triangle has no sides and no angles equal. A Right-angled Triangle contains one right angle

An Obtuse-angled Triangle contains one obtuse angle. An Acute-angled Triangle contains three acute angles.

The Base is the line on which the Triangle stands. The Altitude is the height. The Apex or Vertex is the top point.

Quadrilaterals are figures with four sides: they are called Quadrangles also, because they have four angles.

A Square has four equal sides and four right angles.

A Rhombus has four equal sides but its angles are not right angles.

A Rectangle or Oblong has its opposite sides equal, and its angles are right angles.

A Rhomboil has its opposite sides equal, but its angles are not right angles.

A Parallelogram has its opposite sides parallel.

A Quarry is a square standing on one of its corners.

A Diamond is a rhombus standing on one of its corners.

A Diagonal is the line joining opposite angles of a quadrilateral.

A Diameter is the line joining the centres of opposite sides.

DRAWING DEFINITIONS.—continued.

- Prlygons are figures with many angles. They are Regular when the angles and sides are all equal; but Irregular when they are of various sizes.
 - A Pentagon is a figure with five equal angles and five equal sides; Hexagon, six; Heptagon, seven; Octagon, eight; Nonagon, nine; Decagon, ten; Undecagon, eleven; Duodecagon, twelve.
- A Circle is a figure formed by a curved line called the circumference. The Circumference, or Periphery, is the continuous curved line which forms a circle. The Centre is a point in the middle of the circle. A Radius is a line drawn from the centre to the circumference. All the Radii in one circle are equal in length.
- A Diameter is a straight line through the centre from circumference to circumference.
- A Chord is a straight line across a circle, but not through the centre.
- A Tangent is a line touching a circle. An Arc is any part of the circumference.
- A Semicircle is half a circle. A Quadrant is quarter of a circle.
- A Circle contains 360° A Right Angle = 90° 45° = half a Right Angle. 30° = one-third of a Right Angle.
- A Segment is a piece cut off a circle by a chord.
- A Sector is a part of a circle enclosed by an arc and two radii.
- An Ellipse is a figure bounded by a continuous curved line, and is longer than it is broad. A true Ellipse is not oval or egg-shaped. The Major Axis is longer than the Minor Axis.
- A Trapezium has no sides equal or parallel.
- A Trapezoid has four unequal sides, but two sides are parallel.
- Solids have length, breadth, and height (or depth, or thickness) and have two or more surfaces, as a cone, cylinder, cube, pyramid, prism or sphere.
- A Model or Perspective drawing represents an object (sometimes in outline only) as it appears to the eye.
- A Plan is a drawing of the actual shape of the surface covered by an object viewed from above. An Elevation is a drawing of the actual shape of the surface covered by an object viewed from the front or side.
- A Scale drawing is the representation of an object one-half, one-third, one-tenth, or some other fraction of its real size. Scale \(\frac{1}{2}\) means that a line \(\frac{1}{2}\)-in. long represents something which is 1-in. long; and a line 6-in. long represents something 12-in. long; scale \(\frac{1}{10}\) means that \(\frac{1}{10}\) inch represents 1 inch; and \(\frac{1}{6}\) inch represents 12 inches, or 1 foot. Scale \(\frac{1}{8}\) means \(\frac{1}{8}\) inch represents 2 inches; and \(\frac{1}{8}\) inch represents 12 inches; and \(\frac{1}{8}\) inch represents 5 inches; \(\frac{1}{2}\) inch represents 12 inches; \(\frac{1}{2}\) inch represents 17 inches.

COMMON ERRORS IN COMPOSITION.

We was going (were). I be a good cricketer (am). He went to lay down (lie). That ain't right (is not). He never done anything (did). I could have went (gone) It do not matter (does). It have contracted (has). Let I do it (me). He went their (there). We saw there house (their). Has he as been before (as he has). I have no books for they (them). That was her (she). I know who I saw (whom). He stands between you and I (me). The lion who chased us is dead (which). We know the man which watched us (who). The horse having been in the field (had).

Do not use the superlative degree of adjectives, as tallest, most beautiful, instead

of the comparative, as taller, more beautiful, when comparing two things.

Adjectives should not be used for adverbs, as He ran very quick (quickly). Use and, but, then, and so as seldom as possible, especially at the beginning of a sentence.

Do not use pronouns so often as to confuse two persons together—He told him he was going to his house. Observe the rules of punctuation.

