Farmar's
Spirit-Rule
Guide.

A Complete Manual

for the

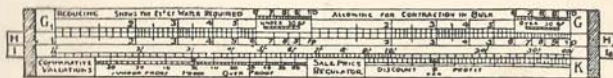Wine and Spirit Trade,

EIGHTH EDITION.

Farmar's

Spirit=Rule

Guide.

A COMPLETE MANUAL
FOR THE
WINE AND SPIRIT TRADE.

BY

FRANK C. FARMAR,

HIS MAJESTY'S CUSTOMS.

Inventor of the "Publicans' Rule,"

Principal of the School of Gauging.

LIVERPOOL:

F. C. FARMAR & SON,

15, HYDE ROAD, WATERLOO.

1906.

PREFACE

TO THE SECOND EDITION.

"FARMAR'S SPIRIT RULE" is a special calculating rule expressly designed to meet all the up-to-date requirements of the Wine and Spirit Trade.

It entirely supersedes the old slide-rules, which for stocktaking purposes are obsolete, and for reducing purposes inaccurate and misleading. The loss to the trade occasioned by the use of these old slide-rules for reducing purposes during the past 40 years is estimated to reach the enormous total of 4½ millions sterling.

Its uses are enumerated in the Index, and in the pages following are given the necessary directions, examples, and exercises in the clearest manner.

It provides an *education* worth more than money, for it enables any man in the trade to protect his own interests, and become complete master of the Business.

FRANK C. FARMAR,
His Majesty's Customs.

WATERLOO, LIVERPOOL,
August, 1902.

PREFACE

TO THE EIGHTH EDITION.

THE SPIRIT RULE, I am gratified to say, has proved a marked success.

The Guide-Book is now presented in its most complete form, no pains having been spared to render it worthy of its great mission as a standard work of reference for the trade.

My grateful acknowledgments are due for the suggestions and encouragement I have received from all classes of traders, and for the kindly notices of the Press, which more than compensate me for the years I devoted to the accomplishment of this work.

FRANK C. FARMAR,
His Majesty's Customs.

School of Gauging.
August, 1906.

INDEX.

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PRELIMINARY DIRECTIONS.

THE *various lines on this Rule are distinguished by letters.*

A and B are the general calculating lines.

C is a line representing the bung and wet-inches of lying casks, or the length and wet-inches of standing casks.

D is for gauging casks in a *lying* position.

E is for gauging casks in a *standing* position.

G and H are special lines which mutually calculate the *exact* quantity of water required to reduce spirits — *contraction of bulk* being allowed for automatically.

I and J make comparative valuations.

I and K make profit and discount calculations.

M is an Altimeter-Line for gauging bottles.

KEY

TO THE READING OF THE RULE.
(LINES A B AND G H).

1= 1 or 10 or 100	3= {3 or 30	5= 5 or 50	7= 7 or 70	9= '9 or 90 or 900
11=1·1 or 11 or 110	31=3·1 or 31	51=5·1 or 51	71=7·1 or 71	91=9·1 or 91 or 910
12=1·2 or 12 or 120	32=3·2 or 32	52=5 2 or 52	72=7·2 or 72	92=9·2 or 92 or 920
13=1·3 or 13 or 130	33=3·3 or 33	53=5·3 or 53	73=7·3 or 73	93=9·3 or 93 or 930
14=1·4 or 14 or 140	34=3·4 or 34	54=5·4 or 54	74=7·4 or 74	94=9·4 or 94 or 940
15=1·5 or 15 or 150	35=3·5 or 35	55=5·5 or 55	75=7·5 or 75	95=9·5 or 95 or 950
16=1·6 or 16 or 160	'36=3·6 or 36	56=5·6 or 56	76=7·6 or 76	96=9·6 or 96 or 960
17=1·7 or 17 or 170	37=3·7 or 37	57=5·7 or 57	77=7·7 or 77	97=9·7 or 97 or 970
18=1·8 or 18 or 180	38=3·8 or 38	58=5·8 or 58	78=7·8 or 78	98=9·8 or 98 or 980
19=1·9 or 19 or 190	39=3·9 or 39	59=5·9 or 59	79=7·9 or 79	99=9·9 or 99 or 990
2= 2 or 20 or 200	4= 4 or 40	6= 6 or 60	8= 8 or 80	10=10 or 100 or 1
21=2 1 or 21 or 210	41=4·1 or 41	61=6·1 or 61	81=8·1 or 81	11=11 or 110 or 1·1
22=2·2 or 22 or 220	42=4·2 or 42	62=6·2 or 62	82=8·2 or 82	12=12 or 120 or 1·2
23=2·3 or 23 or 230	43=4·3 or 43	63=6·3 or 63	83=8·3 or 83	13=13 or 130 or 1·3
24=2·4 or 24 or 240	44=4·4 or 44	64=6·4 or 64	84=8·4 or 84	14=14 or 140 or 1·4
25=2·5 or 25 or 250	45=4·5 or 45	65=6·5 or 65	85=8·5 or 85	15=15 or 150 or 1·5
26=2·6 or 26 or 260	46=4·6 or 46	66=6·6 or 66	86=8·6 or 86	16=16 or 160 or 1·6
27=2·7 or 27 or 270	47=4·7 or 47	67=6·7 or 67	87=8·7 or 87	17=17 or 170 or 1·7
28=2·8 or 28 or 280	48=4·8 or 48	68=6·8 or 68	88=8·8 or 88	18=18 or 180 or 1·8
29=2·9 or 29 or 290	49=4·9 or 49	69=6·9 or 69	89=8·9 or 89	19=19 or 190 or 1·9
3= 3 or 30 or 300	5= 5 or 50	7= 7 or 70	9= 9 or 90	20=20 or 200 or 2

20 = 20 or 200 or 2	**40** = 40 or 4	**60** = 60 or 6	**80** = 80 or 8
21 = 21 or 210 or 2·1	41 = 41 or 4·1	61 = 61 or 6·1	81 = 81 or 8·1
22 = 22 or 220 or 2·2	42 = 42 or 4·2	62 = 62 or 6·2	82 = 82 or 8·2
23 = 23 or 230 or 2·3	43 = 43 or 4·3	63 = 63 or 6·3	83 = 83 or 8·3
24 = 24 or 240 or 2·4	44 = 44 or 4·4	64 = 64 or 6·4	84 = 84 or 8·4
25 = 25 or 250 or 2·5	45 = 45 or 4·5	65 = 65 or 6·5	85 = 85 or 8·5
26 = 26 or 260 or 2·6	46 = 46 or 4·6	66 = 66 or 6·6	86 = 86 or 8·6
27 = 27 or 270 or 2·7	47 = 47 or 4·7	67 = 67 or 6·7	87 = 87 or 8·7
28 = 28 or 280 or 2·8	48 = 48 or 4·8	68 = 68 or 6·8	88 = 88 or 8·8
29 = 29 or 290 or 2·9	49 = 49 or 4·9	69 = 69 or 6·9	89 = 89 or 8·9
30 = 30 or 300 or 3	**50** = 50 or 5	**70** = 70 or 7	**90** = 90 or 9
31 = 31 or 310 or 3·1	51 = 51 or 5·1	71 = 71 or 7·1	91 = 91 or 9·1
32 = 32 or 320 or 3·2	52 = 52 or 5·2	72 = 72 or 7·2	92 = 92 or 9·2
33 = 33 or 330 or 3·3	53 = 53 or 5·3	73 = 73 or 7·3	93 = 93 or 9·3
34 = 34 or 340 or 3·4	54 = 54 or 5·4	74 = 74 or 7·4	94 = 94 or 9·4
35 = 35 or 350 or 3·5	55 = 55 or 5·5	75 = 75 or 7·5	95 = 95 or 9·5
36 = 36 or 360 or 3·6	56 = 56 or 5·6	76 = 76 or 7·6	96 = 96 or 9·6
37 = 37 or 370 or 3·7	57 = 57 or 5·7	77 = 77 or 7·7	97 = 97 or 9·7
38 = 38 or 380 or 3·8	58 = 58 or 5·8	78 = 78 or 7·8	98 = 98 or 9·8
39 = 39 or 390 or 3·9	59 = 59 or 5·9	79 = 79 or 7·9	99 = 99 or 9·9
40 = 40 or 400 or 4	**60** = 60 or 6	**80** = 80 or 8	**100** = 100 or 10

NOTES.

IT will be thus seen that the figures on lines AB and GH are so elastic as to be capable of expressing any quantities whatever, for the numbers represented can be read either as they stand, or they can be increased or decreased tenfold or a hundredfold, merely by the addition or removal of noughts or decimal points.

. FOR quantities *over 100 gallons*, read from the *middle 10* on the Rule. Thus, by imagining a nought to be added to this 10 we get 100; consequently the 11 becomes 110, the 12 becomes 120, and so on. By this means we get the sub-divisions 101, 102, 103, 104, &c., up to 120, &c.

. FOR quantities *under 1 gallon*, it is only necessary to remember that 1 quart is represented by ·25, one half-gallon by ·5, and 3 quarts by ·75, *the Rule expressing all quantities in gallons, tenths of a gallon, or hundredths of a gallon, as the case may be.*

FURTHER NOTES ON THE RULE.

IT might be asked, with reference to the KEY on page 2 : " *Couldn't the rule be made to show quantities right off, without imagining noughts or decimal points ?* "

Certainly it could—by making it four times its present length.

But then it would be too unwieldy to carry ; besides, its price would be prohibitive.

Look at lines AB and GH again.

The numbers, you notice, run consecutively from 1 to 100.

Now, were the rule made four times its present length, we could get four extensions, viz :—1 to 100, representing hundredths of a gallon ; 1 to 10, representing tenths of a gallon ; 1 to 100, representing gallons ; and 100 to 1000, representing hundreds of gallons.

But all this trouble is obviated by merely taking the single extension 1 to 100, and making it read equally for hundredths of a gallon, tenths of a gallon, gallons, and hundreds of gallons, according to our different necessities as they arise.

Isn't this a simpler and more common sense arrangement ?

For instance : look at page 22, example 3.

Here we have a reducing question of 1 gallon of whisky, involving an answer of 26 hundredths of a gallon of water.

The rule accordingly shows 26, meaning 26 *hundredths* of a gallon.

But if the question had been 10 gallons of whisky, the 26 would read 26 *tenths* of a gallon—that is, 2 gallons and 6 tenths of water.

Or, if the question had been 100 gallons of whisky, the 26 would read 26 *gallons* of water. Similarly, 1000 gallons of whisky would take 260 gallons of water. And so on.

The same remarks apply to page 12.

For instance, if we wanted to find the ullage of a 12-gallon cask, we would look under 12.

And if we wanted to find the ullage of a 120 gallon cask, we would still look under 12. *Why ?*

Because we know that 12 is converted into 120 by imagining a nought added.

Read, therefore, the KEY on page 2 *with great care.*

It'll make you master the Rule. And that's worth more than you can realise.

HOW TO KEEP A CASH ACCOUNT.

Draw two columns, and mark them A and B. In column A show all your takings. In column B show your disposal of the money. A *and* B *should balance.*

[**** Accounts may be balanced daily, weekly, or monthly, according to circumstances. The following is a specimen monthly account.]

SPECIMEN CASH ACCOUNT.

		A					B			
1906.		RECEIPTS.	£	s.	d.	1906.	EXPENDITURE.	£	s.	d.
Feb.	1	Takings	10	3	6	Feb. 6	Wages	4	10	0
	2	do.	9	14	3	13	do.	4	10	0
	3	do.	11	5	1	20	do.	4	10	0
	4	do.	10	4	0	27	do.	4	10	0
	5	do.	8	13	7					
	6	do.	12	12	9					
	7	do.	10	0	10		†OTHER EXPENSES			
	8	do.	9	14	8			..	..	..
	9	do.	9	3	8					
	10	do.	10	2	0					
	11	do.	10	15	0					
	12	do.	9	3	0	6	Cash to Office			
	13	do.	11	14	6		(or Bank)	60	0	0
	14	do.	10	0	2	13	do. ,,	70	0	0
	15	do.	10	5	1	20	do. ,,	70	0	0
	16	do.	11	8	9	27	do. ,,	61	15	10
	17	do.	9	14	3					
	18	do.	9	3	6					
	19	do.	9	4	0					
	20	do.	10	0	10	28	A/c outstanding			
	21	do.	9	3	8		—Mr. Jones		16	8
	22	do.	10	2	0	28	Waste Ale			
	23	do.	10	15	0		returned	1	2	0
	24	do.	9	3	0					
	25	do.	11	14	6					
	26	do.	10	0	2					
	27	do.	10	13	7	28	Cash in hand ·			
	28	do.	9	14	8		(*for change*)	2	15	6
		TOTAL TAKINGS £	284	10	0		BALANCED .. £	284	10	0

NOTES.

† *Here could be included, if necessary, other expenses, such as Rent, Licence, Income Tax, Gas, Repairs, Bills Paid, &c. See mode of averaging expenditure, page 8; also mode of reckoning profits, page 9.*

STOCKTAKING.

"KNOWLEDGE IS POWER."

PRACTICAL ADVICE.—Take your own stock. Do it at regular intervals—if possible every week, or every fortnight, but certainly at least once a month. Select a time when you are free from interruption, and directly you start the job finish it off without delay. Don't stop to make any calculations. All you want are merely the wet-inches of your casks and jars, and a rough inventory of your other goods. Calculations by the Rule can be done at your leisure.

DIRECTIONS.—*Arrange the different items under separate headings, and make a summary at the end.*

SPECIMEN STOCKTAKING ACCOUNT.

STOCK FOUND ON HAND 1/3/06, 8 A.M.

SPIRIT CASKS.

Bung.	Wet.	Content.	Gallons.	Description.
26·0	13·4	56	29¼	S.Whisky 22 u.p.
21·1	15·0	28¼	22	I Whisky 20 u.p.
26·8	19·0	57	44¼	Rum 23 u.p.
26·3	12·8	60	31¼	Brandy, 18 u.p.

JARS.

Shape.	Size.	Wet Inches.	Gallons.	Description.
Cylinder.	2-Gallon.	6·7	1¼	Gin, 30 u.p.

WINE CASKS.

Bung.	Wet.	Content	Gallons.	Description.
22·0	13·3	30	19½	Port, n.e. 42°
21·1	8·4	28	10	Sherry, n.e. 30°

BEER CASKS.

Position.	Size.	Wet Ins.	Gals	Description.
Lying.	Hhd.	full	54	
,,	Brl.	,,	36	
,,	,,	,,	36	Burton
,,	,,	14·3	24	150
,,	Hhd.	full	54	
,,	,,	,,	54	
,,	Brl.	,.	36	
,,	,,	,,	36	
,,	,.	,,	36	
,,	,,	,,	36	
,,	,,	,,	36	
,,	,,	,,	36	
,,	,,	12·4	20	Bitter
,,	,,	11·6	18	362
,,	,,	full	36	
,,	,,	,,	36	
,,	,,	,,	36	
,,	,,	,,	36	
,,	,,	15·9	27	Mild.
,,	,,	10·7	16	187
Standing	Hhd.	full	54	
,,	,,	6·6	10	Stout
Lying	Brl.	full	36	64
,,	,,	9·0	12½	Porter 48¼

BOTTLES.

Number.	Description.
74½	Special Whisky.
20¼	Hennessy's ***
22½	Martell's **
10½	Do. *
8	Hollands.
4¾	Port.
3	Sherry.
19	Pints, Bass, &c.
187	½-Pints do.
9½ doz.	Minerals (*large*)
18 7/12 ,,	Do. (*splits*)

SUNDRIES.

8¼ lbs Tobacco.

116 Cigars.

SUMMARY OF STOCK
FOUND ON HAND 1st MARCH. 1906.

Quantity.	Description.	Price. Selling	Cost.	Amount at Selling. £	s.	d.	Cost. £	s.	d.
29¼ Gallons	Scotch Whisky	@18/8	@9/6	27	6	0	13	17	11
22 ,,	Irish do.	18/8	10/6	20	10	8	11	11	0
44¼ ,,	Rum	13/4	9/-	29	10	0	19	18	3
31¾ ,,	Brandy	26/8	12/6	42	5	4	19	16	10
1¼ ,,	Gin	18/8	9/6	1	3	4	..	11	10
19½ ,,	Port	18/8	9/9	18	4	0	9	10	1
10 ,,	Sherry	18/8	5/-	9	6	8	2	10	0
150 ,,	Burton Ale	2/4	1/4½	17	10	0	10	6	3
362 ,,	Bitter do.	2/4	1/2½	42	4	8	21	17	5
187 ,,	Mild do.	1/4	10½d	12	9	4	8	3	7
64 ,,	Stout	2/4	1/4½	7	9	4	4	8	0
48½ ,,	Porter	1/2	9½d	2	16	7	1	18	4
74½ Bottles	Special Whisky	4/-	2/11	14	18	0	10	17	3
20¼ ,,	Hennessy's ***	6/6	5/2	9	16	7	7	16	3
22½ ,,	Martell's **	5/6	4/9	6	3	9	5	6	10
10½ ,,	Do. *	5/6	4/2	2	17	9	2	2	9
8 ,,	Hollands	3/6	2/2	2	8	0	..	17	4
4¾ ,,	Port	2/6	1/10	..	11	10	..	8	8
8 ,,	Sherry	2/-	1/-	..	6	0	..	3	0
19 Pints	Bass, &c.	5d	3½d	..	7	11	..	5	6
187 ½ Pints	Do.	3d	2d	2	6	9	1	11	2
9½ Dozen	Minerals (large)	4/-	10½d	1	18	0	..	8	3
18 ,,	Do. (splits)	2/-	7½d	1	17	2	..	11	8
8¼ lbs.	Tobacco	5/4	4/-	2	4	0	1	13	0
116	Cigars	25/-	15/-	1	9	0	..	17	4
[*,* See pages 8 and 9.]			TOTAL	278	0	8	157	8	6

N.B.—The use of a ready-reckoner will save time in making these calculations. A good one can be obtained at any Stationers for a few pence.

HOW TO CHECK YOUR STOCK.

Draw two columns, and mark them A and B. In column A insert the selling value of the stock left on hand at last stock-taking, and of the supplies subsequently received. In column B insert the amount of your takings, of money owing to you, and of waste goods returned. *Deduct B from A.*

EXAMPLE.

A				B			
Dr.	SELLING VALUE.			**Cr.**	SELLING VALUE.		
	£	s.	d.		£	s.	d.
To Stock left on hand 1/2/'06	292	18	8	By Takings .... *(see page 5)*	284	10	0
SUPPLIES :—				Mr. Jones' a/c outstanding	..	16	8
£ s. d.				Waste Ale returned	1	2	0
Wines & Spirits 100 10 10				TOTAL B..	286	8	8
Bulk Beers.... 99 11 8							
Bottled Beers.. 34 9 10							
Minerals 32 18 0							
Tobacco & Cigars 4 0 4							
£271 10 8..	271	10	8				
TOTAL A..	564	9	4				
[Deduct TOTAL B..	286	8	8				
THEN on 1/3/06 you should have Stock on hand to the value of £	278	0	8†				

NOTE.

†P.S.—As the stock taken on 1/3/06 agrees with this amount *(see page 7)*, it is therefore correct. But if it had turned out say £5 short, it would prove that a deficiency of £5 had taken place during the month. For one's own protection, deficiencies should always be enquired into. Frequent stocktaking is the check on dishonesty.

HOW TO RECKON YOUR PROFIT.

DRAW two columns, and mark them A and B. In column A insert the cost value of the stock left on hand at last Stock-taking, and of the supplies subsequently received. In column B insert the cost value of the present stock found on hand, the amount of your takings, of money owing to you, and of waste goods returned.
Deduct A from B.

EXAMPLE.

A				B			
Dr.	COST VALUE.			**Cr.**	COST VALUE.		
	£	s.	d.		£	s.	d.
To stock left on hand 1/2/06	168	5	9	By Stock on hand 1/3/06 ..	157	8	6
SUPPLIES :				(*See page* 7)			
Wines & Spirits £49 15 6				TAKINGS	284	10	0
Bulk Beers 60 17 0				(*See page* 5)			
Bottled do..... 21 16 0				Mr. Jones' a/c outstanding..	..	16	8
Minerals 8 18 9				Waste Ale returned	1	2	0
Tobacco & Cigars 3 4 0							
£144 11 3..	144	11	3	TOTAL B..	443	17	2
TOTAL A £	312	17	0	Deduct TOTAL A..	312	17	0
				THEN your gross profit on the Takings amounts to ...... £	131	0	2‡

[VIZ: 46 % *on the takings. See footnote.* ‡]

TO FIND YOUR NET PROFIT.
Deduct your working expenses from the gross profit.

EXAMPLE :
Gross Profit on the Takings £131 0 2
Rent, Licence, Wages, Repairs, &c., &c. .. 56 16 6*

Net Profit £74 3 8

(*For Mode of Averaging Expenditure, see page* 33.)

‡ NOTE.— This gross profit of £131 0s. 2d. on a takings of £284 10s. works out 46%, as shown by the Rule, thus:—*Set the Takings to 10 on line A, then over the Profit on the Takings will appear the Percentage Profit.*

SETTING ON RULE.

A 46 Per cent. Profit	10 A
B £131 Profit of the Takings	Takings £284½ B

BOTTLES.

DIRECTIONS.—*Stand the Rule upright by the side of the bottle, and note the Indication on the Altimeter-Line* **M** *corresponding to the height of the liquor. Refer to the proper column in the Table on page* **11**, *according to the description of bottle dealt with. Opposite the Altimeter-Indication will be found the quantity remaining in the bottle: for* **Spirits**, *the number of wine-glasses; for* **Liqueurs**, *the number of liqueur-glasses.*

[N.B.—The wine-glass measures a ½-gill, ¼-quartern, or ¼-noggin.]
(*The liqueur-glass is ⅔ths of a wine-glass.*)

EXAMPLE 1.

THE height of the liquor in an ordinary Whisky bottle (*as illustrated*) shows 19 Altimeter-Indication on line **M** on the Rule. *How much is in the bottle?*

Answer 4 glasses.

RULE,
Line,
M.

—19
ALTIMETER
INDICATION

EXPLANATION.

BEING an ordinary Whisky bottle, we refer to column A in the adjoining table, where we find that 19 Altimeter-Indication=**4 glasses**, the quantity in the bottle.

EXAMPLE 2.

THE height of the liquor in an ordinary Brandy bottle (*as illustrated*) shows 32 Altimeter-Indication on line **M** on the Rule. *How much is in the bottle?*

Answer 7 glasses.

RULE,
Line
M

—32
ALTIMETER
INDICATION

EXPLANATION.

BEING an ordinary Brandy bottle, we refer to column K in the adjoining table, where we find that 32 Altimeter-Indication=**7 glasses**, the quantity in the bottle.

Glasses	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	Glasses
1	7	10	8	7	6	6	8	5	6	8	10	7	10	8	6	7	5	6	5	4	5	4	5	3	4	5	1
2	11	13	12	11	9	9	10	7	9	13	14	11	13	12	8	9	7	7	7	6	7	6	7	4	5	7	2
3	15	17	16	15	12	12	13	8	12	17	18	14	17	15	9	11	9	8	9	8	8	7	8	5	6	9	3
4	19	20	20	18	16	14	15	9	15	21	22	17	20	18	10	13	10	9	10	10	9	9	10	6	7	11	4
5	22	24	24	23	21	18	17	11	18	25	26	20	24	20	12	15	11	10	12	11	11	10	11	6	8	13	5
6	26	27	26	25	21	20	19	12	21	28	28	24	27	23	13	17	12	11	13	12	12	11	12	7	9	15	6
7	30	30	29	27	24	23	21	13	25	31	32	27	30	25	14	19	13	12	14	14	13	12	14	8	10	17	7
8	32	33	32	31	27	25	23	15	28	33	35	31	34	28	16	20	13	13	15	16	15	13	15	9	10	18	8
9	36	37	36	35	31	28	26	17	31	35	39	35	37	31	17	22	14	14	17	17	16	15	17	10	11	20	9
10	45	46	41	42	39	37	35	24	36	41	46	41	45	34	18	24	14	15	18	18	17	16	18	10	12	22	10
11	..	..	..	..	..	..	..	..	..	..	..	46	..	37	19	26	15	16	19	20	18	17	19	11	13	24	11
12	..	..	..	..	..	..	..	..	..	..	..	..	59	40	20	27	16	17	20	21	20	18	21	12	13	25	12
13	..	..	..	..	..	..	..	..	..	..	..	..	..	47	22	29	16	18	21	23	21	19	22	13	14	27	13
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23	30	17	19	23	24	23	20	23	14	15	28	14
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	32	18	20	24	26	24	21	25	14	16	30	15
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	25	33	18	23	25	27	25	22	26	15	17	35	16
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	26	35	19	28	26	30	26	23	28	16	18	..	17
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27	36	20	..	27	35	28	24	30	18	19	..	18
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28	38	20	..	28	..	29	26	31	20	20	..	19
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29	39	21	..	29	..	31	27	33	26	22	..	20
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	40	22	..	30	..	33	28	35	..	26	..	21
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	42	23	..	31	..	39	29	41	..	32	..	22
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	32	47	24	..	31	..	..	30	..	..	..	..	23
24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	34	..	25	..	32	..	..	32	..	..	..	..	24
25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	35	..	25	..	33	..	..	33	..	..	..	..	25
26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36	..	26	..	34	..	..	39	..	..	..	..	26
27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37	..	29	..	35	..	..	..	..	..	..	..	27
28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	38	..	35	..	36	..	..	..	..	..	..	..	28
29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40	..	..	..	37	..	..	..	..	..	..	..	29
30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	43	..	..	..	38	..	..	..	..	..	..	..	30

WHISKY.—SHAPES OF WHISKY BOTTLES IN GENERAL USE.

A B C D E F G H

BRITISH GIN. Ordinary Bottle, A. Hexagonal shaped, I.
HOLLANDS GENEVA.—Square Bottle, J.
BRANDY.—Ordinary, K. Longeneck, L.
RUM.—Ordinary, A.
WINE.—Port, Sherry, &c., M. Vermouth, N.

LIQUEURS.—Absinthe, O. Anisette (*Cusenier's*), P. Bénédictine (*bottle*) Q. Bénédictine (*half-bottle*), R. Chartreuse (*bottle*), S. Chartreuse (*half-bottle*), T. Cherry Brandy (*Heering's*), U. Curaçao (*Fockink's*), V. Kirschwasser, O. Kümmel, W. Grand Marnier, X. Crème de Menthe (*Cusenier's*), Y. Peach Bitters (*S. & T's.*), Z.

N.B.—The following is an extension of column S:—viz. 39=**31** glasses; 40=**32** glasses; 41=**33** glasses; 43=**34** glasses; 45=**35** glasses; 50=**36** glasses.]

WINE, SPIRIT, AND CIDER CASKS.

LYING.

Set the Bung-diameter on C to 100 on D, then under the Wet-inches on C will appear the per cent of content on D. Set this percentage to 100 or 10 on line A, then under the content will be found the Ullage quantity in gallons and fractions of a gallon.

EXAMPLE.
FIND the ullage-quantity in a lying cask from the following particulars:—

BUNG Inches	WET Inches	CONTENT Gallons
26	18·5	56

Answer 43·6 gallons

SETTINGS ON RULE:—

1st	Wet		Bung	
	C 18·5		26 C	
	D 78 %		100 D	

2nd	A 56 Content	100 A
	B 43·6 Ullage	78 % B

EXPLANATION.
We set the bung-diameter 26, to 100 on D, and find that 18·5 wet-inches show 78 % of content, signifying that the ullage-quantity is 78 % of the given content 56 gallons. Setting this percentage to 100 on line A, we find that 56 gallons content give 43·6 gallons ullage.

[Page 19 tells us that 6 tenths of a gallon is equivalent to 4¾ pints, so that the exact quantity in the cask is 43 gallons 4¾ pints.]

EXERCISES.

Bung.	Wet.	Content.	Ullage.
17·1	13·6	14	12·2
21·0	18·4	28¼	26·7
26·4	17·5	55	39·6
34·1	30·9	110	106·3

STANDING.

Set the length on C to 100 on E, then under the Wet-inches on C will appear the per-cent of content on E. Set this percentage to 100 or 10 on line A, then under the content will be found the ullage quantity in gallons and fractions of a gallon.

EXAMPLE.
FIND the ullage quantity in a standing cask from the following particulars:—

LENGTH Inches	WET Inches	CONTENT Gallons
25	18	28

Answer 20·7 gallons

SETTINGS ON RULE:—

1st	Wet		Length	
	C 18		25 C	
	E 74 %		100 E	

2nd	A 28 Content	100 A
	B 20·7 Ullage	74 % B

EXPLANATION.
We set the length 25, to 100 on E, and find that 18 wet-inches show 74 % of content, signifying that the ullage quantity is 74 % of the given content 28 gallons. Setting this percentage to 100 on line A we find that 28 gallons content give 20·7 gallons ullage.

[Page 19 tells us that 7 tenths of a gallon is equivalent to 5¾ pints, so that the exact quantity in the cask is 20 gallons 5¾ pints.]

EXERCISES.

Length	Wet.	Content.	Ullage.
23·8	17·0	18¼	13·3
25·0	18·0	28	20·7
27·8	18·4	30½	20·4
32·5	25·0	56	44·2

NOTE.—These regulations apply to *all* casks, large or small, of wood, porcelain, or earthenware.

**Round casks can be gauged either *lying or standing. Oval* casks can only be gauged *standing.*

FOR METHOD OF READING THE FIGURES ON THE RULE, see KEY, pages 2, 3 and 4.

THE DIP-ROD AND ITS USES.

HOW TO DIP A CASK.

Insert the dip-rod perpendicularly to the bottom through the bung-hole, or head-hole, according as the cask is lying or standing. Take the Wet Inches as found, but deduct the thickness of the upper stave from the external dimension.

EXAMPLE.

A cask (*inch wood*) dips 27·4 inches externally, with 17·5 wet. What shall we write down?

	Bung.	Wet.
Answer	**26·4**	**17·5**

EXPLANATION.—Deducting the inch thickness of the upper stave from the external dimension [*ie* 27·4—1·0], we get 26·4 Bung-diameter.

The " Wet " we leave alone.

☀☀T**HE DIP-ROD** has two lines engraved on it—an *Inch* line and a *Diagonal* line.

The Inch line (graduated in tenths) is used for all general dipping purposes. [*See page* 12 for *Wine, Spirit, and Cider Casks;* page 14 *for Beer Casks;* page 16 *for Jars.*]

The Diagonal line (marked Impl. Galls.) is used for finding the approximate capacity of a cask by insertion through the bung-hole in a *slanting direction.* [*See page* 44 (*e*) *for full explanation.*]

Dip rods are made in three varieties—straight, folding and jointed. The jointed variety is the best for ordinary use. It consists of convenient short pieces, which screw together end to end. (*See page* 64.)

STANDARD SIZES OF CASKS.

Description.	Usual Capacity.	Description.	Usual Capacity.	Description.	Usual Capacity.
PORT ......Pipe	117 — 120	BURGUNDY..Hhd	48 — 50	GENEVA .... Hhd	52 — 61
,, ...Hhd	59 — 60	MADEIRA....Pipe	92 — 97	,, .. Qr. Cask	32 — 35
,, .. Qr. Cask	29 — 30	,, ...Hhd	44 — 49	RUM ......Pun	103 —115
,, ...Octave	14½ — 15	,, .. Qr. Cask	22 — 24	,, ...Hhd	57 — 62
,, ..½-Octave	7 — 7½	MARSALA....Pipe	90 —110	,, ... Barrel	34 — 40
TARRAGONA..Pipe	117 — 122	,, ... *Hhd	44 — 49	WHISKY ....Pun	108 —118
,, ...Hhd	58 — 60	,, .. Qr. Cask	22 — 24	,, ...Hhd	54 — 57
,, .. Qr. Cask	28 — 29	HOCK ....4 Aum	128 —132	,, ... Barrel	27 — 31
SHERRY Dble Butt	220 —224	,, ...3 Aum	94 —104	BEER ......Butt	108
,, ...Butt	109 —112	,, ...2 Aum	60 — 64	,, ...Pun	72
,, ...Hhd	55 — 56	,, ... Aum	30 — 32	,, ...Hhd	54
,, .. Qr. Cask	27 — 28	BRANDY....Piece	115 —125	,, ... Barrel	36
,, ...Octave	14	,, ...Hhd	58 — 61	,, ...Kilderkin	18
,, ..½-Octave	7	,, .. Qr. Cask	29 — 31	,, ... Firkin	9
CLARET ......Hhd	47 — 49	,, Large Octave	17 — 20	,, ... Keg	6
,, ...Qr-Cask	23 — 24	,, Small Octave	15 — 17	,, ... Pin	4½

* NOTE.—Some Marsala Hogsheads are imported in Casks similar in size to Sherries, to meet the exigencies of the Whisky Trade.

N.B.—It will be valuable to note that the Content (or Capacity) of every cask coming from the bonded warehouse is either scribed or painted on the front head. The object of this is to enable the Ullage quantity to be correctly ascertained by the Trade from the wet inches. Traders, therefore, should utilise this Content for their own Stocktaking purposes. In case, however, no Content is marked on a Cask, the readiest way to find it, if lying, is by means of the Diagonal Line, partly described above, but fully explained on page 44 (e). The above Table shows the usual results of capacity in Imperial Gallons.

[NOTE.—*Lager Beer Casks imported have the Foreign Litres branded on them. See page 41 for conversion of litres to gallons.*]

BEER CASKS.

[*⁎* The ullage quantity in each cask is shown opposite the wet inches.]

FIRKINS.

LYING.		STANDING.	
Wet Inches	Galls	Wet Inches	Galls
2·7 =	1	2·2 =	1
4·2 =	2	4·0 =	2
5 6 =	3	5·7 =	3
6·8 =	4	7 4 =	4
8 0 =	5	9·1 =	5
9 2 =	6	10 7 =	6
10·5 =	7	12·5 =	7
12·0 =	8	14·3 =	8
14 7 =	9	16·5 =	9

KILDERKINS.

LYING.		STANDING.	
Wet Inches	Galls	Wet Inches	Galls
2·2 =	1	1 3 =	1
3·5 =	2	2·6 =	2
4·6 =	3	3·8 =	3
5·4 =	4	4·9 =	4
6 8 =	5	6·1 =	5
7·0 =	6	7·1 =	6
7·8 =	7	8·1 =	7
8·5 =	8	9·1 =	8
9·3 =	9	10 1 =	9
10 0 =	10	11·1 =	10
10 7 =	11	12·1 =	11
11·5 =	12	13·1 =	12
12 3 =	13	14·2 =	13
13·0 =	14	15·3 =	14
13·9 =	15	16·4 =	15
14 9 =	16	17·6 =	16
16·3 =	17	18·8 =	17
18 5 =	18	20·2 =	18

BARRELS.

LYING.		STANDING.	
Wet Inches	Galls	Wet Inches	Galls
1·8 =	1	1 0 =	1
2·8 =	2	1·9 =	2
3·7 =	3	2·8 =	3
4·4 =	4	3·6 =	4
5·1 =	5	4·3 =	5
5·7 =	6	5·1 =	6
6·2 =	7	5·9 =	7
6 8 =	8	6·6 =	8
7·3 =	9	7·3 =	9
7·9 =	10	8·0 =	10
8·3 =	11	8·7 =	11
8 8 =	12	9·5 =	12
9 3 =	13	10·2 =	13
9·8 =	14	10 8 =	14
10 8 =	15	11·5 =	15
10 7 =	16	12·2 =	16
11·1 =	17	12 9 =	17
11·6 =	18	13·5 =	18
12·0 =	19	14 2 =	19
12 4 =	20	14 8 =	20
12·9 =	21	15 4 =	21
13 3 =	22	16 1 =	22
13·8 =	23	16·7 =	23
14·3 =	24	17 4 =	24
14·8 =	25	18·1 =	25
15·4 =	26	18·8 =	26
15·9 =	27	19·6 =	27
16·5 =	28	20·8 =	28
17·0 =	29	21·0 =	29
17·6 =	30	21·8 =	30
18·2 =	31	22 5 =	31
18·8 =	32	23 4 =	32
19·5 =	33	24·2 =	33
20·3 =	34	25·0 =	34
21·2 =	35	25·9 =	35
23·1 =	36	26·8 =	36

HOGSHEADS.

LYING.		STANDING.	
Wet Inches	Galls	Wet Inches	Galls
1·7 =	1	1·0 =	1
2 5 =	2	1·6 =	2
3·2 =	3	2·3 =	3
3 9 =	4	2·9 =	4
4·5 =	5	8·6 =	5
5 0 =	6	4 2 =	6
5·4 =	7	4·8 =	7
5·9 =	8	5·4 =	8
6 3 =	9	6·0 =	9
6·8 =	10	6·6 =	10
7·2 =	11	7 2 =	11
7·6 =	12	7·7 =	12
8 0 =	13	8·3 =	13
8 4 =	14	8·9 =	14
8·8 =	15	9 5 =	15
9·2 =	16	10 1 =	16
9·5 =	17	10·7 =	17
9·9 =	18	11·2 =	18
10 3 =	19	11·8 =	19
10·6 =	20	12·4 =	20
11·0 =	21	12·9 =	21
11·3 =	22	13·4 =	22
11·7 =	23	13·9 =	23
12·1 =	24	14·5 =	24
12·4 =	25	15·0 =	25
12·8 =	26	15·5 =	26
13 1 =	27	16 0 =	27
13·4 =	28	16·5 =	28
13 7 =	29	17·1 =	29
14·1 =	30	17·6 =	30
14 4 =	31	18·1 =	31
14·8 =	32	18·6 =	32
15·1 =	33	19·2 =	33
15·4 =	34	19·7 =	34
15·8 =	35	20·2 =	35
16·2 =	36	20 7 =	36
16·5 =	37	21·2 =	37
16 9 =	38	21·7 =	38
17 2 =	39	22·2 =	39
17 6 =	40	22·8 =	40
18 0 =	41	23 4 =	41
18 5 =	42	23·9 =	42
18·9 =	43	24·5 =	43
19·3 =	44	25 1 =	44
19 8 =	45	25·7 =	45
20·2 =	46	26·4 =	46
20 7 =	47	27·0 =	47
21·2 =	48	27 7 =	48
21 7 =	49	28 3 =	49
22·3 =	50	29·0 =	50
23·0 =	51	29 6 =	51
23·6 =	52	30·2 =	52
24·4 =	53	30 9 =	53
26·1 =	54	31·9 =	54

PUNCHEONS.

LYING.

Wet Ins.	Galls	Wet Ins.	Galls
1·4=	1	14·5=	37
2·2=	2	14·8=	38
2·9=	3	15·1=	39
3·5=	4	15·4=	40
4·0=	5	15·7=	41
4·5=	6	16·0=	42
5·0=	7	16·3=	43
5·4=	8	16·6=	44
5·9=	9	16·9=	45
6·2=	10	17·1=	46
6·5=	11	17·4=	47
6·9=	12	17·7=	48
7·0=	13	18·0=	49
7·0=	14	18·3=	50
7·9=	15	18·6=	51
8·0=	16	18·9=	52
8·0=	17	19·2=	53
8·0=	18	19·5=	54
8·0=	19	19·8=	55
9·0=	20	20·1=	56
9·0=	21	20·6=	57
10·1=	22	20·9=	58
10·4=	23	21·2=	59
10·7=	24	21·6=	60
11·0=	25	22·0=	61
11·5=	26	22·5=	62
11·8=	27	22·9=	63
11·8=	28	23·3=	64
11·8=	29	23·8=	65
12·0=	30	24·3=	66
12·0=	31	24·8=	67
12·0=	32	25·3=	68
13·0=	33	25·8=	69
13·0=	34	26·5=	70
13·0=	35	27·0=	71
14·0=	36	27·9=	72

STANDING.

Wet Ins.	Galls	Wet Ins.	Galls
0·7=	1	18·4=	37
1·4=	2	18·8=	38
1·9=	3	19·2=	39
2·5=	4	19·6=	40
3·1=	5	20·2=	41
3·7=	6	20·7=	42
4·2=	7	21·1=	43
4·8=	8	21·6=	44
5·4=	9	22·0=	45
5·9=	10	22·5=	46
6·4=	11	22·9=	47
6·9=	12	23·4=	48
7·4=	13	23·8=	49
7·9=	14	24·3=	50
8·4=	15	24·8=	51
8·9=	16	25·3=	52
9·4=	17	25·8=	53
9·9=	18	26·3=	54
10·4=	19	26·7=	55
10·8=	20	27·2=	56
11·2=	21	27·8=	57
11·7=	22	28·3=	58
12·2=	23	28·8=	59
12·6=	24	29·2=	60
13·1=	25	29·7=	61
13·5=	26	30·2=	62
13·9=	27	30·8=	63
14·4=	28	31·3=	64
14·8=	29	31·8=	65
15·3=	30	32·3=	66
15·7=	31	32·9=	67
16·2=	32	33·5=	68
16·6=	33	34·0=	69
17·0=	34	34·5=	70
17·5=	35	35·1=	71
17·9=	36	35·8=	72

BUTTS

LYING

Wet Ins.	Galls	Wet Ins.	Galls
1·4=	1	15·7=	55
2·0=	2	16·0=	56
2·5=	3	16·2=	57
3·0=	4	16·4=	58
3·4=	5	16·6=	59
3·9=	6	16·8=	60
4·3=	7	17·0=	61
4·7=	8	17·2=	62
5·1=	9	17·4=	63
5·4=	10	17·6=	64
5·7=	11	17·8=	65
6·0=	12	18·0=	66
6·2=	13	18·2=	67
6·5=	14	18·4=	68
6·8=	15	18·6=	69
7·0=	16	18·8=	70
7·3=	17	19·1=	71
7·6=	18	19·3=	72
7·8=	19	19·5=	73
8·1=	20	19·8=	74
8·3=	21	20·0=	75
8·6=	22	20·2=	76
8·9=	23	20·4=	77
9·2=	24	20·6=	78
9·4=	25	20·8=	79
9·6=	26	21·1=	80
9·8=	27	21·3=	81
10·1=	28	21·6=	82
10·3=	29	21·9=	83
10·5=	30	22·1=	84
10·7=	31	22·3=	85
10·9=	32	22·6=	86
11·1=	33	22·9=	87
11·3=	34	23·1=	88
11·5=	35	23·4=	89
11·8=	36	23·6=	90
12·0=	37	23·9=	91
12·3=	38	24·2=	92
12·5=	39	24·5=	93
12·6=	40	24·7=	94
12·8=	41	25·0=	95
13·0=	42	25·3=	96
13·2=	43	25·7=	97
13·4=	44	26·1=	98
13·6=	45	26·4=	99
13·8=	46	26·7=	100
14·1=	47	27·1=	101
14·3=	48	27·4=	102
14·5=	49	27·7=	103
14·7=	50	28·2=	104
14·9=	51	28·6=	105
15·1=	52	29·1=	106
15·3=	53	29·6=	107
15·5=	54	31·0=	108

STANDING

Wet Ins.	Galls	Wet Ins.	Galls
0·6=	1	23·2=	55
1·1=	2	23·6=	56
1·6=	3	24·0=	57
2·1=	4	24·3=	58
2·7=	5	24·7=	59
3·2=	6	25·1=	60
3·7=	7	25·5=	61
4·2=	8	25·9=	62
4·6=	9	26·2=	63
5·1=	10	26·6=	64
5·5=	11	27·0=	65
6·0=	12	27·4=	66
6·5=	13	27·8=	67
7·0=	14	28·2=	68
7·5=	15	28·6=	69
7·9=	16	29·0=	70
8·3=	17	29·4=	71
8·7=	18	29·8=	72
9·1=	19	30·2=	73
9·5=	20	30·5=	74
10·0=	21	30·9=	75
10·4=	22	31·3=	76
10·8=	23	31·7=	77
11·2=	24	32·1=	78
11·6=	25	32·5=	79
12·0=	26	32·8=	80
12·4=	27	33·2=	81
12·8=	28	33·6=	82
13·2=	29	34·0=	83
13·6=	30	34·4=	84
14·0=	31	34·8=	85
14·4=	32	35·2=	86
14·8=	33	35·5=	87
15·2=	34	35·9=	88
15·6=	35	36·3=	89
16·0=	36	36·7=	90
16·4=	37	37·2=	91
16·8=	38	37·7=	92
17·2=	39	38·1=	93
17·6=	40	38·6=	94
18·0=	41	39·0=	95
18·8=	42	39·5=	96
18·7=	43	40·0=	97
19·1=	44	40·4=	98
19·5=	45	40·8=	99
19·8=	46	41·3=	100
20·2=	47	41·8=	101
20·6=	48	42·3=	102
20·9=	49	42·8=	103
21·3=	50	43·3=	104
21·7=	51	43·8=	105
22·1=	52	44·4=	106
22·4=	53	45·0=	107
22·8=	54	45·5=	108

Example 1.—A Barrel of Ale (lying) dips 19·4 wet-inches. How much does it contain?

Answer 20 gallons.

Example 2.—A Hogshead of Ale (*standing*) dips 19·7 wet-inches. How much does it contain?

Answer 34 gallons.

JARS.

DIRECTIONS:—_Take the wet-inches by means of the dip-rod; then refer to the proper column in the Table below, where, opposite the wet-inches, will be found the quantity remaining in the Jar._

$\frac{1}{4}$-gallon = 1 quart.
$\frac{1}{2}$-gallon = 2 quarts.
$\frac{3}{4}$-gallon = 3 quarts.

ULLAGE TABLE.

Approximate Quantity in the Jar.	1 GALLON-JAR.		2 GALLON-JAR.		3 GALLON-JAR.		4 GALLON-JAR.		5 GALLON-JAR.		6 GALLON-JAR.		Approximate Quantity in the Jar.
	Cylinder Shape.	Bouge Shape.	Cylinder Shape.	Bouge Shape.	Cylinder Shape.	Bouge Shape.	Cylinder Shape.	Bouge Shape.	Cylinder Shape.	Bouge Shape.	Cylinder Shape.	Bouge Shape.	
GALLONS	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	Wet Inches	GALLONS
0 $\frac{1}{4}$	2·0	3·0	1·3	2·0	1·1	1·3	1·0	1·3	0·9	1·0	0·7	1·0	0 $\frac{1}{4}$
$\frac{1}{2}$	4·1	5·0	2·7	3·5	2·2	2·6	1·9	2·2	1·7	1·9	1·4	1·8	$\frac{1}{2}$
$\frac{3}{4}$	6·1	6·8	4·0	5·0	3·4	3·7	2·8	3·1	2·5	2·6	2·2	2·5	$\frac{3}{4}$
1	8·0	8·0	5·4	6·0	4·5	4·7	3·7	4·0	3·3	3·4	2·9	3·3	1
$\frac{1}{4}$	—	—	6·7	7·1	5·6	5·5	4·7	4·8	4·1	4·1	3·6	4·0	$\frac{1}{4}$
$\frac{1}{2}$	—	—	8·1	8·2	6·7	6·2	5·6	5·7	5·0	4·9	4·4	4·6	$\frac{1}{2}$
$\frac{3}{4}$	—	—	9·5	9·6	7·8	7·1	6·5	6·6	5·8	5·4	5·1	5·4	$\frac{3}{4}$
2	—	—	11·0	11·0	9·0	8·2	7·5	7·0	6·6	6·1	5·8	5·8	2
$\frac{1}{4}$	—	—	—	—	10·1	9·0	8·4	7·8	7·4	6·8	6·5	6·3	$\frac{1}{4}$
$\frac{1}{2}$	—	—	—	—	11·3	9·8	9·4	8·7	8·3	7·4	7·3	7·0	$\frac{1}{2}$
$\frac{3}{4}$	—	—	—	—	12·2	10·8	10·3	9·3	9·1	8·0	8·0	7·5	$\frac{3}{4}$
3	—	—	—	—	13 2	11·7	11·3	9·8	9·9	8·5	8·7	8·1	3
$\frac{1}{4}$	—	—	—	—	—	—	12·2	10 4	10·7	9·1	9·5	8·4	$\frac{1}{4}$
$\frac{1}{2}$	—	—	—	—	—	—	13·2	11·0	11·6	9·6	10·2	9·1	$\frac{1}{2}$
$\frac{3}{4}$	—	—	—	—	—	—	14·1	11·7	12·4	10·2	10·9	9·7	$\frac{3}{4}$
4	—	—	—	—	—	—	15·0	13·0	13·2	10·7	11·6	10·3	4
$\frac{1}{4}$	—	—	—	—	—	—	—	—	14·0	11·3	12 2	10·8	$\frac{1}{4}$
$\frac{1}{2}$	—	—	—	—	—	—	—	—	14 9	11·9	13·1	11·4	$\frac{1}{2}$
$\frac{3}{4}$	—	—	—	—	—	—	—	—	15·7	12·6	13·8	11·9	$\frac{3}{4}$
5	—	—	—	—	—	—	—	—	16·5	14·0	14·6	12·5	5
$\frac{1}{4}$	—	—	—	—	—	—	—	—	—	—	15·3	13·1	$\frac{1}{4}$
$\frac{1}{2}$	—	—	—	—	—	—	—	—	—	—	16·0	13·8	$\frac{1}{2}$
$\frac{3}{4}$	—	—	—	—	—	—	—	—	—	—	16·7	14·5	$\frac{3}{4}$
6	—	—	—	—	—	—	—	—	—	—	17·5	15·2	6

EXAMPLE 1.