PRINCIPAL PREFIXES.

LATIN.

a, ab, abs, from, by.
ad, to, at.
amb, around, both.
ante, refore.
circum, around.
con, col, with, together.
contra, against.
de, down, from, concerning
di, or dis, apart.
e, ex, out of, beyond.
extra, beyond.
in, im, in, into, not.
inter, between.

intro, within.
ob, against, in the way of
per, through.
post, after.
pre, before.
pro, forward.
re, back, again.
se, apart, aside.
sub, under.
super, over. [yond.
trans, or tra, across, beGREEK.
amphi, both.
ana, up, again.

cata, down.
dia, through.
en, or em, into.
epi, on, upon, over.
hypo, under.
para, or par, besides.
syn, or sym, with, toen, to make, in. [gether.
fore, before.
mis, wrong, not.
out, beyond.
over, above.
un, not.
with, against.

LETTERING FOR MAPS, &c.

ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234567890

ABCDGFGDJJAEMUOPQ BBCUVWXY3. abcdefghijk lmnopqrstuvwxy3.

 $\begin{array}{l} ABCDEFGHIJKLMNOPQRSTUVWXYZ\\ abcdefghijklmnopqrstuvwxyz1234567890 \end{array}$

ABCDEFGHIJKLMNOPQRSTUV WXYZ

ABBREVIATIONS AND COMMON PHRASES.

A 1 First Class; A.B. Able Seaman [Lord Acc., Act. Account A.D. (Anno Domini) in the year of our A.M. Before noon; P.M. After noon Anon. Anonymous—without a name B.A. Bachelor of Arts; M.A. Master of B.C. Before Christ Arts Britt. Reg. Queen of the Britons B.P. British Public—Beecham's Pills C.C. County Council Cf. Compare; q.v. which see Col. Colonel; Capt. Captain Cr. Creditor; Dr. Debtor or Doctor D.D. Doctor of Divinity D.G. By the Grace of God Do. ditto. The same D.V. God willing Ed. Editor; Esq. Esquire e.g. For example; Ex. Example Fahr. Fahrenheit; C. Centigrade F.D. Defender of the Faith F.R.S. Fellow of the Royal Society G.P.O. General Post Office H.M.S. Her Majesty's ship H.R.H. His or Her Royal Highness Ibid. in the same place i.e. (id est) that is Inst. Instant, this month

I.H.S. Jesus, Saviour of men J.P. Justice of the Peace Lat. Latitude; Long. Longitude Lieut. Lieutenant; Gen. General M.D. Doctor of Medicine Mem. Memoranda, Notes Messrs. Messieurs, Sirs Mr. Mister; Mrs. Mistress M.P. Member of Parliament MSS. Manuscripts N. North; E. East; W. West; S. South N.B. Note, or mark well Nos. Numbers O.H.M.S. On Her Majesty's Service Per cent. by the hundred Pro tem. for the time being Prox. Next Month; Ult. Past Month P.S. Postscript P.T.O. Please turn over Rev. Reverend S. or St. Saint S.S. Steamship T.C. Town Councillor U.S.A. United States of America Viz. Namely; V.C. Victoria Cross V.R. Victoria, the Queen &c. etc. (et cetera) and others R.S.V.P. Reply, if you please

Alias...Otherwise A la mode. . According to the fashion A propos...To the point Au revoir . Adieu till we meet again Bonå fide. . In good faith Bon marché. . Cheap market Dieu et mon droit. . God and my right Esprit de corps.. The animating spirit of a number of persons Felo de se. Suicide Honi soit qui mal y pense. . Evil to him who evil thinks Ich dien. . I serve; In toto . . Entirely In statu quo. . In the former state Inter alia. . Among other things Lapsus linguæ. . A slip of the tongue L'homme propose, et Dieu dispose... Man proposes and God disposes

Multum in parvo. . Much in little Nom de plume...An assumed title Non compos mentis. . Not in sound mind Pater Noster..Our Father Pons asinorum. . The ass's bridge Poste restante. . To remain till called for Pro bono publico. . For the public good Pro ratà...In proportion Quid pro quo. One thing for another Tempus fugit.. Time flies Terra firma... Solid earth; safe footing Tout ensemble. . The whole taken together Versus. . Against Viâ. . By the way of Vice versa. . The reverse Vox populi...The voice of the people In re. . In the matter of Sine qua non. . Something in 'ispensable