A 2-gallon _Cylinder-shaped_ Jar dips 6·7 wet-inches. How much does it contain?

Answer 1$\frac{1}{4}$ gallons.

EXAMPLE 2.

A 4-gallon _bouge-shaped_ Jar dips 8·7 wet-inches. How much does it contain?

Answer 2$\frac{1}{2}$ gallons.

URNS, &c.

Ascertain from the undermentioned table the number of pounds-per-gallon corresponding to the hydrometer strength. Set this result to 10 on line A; then over the total net pounds will be found the exact quantity in the vessel in gallons and fractions of a gallon.

TABLE.

STRENGTH.	POUNDS PER GALLON
Proof =	9·187
1 u.p. =	9·200
2 u.p. =	9·211
3 u.p. =	9·222
4 u.p. =	9·235
5 u.p. =	9·246
6 u.p. =	9·258
7 u.p. =	9·270
8 u.p. =	9·281
9 u.p. =	9·292
10 u.p. =	9·303
11 u.p. =	9·313
12 u.p. =	9·325
13 u.p. =	9·336
14 u.p. =	9·347
15 u.p. =	9·358
16 u.p. =	9·368
17 u.p =	9·380
18 u.p. =	9·391
19 u.p. =	9·401
20 u.p. =	9·411
21 u.p. =	9·421
22 u.p. =	9·431
23 u.p. =	9·441
24 u.p. =	9·451
25 u.p. =	9·461
26 u.p. =	9·471
27 u.p. =	9·480
28 u.p. =	9·490
29 u.p. =	9·500
30 u.p. =	9·508
31 u.p. =	9·516
32 u.p. =	9·525
33 u.p. =	9·532
34 u.p. =	9·541
35 u.p. =	9·550

EXAMPLE.

FIND the quantity of Whisky in a glass Urn from the following weight and strength:—

Gross lbs.	Tare lbs.	Nett lbs.	Strength of the Spirit contained.
25½	11½	14	20 u.p.

Answer 1·48 gallons.

SETTING ON RULE.

A 1·48 Gallons	10 A
B 14 lbs. Nett	9·41 B

EXPLANATION.

THE adjoining table tells us that spirit at 20 u.p. weighs 9·411 lbs. per gallon. Setting this 9·41 to 10 on line A, we find that 14lbs nett = 1·48 gallons. [*Page 19 tells us that 48 hundredths of a gallon = 3 pints and 3¼ quarterns, so that the exact quantity in the Urn is 1 gallon, 3 pints and 3¼ quarterns.*]

[*⁎* If the vessel contains *Wine*, reckon it roughly at 10lbs. per gallon.]

NOTE.—*For the purpose of Stocktaking, mark the tare on a small label on the vessel, so that it may be deducted when taking the gross weight.*

CIGARS.

METHOD.—*Set the price per* 100 *in shillings to* 100 *on line* A; *then under any number of Cigars will be found their value in shillings and pence.*

EXAMPLE (*a*).—*Find the value of 46 cigars at 36/- per* 100.

Answer 16s 6d.

SETTING ON RULE:—

A 46 Cigars	100 A
B 16s. 6d.	36 B

KEY.—We set 36 shillings to 100 on line A, and find that 46 cigars are worth 16s. 6d.

EXAMPLE (*b*).—Find the value of 40 cigars at 24/6 per 100.

Answer 9s. 9d.

SETTING ON RULE:—

A 40 Cigars	100 A
B 9s. 9d.	24½ B

KEY.—We set 24½ shillings to 100 on line A; then under 40 cigars we find 9s. 9d., their value.

SUPPLEMENTARY NOTES.

FOOD AND DRUGS ACT.—
Whisky, Brandy and Rum may be reduced to 25 *underproof, and Gin to* 35 *underproof.*

" PROOF SPIRIT " is twelve-thirteenths of the weight of an equal measure of distilled water at 51° Fahrenheit: specific gravity ·9187 at 62°, and the proportions of alcohol and water contained in 100 parts by volume, 57·06 and 42·94 respectively. Taking 100 as the standard for "Proof," overproof is *over* the 100, and underproof *under* the 100.

☞ [For Calculation of proof-quantities, see page 28.]

⁂ THE STANDARD for the Imperial Gallon is the space occupied by 10*lbs. avoirdupois of distilled water at* 62° *Fahrenheit, with the barometer at* 30 *inches.*

The Standard for the Litre is the volume of 1000 cubic centimetres, or 1 kilogramme of distilled water at 4° Centigrade.

CELLARS should be kept at an even temperature—that is, not subject to sudden changes. *The following are the best temperatures for the different goods specified :*— viz.

40°	50°	54°	55°	59°	60°
For Spirits and Ærated Waters.	For Champagne, Moselle, Hock, and other Sparkling & light White Wines.	For Ale, Stout and bottled Beer for keeping.	For Burgundy Claret, and other light Red Wines.	For Port, Sherry, Madeira and Marsala	For Bottled Beer intended to Mature rapidly.

TABLE
SHOWING
TENTHS AND HUNDREDTHS OF A GALLON AND EQUIVALENTS IN PINTS and QUARTERNS.

[NOTE.—Quarterns, Gills, and Noggins represent the same quantity.]

IMPERIAL MEASURE.
[4 quarterns make 1 pint; 2 pints, 1 quart; 4 quarts, 1 gallon.]

TENTHS OF A GALLON.		EQUIVALENT TO PINTS.
1	=	3/4
2	=	1 1/2
3	=	2 1/2
4	=	3 1/4
5	=	4
6	=	4 3/4
7	=	5 3/4
8	=	6 1/2
9	=	7 1/4
10	=	8

HUNDREDTHS OF A GALLON.		EQUIVALENT TO PINTS.	QRTNS
1	=	0	0 1/4
2	=	0	0 1/2
3	=	0	1
4	=	0	1 1/4
5	=	0	1 1/2
6	=	0	2
7	=	0	2 1/4
8	=	0	2 1/2
9	=	0	2 3/4
10	=	0	3
11	=	0	3 1/4
12	=	0	3 3/4
13	=	1	0
14	=	1	0 1/4
15	=	1	0 3/4
16	=	1	1
17	=	1	1 1/4
18	=	1	1 3/4
19	=	1	2
20	=	1	2

HUNDREDTHS OF A GALLON.		EQUIVALENT TO PINTS.	QRTNS
21	=	1	2 1/2
22	=	1	3
23	=	1	3 1/4
24	=	1	3 1/2
25	=	2	0
26	=	2	0 1/4
27	=	2	0 1/2
28	=	2	1
29	=	2	1 1/4
30	=	2	2
31	=	2	2
32	=	2	2 1/4
33	=	2	2 1/2
34	=	2	2 3/4
35	=	2	3
36	=	2	3 1/2
37	=	2	3 1/2
38	=	3	0
39	=	3	0 1/2
40	=	3	1
41	=	3	1
42	=	3	1 1/4
43	=	3	1 3/4
44	=	3	2
45	=	3	2 1/4
46	=	3	2 3/4
47	=	3	3
48	=	3	3 1/4
49	=	3	3 1/2
50	=	4	0
51	=	4	0 1/4
52	=	4	0 1/2
53	=	4	1
54	=	4	1 1/4
55	=	4	1 1/2
56	=	4	2
57	=	4	2 1/4
58	=	4	2 1/4
59	=	4	2 3/4
60	=	4	3

HUNDREDTHS OF A GALLON.		EQUIVALENT TO PINTS.	QRTNS
61	=	4	3 1/4
62	=	4	3 3/4
63	=	5	0
64	=	5	0 1/2
65	=	5	0 3/4
66	=	5	1
67	=	5	1 1/4
68	=	5	1 3/4
69	=	5	2 1/4
70	=	5	3
71	=	5	3
72	=	5	3 1/4
73	=	5	3 1/2
74	=	5	3 3/4
75	=	6	0
76	=	6	0 1/4
77	=	6	0 1/2
78	=	6	1
79	=	6	1 1/4
80	=	6	2
81	=	6	2
82	=	6	2 1/4
83	=	6	2 1/2
84	=	6	2 3/4
85	=	6	3
86	=	6	3 1/4
87	=	6	3 1/2
88	=	7	0
89	=	7	0 1/2
90	=	7	1
91	=	7	1 1/4
92	=	7	1 1/2
93	=	7	1 3/4
94	=	7	2
95	=	7	2 1/4
96	=	7	2 3/4
97	=	7	3
98	=	7	3 1/4
99	=	7	3 1/2
100	=	8	0

REDUCING.

VITAL FACTS.

OWING to chemical action, a contraction in bulk takes place when spirit and water combine. Or, as the expression goes, "A gallon of spirit and a gallon of water won't make two gallons." To meet contraction, an increased quantity of water is required—the calculation of which must be based on the specific gravity system. This the Rule does automatically. The total water thus shown is absolutely needed to make both the strength and the quantity right.

₊ Contraction of bulk is due to the interpenetration or marrying of the different sized molecules which compose spirit and water—the same law holding good with regard to any two miscible liquids of different densities. Directly water combines with spirit a chemical action is set up—heat being generated by the smaller molecules of the spirit breaking into and filling up the spaces between the larger molecules of the water. The contraction thus resulting is, however, compensated for by an increase of strength. So that by adding extra water we merely restore the equilibrium.

ILLUSTRATION.

I have 50 gallons of whiskey at 8 overproof which I want to reduce to 20 underproof. How much water shall I require?

WORKED out by the pen, or by the old slide-rules, the water required appears to be 17·5 gallons.

```
108
 80
 ──
 28      ⎱ ⎰   67·5      50
 50      ⎱
80)140·0  ⎱    20 u.p.   8 o.p.
 17·5    ⎱ ⎰
```

But this is a false answer, entailing a loss to the trader of nearly three-quarters of a gallon. Instead of getting 67·5 gallons, as he expects, he gets only 66·8 gallons, or **46 glasses short.** If he tries the strength, he will find it 19·1 u.p., and it will just take this extra 46 glasses of water to bring it down to 20 u.p., and to make his bulk quantity right.

In other words, he needs another 7 tenths of a gallon of water, over and above the pen-calculation, to give him 67·5 gallons at 20 u.p. That is, he needs 17·5+0·7, or 18·2 gallons of water altogether—*the precise quantity shown at a glance by* FARMAR'S RULE. [See Example 1, page 21.]

[*₊* *It will be thus seen that traders who reduce their spirits without allowing for contraction in bulk, unconsciously sell their stuff stronger than they imagine, and rob themselves by deficiency in the output.*]

TO ASCERTAIN THE TRUE WATER REQUIRED FOR REDUCING PURPOSES.

METHOD:—*Set the SUM of the two strengths on line* H *to the required strength in Section No. 1; then under the quantity of spirit on line* G *will appear the exact quantity of water required—allowing for contraction in bulk.*

IMPORTANT.— But when reducing from underproof to a further degree underproof, set the DIFFERENCE instead of the sum. †

EXAMPLE 1.

I HAVE 50 *gallons of whisky at 8 overproof, which I want to break down to 20 underproof. How much water shall I require, and what will be the final result ?*

Answer:—Exact water required : 18·2 gallons.

Final result, 67·5 gallons at 20 u.p.

SETTING ON RULE:—

	Section No. 1.	Gallons	
G	20 u p.	Spirit 50	G
H	28	Water 18·2	H

EXPLANATION —The given strengths are 8 o.p. and 20 u.p. Adding these figures mentally together we get 28, and this sum 28 we set to 20 u.p., the required strength, in section No. 1. Then, looking under 50 gallons of spirit on line G we find 18·2 gallons, the water required. [*Page* 19 *tells us that* 2 *tenths of a gallon*=1½ *pints, so that the exact quantity of water required is* 18 *gallons* 1½ *pints.*]

[*⁎* Now, to find the extent of the contraction, we repeat the setting in section No. 2, when there appears a diminished result, viz. 17·5 gallons.]

		Gallons	Section No. 2	
G		Spirit 50	20 u.p.	G
H		17·5	28	H

This implies that after we have put in 18·2 gallons of water, the proper quantity, the total bulk now becomes as though we had only put in 17·5 gallons. The final result, therefore, is now 67·5 gallons at 20 underproof— a fact which can be verified by the hydrometer and the standard measures.

REDUCING.—*Continued.*

EXAMPLE 2.

I HAVE 13 *gallons of Whisky at 22 overproof which I want to break down to proof-strength. How much water shall I require, and what will be the final result ?*

Answer:

Exact water required, **3** gallons.
Final result, **15·85** gallons at proof.

SETTING ON RULE.

	Section No. 1	Gallons.	
G	0	13 Spirit	G
H	22	3 Water	H

E x p l a n a t i o n.— The given strengths are 22 o.p. and 0 o.p. Adding these figures mentally together we get 22, and this sum 22 we set to proof or 0, the required strength, in Section No 1. Then looking under 13 gallons of spirit on Line G, we find 3 gallons, the exact quantity of water required.

*** *Now, to find the extent of the contraction, we repeat the setting in Section No. 2, when there appears a diminished result, viz 2·85 gallons.*]

	Gallons.	Section No. 2	
G	13 Spirit	0	G
H	2·85	22	H

THIS implies that after we have put in 3 gallons of water, the proper quantity, the total bulk now becomes as though we had only put in 2·85 gallons. The final result, therefore, is now 15·85 gallons at proof strength. [*Page* 19 *tells us that* 85 *hundredths of a gallon* = 6 *pints* 3 *quarterns, so that our exact quantity is* 15 *gallons,* 6 *pints,* 3 *quarterns.*]

EXAMPLE 3.

I HAVE 1 *gallon of Whisky at proof-strength which I want to break down to 20 underproof. How much water shall I require, and what will be the final result ?*

Answer: ·
Exact water required, **0·26** gallon.
Final result, 1¼ gallons at **20** u.p.

SETTING ON RULE.

	Section No. 1	Gallon.	
G	20 u.p.	1 Spirit	G
H	20	·26 Water	H

E x p l a n a t i o n. — The given strengths are 0 o.p. and 20 u.p. Adding these figures mentally together we get 20, and this sum 20 (represented by the figure 2 on the rule) we set to 20 u.p., the required strength, in Section No. 1. Then looking under 1 gallon of spirit on line G (*represented by the figure* 10 *or* 1, *see Key, page* 2) we find 0·26 gallon, the exact quantity of water required. [*Page* 19 *tells us that* 26 *hundredths of a gallon* = 2 *pints and* ¼ *quartern.*]

[*** *Now, to find the extent of the contraction, we repeat the setting in Section No. 2, when there appears a diminished result, viz :* 0·25 *gallon.*]

	Gallon.	Section No. 2	
G	1 Spirit	20 u.p.	G
H	·25	20	H

THIS implies that after we have put in 0·26 gallon of water, the proper quantity, the total bulk now becomes as though we had only put in 0·25 gallon. The final result, therefore, is now 1·25, or 1¼ gallons at 20 under-proof. [*Page* 19 *tells us that* 25 *hundredths of a gallon* = 2 *pints or* 1 *quart, so that our exact quantity is* 1¼ *gallons.*]

REDUCING.— *Continued.*

EXAMPLE 4.

I HAVE 150 *gallons of spirit at 20 overproof which I want to break down to 15 underproof. How much water shall I require, and what will be the final result?*

Answer:

Exact water required, **64** gallons. Final result, **211·7** gallons at 15 u.p.

SETTING ON RULE.

	Section No. 1	Gallons	
G	15 u.p.	150 Spirit	G
H	35	64 Water	H

EXPLANATION.— The given strengths are 20 o.p. and 15 u.p. Adding these figures mentally together we get 35, and this sum 35 we set to 15 u.p., the required strength, in Section No. 1. Then looking under 150 gallons of spirit on line G (*represented by the figure 15, see Key, page 2*), we find 64 gallons, the exact water required.

[*** Now, to find the extent of the contraction, we repeat the setting in section No. 2, when there appears a diminished result, viz. 61·7 gallons.*]

	Gallons	Section No. 2	
G	150 Spirit	15 u.p.	G
H	61·7	35	H

This implies that after we have put in 64 gallons of water, the proper quantity, the total bulk now becomes as though we had only put in 61·7 gallons. The final result, therefore, is now 211·7 gallons at 15 underproof. [*Page 19 tells us that 7 tenths of a gallon = 5½ pints, so that our exact quantity is 211 gallons 5½ pints.*]

EXAMPLE 5.

I HAVE 12·8 *gallons of spirit at 5 underproof which I want to break down to 20 underproof. How much water shall I require, and what will be the final result?*

Answer:

Exact water required, **2·5** gallons. Final result, **15·2** gallons at 20 u.p.

SETTING ON RULE.

	Section No. 1	Gallons	
G	20 u.p.	12·8 Spirit	G
H	15	2·5 Water	H

EXPLANATION. — The given strengths are 5 u.p. and 20 u.p. Taking the difference of these figures (*in accordance with the directions given on page 21*) we get 15, and this difference 15 we set to 20 u.p., the required strength, in section No. 1. Then looking under 12·8 gallons of spirit on line G, we find 2·5 gallons, the water required. [*Page 19 tells us that 5 tenths of a gallon = 4 pints, so that the exact quantity of water required is 2 gallons and 4 pints.*]

[***Now, to find the extent of the contraction, we repeat the setting in section No. 2, when there appears a diminished result, viz. 2·4 gallons.*]

	Gallons	Section No. 2	
G	12·8 Spirit	20 u.p.	G
H	2·4	15	H

This implies that after we have put in 2·5 gallons of water, the proper quantity, the total bulk now becomes as though we had only put in 2·4 gallons. The final result, therefore, is now 15·2 gallons at 20 underproof. [*Page 19 tells us that 2 tenths of a gallon = 1½ pints, so that our exact quantity is 15 gallons 1½ pints.*]

HOW TO REMEDY A MISTAKE MADE BY OVER-REDUCING.

A RRANGE *the terms of the given proportion, as under, using the lines* A *and* B *on the Rule.   Set the 1st term to the 2nd ; then over the 3rd term will be found the Answer.*

The strength of the spirit proposed to be added [PLUS] The required strength	:	The required strength [MINUS] The present strength	.. ..	The present quantity of spirit	:	The quantity of the stronger spirit required

EXAMPLE 1.

I have 48 gallons of Whisky at 30 u.p. which I want to bring up to 20 u.p., with spirit at 20 o.p.   How much of that stronger spirit shall I require?

Answer, 12 gallons.

TERMS STATED :—

20 o.p.	30 u.p.	
20 u.p.	20 u.p.	
——	——	Gallons
40	: 10 ::	48

If we set 40 to 10, then over 48 gallons we shall find 12 gallons, the Answer.

SETTING ON RULE.

A 10	· 12 A
B 40	48 B

So that if we add 12 gallons of Spirit at 20 overproof, the mixture will be exactly 20 underproof.

EXAMPLE 2.

I have 4¼ gallons of Whisky at 31 u.p. which I want to bring up to 17 u.p., with spirit at 22 o.p.   How much of that stronger spirit shall I require?

Answer, 1½ gallons.

TERMS STATED :—

22 o.p.	31 u.p.	
17 u.p.	17 u.p.	
——	——	Gallons
39	: 14 ::	4¼

If we set 39 to 14, then over 4¼ gallons we shall find 1·5 or 1½ gallons, the Answer.

SETTING ON RULE.

A 14	1·5 A
B 39	4¼ B

So that if we add 1½ gallons of Spirit at 22 overproof, the mixture will be exactly 17 underproof.

HOW TO PROPORTION THE SPIRIT AND WATER REQUIRED TO MAKE-UP ANY SPECIFIED REDUCED QUANTITY.

METHOD.—*Set the required strength † on B to the present strength on A ; then under the total quantity required to be made up will appear the proportion of spirit to be used. The remainder is water.*

EXAMPLE 1.

HOW much Spirit at 20 o.p. is required to make up 4 gallons at 16 u.p. ?

Answer, 2·8 gallons.

[*or, 2 galls, 6½ pints : see page 19.*]

SETTING ON RULE.

A 120	Present strength	Required quantity	4 A
B 84	Required strength	Spirit	2·8 B

EXPLANATION.—From the footnote we find that 16 u.p. is expressed by 84, and 20 o.p. by 120. We therefore set 84, the required strength, to 120, the present strength.

[*** Note that 12 on rule reads 120 : see Key, page 2.*]

Then under 4 gallons, the total quantity required to be made up, we find 2·8 gallons, the proportion of spirit to be used. If we put this quantity of 20 o.p. spirit into a 4 gallon measure, and fill up with water, we shall have 4 gallons at 16 under proof.

EXAMPLE 2.

HOW much Spirit at proof is required to make up 2 gallons at 20 u.p. ?

Answer, 1·6 gallons.

[*or, 1 gall. 4¾ pints : see page 19*].

SETTING ON RULE.

A 100	Present strength	Required quantity	2 A
B 80	Required strength	Spirit	1·6 B

EXPLANATION.—From the footnote we find that 20 u.p. is expressed by 80, and " proof " by 100. We therefore set 80, the required strength, to 100, the present strength.

[*** Note that 10 on rule reads 1, 10, or 100 : see Key, page 2.*]

Then under 2 gallons, the total quantity required to be made up, we find 1·6 gallons, the proportion of spirit to be used. If we put this quantity of proof spirit into a 2 gallon measure, and fill up with water, we shall have 2 gallons at 20 under proof.

† *Express all strengths in the percentage form. Thus " proof " being* 100, *"overproof " is* 100 *plus the o.p. ; " underproof " is* 100 *minus the u.p. For example,* 10 *o.p. would be expressed* 110 ; 10 *u.p. as* 90 ; *and so on.*

OBSCURATION :

HOW TO AVOID LOSS CAUSED BY IT.

METHOD.—*Reduce your Rums and Brandies to an extent below the hydrometer strength equal to the percentage of obscuration.*

EXAMPLE.

SAY you want to reduce a Brandy to 20 u.p., and you find from the permit that it contains 3 per cent. of obscuration. *You must reduce it so that the hydrometer registers 23 u.p.* The true strength will then be 20 u.p.—the obscuration causing the instrument to show 3 % less than the true strength.

WHAT IS MEANT BY "OBSCURATION."

Obscuration means the amount of strength hidden or obscured in a spirit by reason of the presence of sweetening or other matter which interferes with the correct action of the hydrometer. It is really the difference between the ordinary and the distillate strength ascertained at the time of importation. It only occurs, however, in Rums and Brandies, and is not affected by reducing. When the obscuration noted on the permit is added to the hydrometer strength we get the actual strength. Thus:—

Hyd. Str.	Obs.	Act. Str.
35·2 o.p.	+ 2·6 =	37·8 o.p.
2·5 o.p.	+ 1·4 =	3·9 o.p.
0·0 o.p.	+ 1·4 =	1·4 o.p.
0·6 u.p.	+ 1·4 =	0·8 o.p.
18·8 u.p.	+ 1·8 =	17·0 u.p.

SUPPLEMENTARY NOTES.

HOW TO TRY THE STRENGTH.

DRAW a sample of the spirit in the test tube at least three-quarters full, and stir well with the thermometer. Note the temperature, and open the table-book to that temperature. Then take the hydrometer, and apply one of the weights to the lower stem—selecting that particular weight which will cause the instrument to float with some portion of its upper stem intersecting the surface of the liquor. The weight so applied *plus* the division marked on the upper stem of the instrument is called the *" Indication."* Look in the table book for this Indication, and opposite you will find the hydrometer strength — over-proof or under-proof as the case may be

EXAMPLE.

A sample of spirit shows 59° temperature, 69·2 Indication. What is the hydrometer strength ?

Answer 17·1 u.p.

PRACTICAL HINTS.

BE careful to wipe your hydrometer with a soft dry cloth, a silk handkerchief for preference, immediately after use. Also when taking it out of the box rest it on a soft piece of flannel—never on the hard counter. If there's the slightest dint in the instrument, don't use it until repaired. If you have *two* hydrometers in use, don't mix the weights as they are not interchangeable. When testing, keep the hydrometer, thermometer and the sample a little while together to equalise their temperatures.

CAUTIONARY NOTES ON THE HYDROMETER.

DON'T imagine that because a hydrometer is seldom used it must of necessity be correct. This by no means follows. The hydrometer is a very delicate instrument, and constantly liable to get out of order. Even the Revenue hydrometers are subject to the same disadvantage, but are kept perfect by being standardised every week. The worst of it is that when a hydrometer is wrong it is almost invariably wrong to the prejudice of the trader, for it makes the spirit appear to be weaker than it really is. For this reason, it is obviously desirable, from an economic point of view, especially where the trade is large, to bear the comparatively small expense of getting it standardised at regular intervals. However, for reducing purposes—*provided the spirit has not been tampered with, and that the directions given on pages 20 to 23 be faithfully followed*—the use of the hydrometer is unnecessary, except, perhaps, as a check, to verify the results. But if used for that purpose, be careful to test the strength of the spirit *before* as well as *after* adding the water, independently of the strength shown on the permit.

NEVER, therefore, unreasonably blame the Wholesale Dealer, much less the Revenue, when you can't find the precise strength recorded on your permit. *Are you sure your hydrometer is right?* Probably 70°/₀ of the hydrometers in commercial use are one or two subdivisions *light*. They want adjusting.

PROOFING.

CALCULATION OF PROOF-QUANTITIES.

METHOD.—*Set the strength (overproof or underproof) to 100 on line* A *; then under the liquid gallons will appear the quantity to add or deduct, as the case may be.*

EXAMPLE 1.	EXAMPLE 2.

IN 38 gallons @ 5 overproof how many proof-gallons?

Answer 39·9

SETTING ON RULE.

A	38 Gallons	100	A
B	1·9 TO ADD	5	B

EXPLANATION.

The spirit being *over*-proof, the Rule shows 1·9 *to add*. Then 38·0 +1·9 = 39·9, the proof-gallons.

IN 38 gallons @ 5 underproof how many proof-gallons?

Answer 36·1

SETTING ON RULE.

A	38 Gallons	100	A
B	1·9 TO DEDUCT	5	B

EXPLANATION.

The spirit being *under*-proof, the Rule shows 1·9 *to deduct*. Then 38·0 − 1·9 = 36·1, the proof gallons.

No.	EXERCISES.		
	Liquid Gallons.	Strength.	Proof-Gallons.
3	20·0	15 u.p.	= 17·0
4	25·2	8 o.p.	= 27·2
5	28·6	4·5 o.p.	= 29·8
	28·6	4·5 u.p.	= 27·3

NOTE.—Fractions of a proof-gallon beyond the tenth are disregarded. If, for instance, we had 1·28 to *add*, we would call it **1·2**; but if we had 1·28 to *deduct*, we would call it **1·3**. Example 5 furnishes a case in point.

VALUING.

COMPARATIVE PRICING OF SPIRITS.

Set any Price on I *to any Strength on* J ; *then over any other strength will appear the corresponding value.*

EXAMPLE 1.

A *Spirit is worth* 16/- *a gallon at* 20 *overproof; how much is it worth at* 10 *underproof?*

Answer 12/-

SETTING ON RULE:-

I	12/–	16/–	I
J	10 u.p.	20 o.p.	J

EXPLANATION.—We set 16/- to 20 o.p.; then over 10 u.p. we find 12/-, the comparative value.

EXAMPLE 2.

A *Spirit at* 20 o.p. *costs* 5/- *a gallon in Bond. How much is it worth, Duty Paid, when reduced to* 16 u.p., *the Duty being, say,* 11/4 *per proof gallon?*

Answer 13/-.

SOLUTION.—5/- @ 20 o.p. is found by the Rule to be equivalent to 4s. 2d. at proof
Add Duty 11s. 4d.

Value 15s. 6d. at proof

Then 15/6 at proof = 13/- at 16 u.p.

REFERENCE TABLE.

GALLON.	PINT.	NOGGIN. QUARTERN. GILL.	½-NOGGIN. ½-QUARTERN. ½-GILL,	DOZEN CASE. (6 to the gallon)	BOTTLE.
s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
8 0	1 0	0 3	0 1½	16 0	1 4
9 4	1 2	0 3½	0 1¾	18 8	1 6⅔
10 8	1 4	0 4	0 2	21 4	1 9⅓
12 0	1 6	0 4½	0 2¼	24 0	2 0
13 4	1 8	0 5	0 2½	26 8	2 2⅔
14 8	1 10	0 5½	0 2⅔	29 4	2 5⅓
16 0	2 0	0 6	0 3	32 0	2 8
17 4	2 2	0 6½	0 3¼	34 8	2 10⅔
18 8	2 4	0 7	0 3½	37 4	3 1⅓
20 0	2 6	0 7½	0 3¾	40 0	3 4
21 4	2 8	0 8	0 4	42 8	3 6⅔
22 8	2 10	0 8½	0 4¼	45 4	3 9⅓
24 0	3 0	0 9	0 4½	48 0	4 0
25 4	3 2	0 9½	0 4¾	50 8	4 2⅔
26 8	3 4	0 10	0 5	53 4	4 5⅓
28 0	3 6	0 10½	0 5¼	56 0	4 8
29 4	3 8	0 11	0 5½	58 8	4 10⅔
30 8	3 10	0 11½	0 5¾	61 4	5 1⅓
32 0	4 0	1 0	0 6	64 0	5 4

TO FIND THE COST OF SPIRITS
WHEN TAKEN OUT OF BOND.

		£	s.	d.
Price..28 gallons @ 4/6		6	6	0
Duty..28·5 Proof-Gallons @ 11/-		15	13	6
Storage and Rent.............		..	2	4
Cartage		..	1	6
Total £		22	3	4

⁂ If this total be divided by the number of proof-gallons duty paid the result is the cost per proof-gallon.

THUS :—

$$\frac{£22 \; 3s. \; 4d.}{28\cdot5} = 15s. \; 6\tfrac{1}{2}d.$$

[For comparative value after reduction with water, see page 29.]

NOTE.

WHEN spirits are bought in bond on the *original* gauge, a loss by absorption and evaporation must be taken into account. This loss, however, is generally a little less than the Revenue Allowances —*a copy of which is given below*:

ALLOWANCE FOR LOSS IN WAREHOUSE.

For periods not exceeding	In Casks under 80 Gallons content.	
	ORDINARY.	† SPECIAL.
1 month	1 per cent.	1 per cent.
2 ,,	2 ,,	2 ,,
6 ,,	4 ,,	3 ,,
1 Year	5 ,,	4 ,,
2 ,,	7 ,,	5 ,,
3 ,,	9 ,,	6 ,,
4 ,,	11 ,,	7 ,,
5 ,,	13 ,,	8 ,,

⁂ The allowance is calculated on the original proof-quantity warehoused. Thus a cask originally containing 24 proof-gallons, would, if bonded for 10 months, be entitled to one year's allowance, viz. : 5% = 1·2 proof-gallons, *if necessary.*

† *The "special" allowance is to cover extra losses caused by defective casks.*

[P.S.— *The allowance on* WINE *is one gallon per cask per year.*]

PRICING WINE

PER GALLON IN BOND, OR PER DOZEN DUTY-PAID.

METHOD.—*Set the gauge or yield to 10 on line* A, *then over the total cost in shillings will appear the price in shillings and pence.*

EXAMPLE 1.

A PIPE of Port, 115 gallons *ne.* 42°, costs £35 in Bond. How much is that per gallon ?

Answer 6s. 1d

SETTING ON RULE.

6s. 1d.	10 A
B 700 Shillings	Gallons 115 B

EXPLANATION —Setting 115 gallons to 10 on line A, we find that 700 shillings=6s. 1d. the price per gallon in bond.

[NOTE,—*115 gallons is represented on line* B *of the Rule as 11·5, and 700 shillings as 70: See* KEY, *pages 2 and 3, for method of reading the figures on the Rule.*]

EXAMPLE 2.

A PIPE of Port, yielding 56 dozens, costs £52 5s. (or 1045 shillings) duty-paid. How much is that per dozen ?

Answer 18s. 8d.

SETTING ON RULE.

A 18s. 8d.	10 A
B 1045 Shillings	Dozens 56 B

EXPLANATION.— Setting 56 dozens to 10 on line A, we find that 1045 shillings=18s. 8d. the price per dozen duty-paid.

[NOTE.—*56 dozens is represented on line* B *of the Rule as 56, and 1045 shillings as 10·45: See* KEY, *pages 2 and 3, for method of reading the figures on the Rule.*]

REFERENCE TABLE.

WINE.				❊ Standard Gauge.	❊ Average Yield.	DUTY.					
						Ne. 30° @ 1/3			*Ne.* 42° @ 3/-		
				GALLONS.	DOZENS.	£	s.	d.	£	s.	d.
Port	PIPE			115	56	7	3	9	17	5	0
Tarragona	,,			115	56	7	3	9	17	5	0
Lisbon..	,,			117	57	7	6	3	17	11	0
Bucellas	,,			117	57	7	6	3	17	11	0
Calcavellos	,,			117	57	7	6	3	17	11	0
Sherry	BUTT			108	52	6	15	0	16	4	0
Tent	,,			108	52	6	15	0	16	4	0
Teneriffe	PIPE			100	48	6	5	0	15	0	0
Marsala..	,,			93	45	5	16	3	13	19	0
Madeira	,,			92	44	5	15	0	13	16	0
Cape	,,			92	44	5	15	0	13	16	0
Claret	HHD			47	23	2	18	9	—		
Burgundy	,,			47	23	2	18	9	—		
Rhenish	AUM			30	14½	1	17	6	—		
Hock	,,			30	14½	1	17	6	—		
Moselle..	,,			30	14½	1	17	6	—		

NOTE—These are the standards and averages commonly recognised by the Trade, but do not necessarily indicate the actual output. The Rule, however, calcu-lates independently from any gauge or yield.

P.S.—The cost of Bottling runs about 3/6 per dozen case. This includes labour, bottles, corks, capsules, paper, packing case, etc.

PROFIT AND DISCOUNT CALCULATIONS.

PROFIT.

Set the cost-price on 1 *to " Par " on line* K; *then under the selling-price will appear the profit on the cost.*

EXAMPLE.

I buy a spirit at 9s. 4d. a gallon. What do I gain on the cost by selling it for 18s. 8d. a gallon ?

Answer 100 %.

SETTING ON RULE.

1 9/4	18/8 1
K Par	100 % Profit K

KEY.

We set the cost price 9s. 4d. to Par on line K, then under 18/8, the selling price, we find 100 %, the profit on the cost.

DISCOUNT.

Set the gross buying price to " Par " on line K; *then over the rate of discount will appear the nett buying price.*

EXAMPLE.

I buy goods at 5s. with 5 % off for ready cash. What is the net price ?

Answer 4s. 9d.

SETTING ON RULE

1 4/9	5/- 1
K 5 % Discount	Par K

KEY.

We set 5s. to " Par " on line K, then over 5 % discount we find 4s. 9d. the net price.

PROFIT CALCULATIONS.

METHOD.—*Set the cost price on line I to "PAR" on line K, then under
the selling price will appear the percentage profit.*

EXAMPLE.

COST 4/– a gallon, and sold for 5/–.
What is the profit?

ANSWER.

25 % on the cost, or
20 % on the return.

SETTING ON RULE:

I	4/–	5/–		I
K	Par	25 % profit on the cost		K
		20 % profit on the return		KK

NOTES.

ALL profit should be calculated upon the *returns*, that is, upon the *selling price*; if not, you include your principal in the profit, which is neither more nor less than interest of capital calculated at per annum. And unless profit be calculated upon the *returns*, you depreciate your principal, or, in other words, *realise less profit than you anticipated.*

For example :—If an article costs 4/– and is sold for 5/–, it is called 25 *per cent. profit;* but if you deduct 25 per cent. from 5/– you will find you have only 3/9 of your principal left. The real profit realised, therefore, is 20 *per cent.*, being *one-fifth of the whole amount;* and if this percentage be deducted, your principal remains the same, viz., **4/.**

NOTES—*continued.*

*** The object of line KK is to assist the Buyer, not only by giving him the amount of profit to mark upon his goods, but also to find how much to give for an article to be sold, *to realise a certain amount of profit.*

Most persons calculate profit erroneously, even many whose daily employment is buying and selling. This difference has given rise to much disappointment. Thus, those who calculate that they get 100 per cent. profit by the sale of an article for 20/– which cost 10/–, ought to be quite correct, only to enter 10/– in their receipt book, otherwise they *depreciate their principal;* the profit realised being only *50 per cent. on the returns,* which is the only correct and therefore safe standard upon which to reckon profits. By the custom of calculating profit on the *cost price,* capital is *depreciated* in the ratio of the difference between the profit on the *cost* and on the *selling price.*

*** To find how much to give for an article to procure a certain amount of profit, discount your *selling* price by the profit intended to be realised. Thus, for example, if you want to procure 10% profit on an article to be *sold* at 30/–, discount the 30/– by 10 %, which leaves 27/–, and this amount, 27/–, is to be given for an article to be sold at 30/– in order to realise 10 % *profit.*

AVERAGING EXPENDITURE.

SPECIMEN ACCOUNT.

	PER DAY.		
	£	s.	d.
Rent and Taxes @ £100 per annum	..	5	$5\frac{1}{2}$
Licence @ £25 per annum	..	1	$4\frac{1}{2}$
Help	..	7	2
Gas	..	..	$10\frac{1}{2}$
Glassware and Breakages	..	..	3
Ice	..	..	$1\frac{1}{2}$
Sundries (*Sugar, Lemons, &c.*)	..	..	2
Newspapers, Pipes, Treats, &c.	..	2	0
Charity (*Ball and Club Tickets, &c.*)	..	..	8
†Fixtures	..	..	5
Repairs	..	1	1

INTEREST ON MONEY INVESTED : —

Stock .. £200			
Fixtures 80			
5 % on £280	..	..	9
TOTAL £	1	0	4

NOTE.

[† *To provide for depreciation of value of the fixtures and fittings, spread the entire cost over the whole term of the lease. Thus, a cost of £80 on a 10 years' lease works out 5d. per day.*]

DUTY TABLE.

DESCRIPTION.[1]			Insert here any change in the Duty that may subsequently occur.			
P. B. Spirits	11/-		......	......	....	....
B. Compounds	11/-	†	......	......	....	....
Brandy	11/4 ..	12/4	......	......	....	....
Rum	11/4 ..	12/4	......	......	....	....
Imitation Rum	11/5 ..	12/5	......	......	....	....
Geneva	11/5 ..	12/5	......	......	....	....
Liqueurs, *Tested*..............	11/7 ..	12/7	......	......	....	....
Liqueurs, *Not Tested*	— ..	16/4	......	......	....	....
U. U. Spirits	11/5 ..	11/5	......	......	....	....
Perfumed Spirits	18/1 ..	19/1	......	......	....	....
Wine (*Still*), ne 30°	1/3 ..	2/3	......	......	....	....
Wine (*Still*), ne 42°	3/- ..	4/-	......	......	....	....
Wine (*Sparkling*), ne 30°	— ..	3/9	......	......	....	....
Beer (*Mum, Spruce. &c.* .... exceeding 1215°..	37/6 ‡		......	......	....	....
Beer (do.) ne 1215°..	32/-		......	......	....	....
Beer (*other sorts*) ..ne 1055°..	8/-		......	......	....	....
do. (*British*) ..ne 1055°..	7/9		......	......	....	....

NOTE.

Duty is chargeable on the *Proof* Gallon for Spirits, and on the *Liquid* Gallon for Wines; the only exceptions being "Liqueurs not tested." and "Perfumed Spirits," both of which are charged on the liquid gallon.

* Imported in Cask.   † Imported in Bottle.   ‡ Per Barrel of 36 gallons.

IT will be useful to note that a fall of 2 degrees in the strength compensates a rise of 6d in the spirit duty. For example : A 17 u.p. Whisky selling at 21/- a gallon while the duty is 11/-, should, to sell at the same price, be reduced to 19 u.p. if the Duty be raised to 11/6.

DUTY ON SPIRITS IN CASK.

WHISKY
11'- per Proof Gallon.

Proof Galls.	£	s.	d.	Proof Galls.	£	s.	d.
1=	0	11	0	34=	18	14	0
2=	1	2	0	35=	19	5	0
3=	1	13	0	36=	19	16	0
4=	2	4	0	37=	20	7	0
5=	2	15	0	38=	20	18	0
6=	3	6	0	39=	21	9	0
7=	3	17	0	40=	22	0	0
8=	4	8	0	41=	22	11	0
9=	4	19	0	42=	23	2	0
10=	5	10	0	43=	23	13	0
11=	6	1	0	44=	24	4	0
12=	6	12	0	45=	24	15	0
13=	7	3	0	46=	25	6	0
14=	7	14	0	47=	25	17	0
15=	8	5	0	48=	26	8	0
16=	8	16	0	49=	26	19	0
17=	9	7	0	50=	27	10	0
18=	9	18	0	60=	33	0	0
19=	10	9	0	70=	38	10	0
20=	11	0	0	80=	44	0	0
21=	11	11	0	90=	49	10	0
22=	12	2	0	100=	55	0	0
23=	12	13	0	10ths			
24=	13	4	0	1=	0	1	1
25=	13	15	0	2=	0	2	2
26=	14	6	0	3=	0	3	3
27=	14	17	0	4=	0	4	4
28=	15	8	0	5=	0	5	6
29=	15	19	0	6=	0	6	7
30=	16	10	0	7=	0	7	8
31=	17	1	0	8=	0	8	9
32=	17	12	0	9=	0	9	10
33=	18	3	0				

BRANDY & RUM
11/4 per Proof Gallon.

Proof Galls.	£	s.	d.	Proof Galls.	£	s.	d.
1=	0	11	4	34=	19	5	4
2=	1	2	8	35=	19	16	8
3=	1	14	0	36=	20	8	0
4=	2	5	4	37=	20	19	4
5=	2	16	8	38=	21	10	8
6=	3	8	0	39=	22	2	0
7=	3	19	4	40=	22	13	4
8=	4	10	8	41=	23	4	8
9=	5	2	0	42=	23	16	0
10=	5	13	4	43=	24	7	4
11=	6	4	8	44=	24	18	8
12=	6	16	0	45=	25	10	0
13=	7	7	4	46=	26	1	4
14=	7	18	8	47=	26	12	8
15=	8	10	0	48=	27	4	0
16=	9	1	4	49=	27	15	4
17=	9	12	8	50=	28	6	8
13=	10	4	0	60=	34	0	0
19=	10	15	4	70=	39	13	4
20=	11	6	8	80=	45	6	8
21=	11	18	0	90=	51	0	0
22=	12	9	4	100=	56	13	4
23=	13	0	8	10ths			
24=	13	12	0	1=	0	1	1
25=	14	3	4	2=	0	2	3
26=	14	14	8	3=	0	3	4
27=	15	6	0	4=	0	4	6
28=	15	17	4	5=	0	5	8
29=	16	8	8	6=	0	6	9
30=	17	0	0	7=	0	7	11
31=	17	11	4	8=	0	9	0
32=	18	2	8	9=	0	10	2
33=	18	14	0				

HOLLANDS GENEVA
11/5 per Proof Gallon.

Proof Galls.	£	s.	d.	Proof Galls.	£	s.	d.
1=	0	11	5	34=	19	8	2
2=	1	2	10	35=	19	19	7
3=	1	14	3	36=	20	11	0
4=	2	5	8	37=	21	2	5
5=	2	17	1	38=	21	13	10
6=	3	8	6	39=	22	5	3
7=	3	19	11	40=	22	16	8
8=	4	11	4	41=	23	8	1
9=	5	2	9	42=	23	19	6
10=	5	14	2	43=	24	10	11
11=	6	5	7	44=	25	2	4
12=	6	17	0	45=	25	13	9
13=	7	8	5	46=	26	5	2
14=	7	19	10	47=	26	16	7
15=	8	11	3	48=	27	8	0
16=	9	2	8	49=	27	19	5
17=	9	14	1	50=	28	10	10
18=	10	5	6	60=	34	5	0
19=	10	16	11	70=	39	19	2
20=	11	8	4	80=	45	13	4
21=	11	19	9	90=	51	7	6
22=	12	11	2	100=	57	1	8
23=	13	2	7				
24=	13	14	0	10ths			
25=	14	5	5	1=	0	1	1
26=	14	16	10	2=	0	2	3
27=	15	8	3	3=	0	3	5
28=	15	19	8	4=	0	4	6
29=	16	11	1	5=	0	5	8
30=	17	2	6	6=	0	6	10
31=	17	13	11	7=	0	7	11
32=	18	5	4	8=	0	9	1
33=	18	16	9	9=	0	10	3

EXAMPLE.

What is the Duty on 38·4 proof-gallons of Whisky @ 11/- ?

Answer, £21 2s. 4d.

Thus—Duty on 38·0 = £20 18 0
,, 0·4 = 4 4
,, 38·4 = £21 2 4

ON-LICENCES.

DESCRIPTION.	LICENCE DUTY.		
	ENGLAND.	IRELAND.	SCOTLAND.
	£ s. d.	£ s. d.	£ s. d.
Spirits, Beer and Wine..PUBLICANS.	Octr. 11th.	Octr. 11th.	May 16th.
£			
Rateable value under 10	4 10 0	4 10 0	4 10 0
„ „ 15	6 0 0	6 0 0	6 0 0
„ „ 20	8 0 0	8 0 0	8 0 0
„ „ 25	11 0 0	11 0 0	11 0 0
„ „ 30	14 0 0	14 0 0	14 0 0
„ „ 40	17 0 0	17 0 0	17 0 0
„ „ 50	20 0 0	20 0 0	20 0 0
„ „ 100	25 0 0	25 0 0	25 0 0
„ „ 200	30 0 0	30 0 0	30 0 0
„ „ 300	35 0 0	35 0 0	35 0 0
„ „ 400	40 0 0	40 0 0	40 0 0
„ „ 500	45 0 0	45 0 0	45 0 0
„ „ 600	50 0 0	50 0 0	50 0 0
„ „ 700	55 0 0	55 0 0	55 0 0
£700 and over	60 0 0	60 0 0	60 0 0
Beer and Wine ....RETAILERS.	Octr. 11th.	Octr. 11th.	May 16th.
on	4 0 0	4 0 0	4 0 0
Beer ....RETAILERS.	Octr. 11th.	Octr. 11th.	May 16th.
on	3 10 0	3 10 0	3 10 0
Wine ....RETAILERS.	April 1st.	April 1st.	May 16th.
on	3 10 0	3 10 0	3 10 0
Sweets ....RETAILERS.	July 6th.	July 6th.	July 6th.
on	1 5 0	1 5 0	1 5 0

NOTE.—For Sunday Closing, or for Early Closing, the Licence Duty is ¼th less. For both Sunday and Early Closing, it is ⅜ths less.

OFF-LICENCES.

DESCRIPTION.	LICENCE DUTY.			REMARKS.
	England.	Ireland.	Scotland.	
BEER & WINE RETAILERS	£ s. d. Oct, 11th 3 0 0	£ s. d. Oct. 11th 3 0 0	£ s. d.	Sale restricted to less than 4½ gallons of beer, and less than 2 gallons of wine, to same person at one time.
BEER { WHOLESALE DEALERS	July 6th 3 6 1	Oct. 11th 3 6 1	July 6th 3 6 1	Not less than 4½ gallons, or 2 dozen reputed quarts.
BEER { RETAIL DEALERS	July 6th 1 5 0	Oct. 1st 1 5 0	....	Quantities less than above
BEER { RETAILERS	Oct. 11th 1 5 0	....	May 16th 2 10 0 4 4 0	Under £10 valuation. £10 and upwards (Grocers, Scotland.)
TABLE BEER··RETAILERS	July 6th 0 5 0	July 6th 0 5 0	July 6th 0 5 0	Price not to exceed 1¼d. per quart.
WINE { WHOLESALE DEALERS	July 6th 10 10 0	July 6th 10 10 0	July 6th 10 10 0	Any person may sell Foreign wine *in Bond* in entire casks or packages, in quantities not less than 100 gals.
WINE { RETAILERS	April 1st 2 10 0	April 1st 2 10 0	....	To be sold in reputed pints or quart bottles only, and in less quantities than 2 gallons, or 1 doz. reputed pints at one time.
WINE { GROCERS	....	....	May 16th 2 4 1	May sell wine and sweets in any quantity.
GROCERS { SPIRITS & BEER	....	....	May 16th 4 4 0 5 5 0 9 9 0 10 10 0 11 11 0 12 12 0 13 13 0	Rateable Value — May sell spirits and beer in any quantity to be consumed off, but cannot sell spirit to a rectifier, dealer or retailer without a dealer's licence. Under £10 ,, £20 ,, £25 ,, £30 ,, £40 ,, £50 £50 & over
GROCERS { SPIRIT GROCERS	....	Oct. 11th 9 18 5 11 0 6 12 2 6 13 4 7 14 6 7	....	Under £25 ,, £30 ,, £40 ,, £50 £50 & over — Spirit grocer cannot have *Beer* retail off licence without a beer dealer's licence.
SPIRITS { SPIRIT DEALERS	July 6th 10 10 0	July 6th 10 10 0	July 6th 10 10 0	Wholesale (2 *gallons and upwards.*)
SPIRITS { SPIRIT DEALERS	July 6th 2 2 0	July 6th 2 2 0	July 6th 2 2 0	Retailing Foreign liqueurs in bottle, under 2 gallons, and not less than 1 reputed quart.
SPIRITS { SPIRIT DEALERS	July 6th 3 3 0	....	....	Retailing British or Foreign Spirits, and Foreign Liqueurs in bottle, under 2 gallons and not less than 1 reputed quart, & Foreign Liqueurs in the bottles in which imported.

NOTES ON LICENCES.

PERMITS.—Spirits sent out, when the quantity exceeds one gallon of same denomination, must be accompanied by a Certificate.

❊   ❊   ❊

BEER DEALERS are not allowed to sell less than 4½ gallons or 2 dozen reputed quarts at one time to the same person without a retail licence.

❊   ❊   ❊

BREWERS for sale may sell at their brewing premises beer of their own making in quantities not less than 4½ gallons or 2 dozen reputed quarts without a dealer's licence.

❊   ❊   ❊

BREWERS' AGENTS who do not keep stock are not required to take out a licence.

❊   ❊   ❊

THE beer retailers' licence includes the sale of cider and perry.

❊   ❊   ❊

IN England and Ireland holders of a Beer Dealers' retail off-licence may obtain a Wine Retail off-licence under the Refreshment House Acts, and, in England, if licensed as a Spirit Dealer, a Spirit Bottle License for the same premises.

❊   ❊   ❊

THE Refreshment House Licence (*England 10 p.m. to 5 a.m., Ireland 10 p.m. to 7 a.m.*), for premises under £30 valuation is 10s. 6d.; £30 and upwards, £1 1s. The year commences April 1st.

WHEN a person holding any of the licences named in column A takes out for the same premises the licence opposite in column B, he is to be repaid a fourth part of the first named licence for each unexpired quarter of it, the quarter in which the new licence is taken out reckoning as one.

A ORIGINAL LICENCE.	B NEW LICENCE.
Beer Retailer, on or off	Spirit Retailer (Pub)
Beer Retailer, off (1 Wm IV.)	Beer Retailer, on
Beer Retailer, on	Beer & Wine Retailer on.
Beer Retailer, off	Beer & Wine Retailer off.
Beer Retailer (Pub) ..	Beer & Wine Retailer on
Beer Retailer (Pub) ..	Spirit Retailer (Pub)
Beer Dealers' Additional Retail	Spirit Retailer (Pub)
Beer Dealers' Additional Retail	Beer Retail, on or off.
Beer Retail (Grocer) Scotland	Spirit Retailer (Grocer)
Beer & Wine Retailer	Spirit Retailer (Pub)
Beer Dealer	Spirit Retailer (Pub)
Cider Retailer	Spirit Retailer (Pub)
Spirit Dealers' Additional Bottles, (£3 3 0)	Spirit Retailer (Pub)
Spirit Dealers: Additional Fg. Liqueurs (£2 2 0)	Spirit Retailer (Pub)
Spirit Grocer (Ireland)	Spirit Retailer (Pub)
Spirit Grocer (Scotland)	Spirit Retailer (Pub)
Wine Dealer	Spirit Retailer (Pub)
Wine Retailer, on or off	Spirit Retailer (Pub)
Wine Retailer, off	Wine Dealer.
Wine Retailer, off	Beer & Wine Retailer. off.
Wine Retailer, on	Beer & Wine Retailer, on.
Wine Retailer, Grocer (Scotland)	Spirit Retailer (Pub)
Sweets Retailer, on or off	Wine Retailer, on or off
Sweets Retailer, on or off	Wine Dealer.
Sweets Retailer, on or off	Sweets Dealer.
Refreshment House ..	Wine Retailer, on.

FINING.

BEER.— Dissolve in hard ale sufficient isinglass to form a thick jelly. A pint of this to a barrel will clarify any beer.

❖   ❖   ❖   ❖

SHERRY.— Mix 1 ounce of isinglass with 1 pint of the wine, and heat gently over a fire. When cold, add the white of 3 eggs well beaten, and a dessert-spoonful of salt. Whisk up well with a little of the wine; then pour into the cask and rouse well. This quantity makes sufficient for a hogshead.

❖   ❖   ❖   ❖

PORT.— To the white of 8 eggs well beaten into a froth, add a dessert-spoonful of salt, and a little of the wine. Mix them together, and rouse well after putting into the cask. This quantity makes sufficient for a hogshead.

❖   ❖   ❖   ❖

~~**W**HISKY and **G**IN.— When they become cloudy or dull: For every 100 gallons, dissolve 2 ounces of roach alum in a quart of water by boiling. Pour into the cask hot, and add 1 ounce of salts of tartar. Stir well, and by the next day the spirit should be quite bright.~~

❖   ❖   ❖   ❖

RUM.— A small quantity of pine apple, honey, or prunes, will greatly improve the flavour of Rum. When using prunes, beat well with a hammer, so as to break the stones.

[*.* N.B.—*Keep the Rule in a dry and warm place, to render it easily workable. Should it become stiff, remove the slide, and rub a piece of fine emery paper along the grooves; then polish off with a little mutton suet.*]

SUPPLEMENT.

INDEX.

— ❦ —

GAUGING

FOR CAPACITY.

METHOD.—Take the three dimensions of the Cask, viz., the Length, Head, and Bung—being careful to make proper allowance for thickness of wood. If the cask is of "bad figure," deduct from the length sufficient to compensate for deficiency of curvature in the quarters.✻ Chalk the net dimensions on the front head. Then cast out the Content—using the Rule in connection with the Table of Factors on page 43 Thus : —

Set the sum of the two Factors to 10 *on Line* A; *then under the Length will appear the Content of the Cask.*

EXAMPLE (*a*).—Find the Content of a Brandy Hogshead from the following dimensions :—

Length	Head	Bung
34·0	22·4	26·1

Answer 59¾ galls.

SETTING ON RULE :—

A	34 Length	10	A
B	59¾ Content	1·76	B

KEY.—The head factor = ·4738
    The bung factor = 1·2864

The *sum* = 1·7602

Setting this 1·76 to 10 on line A, we find that 34 length = 59¾ content.

EXAMPLE (*b*).—Find the Content of a Port Pipe from the following dimensions :—

Length	Head	Bung
·49·6	22·6	31·9

Answer 119 galls.

SETTING ON RULE :—

A	49·6 Length	10	A
B	119 Content	2·4	B

KEY.—The head factor = ·4823
    The bung factor = 1·9216

The *sum* = 2·4039

Setting this 2·4 to 10 on line A, we find that 49·6 length = 119 Content.

GAUGING NOTES.

✻ *The following Scale of Allowances affords an excellent guide to the Gauger —the figures denoting average deductions from the Length in tenths of an inch.*

Port Pipes . . .	8 to 16	Madeira Pipes . .	16 to 25	Rum Hhds....	3 to 7
„ Hhds......	0 to 2	„ Hhds..	5 to 13	„ Brls....	2 to 4
Sherry Butts...	10 to 12	Claret Hhds....	0 to 2	Geneva Puns:.	4 to 10
„ Hhds....	6 to 8	Burgundy Hhds	0 to 2	„ Hhds..	0 to 4
Marsala Pipes..	10 to 15	Brandy Pieces..	4 to 8	„ Qr-Cks	0 to 2
„ Hhds ..	6 to 10	„ Hhds...	0 to 3	Whisky Puns.	6 to 15
Tarragona Pipes	8 to 15	„ Qr-Cks..	0 to 2	„ Hhds.	4 to 10
„ Hhds	0 to 2	Rum Puns.. ...	5 to 8	„ Brls ..	3 to 6

** Wine qr-casks, octaves, and ½ octaves are gauged by the Diagonal only.

Diameters.	0	1	2	3	4	5	6	7	8	9	Diameters.
10 Head ..	·0944	·0963	·0982	·1002	·1021	·1041	·1061	·1081	·1101	·1122	Head .. 10
10 Bung ..	·1889	·1926	·1965	·2003	·2043	·2082	·2122	·2162	·2203	·2243	Bung .. 10
11 Head ..	·1142	·1162	·1184	·1206	·1227	·1249	·1270	·1292	·1315	·1337	Head .. 11
11 Bung ..	·2285	·2327	·2369	·2411	·2454	·2497	·2541	·2585	·2629	·2674	Bung .. 11
12 Head ..	·1359	·1382	·1405	·1428	·1452	·1475	·1499	·1523	·1547	·1571	Head .. 12
12 Bung ..	·2719	·2765	·2811	·2857	·2903	·2951	·2998	·3046	·3094	·3143	Bung .. 12
13 Head ..	·1596	·1620	·1645	·1670	·1695	·1721	·1746	·1772	·1798	·1824	Head .. 13
13 Bung ..	·3191	·3241	·3290	·3341	·3391	·3441	·3493	·3544	·3596	·3649	Bung .. 13
14 Head ..	·1850	·1877	·1904	·1931	·1958	·1985	·2013	·2040	·2068	·2096	Head .. 14
14 Bung ..	·3701	·3754	·3808	·3861	·3916	·3970	·4025	·4081	·4136	·4192	Bung .. 14
15 Head ..	·2124	·2153	·2181	·2210	·2239	·2268	·2298	·2327	·2357	·2387	Head .. 15
15 Bung ..	·4249	·4306	·4363	·4421	·4479	·4537	·4595	·4655	·4714	·4774	Bung .. 15
16 Head ..	·2417	·2447	·2478	·2509	·2539	·2571	·2602	·2634	·2665	·2697	Head .. 16
16 Bung ..	·4854	·4895	·4956	.5017	·5074	·5141	·5203	·5266	·5830	·5893	Bung .. 16
17 Head ..	·2729	·2761	·2793	·2826	·2859	·2892	·2925	·2958	·2992	·3025	Head .. 17
17 Bung ..	·5457	·5522	·5587	·5652	·5717	·5788	·5849	·5916	·5983	·6051	Bung .. 17
18 Head ..	·3059	·3094	·3128	·3162	·3197	·3231	·3267	·3302	·3337	·3373	Head .. 18
18 Bung ..	·6119	·6186	6255	·6324	·6393	·6463	·6533	·6603	·6674	·6745	Bung .. 18
19 Head ..	·3409	·3444	·3481	·3517	·3554	·3590	·3627	·3664	·3702	·3739	Head .. 19
19 Bung ..	·6817	·6889	·6961	·7084	·7107	·7181	·7255	·7329	·7403	·7478	Bung .. 19
20 Head ..	·3777	·3815	·3853	·3891	·3929	·3968	·4007	·4046	·4085	·4124	Head .. 20
20 Bung ..	·7553	·7629	·7705	·7782	·7859	·7936	·8018	·8091	·8170	·8249	Bung .. 20
21 Head ..	·4164	·4204	·4244	·4284	·4324	·4365	·4405	·4446	·4487	·452?	Head .. 21
21 Bung ..	·8328	·8407	·8487	·8567	·8648	·8729	8811	·8892	·8974	·9057	Bung .. 21
22 Head ..	·4570	·4612	·4654	·4695	·4738	·4750	·4823	·4865	·4908	·4951	Head .. 22
22 Bung ..	·9140	·9223	·9306	·9361	·9475	·9560	·9645	·9731	·9817	·9903	Bung .. 22
23 Head ..	·4995	·5038	·5082	·5126	·5170	·5214	·5259	·5303	·5348	·5393	Head .. 23
23 Bung ..	·9989	1·0077	1·0164	1·0252	1·0340	1·0429	1·0517	1·0607	1·0697	1·0787	Bung .. 23
24 Head ..	·5439	·5484	·5529	·5575	·5621	·5667	·5714	·5760	·5807	·5854	Head .. 24
24 Bung ..	1·0877	1·0968	1·1059	1·1151	1·1243	1·1335	1·1428	1·1521	1·1614	1·1708	Bung .. 24
25 Head ..	·5901	·5948	·5996	·6044	·6092	·6139	·6188	·6236	·628?	·6384	Head .. 25
25 Bung ..	1·1802	1·1897	1·1992	1·2087	1·2188	1·2279	1·2375	1·2473	1·2570	1·2667	Bung .. 25
26 Head ..	·6388	·6422	·6481	·6581	·6581	·6631	·6681	·673?	·6782	·6832	Head .. 26
26 Bung ..	1·2765	1·2864	1·2963	1·3062	1·3161	1·3261	1·3361	1·3462	1·3568	1·3665	Bung .. 26
27 Head ..	·6888	·6934	·6985	·7037	·7089	·7140	·7192	·7245	·7297	·7349	Head .. 27
27 Bung ..	1·3766	1·3869	1·3971	1·4074	1·4177	1·4281	1·4385	1·4489	1·4594	1·4699	Bung .. 27
28 Head ..	·7402	·7455	·7509	·7562	·7615	·7669	·7723	·7777	·7831	·7886	Head .. 28
28 Bung ..	1·4805	1·4911	1·5017	1·5124	1·5231	1·5338	1·5446	1·5554	1·5663	1·5772	Bung .. 28
29 Head ..	·7940	·7995	·8050	·8106	·8161	·8217	·8273	·8329	·8385	·8441	Head .. 29
29 Bung ..	1·5881	1·5991	1·6101	1·6211	1·6322	1·6433	1·6545	1·6657	1·6769	1·6882	Bung .. 29
30 Head ..	·8498	·8554	·8611	·8668	·8726	·8783	·8841	·8899	·8957	·9015	Head .. 30
30 Bung ..	1·6995	1·7109	1·7223	1·7387	1·7451	1·7567	1·7682	1·7798	1·7914	1·8031	Bung .. 30
31 Head ..	·9074	·9132	·9191	·9250	·9309	·9369	·9428	·9488	·9548	·9608	Head .. 31
31 Bung ..	1·8147	1·8265	1·8382	1·8500	1·8619	1·8737	1·8857	1·8976	1·9096	1·9216	Bung .. 31
32 Head ..	·9668	·9729	·9790	·9851	·9912	·9973	1·0034	1·0096	1·0158	1·0220	Head .. 32
32 Bung ..	1·9337	1·9458	1·9580	1·9701	1·9823	1·9946	2·0069	2·0192	2·0316	2·0440	Bung .. 32
33 Head ..	1·0282	1·0345	1·0407	1·0470	1·0533	1·0596	1·0659	1·0723	1·0787	1·0851	Head .. 33
33 Bung ..	2·0565	2·0689	2·0815	2·0940	2·1066	2·1192	2·1319	2·1446	2·1574	2·1701	Bung .. 33
34 Head ..	1·0915	1·0979	1·1043	1·1108	1·1173	1·1238	1·1303	1·1369	1·1434	1·1500	Head .. 34
34 Bung ..	2·1829	2·1958	2·2087	2·2217	2·2346	2·2476	2·2607	2·2738	2·2869	2·3001	Bung .. 34
35 Head ..	1·1566	1·1632	1·1699	1·1765	1·1832	1·1899	1·1966	1·2034	1·2101	1·2169	Head .. 35
35 Bung ..	2·3133	2·3265	2·3397	2·3531	2·3664	2·3798	2·3933	2·4067	2·4202	2·4337	Bung .. 35
36 Head ..	1·2237	1·2305	1·2373	1·2441	1·2510	1·2579	1·2648	1·2717	1·2787	1·2856	Head .. 36
36 Bung ..	2·4473	2·4609	2·4746	2·4883	2·5020	2·5158	2·5296	2·5434	2·5573	2·5712	Bung .. 36
37 Head ..	1·2926	1·2996	1·3066	1·3136	1·3207	1·3278	1·3349	1·3419	1·3491	1·3562	Head .. 37
37 Bung ..	2·5852	2·5992	2·6132	2·6273	2·6414	2·6555	2·6697	2·6839	2·6982	2·7125	Bung .. 37
38 Head ..	1·3634	1·3706	1·3778	1·3850	1·3923	1·3995	1·4068	1·4141	1·4214	1·4287	Head .. 38
38 Bung ..	2·7268	2·7412	2·7556	2·7700	2·7845	2·7991	2·8186	2·8289	2·8428	2·8575	Bung .. 38
39 Bung ..	2·8722	2·8869	2·9019	2·9166	2·9314	2·9468	2·9613	2·9763	2·9918	3·0064	Bung .. 39
40 Bung ..	3·0214	3·0365	3·0517	3·0669	3·0821	3·0974	3·1127	3·1281	3·1435	3·1589	Bung .. 40

If the diameters are greater than here shown, halve them and quadruple results. Thus, suppose 70 Head, 80 Bung. Halving them we get 35 Head, 40 Bung—the factors for which amount to 4·1780. Multiplying by 4 we get the true sum.

GAUGING FOR CAPACITY.—*Continued.*

(c).—To Find the Diameter from the Circumference :

Carry the string or measuring tape round the cask. Set this measurement to 31½ on line A, then under "10" will be found the *external* diameter of the cask. From this external diameter deduct the thickness of two staves.

Example.—The circumference of a cask is 90 inches: what is the internal diameter—*assuming inch wood*?

Answer 26·6.

Setting on Rule	A	31½	10	A
	B	90	28·6	B

Key: 28·6 less 2 inches = 26·6.

(d)—To Find the Content from the Ullage.

Take the Bung and Wet-inches, and proceed as directed on page 12—only that instead of reading the Ullage under the ascertained Content, *read the Content over the ascertained Ullage.*

(e)—To Find the Content from the Diagonal :

Insert the dip-rod, with the diagonal line uppermost, through the bung-hole *in a slanting direction,* so that the point shall reach the inner chimb where the bottom stave joins the front head—observing the mark on the rod nearest the centre of the bung-hole on a level with the inner part of the stave. Then take a similar dimension towards the back head, and average the results.

Example.—A cask diagonals 29 gallons one way, and 30 the other. What is the content?

Answer 29½ gallons

***If a diagonal-rod is not handy, measure the distance in inches and tenths by means of any plain rod chisel-shaped at one end, and afterwards measured by measuring-tape or footrule : *Cube the result, and divide by* 441.

Example : *A cask diagonals 25 inches. What is the content?*

Answer 35½ gallons nearly.

Key.

$$\frac{25 \times 25 \times 25}{441} = 35\cdot4$$

Caution.—*The Diagonal line as a means for ascertaining the content is reliable only for small casks, such as ½ octaves, octaves, and qr-casks. For larger casks it is a close approximation.*

(f).—To Gauge an Oval Cask.

Find the Length, the mean-proportional Head, and the mean-proportional Bung. From these dimensions cast out the Content as directed on page 42.

* The mean-proportional of any two numbers is found by multiplying them together, and extracting the square root.

The Length of the Cask is first taken; then the lesser and greater Head diameters; then the lesser and greater Bung diameters – proper allowance, of course, being made for thickness of wood.

EXAMPLE—*Find the Content of an Oval Cask from the following dimensions* :—

Length.	Head.		Bung.	
34·4	34·0	× 50·9	39·2	× 55·8

Answer 198 gallons

KEY.

The sq. root of 34·0 × 50·9 = 41·6
The sq. root of 39·2 × 55·8 = 46·7

Then we write down

Length.	Head.	Bung.
34·4	41·6	46·7

See pages 42 & 43 for Casting-out Content.

(g).—To Gauge a Cylinder.

Multiply the square of the diameter by ·002832. If the result be multiplied by the length or height of the Cylinder, we get the *Content*. If it be multiplied by the height of the liquor, we get the *Ullage*.

EXAMPLE—Find the Content and Ullage of a Cylinder (*standing*) from the following dimensions :—

Height.	Wet.	Diameter.
40	35·5	46·9

Answer 249 Content, 221·1 Ullage.

KEY.

46·9 × 46·9 × ·002832 = 6·22929
Then 6·22929 × 40 = 249 the Content
and 6·22929 × 35·5 = 221·1 the Ullage

(h).—To Gauge a Tapering Vat.

Measure the top and bottom diameters, and the perpendicular height, in inches and tenths.

Add together the square of the top diameter, the square of the bottom diameter, and four times the square of their average. If the result be multiplied by the perpendicular height, and again by ·000472,* we get the Capacity or Content in Imperial Gallons.

EXAMPLE—Find the Content of a Tapering Vat from the following dimensions :—

Perpendicular height. (inches).	Top diameter. (inches).	Bottom diameter. (inches).
50	80	120

Answer 1434 gallons.

KEY.

$$\frac{80 + 120}{2} = 100 \text{ Average diameter.}$$

80 × 80		=	6400
120 × 120		=	14400
100 × 100	× 4	=	40000
			60800

Then 60800 × 50 × ·000472 = 1434.

NOTE.

If the vat is oval as well as tapering, the top and bottom diameters must be mean proportionals.

To ascertain the Ullage, find the "top" diameter from the circumference taken at the perpendicular height of the liquor.

* *This multiplying factor is obtained by dividing six circular divisors into unity. Thus* $\dfrac{1}{353·036 \times 6} = ·000472.$

STANDARD SIZES OF CASKS.

Description.	Usual Capacity.	Description.	Usual Capacity.	Description.	Usual Capacity.
PORT ......Pipe	117 —120	BURGUNDY Hhd.	48 — 50	GENEVA ....Hhd.	52 — 61
,, ... Hhd.	59 -- 60	MADEIRA....Pipe	92 — 97	,, ..Qr. Cask	32 — 35
,, .. Qr. Cask	29 — 30	,, ... Hhd.	44 — 49	RUM ....Pun,	103 – 115
,, ...Octave	14½— 15	,, Qr. Cask	22 -- 24	,, ...Hhd.	57 — 62
,, ..½-Octave	7 — 7½	MARSALA....Pipe	90 —110	,, ... Barrel	84 — 40
TARRAGONA Pipe	117 —122	,, ...*Hhd.	44 — 49	WHISKEY ..Pun.	108 —118
,, ..Hhd.	58 — 60	,, Qr. Cask	22 — 24	,, ...Hhd.	54 — 57
,, Qr. Cask	28 — 29	HOCK ....4 Aum	128 - 182	,, ...Barrel	27 — 31
SHERRY Dble Butt	220 —224	,, ...3 Aum	94 —104	BEER ......Butt	108
,, ...Butt	109 —112	,, ...2 Aum	60 — 64	,, ...Pun.	72
,, ... Hhd.	55 — 56	,, ... Aum	30 — 32	,, ...Hhd.	54
,, ..Qr. Cask	27 — 28	BRANDY ....Piece	115 —125	,, ... Barrel	36
,, .. Octave	14	,, ...Hhd.	58 — 61	,, ..Kilderkin	18
,, ..½-Octave	7	,, ..Qr. Cask	29 — 31	,, ... Firkin	9
CLARET ....Hhd.	47 — 49	,, Large Octave	17 — 20	,, ... Keg	6
,, ..Qr.-Cask	23 — 24	,, Small Octave	15 — 17	,, ... Pin.	4½

*NOTE.—Some Marsala Hogsheads are imported in Casks similar in size to Sherries, to meet the exigencies of the Whiskey Trade.

PRACTICAL GAUGING.

ALLOWING for thickness of timber, take the dimensions in the following order —especially if there is a tier of Casks to gauge :—

1.—Back Head	3.—Perpendicular Bung	5.—Length
2.—Cross Bung	4.—Wet Inches.	6.—Front Head.

[※※ *Take an average between 1 and 6, and 2 and 3.*]

TO FIND WHAT ALLOWANCE IS NECESSARY FOR "BAD FIGURE."

Place the Long Calipers as in taking the Length, allowing them to rest on the Bung-hole perfectly level. Then measure by means of the Dip-rod the perpendicular space from the cask to the calipers half-way between the bung-hole and the chimb, and also the space between the chimb and calipers. Divide the first distance by the second, and

If the quotient is ·23 .....Take all the length.

,,	,,	·26 ....Allow 1% off the length.
,,	,,	·28.... ,, 2% ,,
,,	,,	·30.... ,, 3% ,,
,,	,,	·32 .. ,, 4% ,,
,,	,,	·34.... ,, 5% ,,
,,	,,	·38.. ,, 6% ,,
,,	,,	·42.... ,, 7% ,,

FOR EXAMPLE—Say Sherry Butt

$$\begin{array}{cccc} \text{Length.} & \text{Head.} & \text{Bung. 1st Distance} & \text{2nd Distance} \\ 42·5 & 26·1 & 33·2 \quad 1·05 & \div \quad 3·5 = ·30 = 3\%. \end{array}$$

Then 3% off 42·5 = 1·2

$$\begin{array}{ccc} 41·3 & 26·1 & 33·2 = 112 \text{ gallons content.} \end{array}$$

ENGLISH AND FRENCH MEASURES.

Litres.	Gallons.	Litres.	Gallons.	Litres.	Gallons.	Litres.	Gallons.
1 =	0·2201	11 =	2·4211	30 =	6·6030	400 =	88·0400
2 =	0·4402	12 =	2·6412	40 =	8·8040	500 =	110·0500
3 =	0·6603	13 =	2·8613	50 =	11·0050	600 =	132·0600
4 =	0·8804	14 =	3·0814	60 =	13·2060	700 =	154·0700
5 =	1·1005	15 =	3·3015	70 =	15·4070	800 =	176·0800
6 =	1·3206	16 =	3·5216	80 =	17·6080	900 =	198·0900
7 =	1·5407	17 =	3·7417	90 =	19·8090	1000 =	220·1000
8 =	1·7608	18 =	3·9618	100 =	22·0100	2000 =	440·2000
9 =	1·9809	19 =	4·1819	200 =	44·0200	3000 =	660·3000
10 =	2·2010	20 =	4·4020	300 =	66·0300	4000 =	880·4000

GALLONS.	LITRES.	GALLONS.	LITRES.	GALLONS.	LITRES.	GALLONS.	LITRES.
1 =	4·54	33 =	149·93	65 =	295·32	97 =	440·71
2 =	9·09	34 =	154·47	66 =	299·89	98 =	445·26
3 =	13·63	35 =	159·02	67 =	304·40	99 =	449·80
4 =	18·17	36 =	163·56	68 =	308·95	100 =	454·84
5 =	22·72	37 =	168·11	69 =	313·50	101 =	458·88
6 =	27·26	38 =	172·64	70 =	318·04	102 =	463·43
7 =	31·80	39 =	177·19	71 =	322·58	103 =	467·96
8 =	36·35	40 =	181·74	72 =	327·13	104 =	472·50
9 =	40·89	41 =	186·28	73 =	331·67	105 =	477·05
10 =	45·43	42 =	190·82	74 =	336·21	106 =	481·59
11 =	49·98	43 =	195·37	75 =	340·76	107 =	486·13
12 =	54·52	44 =	199·91	76 =	345·30	108 =	490·68
13 =	59·06	45 =	204·45	77 =	349·84	109 =	495·22
14 =	63·61	46 =	209·00	78 =	354·89	110 =	499·76
15 =	68·15	47 =	213·54	79 =	358·93	111 =	504·31
16 =	72·69	48 =	218·08	80 =	363·48	112 =	508·85
17 =	77·24	49 =	222·63	81 =	368·02	113 =	513·39
18 =	81·78	50 =	227·17	82 =	372·56	114 =	517·94
19 =	86·32	51 =	231·71	83 =	377·11	115 =	522·48
20 =	90·86	52 =	236·26	84 =	381·65	116 =	527·02
21 =	95·41	53 =	240·80	85 =	386·19	117 =	531·57
22 =	99·95	54 =	245·34	86 =	390·74	118 =	536·11
23 =	104·50	55 =	249·89	87 =	395·28	119 =	540·65
24 =	109·04	56 =	254·43	88 =	399·81	120 =	545·20
25 =	113·59	57 =	258·97	89 =	404·36	200 =	908·69
26 =	118·13	58 =	263·52	90 =	408·91	300 =	1363·03
27 =	122·67	59 =	268·06	91 =	413·45	400 =	1817·38
28 =	127·22	60 =	272·60	92 =	418·00	500 =	2271·72
29 =	131·76	61 =	277·15	93 =	422·54	600 =	2726·07
30 =	136·30	62 =	281·69	94 =	427·08	700 =	3180·41
31 =	140·84	63 =	286·24	95 =	431·63	800 =	3634·76
32 =	145·39	64 =	290·78	96 =	436·17	900 =	4089·10

Note.—To convert decimals of a gallon into *quarts*, multiply by 4; to *pints*, multiply by 8; to *gills*, multiply by 32. Thus 2·4211 gallons=2 gallons, 13½ gills. [4211 × 32 = 13·4752, or 13½ gills nearly].

The standard for the Imperial Gallon is the space occupied by 10lbs avoirdupois of distilled water at 62° Fahrenheit, with the barometer at 30 inches. This space expressed in cubic inches is 277·274 for rectangular vessels, and 353·036 for cylindrical vessels. The square roots of these numbers are called Gauge-Points; the square gauge-point being 16·65, and the circular gauge-point 18·79. Thus, a cylinder measuring 18·79 inches in diameter contains an imperial gallon for every inch of its depth. The standard for the Litre is the volume of 1000 cubic centimetres, or 1 kilogramme, of distilled water at 4° centigrade.

## RELATIVE VALUE
OF
FRENCH & ENGLISH MEASURES

Price per Litre.	Equivalent per		
	Hectolitre (22 gallons)	Imperial gallon	
Francs	Francs	s.	d.
0·05	5	0	2¼
0·10	10	0	4½
0·20	20	0	8½
0·25	25	0	11
0·30	30	1	1
0·35	35	1	3½
0·40	40	1	5½
0·45	45	1	7½
0·50	50	1	10
0·55	55	2	0
0·60	60	2	2
0·65	65	2	4½
0·70	70	2	6½
0·75	75	2	8½
0·80	80	2	11
0·85	85	3	1
0·90	90	3	3
0·95	95	3	5½
1	100	3	7½
2	200	7	3½
3	300	10	11
4	400	14	6½
5	500	18	2
6	600	21	10
7	700	25	5½
8	800	29	1
9	900	32	9
10	1000	36	4

FRANCS AND CENTIMES
WITH
ENGLISH EQUIVALENTS.

Francs	£ s. d.	Francs	£ s. d.
0·05	0 0 0½	37	1 9 7
0·10	0 0 1	38	1 10 5
0·15	0 0 1½	39	1 11 2½
0·20	0 0 1¾	40	1 12 0
0·25	0 0 2¼	41	1 12 9½
0·30	0 0 2¾	42	1 13 7
0·35	0 0 3¾	43	1 14 5
0·40	0 0 3½	44	1 15 2½
0·45	0 0 4½	45	1 16 0
0·50	0 0 4½	46	1 16 9½
0·55	0 0 5¼	47	1 17 7
0·60	0 0 5¼	48	1 18 5
0·65	0 0 6¼	49	1 19 2½
0·70	0 0 6¾	50	2 0 0
0·75	0 0 7¼	51	2 0 9½
0·80	0 0 7¼	52	2 1 7
0·85	0 0 8¼	53	2 2 5
0·90	0 0 8½	54	2 3 2½
0·95	0 0 9¼	55	2 4 0
1·00	0 0 9⅝	56	2 4 9½
1·25	0 1 0	57	2 5 7
2·00	0 1 7	58	2 6 5
2·50	0 2 0	59	2 7 2½
3·00	0 2 5	60	2 8 0
3·75	0 3 0	61	2 8 9½
4·00	0 3 2½	62	2 9 7
5·00	0 4 0	63	2 10 5
6·00	0 4 9½	64	2 11 2½
6·25	0 5 0	65	2 12 0
7·00	0 5 7	66	2 12 9½
7·50	0 6 0	67	2 13 7
8·00	0 6 5	68	2 14 5
8·75	0 7 0	69	2 15 2½
9·00	0 7 2½	70	2 16 0
10·00	0 8 0	71	2 16 9½
11·00	0 8 9½	72	2 17 7
12·00	0 9 7	73	2 18 5
12·50	0 10 0	74	2 19 2½
13·00	0 10 5	75	3 0 0
14·00	0 11 2½	76	3 0 9½
15·00	0 12 0	77	3 1 7
16·00	0 12 9½	78	3 2 5
17·00	0 13 7	79	3 3 2½
18·00	0 14 5	80	3 4 0
18·75	0 15 0	81	3 4 9½
19·00	0 15 2½	82	3 5 7
20·00	0 16 0	83	3 6 5
21·00	0 16 9½	84	3 7 2½
21·25	0 17 0	85	3 8 0
22·00	0 17 7	86	3 8 9½
23·00	0 18 5	87	3 9 7
23·75	0 19 0	88	3 10 5
24·00	0 19 2½	89	3 11 2½
25·00	1 0 0	90	3 12 0
26·00	1 0 9½	91	3 12 9½
27·00	1 1 7	92	3 13 7
28·00	1 2 5	93	3 14 5
29·00	1 3 2½	94	3 15 2½
30·00	1 4 0	95	3 16 0
31·00	1 4 9½	96	3 16 9½
32·00	1 5 7	97	3 17 7
33·00	1 6 5	98	3 18 5
34·00	1 7 2½	99	3 19 2½
35·00	1 8 0	100	4 0 0
36·00	1 8 9½	125	5 0 0

HYDROMETER AND THERMOMETER COMPARISONS.
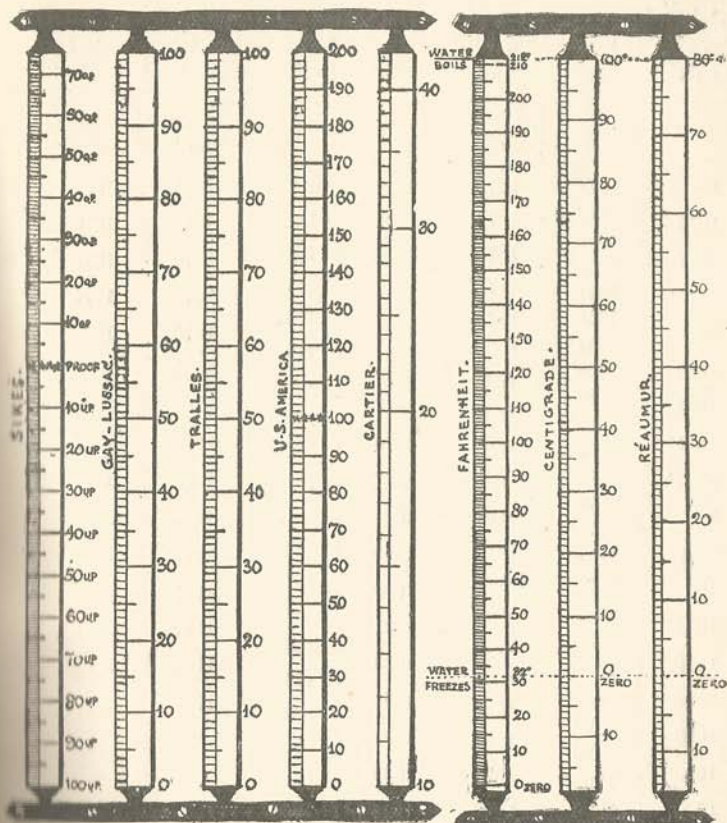
⁎ The above hydrometer comparisons show equivalent strengths according to the different systems in use. Thus 25 Cartier, 128 U.S America, 64 Gay-Lussac, and 12 o.p. mean practically one and the same thing. With regard to the comparison of *Wine* strengths, however, bear in mind that to get the "degrees" in Sikes, the U.P. strength must be deducted from 100 Thus, 16°=84 u p ; 28°=72 u.p. ; 35°=65 u.p, and so on. According to this, 20 Gay-Lussac=35 degrees Sikes.

In the United Kingdom, "Proof-Spirit" is 12—13ths of the weight of an equal volume of distilled water at 51° Fahrenheit; specific gravity ·9187 at 62°; and the proportions of absolute alcohol and water contained in 100 parts by volume, 57·06 and 42·94 respectively. Absolute alcohol at 60° F. has a density of ·7938, and is 75·25 o.p. by Sikes's hydrometer. Gay-Lussac's absolute alcohol, strength 100, has a specific gravity of ·7947 at 15 Centigrade. In the United States, "Proof-Spirit" contains half its volume of absolute alcohol; and in that country as well as in France and Germany, strengths are expressed in degrees of alcohol.

VINTAGE CALENDAR.

[*₊*The following are considered by Connoisseurs to be " *Good* " vintage years. Those marked * are " *Very Good*." Records are taken up to 1903, and subsequent recordings may be inserted in the spaces left.]

BRANDY.	PORT.	SHERRY.	CLARET.	BURGUNDY	HOCK AND MOSELLE.	CHAMPAGNE.
1870*	1847*	1873	1864*	1868	1865*	1868
1872	1848	1874	1869*	1869	1868*	1870
1874	1850	1875	1870*	1870*	1870	1872
1875*	1851*	1877*	1871	1874*	1874*	1874*
1878*	1852	1879	1874	1877	1876	1878
1880	1853*	1880	1875*	1878	1880	1880*
1881	1854*	1882*	1877	1883	1884	1884*
1884*	1858	1885	1878	1885	1886	1889*
1887*	1862	1887	1887	1886	1889	1892
1889	1863*	1890	1888*	1887	1892	1893*
1890*	1867	1891	1889	1889*	1893*	1895
1892	1868*	1892	1890*	1890	1895	1898*
1893*	1870*	1894	1891	1892*	1897	1899
1895	1873*	1895	1893	1893*	1900	1900*
1896	1875*	1896	1898	1894*	1903	
1898	1878*	1897	1899*	1895		
1899*	1881	1898	1900*	1896		
1900*	1884*	1900	1903	1898		
	1885*	1901		1900		
	1887*	1903*		1903		
	1890					
	1896*					
	1900*					
	1903					

Standard Classification of Clarets.

1st Growths.

Château Lafite .... *Pauillac.*
  ,,   Margaux ...... *Margaux.*
  ,,   Latour .... *Pauillac.*
  ,,   Haut-Brion ...... *Pessac.*

2nd Growths.

Mouton .... *Pauillac.*
Rauzan-Ségla .... *Margaux.*
Rauzan-Gassies .... *do.*
Léoville-Lascases ...... *St. Julien.*
Léoville-Poyferré .... *do.*
Léoville-Barton .... *do.*
Durfort Vivens .... *Margaux.*
Lascombes .... *do.*
Gruaud-Larose-Sarget .. *St. Julien.*
Gruaud-Larose-Bethmann *do.*
Brane Cantenac .... *Cantenac.*
Pichon Longueville ...... *Pauillac.*
Pichon-Longueville-Lalande *do.*
Ducru Beaucaillou ...... *St. Julien.*
Cos-d'Estournel .... *St. Estéphe.*
Montrose .... *do.*

3rd Growths.

Kirwan .... *Cantenac.*
Château d'Issan .... *do.*
Lagrange .... *St. Julien.*
Langoa .... *do.*
Giscours .... *Labarde.*
Malescot .... *Margaux.*
Brown-Cantenac .... *Cantenac.*
Palmer .... *do.*
La Lagune .... *..Ludon.*
Desmirail .... *Margaux.*
Calon-Ségur .... *St. Estéphe.*
Ferrière .... *Margaux.*
Becker .... *do.*

4th Growths.

Saint-Pierre Bontemps .. *St. Julien.*
Branaire-Du-Luc .... *do.*
Talbot .... *do.*
Duhart-Milon .... *Pauillac.*
Poujet .... *Cantenac.*
La Tour-Carnet ...... *St. Laurent.*
Rochet .... *St. Estéphe.*
Château Baychevelle .... *St. Julien.*
Le Prieuré .... *Cantenac.*
Marquis de Therme ...... *Margaux.*

5th Growths

Pontet Canet .... *Pauillac.*
Batailley .... *do.*
Grand-Puy-Lacoste . .... *do.*
Ducasse-Grand-Puy .... *do.*
Lynch-Moussas .... *do.*
Lynch Bages .... *do.*
Dauzac .... *Labarde.*
Mouton-d'Armailhacq .. ..*Pauillac.*
Le Tertre .... *Arsac.*
Haut-Bages .... *Pauillac.*
Pédesclaux .... *do.*
Belgrave .... *St. Laurent.*
Camensac .... *do.*
Cos-Labory .... *St. Estéphe.*
Clerc-Milon .... *Pauillac.*
Croizet-Bages .... *do.*
Cantemerle .... *Macau.*

The following are the *1st Growths* of the SAUTERNE district (Château Yquem standing alone in superiority) :—

Château Vigneau de Pontac *Bommes.*
Château La Tour Blanche . . *Bommes.*
Château Peyraguey ...... *Bommes.*
Château de Suduiraut .... *Preignac.*
Château Coutet .... *Barsac.*
Château Climens .... *Barsac.*
Château Guiraud .... *Sauternes.*
Château Rieussec .... *Fargues.*
Château Rabant .... *Bommes.*

BLENDING.

METHOD:—*Arrange the given Strengths or Prices in any stated order. Insert under each the average required, and take the lesser from the greater in each pair. The proportions of the mixture will then appear in* REVERSE *order.*

EXAMPLE (*a*).—In what proportions should I blend two spirits, at 14 o.p. and 4 o.p. respectively, to make up 20 gallons at 8 o.p. ?

Answer 8 and 12 gallons respectively.

STRENGTHS STATED:—

114	104
108	108

$$\overline{6} \ + \ \overline{4} \ = \ 10$$

Then (reading from right to left) :—

GALLONS.

$\frac{4}{10}$ of 20 gallons =   8   @   14 o.p.

$\frac{6}{10}$ of 20   „   =   12   @   4 o.p.

SETTING ON RULE:—

1st result

A 4	8 A
B 10	20 B

2nd result

A 6	12 A
B 10	20 B

PROOF BY THE PEN:—

                  Pf. Galls.

   8 galls.   @ 14 o.p. =   9·12

  12   „   @   4 o.p. = 12·48

  20   „   @   8 o.p. = 21·60

EXAMPLE (*e*) – In what proportions should I blend two spirits, worth respectively 3/- and 3/8 a gallon, to produce a mixture worth 3/3 a gallon ?

Answer: In the proportions of 5 and 3.

PRICES STATED:—

3/-	3/8
3/3	3/3

| -/3 | -/5 |

KEY—The proportions (reading from right to left) stand thus :—

To every 5 gallons of the 3/- spirit

add 3   „   „   3/8   „

PROOF BY THE PEN:—

                     Shillings

   5 galls @ 3/- = 15

   3   „   @ 3/8 = 11

   8   26

Then 26 ÷ 8 = 3/3 average.

AVERAGING VALUES OF BLENDS.

METHOD.— *Multiply each separate quantity by its own Price, and divide the sum of the results by the total quantity.*

EXAMPLE (a).—What is the average *value* of the following Blend :—

120 gallons at 3/6
40   ,,   5/–
20   ,,   7/6

Answer 4/3¼

EXAMPLE (b).—What is the average *value* of the following Blend :—

120 gallons at 3/6
40   ,,   5/–
20   ,,   7/6
50   (Water)   —

Answer 3/4

PRICES:—

s.	d.				shillings
3	6	×	120	=	420
5	0	×	40	=	200
7	6	×	20	=	150
					180	770

Then 770 ÷ 180 = 4/3¼

PRICES —

s.	d.				shillings.
3	6	×	120	=	420
5	0	×	40	=	200
7	6	×	20	=	150
(Water)		50	=	0
		**230		770

Then 770 ÷ 230 = 3/4

SETTING ON RULE:—

A	1	* 4·27	A
B	180	770	B

SETTING ON RULE:—

A	3·34†	1	A
B	770	230	B

NOTES.

* The Rule here expresses the Answer 4·27, meaning 4 shillings and 27 hundredths of a shilling.   Any decimal of a shilling may be converted to *pence* by multiplying mentally by 12.   Thus ·27 × 12 = 3·24 pence, or 3¼d. nearly.

† Similarly, 3·34 = 3/4.

** No notice is here taken of the *Contraction in Bulk* which necessarily arises

FORTIFYING.

[SIMPLE PROPORTION: *Use the lines* A *and* B *on the rule.*]

The strength of the fortifying Spirit. ❋ The required strength of the Wine.	:	The required strength of the Wine. ❋ The present strength of the Wine	: :	The quantity of Wine to be fortified.	:	The quantity of Spirit required.

EXAMPLE (*a*).—How much spirit at 64·2 o.p. is required to fortify 108 gallons of wine, from 34 to 40 degrees?

Answer 5·2 gallons.

TERMS STATED:—

164·2		40
40		34

124·2 : 6 :: 108 : 5·2

SETTING ON RULE:—

A 5·2	6 A
B 108	124·2 B

KEY.—We set the 1st term to the 2nd; then over the 3rd term we find the Answer.

EXAMPLE (*b*).—How much spirit at 64 2 o.p. is required to fortify 108 gallons of wine, from 25 to 30 degrees?

Answer 4 gallons

TERMS STATED:—

164·2		30
30		25

134·2 : 5 :: 108 : 4

SETTING ON RULE:—

A 4	5 A
B 108	134·2 B

KEY.—We set the 1st term to the 2nd; then over the 3rd term we find the Answer.

❋ Subtract the one from the other.

NOTE—The expression "Degrees" literally means "Proof-per-cent." Thus, "34 degrees" means that 34 proof-gallons are contained in every 100 gallons of the wine.

❋‚❋ Wine may be Fortified in Bond up to 40 degrees, but not more than 10 proof-gallons of spirit to every 100 gallons of the wine may be used.

USEFUL ULLAGE TABLE FOR LYING CASKS.

GALLONS VACUITY.	PORT TARRAGONA.				SHERRY MALAGA.					MADEIRA MARSALA.			CLARET BURGUNDY		GALLONS VACUITY.
	Pipe.	Hogshead.	Qr. Cask.	Octave.	Double Butt.	Butt.	Hogshead.	Qr. Cask.	Octave.	Pipe.	Hogshead.	Qr. Cask.	Hogshead.	Qr. Cask.	
	DRY-INCHES.				DRY-INCHES.					DRY-INCHES.			DRY-INS.		
0½	0·7	1·1	1·3	1·6	0·7	0·8	1·1	1·3	1·6	0·8	1·1	1·4	1·2	1·4	0½
1	1·3	1·7	2·0	2·4	1·1	1·4	1·7	2·0	2·4	1 4	1·7	2·1	1·8	2·1	1
1½	1·7	2·2	2·6	3·0	1·5	1·8	2·1	2·6	3·0	1·7	2·1	2 6	2·3	2·7	1½
2	2·0	2 6	3·1	3·6	1·9	2·1	2·5	3·1	3·6	2 0	2 5	3·1	2·7	3·2	2
2½	2·3	3·0	3·5	4 2	2·2	2·4	2·9	3·5	4·2	2 4	2·9	3·6	3·1	3·7	2½
3	2·5	3·3	3 9	4·7	2·4	2·7	3·2	3·9	4·7	2·7	3·2	4·0	3·4	4·1	3
3½	2·8	3·7	4·3	5·2	2·6	3·0	3·5	4·3	5·2	2·9	3·5	4·4	3·8	4·5	3½
4	3·0	4·0	4·7	5·7	2·8	3·2	3·8	4·6	5·7	3·1	3 8	4·8	4·1	4·9	4
4½	3·2	4·3	5·0	6 2	3·0	3·5	4·1	5·0	6·2	3·4	4·1	5 2	4·4	5·3	4½
5	3·4	4·5	5·3	6·6	3·1	3·7	4·3	5·3	6·6	3·6	4·4	5 6	4·6	5·7	5
5½	3·6	4 8	5·7	7·1	3·3	3·9	4·6	5·7	7·1	3·8	4·7	5·9	4·9	6·0	5½
6	3·8	5·0	6·0	7·5	3·5	4·1	4 8	6 0	7·5	3·9	4·9	6·2	5·1	6·3	6

GALLONS VACUITY.	RHENISH HOCK.			BRANDY GENEVA.					RUM.			WHISKY.			GALLONS VACUITY.
	4 Aum.	2 Aum.	Aum.	Piece.	Hogshead.	Qr. Cask.	Large Octave.	Small Octave.	Puncheon.	Hogshead.	Barrel.	Puncheon	Hogshead	Farrel.	
	DRY-INCHES.			DRY-INCHES.					DRY-INCHES.			DRY-INCHES.			
0½	0·8	1·1	1·3	0 8	1·1	1·3	1·4	1·6	0 9	1·1	1·3	0·8	1·2	1·3	0½
1	1·4	1·7	2·0	1·3	1·6	1·9	2·2	2 4	1·5	1·7	1 9	1·5	1·7	2·0	1
1½	1·8	2·1	2·5	1·7	2·0	2·4	2·8	3·0	1 9	2 2	2·4	1·8	2·1	2·6	1½
2	2 1	2·5	3·0	2·0	2·4	2·8	3·3	3·6	2·3	2 5	2·9	2·2	2·5	3·0	2
2½	2·4	2·9	3·4	2·3	2·8	3 3	3·7	4·1	2·6	2 8	3·3	2·5	2·9	3·5	2½
3	2·7	3·2	3·7	2·5	3·1	3·7	4·2	4·7	2·8	3·2	3·7	2·7	3·2	3·9	3
3½	2·9	3·5	4·1	2·8	3·4	4·0	4·6	5·2	3·1	3·5	4·1	3·0	3·5	4·3	3½
4	3·1	3·8	4·5	3·0	3 7	4·3	5 0	5·6	3·4	3 8	4·4	3·3	3·8	4 6	4
4½	3·4	4·1	4·8	3 2	3·9	4·7	5·5	6·1	3·6	4·1	4·7	3·5	4·1	5·0	4½
5	3·6	4·3	5·1	3·4	4·2	5·0	5·9	6 5	3 8	4·4	5·0	3·7	4·3	5·3	5
5½	3·8	4 6	5·4	3·6	4·4	5·3	6·3	7·0	4·0	4·7	5·3	3·9	4·6	5·7	5½
6	4·0	4·8	5·7	3·8	4·6	5 6	6·6	7·4	4·2	4·9	5·6	4·1	4·8	6·0	6

DIRECTIONS.—Take the Bung and Wet-Inches, and deduct the one from the other to get the Dry-Inches. Refer to the proper column in the Table according to the description of cask dealt with. * Opposite the Dry-Inches will be found the Gallons-Vacuity, which deducted from the full content gives the ullage-quantity in the cask. *Thus:* 2·5 *Dry-Inches in a Port Pipe give 3 gallons vacuity.* If, then, the content be 120 gallons, the ullage will be 117; or, similarly, if the content be 119, the ullage will be 116. *To prevent overflows in racking operations:* Take the Dry-Inches, and the Table will tell how much more the cask will hold. *For example: A Whiskey Hogshead showing* 2·9 *Dry-Inches will take* 2½ *gallons to fill it.* [*₊* For extended Table, see "Farmar's Ullage-Indicator"; and to facilitate the taking of the Dry-Inches, use "Farmar's Vacuity-Rod."]

RAISING.

[SIMPLE PROPORTION: *Use the lines* A *and* B *on the rule.*]

The strength of the spirit proposed to be added. ∗ The required strength.	:	The required strength. ∗ The present strength.	: :	The present quantity of spirit.	:	The quantity of the stronger spirit required.

EXAMPLE.—*I have 48 gallons of Gin at 30 u.p. which I want to bring up to 20 u.p. with spirit at 60 o.p. How much of that stronger spirit shall I require?*   **Answer 6 gallons.**

† TERMS STATED:—

160	80			
80	70			
80	:	10	: :	48	:	6

SETTING ON RULE:

A 10	6 A
B 80	48 B

KEY.—We set the 1st term to the 2nd; then over the 3rd term we find the Answer.

PROOF BY THE PEN:—

| 48 gallons | @ 30 u.p. = | 33·6 pf galls. |
| 6   „ | @ 60 o.p. = | 9·6   „ |

54 gallons @ 20 u.p. = 43·2 „
And 4320 ÷ 54 = 80°/₀, or 20 u.p.

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*†See footnote page 57.   NOTE.—When spirits have been accidentally over-reduced, be careful to calculate on the actual and not on the assumed quantity. For instance: Say we originally had 31 gallons of whisky at 5 o.p. and intended to break it down to 20 u.p., but that instead of putting in 10 gallons of water, the proper quantity, we put in 16 gallons or 6 gallons too much. So on trying the strength we find it to be 30 u.p. Now, we musn't suppose that we now have 47 gallons of reduced liquor—that is 31 + 16. What we really have is 46½ gallons—the remainder being lost in the contraction (vide pages 20 to 23) and it is therefore only on 46½ gallons that we must base our new calculation.

LOWERING.

[SIMPLE PROPORTION: *Use the lines* A *and* B *on the rule.*]

The required strength. * The strength of the spirit proposed to be added.	:	The present strength. * The required strength.	: :	The present quantity of spirit.	:	The quantity of the weaker spirit required.

EXAMPLE.—*I have 54·4 gallons of Whiskey at 15 o.p. which I want to bring down to 5 o.p. with spirit at 12 u.p. How much of that weaker spirit shall I require?* **Answer 32 gallons.**

TERMS STATED:—

105		115				
88		105				
17	:	10	: :	54·4	:	32

SETTING ON RULE:—

A 10	32 A
B 17	54·4 B

KEY.—We set the 1st term to the 2nd; then over the 3rd term we find the Answer.

PROOF BY THE PEN:—

54·4 gallons @ 15 o.p. = 62·56 pf. galls.
32·0   „   @ 12 u.p. = 28·16   „

86·4 gallons @ 5 o.p. = 90·72   „
And 9072 ÷ 86·4 = 105, or 5 o.p.

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* Subtract the one from the other.

† Express all strengths in the *percentage* form: thus, "proof" being 100, "overproof" is 100 plus the o.p.; "underproof" is 100 minus the u.p. For example, 10 o.p. would be expressed 110; 10 u.p. as 90; and so on,

INCREASING.

[SIMPLE PROPORTION: *Use the lines* A *and* B *on the rule.*]

The value of the article proposed to be added. * The required value of the mixture.	:	The required value of the mixture. * The present value.	: :	The quantity of stuff in hand.	:	The quantity of the dearer stuff to be added.

EXAMPLE :—I have 60 gallons of spirit worth 11/6 a gallon. How much spirit worth 16/3 a gallon must I *add* to it to produce a mixture worth 14/- a gallon?

Answer 66·7 gallons.

TERMS STATED :—
16/3	14/-
14/-	11/6

2/3	2/6
(or) pence	(or) pence
27	:	30	: :	60	:	66·7

SETTING ON RULE :—

A	30		66·7	A
B	27		60	B

KEY.—*We set the 1st term to the 2nd; then over the 3rd term we find the Answer.*

PROOF BY THE PEN :—

    60   gallons @ 11/6 =   690 shillings
    66·7   „   @ 16/3 = 1084   „
    ─────   ─────
    126·7   1774
        Then 1774 ÷ 126·7 = 14/- average.

✲ *Subtract the one from the other.*

LESSENING.

[SIMPLE PROPORTION: *Use the lines* A *and* B *on the rule.*]

The required value of the mixture. ∗ The value of the article proposed to be added.	:	The present value ∗ The required value of the mixture.	: :	The quantity of stuff in hand.	:	The quantity of the cheaper stuff to be added.

EXAMPLE.—I have 60 gallons of spirit worth 16/3 a gallon. How much spirit worth 11/6 a gallon must I *add* to it to produce a mixture worth 14/- a gallon?

Answer 54 gallons

TERMS STATED:—

14/–	16/3
11/6	14/-
2/6	2/3

(or) pence   (or) pence

30   :   27   : :   60   :   54

SETTING ON RULE:—

A 27	54 A
B 30	60 B

KEY.—*We set the 1st term to the 2nd; then over the 3rd term we find the answer.*

PROOF BY THE PEN:—

60 gallons @ 16/3 = 975 shillings
54 „ @ 11/6 = 621 „
114   1596
Then 1596 ÷ 114 = 14/- average

∗ *Subtract the one from the other.*

LIST OF BONDING TOWNS. ✻

Aberdeen (C)	Cardiff (C)	Goole (C)	Market Harborough (E)	Sligo (E)
Abergavenny (E)	Cardigan (E)	Grangemouth (C)	Markinch (E)	Southampton (C)
Allendale (E)	Carlisle (E)	Granton (C)	Maryport (C)	Stockton-on-Tees (E)
Arbroath (E)	Carnarvon (C)	Gravesend (E)	Merthyr Tydvil (E)	Stonehaven (E)
Ardrossan (C)	Carrick-on-Suir (E)	Greenock (C)	Middlesboro' (C)	Stourbridge (E)
Armagh (E)	Carron (E)	Grimsby (C)	Monasterevan (E)	Stowmarket (E)
Ashford (E)	Castle Eden (E)	Halifax (E)	Montrose (E)	Strabane (E)
Aughnacloy (E)	Chard (E)	Hanley (Staffs) (E)	Morpeth (E)	Sunderland (C & E)
Ayr (C)	Chester (E)	Hartlepool, West (C)	Newcastle (C & E)	Swansea (C)
Ballina (E)	Clonmel (E)	Harwich (C)	Newhaven (C)	Swindon, Old (E)
Ballymena (E)	Colchester (C)	Hereford (E)	Newport, Mon (C)	Taunton (E)
Ballymoney (E)	Coleraine (E)	Hertford (E)	New Ross (E)	Teignmouth (E)
Banbury (E)	Cookstown (E)	Highbridge (E)	Newry (C)	Tiverton (E)
Bandon (E)	Cork (C & E)	Hull (C)	Newton Abbot (E)	Tralee (E)
Barnstaple (E)	Cowes (C)	Inverness (C)	Northampton (E)	Trowbridge (E)
Barrow (C)	Darlington (E)	Ipswich (E)	Norwich (E)	Truro (E)
Bath (E)	Deptford (E)	Keighley (E)	Nottingham (E)	Tuam (E)
Bathgate (E)	Derby (E)	Kelso (E)	Omagh (E)	Tullamore (E)
Belfast (C & E)	Devizes (E)	Kendal (E)	Paisley (E)	Wadebridge (E)
Berwick (C)	Dorchester (E)	Kilkenny (E)	Penzance (E)	Warrington (E)
Bideford (E)	Douglas, 'M (C)	Kilmarnock (E)	Perth (E)	Waterford (C)
Birmingham (E)	Dover (C)	Kinsdale (E)	Plymouth (C)	Weston-super-
Blackburn (E)	Drogheda (E)	Kirkcaldy (C & E)	Poole (E)	Mare (E)
Blandford (E)	Dublin (C & E)	Lancaster (E)	Port Glasgow (E)	Westport (E)
Blyth (C)	Dudley (E)	Larne (E)	Portsmouth (C)	Wexford (E)
Bolton (E)	Dumfries (E)	Leeds (E)	Preston (E)	Weymouth (C)
Bo'ness (C)	Dundalk (E)	Leicester (E)	Queensferry, S. (E)	Whitby (E)
Boston (C)	Dungannon (E)	Leith (C & E)	Ramsgate (C)	Whitehaven (E)
Bradford (E)	Dundee (C)	Lerwick (E)	Reading (E)	Wick (C)
Brecon (E)	Dunfermline (E)	Limerick (C & E)	Redruth (E)	Wigan (E)
Bridgwater (E)	Durham (E)	Liverpool (C & E)	Reigate (E)	Windsor (E)
Bridport (E)	Edinburgh (E)	Llanelly (C)	Ripon (E)	Wolverhampton (E)
Brighton (E)	Elgin (E)	London (C & E)	Rochester (C)	Woodbridge (E)
Bristol (C)	Enniskillen (E)	Londonderry (C)	Runcorn (E)	Worcester (E)
Burnley (E)	Exeter (C)	Longford (E)	St. Austell (E)	Workington (E)
Burton-on-Trent (E)	Falmouth (C)	Louth (E)	Scarborough (E)	Wrexham (E)
	Folkestone (C)	Lowestoft (E)	Selby (E)	Yarmouth (C)
Bury St. Edmunds (E)	Galway (E)	Lynn (C)	Sheffield (E)	York (E)
	Gateshead (E)	Maidstone (E)	Shields, N. (C)	Youghal (E)
Cambridge (E)	Glasgow (C & E)	Manchester (C & E)	Shields, S. (C)	
Cambeltown (E)	Gloucester (C)			

✻ i.e. Places where Bonding Warehouses are situated. "(C)" denotes Customs Warehouses, "(E)" Excise. Wines and Spirits may be removed under Bond, in the penalty of the Duty involved, from any one Bonded Warehouse to another between any of the places here mentioned. Addresses may be obtained on application at any Custom House or Inland Revenue Office : or Official List (bound) be purchased, price 6d.

TABLES OF EXCHANGE

SHOWING THE AMOUNT OF FOREIGN MONEY THAT SHOULD BE PAID FOR ENGLISH MONEY.

English Money			Belgium, Bulgaria, Chili, Congo Free State, Italy, Salvador, Servia, Switzerland Uruguay.		France and Algeria, Luxemburg, Roumania, Tunis, and Austria.		Germany.		Netherlands and Dutch East Indies.		Denmark, Iceland and Danish West Indies, Norway and Sweden.		Portugal, Azores, and Madeira.	Egypt.		United States, Canada, and Hawaii.	
£	s.	d.	Francs	Cents.	Francs	Cents.	Marks.	Pfen.	Florins.	Cents.	Kroner.	Ore.	Reis.	Pounds Egyptian	Millièmes	Dollars	Cents.
0	0	1	0	10	0	10	0	08	0	05	0	07	10	0	004	0	02
0	0	2	0	20	0	21	0	17	0	10	0	15	30	0	008	0	04
0	0	3	0	30	0	31	0	25	0	15	0	22	50	0	012	0	06
0	0	4	0	40	0	42	0	34	0	20	0	30	70	0	016	0	08
0	0	5	0	50	0	52	0	42	0	25	0	37	90	0	020	0	10
0	0	6	0	60	0	63	0	51	0	30	0	45	110	0	024	0	12
0	0	7	0	70	0	73	0	59	0	35	0	52	130	0	028	0	14
0	0	8	0	80	0	84	0	68	0	40	0	60	150	0	032	0	16
0	0	9	0	90	0	94	0	76	0	45	0	68	170	0	036	0	18
0	0	10	1	00	1	05	0	85	0	50	0	75	190	0	040	0	20
0	0	11	1	10	1	15	0	93	0	55	0	83	200	0	044	0	22
0	1	0	1	20	1	26	1	02	0	60	0	90	220	0	048	0	24
0	2	0	2	50	2	52	2	04	1	20	1	81	450	0	097	0	49
0	3	0	3	70	3	78	3	06	1	81	2	72	680	0	146	0	73
0	4	0	5	00	5	04	4	08	2	41	3	62	910	0	195	0	97
0	5	0	6	30	6	30	5	10	3	02	4	53	1,140	0	243	1	22
0	6	0	7	50	7	56	6	12	3	62	5	43	1,370	0	292	1	46
0	7	0	8	80	8	82	7	14	4	22	6	35	1,590	0	341	1	71
0	8	0	10	00	10	08	8	16	4	83	7	25	1,820	0	390	1	95
0	9	0	11	30	11	34	9	18	5	43	8	15	2,050	0	438	2	19
0	10	0	12	60	12	60	10	20	6	04	9	06	2,280	0	487	2	44
0	11	0	13	80	13	86	11	22	6	64	9	96	2,510	0	536	2	68
0	12	0	15	10	15	12	12	24	7	24	10	87	2,740	0	585	2	92
0	13	0	16	30	16	38	13	26	7	85	11	77	2,970	0	633	3	17
0	14	0	17	60	17	64	14	28	8	45	12	68	3,190	0	682	3	41
0	15	0	18	90	18	90	15	30	9	06	13	59	3,420	0	731	3	65
0	16	0	20	10	20	16	16	32	9	66	14	49	3,650	0	780	3	90
0	17	0	21	40	21	42	17	34	10	26	15	41	3,880	0	828	4	14
0	18	0	22	60	22	68	18	36	10	87	16	31	4,110	0	877	4	38
0	19	0	23	90	23	94	19	38	11	47	17	21	4,340	0	926	4	63
1	0	0	25	20	25	20	20	40	12	08	18	12	4,570	0	975	4	87
2	0	0	50	40	50	40	40	80	24	16	36	24	9,140	1	950	9	74
3	0	0	75	60	75	60	61	20	36	24	54	36	13,710	2	925	14	61
4	0	0	100	80	100	80	81	60	48	32	72	48	18,280	3	900	19	48
5	0	0	126	00	126	00	102	00	60	40	90	60	22,850	4	875	24	35
6	0	0	151	20	151	20	122	40	72	48	108	72	27,420	5	850	29	22
7	0	0	176	40	176	40	142	80	84	56	126	84	31,990	6	825	34	09
8	0	0	201	60	201	60	163	20	96	64	144	96	36,560	7	800	38	96
9	0	0	226	80	226	80	183	60	108	72	163	08	41,130	8	775	43	83
10	0	0	252	00	252	00	204	00	120	80	181	20	45,700	9	750	48	70

TABLES OF EXCHANGE.

SHOWING THE AMOUNT OF ENGLISH MONEY THAT SHOULD BE PAID FOR FOREIGN MONEY.

Belgium and Congo Free State.		Switzerland, Bulgaria, and Servia.		France and Algeria, Luxemburg, Italy, Salvador, Tunis, Roumania, and Austria.		Germany.		Netherlands and Dutch East India.		English Money.		
Francs.	Cents.	Francs.	Cents.	Francs.	Cents.	Marks.	Pfen.	Florins.	Cents.	£	s.	d.
0	11	0	11	0	11	0	09	0	06	0	0	1
0	21	0	22	0	21	0	18	0	11	0	0	2
0	32	0	32	0	32	0	26	0	16	0	0	3
0	42	0	43	0	42	0	35	0	21	0	0	4
0	53	0	53	0	53	0	43	0	26	0	0	5
0	63	0	64	0	63	0	52	0	31	0	0	6
0	74	0	74	0	74	0	60	0	36	0	0	7
0	84	0	85	0	84	0	69	0	41	0	0	8
0	95	0	95	0	95	0	77	0	46	0	0	9
1	05	1	06	1	05	0	86	0	51	0	0	10
1	16	1	16	1	16	0	94	0	56	0	0	11
1	26	1	27	1	26	1	03	0	61	0	1	0
2	53	2	53	2	52	2	05	1	21	0	2	0
3	79	3	80	3	78	3	07	1	82	0	3	0
5	05	5	06	5	04	4	09	2	42	0	4	0
6	31	6	33	6	30	5	12	3	03	0	5	0
7	58	7	59	7	56	6	14	3	63	0	6	0
8	84	8	86	8	82	7	16	4	24	0	7	0
10	10	10	12	10	08	8	18	4	84	0	8	0
11	36	11	39	11	34	9	21	5	45	0	9	0
12	63	12	65	12	60	10	23	6	05	0	10	0
13	89	13	92	13	86	11	25	6	66	0	11	0
15	15	15	18	15	12	12	27	7	26	0	12	0
16	41	16	45	16	38	13	30	7	87	0	13	0
17	68	17	71	17	64	14	32	8	47	0	14	0
18	94	18	98	18	90	15	34	9	08	0	15	0
20	20	20	24	20	16	16	36	9	68	0	16	0
21	46	21	51	21	42	17	39	10	29	0	17	0
22	73	22	77	22	68	18	41	10	89	0	18	0
23	99	24	04	23	94	19	43	11	50	0	19	0
25	25	25	30	25	20	20	45	12	10	1	0	0
50	50	50	60	50	40	40	90	24	20	2	0	0
126	25	126	50	126	00	102	25	60	50	5	0	0
151	50	151	80	151	20	122	70	72	60	6	0	0
202	00	202	40	201	60	163	60	96	80	8	0	0
252	50	253	00	252	00	204	50	121	00	10	0	0

Denmark and Iceland.		Danish West Indies.		Norway and Sweden.		Portugal, Azores, and Madeira.	Egypt.		United States, Canada, and Hawaii.		English Money.		
Kroner.	Ore.	Kroner.	Ore.	Kroner.	Ore.	Reis.	Pounds Egyptian.	Mil-lièmes	Dollars.	Cents.	£	s.	d.
0	08	0	07	0	08	20	0	004	0	02	0	0	1
0	16	0	15	0	16	40	0	008	0	04	0	0	2
0	23	0	22	0	23	60	0	012	0	06	0	0	3
0	31	0	30	0	31	80	0	016	0	08	0	0	4
0	38	0	37	0	38	100	0	020	0	10	0	0	5
0	46	0	45	0	46	120	0	024	0	12	0	0	6
0	54	0	52	0	53	140	0	028	0	14	0	0	7
0	61	0	60	0	61	160	0	032	0	16	0	0	8
0	69	0	68	0	43	180	0	036	0	18	0	0	9
0	76	0	75	0	76	200	0	040	0	20	0	0	10
0	84	0	83	0	84	210	0	044	0	22	0	0	11
0	91	0	90	0	91	230	0	048	0	24	0	1	0
1	82	1	81	1	82	460	0	097	0	49	0	2	0
2	73	2	72	2	72	690	0	146	0	73	0	3	0
3	64	3	63	3	63	920	0	195	0	97	0	4	0
4	55	4	53	4	53	1,150	0	243	1	22	0	5	0
5	46	5	44	5	45	1,380	0	292	1	46	0	6	0
6	37	6	35	6	35	1,600	0	341	1	71	0	7	0
7	28	7	26	7	25	1,830	0	390	1	95	0	8	0
8	19	8	16	8	16	2,060	0	438	2	19	0	9	0
9	10	9	07	9	06	2,290	0	487	2	44	0	10	0
10	01	9	98	9	97	2,520	0	536	2	68	0	11	0
10	92	10	89	10	88	2,750	0	585	2	92	0	12	0
11	83	11	79	11	78	2,980	0	633	3	17	0	13	0
12	74	12	70	12	69	3,200	0	682	3	41	0	14	0
13	65	13	61	13	59	3,430	0	731	3	65	0	15	0
14	56	14	52	14	50	3,660	0	780	3	90	0	16	0
15	47	15	42	15	41	3,890	0	828	4	14	0	17	0
16	38	16	33	16	31	4,120	0	877	4	38	0	18	0
17	29	17	24	17	22	4,350	0	926	4	63	0	19	0
18	20	18	15	18	12	4,570	0	976	4	87	1	0	0
36	40	36	30	30	24	9,140	1	950	9	74	2	0	0
90	00	90	75	90	60	22,850	4	875	24	35	5	0	0
100	20	108	90	108	72	27,420	5	850	29	22	6	0	0
145	60	145	20	144	96	36,560	7	800	38	96	8	0	0
181	00	181	50	181	20	45,700	9	750	48	70	10	0	0

₅ *Imperial System of Weights and Measures:*—Antigua, Barbadoes, Bermuda, British Guiana, British Honduras, Canada, Cape of Good Hope, Ceylon, Cyprus, Dominica, Fiji, Great Britain, Grenada, Hong Kong, Jamaica, Malta, Natal, Nevis, New Brunswick, New South Wales, New Zealand, Nova Scotia, Queensland, Sierra Leone, Singapore, South Australia, St. Christopher, St. Helena, St Vincent, Tobago, Trinidad, Vancouver's Island, Victoria, and Western Australia.

Metric System:—Algiers, Argentine Republic, Austria, Brazil, Belgium, Bolivia, Chili, France, Germany, Greece, Holland, Italy, Mexico, Norway, Portugal, Roumania, Servia, Spain, Sweden, Switzerland, Uruguay and Venezuela.

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APPENDIX
TO
SUPPLEMENT.

APPENDIX

TO

SUPPLEMENT.

—⸎—

———

PROOFING.

DIRECT METHOD.—*Set the Strength on* **BB** *to* "*Proof*" *on* **AA***; then under the ullage on* **A** *will appear the Proof-quantity on* **B**.

EXAMPLE (*a*).   Gallons.   o.p.   Proof.
EXAMPLE (*a*).   38·0 @ 5·0 = 39·9

SETTING ON RULE:—

AA Proof	38 A
BB 5 o p.	39·9 B

KEY.—We set 5 o.p. to "Proof"; then under 38 we find **39·9**, the proof-quantity.

EXAMPLE (*b*).   Gallons.   u.p.   Proof.
EXAMPLE (*b*).   56·2 @ 12·0 = 49·4

SETTING ON RULE:—

AA Proof	56·2 A
BB 12 u.p.	49·4 B

KEY.—We set 12 u.p. to "Proof"; then under 56·2 we find **49·4**, the proof-quantity.

INDIRECT METHOD.—*Set the strength on* **B** *to 10 on line* **A** *; then under the ullage will appear the quantity to add or deduct, according as the spirit is o.p. or u.p.*

EXAMPLE (*a*).   Gallons.   o.p.   Proof.
EXAMPLE (*a*).   38·0 @ 5·0 = 39·9

SETTING ON RULE:—

A 38	10 A
B 1·9	5 B

KEY.—We set 5 to 10; then under 38 we find 1·9, the required *addition* to the ullage to make the Proof.

EXAMPLE (*b*).   Gallons.   u.p.   Proof.
EXAMPLE (*b*).   56·2 @ 12·0 = 49·4

SETTING ON RULE:—

A 56·2	10 A
B 6·8	12 B

KEY.—We set 12 to 10; then under 56·2 we find 6·8, the required *deduction* from the ullage to make the Proof.

EXERCISES.

Ullage.	Strength.	Proof.
28·6	14·5 o.p.	32·7
34·8	9·4 u.p.	31·5
59·6	17·2 o.p.	69·8
59·6	17·2 u.p.	49·3
108·5	5·6 o.p.	114·5

NOTE.—The *direct* method is recommended for Stocktaking purposes; the *indirect* for Duty purposes.

SELLING.

PROFIT.

Set the cost-price on | to " Par " on K; then over the desired gain per cent will appear the selling-price.

EXAMPLE (*a*).—Bought at 3/1 a gallon, and desire to make 15 % profit. What must be the selling-price?

Answer 3/6½

SETTING ON RULE:—

I	3/1	3/6¼	I
K	Par	Profit 15 %	K

KEY.—We set 3/1 to "Par," then over 15% profit is found 3/6¼, the selling-price.

EXAMPLE (*b*).—I buy at 3/1 a gallon, and sell at 3/6½. What do I gain per cent?

Answer 15 %

SETTING ON RULE:—

I	3/1	3/6¼	I
K	Par	Profit 15%	K

KEY.—We set 3/1 to "Par"; then under 3/6¼ is found 15 % Profit.

DISCOUNT.

Set the nominal selling price on ¼ to " Par " on K; then over the stipulated rate of discount will appear the net selling-price.

EXAMPLE (*a*).—I sell at 18/5 a gallon, subject to 5% discount. What do I *net?*

Answer 17/6.

SETTING ON RULE:—

I	17/6	18/5	I
K	5% Discount.	Par.	K

KEY.—We set 18/5 to "Par"; then over 5% Discount is found 17/6, the net price.

EXAMPLE (*b*).—I sell nominally at 18/5 a gallon, but net only 17/6. What rate of discount is that?

Answer 5%.

SETTING ON RULE:—

I	17/6	18/5	I
K	5% Discount.	Par.	K

KEY.—We set 18/5 to "Par"; then under 17/6 is found 5% Discount.

EXERCISES.

Cost Price.	Desired Profit.	Selling Price.
4/6	25%	5/7½
17/2	15%	19/9
16/6	40%	23/1

EXERCISES.

Nominal Selling-price.	Rate of Discount.	Net Selling-price.
5/9	10%	5/2¼
19/-	6½%	17/9
21/6	5%	20/5

SELLING.

PROFIT AND DISCOUNT COMBINED.

Set the cost-price on I *to the rate of discount on* K; *then over the required gain per cent. will appear the nominal selling price.*

EXAMPLE (*a*).—A spirit costs me 18/– a gallon. What price should I *ask* for it, so that I may be enabled to make 16 % Profit, and yet allow 5 % Discount? **Answer 22/-.**

SETTING ON RULE:—

I 18/–	22/– I
K 5% Discount	Profit 16% K

KEY.—We set 18/- to 5% Discount; then over 16% Profit we find 22/-, the *asking* price.

EXAMPLE (*b*).—A spirit costs me 18/– a gallon, and I *ask* 22/– for it, subject to a discount of 5%. What profit do I make myself?

Answer 16%.

SETTING ON RULE:—

I 18/–	22/– I
K 5% Discount	Profit 16% K

KEY.—We set 18/- to 5% Discount then under 22/- we find 16% the net profit.

EXERCISES.

Cost Price.	Expected Profit.	Discount to Customer.	Asking Price.
5/–	30%	2½%	6/8
15/–	25%	6¼%	20/1
17/6	20%	5%	22/1

PROFIT ON THE RETURN.

EXPLANATION:—*Say a spirit costs me* 4/- *a gallon, and I sell at* 5/-. *Then I make* 25% *on the* 4/-, *or* 20% *on the* 5/-. *The one is called the "Profit on the Cost," the other the "Profit on the Return."*

Set the cost price on I to "Par" on KK; then under the selling-price will appear the profit on the return.

EXAMPLE *c*

I buy at 4/- a gallon and sell at 5/-. What do I make on the *return*?

Answer 20 %

SETTING ON RULE:—

I 4/-	5/- I
KK Par	Profit 20 % KK

EXPLANATION.

We set 4/-, the cost-price to "Par" on line KK; then under 5/. the selling-price, we find 20% the profit on the return.

BLENDING.

METHOD :—*Arrange the given Strengths or Prices in any stated order. Insert under each the average required, and take the lesser from the greater in each pair. The proportions of the mixture will then appear in* REVERSE *order.*

EXAMPLE (*a*).—In what proportions should I blend two spirits, at 14 o.p. and 4 o.p. respectively, to make-up 20 gallons at 8 o.p. ?

Answer 8 and 12 gallons respectively.

STRENGTHS STATED:—

114	104
108	108

$$\overline{\quad 6 \quad} + \overline{\quad 4 \quad} = 10$$

Then (reading from right to left) :—

GALLONS.

$\frac{4}{10}$ of 20 gallons = 8   @   14 o.p.

$\frac{6}{10}$ of 20   „   = 12   @   4 o.p.

SETTING ON RULE:—

1st result	A 4	8 A
	B 10	20 B

2nd result	A 6	12 A
	B 10	20 B

PROOF BY THE PEN:—

                            Pf. Galls.

8 galls.	@ 14 o.p. =	9·12
12 „	@ 4 o.p. =	12·48
20 „	@ 8 o.p. =	21·60

EXAMPLE (*b*). — In what proportions should I blend three spirits, at 14 o.p., 4 o.p. and 4 u.p. respectively, to make up 20 gallons at 8 o.p. ?

Answer—

    11 galls. 3½ pts. ⎫

    4 galls. 2¼ pts. ⎬ respectively.

    4 galls. 2¼ pts. ⎭

STRENGTHS STATED:—

* (114	114)	104	96
108	108	108	108

$$\overline{\quad 6 \quad} + \overline{\quad 6 \quad} + (\overline{4} + \overline{12}) = 28$$

Then (reading from right to left):—

                               gal. pts.

$\frac{16}{28}$ of 20 gals.= 11·43 (or 11·3½) @ 14 o.p.

$\frac{6}{28}$ of 20   „   = 4·28 („   4·2¼) @   4 o.p.

$\frac{6}{28}$ of 20   „   = 4·29 („   4·2¼) @   4 u.p.

SETTING ON RULE:—

1st result	A 16	11·43 A
	B 28	20 B

(The other results are found in like manner.)

PROOF BY THE PEN:—

                               Pf. Galls.

11·43 galls.	@ 14 o.p. =	13·03
4·28 „	@ 4 o.p. =	4·45
4·29 „	@ 4 u.p. =	4·12
20·00 „	@ 8 o.p. =	21·60

EXAMPLE (c).—In what proportions should I blend four spirits, at 2 o.p., Proof, 10 o.p. and 6 o.p. respectively, to make up 28 gallons at 4 o.p. ?

Answer 4, 12, 8, & 4 gallons respectively.

STRENGTHS STATED :—

102	100	110	106
104	104	104	104

$$2 \; + \; 4 \; + \; 6 \; + \; 2 = 14$$

Then (reading from right to left) :—

GALLONS.

$\frac{2}{14}$ of 28 gallons	=	4	@	2 o.p.
$\frac{10}{14}$ of 28	„	= 12	@	Proof
$\frac{4}{14}$ of 28	„	= 8	@	10 o.p.
$\frac{2}{14}$ of 28	„	= 4	@	6 o.p.

SETTING ON RULE :—

1st result	A 2	4 A
	B 14	28 B

(The other results are found in like manner.)

PROOF BY THE PEN :—

					Pf. Galls.
4 galls.	@	2 o.p.	=	4·08
12	„	@	Proof	=	12·00
8	„	@	10 o.p.	=	8·80
4	„	@	6 o.p.	=	4·24
28	„	@	4 o.p.	=	29·12

EXAMPLE (d).—In what proportions should I blend five spirits, at Proof, 4 o.p., 14 o.p., 4 u.p and 10 o.p. respectively, to make up 34 gallons at 8 o.p. ?

Answer 2, 2, 12, 6 & 12 gallons respectively.

STRENGTHS STATED :—

100	104	114	96	(110	110)*
108	108	108	108	108	108

$$(8 \; + \; 4) \; + \; 6 + 12 \; + \; 2 \; + \; 2 = 34$$

Then (reading from right to left) :—

GALLONS.

$\frac{2}{34}$ of 34 gallons	=	2	@	Proof
$\frac{2}{34}$ of 34	„	= 2	@	4 o.p.
$\frac{12}{34}$ of 34	„	= 12	@	14 o.p.
$\frac{6}{34}$ of 34	„	= 6	@	4 u.p.
$\frac{12}{34}$ of 34	„	= 12	@	10 o.p.

PROOF BY THE PEN :—

					Pf. Galls
2 gallons	@	Proof	=	2·00
2	„	@	4 o.p.	=	2·08
12	„	@	14 o.p.	=	13·68
6	„	@	4 u.p.	=	5·76
12	„	@	10 o.p.	=	13·20
34 galls.	@	8 o.p.	=	36·72

NOTES.

HOW TO FIX THE AVERAGE STRENGTH.—Arrange the given strengths, forming the mixture, in *progressive* order, and separate them into two equal groups. The limits will lie between the two *centre* strengths. For instance, take Example (c) above. Here we have four spirits whose strengths are, Proof, 2 o.p.—6 o.p., 10 o p. The average strength lies between 2 o p. and 6 o.p.

* *Observe that there must be an* EVEN *number of strengths. If, therefore, an odd number is stated, one of them must be* REPEATED. *Vide examples (b) and (d).*

BLENDING.—*Continued.*

METHOD :—*Arrange the given Prices in any stated order. Insert under each the average required, and take the lesser from the greater in each pair. The proportions of the mixture will then appear in* REVERSE *order.*

EXAMPLE (*e*).—In what proportions should I blend two spirits, worth respectively 3/- and 3/8 a gallon, to produce a mixture worth 3/3 a gallon ?

Answer: In the proportions of 5 and 3.

PRICES STATED:—

3/-	3/8
3/3	3/3
——	——
-/3 :	-/5

KEY.—The proportions (reading from right to left) stand thus :—

To every 5 gallons of the 3/- spirit add 3   „   „   3/8 „

PROOF BY THE PEN :—

		Shillings
5 galls @ 3/-	=	15
3 „ @ 3/8	=	11
——		——
8		26

Then 26 ÷ 8 = 3/3 average.

EXAMPLE (*f*).—In what proportions should I blend three wines, worth respectively 4/-, 6/-, and 8/- a gallon, to produce a mixture worth 7/- a gallon ?

Answer: In the proportions of 1, 1 and ·4 respectively.

PRICES STATED:—

4/-	6/-	(8/-	8/-)
7/-	7/-	7/-	7/-
——	——	——	——
(3	1) :	1 :	1

KEY —The proportions (reading from righ to left) stand thus :—

To every 1 gallon of the 4/- wine
add 1   „   „   6/- „
and 4   „   „   8/- „

PROOF BY THE PEN :—

		Shillings
1 gall. @ 4/-	=	4
1 „ @ 6/-	=	6
4 „ @ 8/-	=	32
——		——
6		42

Then 42 ÷ 6 = 7/- average.

EXAMPLE (g).—In what proportions should I blend four wines, worth respectively 4/-, 6/-, 8/- and 9/- a gallon, to make up 28 gallons worth 7/- a gallon?

Answer: In the proportions of 8, 4, 4, and 12 respectively.

PRICES STATED:—

4/–	6/–	8/–	9/–
7/–	7/–	7/–	7/–

3 + 1 + 1 + 2=7

Then (reading from right to left):—

		Gallons.		
$\frac{2}{7}$ of 28 gallons	=	8	@	4/–
$\frac{1}{7}$ of 28	„	=	4	@ 6/–
$\frac{1}{7}$ of 28	„	=	4	@ 8/–
$\frac{3}{7}$ of 28	„	=	12	@ 9/–

SETTING ON RULE:—

1st result:

A	2		8	A
B	7		28	B

[The other results are found in like manner.]

PROOF BY THE PEN:—

				Shillings
8 gallons	@	4/–	=	32
4	„	@ 6/–	=	24
4	„	@ 8/–	=	32
12	„	@ 9/–	=	108
28				196

And 196 ÷ 28 = 7/– average.

EXAMPLE (h).—In what proportions should I blend six spirits, worth respectively 4/-, 3/-, 3/6, 4/6, 5/6 and 5/- a gallon, to produce a mixture worth 4/3 a gallon?

Answer: In the proportions of 9, 15, 3, 9, 15, and 3 respectively.

PRICES STATED:—

4/–	3/–	3/6	4/6	5/6	5/–
4/3	4/3	4/3	4/3	4/3	4/3

–/3 : 1/3 : –/9 : –/3 : 1/3 : –/9

or, expressed in *pence*:—

3 : 15 : 9 : 3 : 15 : 9

KEY.—The proportions (reading from right to left) stand thus:—

				Shillings
To every 9 galls of the 4/- spirit	= 36			
add 15	„	3/–	„ =	45
3	„	3/6	„ =	10½
9	„	4/6	„ =	40½
15	„	5/6	„ =	82½
and 3	„	5/–	„ =	15
54				229½

Then 229½ ÷ 54 = 4/3 average.

NOTES.

How to FIX THE AVERAGE PRICE.—Arrange the given prices, forming the mixture, in *progressive* order, and separate them into two equal groups. The limits will lie between the two *centre* prices. For instance, take Example (h) above. Here we have six spirits whose values are 3/-, 3/6, 4/- 4/6, 5/-, 5/6. The average price lies between 4/- and 4/6. Any odd amount can be fixed upon within these limits.

* Observe that there must be an EVEN number of prices. If, therefore, an odd number is stated, one of them must be REPEATED. Vide example (f.)

AVERAGING STRENGTHS OF BLENDS.

METHOD.—*Multiply each separate quantity by its own strength, and divide the sum of the results by the total quantity.*

EXAMPLE 1.—What is the average strength of the following blend of spirits : –

    154·4 gallons @ 9·2 o.p.

    26·2   „   „   2·5 o.p.

    108·2   „   „   Proof.

    74·6   „   „   4·6 u.p.

          Answer 3·1 o.p.

†† STRENGTHS :—

    154·4 × 109·2 = 16860 ‡

    26·2 × 102·5 =   2680

    108·2 × 100·0 = 10820

    74·6 × 95·4 =   7110

    363·4   37470

Then 37470 ÷ 363·4 = 103·1, or 3·1 o.p.

SETTING ON RULE:—

A	103·1		100	A
B	3747		363·4	B

EXAMPLE 2.— What is the average strength of the following blend of wines :—

    56 gallons @ 36 degrees.

    110   „   „   38   „

    24   „   „   33   „

          Answer 37°

**STRENGTHS: –

    56 × 36° = 20·16 × 100 = 2016

    110 × 38° = 41·80 × 100 = 4180

    24 × 33° = 7·92 × 100 = 792

    190   6988

Then 6988 ÷ 190 = 36·7, or 37 degrees.

SETTING ON RULE:—

A	36·7		100	A
B	6988		190	B

†† Express all strengths in the *percentage* form : thus, " proof " being 100, " overproof " is 100 plus the o.p. ; " underproof " is 100 minus the u.p. For example, 10 o.p. would be expressed 110 ; 10 u.p. as 90 ; and so on.

‡ These results may be obtained by the *Rule* if desired—being merely the *proof quantities* multiplied by 100. (*See page 28.*)

** The expression " Degrees " literally means " Proof-per-Cent." Thus, " 36 degrees " means that 36 proof-gallons are contained in every 100 gallons of the wine.

[※₀※ For Averaging *Values* of Blends, see page 53].

AVERAGING STRENGTHS.—*Continued.*

What is the average *Obscuration** of the following Blend?

Gallons.	Obs.
36·2	2·6
124·6	1·4
42 7	Nil
24·6	1·8

Answer, 1·3.

METHOD—

$$36·2 \times 2·6 = 94·12$$
$$124·6 \times 1·4 = 174·44$$
$$42·7 \times 0·0 = 0·00$$
$$24·6 \times 1·8 = 44·28$$

| 228·1 | 312·84 |

Then $312·84 \div 228·1 = 1·3$.

✲ " Obscuration " means the amount of strength hidden or *obscured* in a spirit, by reason of the presence of sweetening or other matter, which interferes with the correct action of the hydrometer. So that a spirit containing *obscuration* is really *stronger* than what the hydrometer registers. This addition to the apparent strength of Rums and Brandies is *officially* ascertained by distilling a sample of the spirit, and taking the *difference* between the strengths before and after—*the same being noted on the Permit.* When the obscuration is added to the hydrometer strength we get the *Actual* strength. Thus :—

Hyd. Str.		Obs.		Act. Str.
35·2 o.p.	+	2·6	=	37·8 o.p.
2·5 o.p.	+	1·4	=	3·9 o.p.
0·8 u.p.	+	1·4	=	0·6 o.p.
18·8 u.p.	+	1·8	=	17·0 u.p.

₊ *Obscuration* is in no way affected by the breaking-down with water. Thus, a Rum containing 2·1 % obscuration *before* reducing, contains the same 2·1 % *afterwards.* The figures merely represent a percentage of the proof-strength, and not of the weight or bulk of the spirit. Traders, therefore, are quite safe in reducing their Rums and Brandies to an extent *below the hydrometer strength* equal to the percentage of obscuration. For example: To reduce a Brandy containing 3 % of obscuration to 22 u.p., water should be added sufficient to make the hydrometer register 25 u.p.

The *Retailer* especially should note this, and remember that Duty has to be paid as much on the *obscured* strength as on the hydrometer strength. If, therefore, he adds the obscuration shown on his permit to the ascertained hydrometer strength, he will probably find his Invoice correct. If, however, he wants a certain hydrometer strength, he should so specifically order.

PROPORTIONING SPIRIT AND WATER.

NOTE.—*Owing to chemical action, a Contraction in Bulk takes place when spirits and water combine. To meet this " Contraction," an increased quantity of water is required—the calculation of which must be based on the specific gravity system. This the rule does automatically. The total water thus shown is absolutely needed to make both the strength and the quantity right. (See page 20).*

TO PROPORTION THE SPIRIT.

Set the required strength on BB to the present strength on AA; then under the total required bulk on A will appear the proportion of spirit required.

EXAMPLE (*a*).—How much spirit at 20 o.p. is required to make up 4 gallons at 15 u.p.?

Answer 2·83

[or, 2 galls. 6 pints, 2½ quarterns.]
See page 19.

SETTING ON RULE:—

AA 20 o.p.	Bulk 4	A
BB 15 u.p.	Spirit 2·83	B

KEY.— We set 15 u.p. to 20 o.p.; then under 4 gallons we find 2·83, the proportion of spirit required.

[Page 19 tells us that ·83=6 pints 2½ quarterns].

TO PROPORTION THE WATER.

Set the *sum** of the two strengths on H to the required strength in section No. 1. Then under the quantity of spirit will appear the *true* water required—*allowing for contraction in bulk.*

Referring to EXAMPLE (*a*) *opposite :*—
EXAMPLE (*a*).—Having 2·83 spirit @ 20 o.p., find the balance of *water* required to make up 4 gallons @ 15 u.p.—*allowing for contraction in bulk.*

Answer 1·21

[or, 1 gall. 1 pint, 2½ quarterns].
See page 19.

SETTING ON RULE:—

G	Section No. 1 / 15 u.p.	Spirit 2·83	G
H	35	Water 1·21	H

KEY. 20+15=35. We therefore set 35 to 15 u.p. in section No. 1; then under 2·83 we find 1·21, the *true* water required.

[The "Contraction" therefore = 1 quartern.]

* Set the *difference* instead of the *sum* when reducing from u.p. to a further degree u.p. *See page 21.*

EXAMPLE .(b).—How much spirit must be drawn off from a cask containing say 60¼ gallons @ 6 o.p. so that, *when replaced with water*, there may remain say 60 gallons @ 21 u.p. ?

Answer: Draw off 15¾ gallons, Leaving in the Cask 44¾ gallons.

SETTING ON RULE:—

| AA 6 o.p. | Bulk 60 A |
| BB 21 u.p. | Spirit 44¼ B |

KEY.—We set 21 u.p. to 6 o.p.; then under 60 gallons, the required total bulk, we find 44¾ gallons, the proportion of spirit required.

Referring to EXAMPLE (b) *opposite* :—

Having 44¾ gallons of spirit @ 6 o.p , find the balance of water required to make up 60 gallons @ 21 u.p., *allowing for contraction in bulk.*

Answer 15·9 gallons,

[or 15 gallons 7¼ pints.]

SETTING ON RULE: -

| G | 21 u p. | Spirit 44¾ G |
| H | 27 | Water 15·9 H |

KEY. 6+21=27. We therefore set 27 to 21 u.p. at the middle position; then under 44¾ we find 15·9, the *true* water required.

[The " Contraction " therefore = 5¼ pints.]

GENERAL EXERCISES.

Strength of the Spirit used.	Required Strength.	Quantity to be Made up.	True Proportions. ✻		Extent of Contraction. ✻
			Spirit.	Water.	
		Gallons.	Gallons.	Gallons.	Gallons.
21 o.p.	18 u.p.	25	16·95	8·35	0·30
2 o.p.	17 u.p.	5	4·07	0·97	0·04
2 u.p.	20 u.p.	2	1·63	0·38	0·01
24·2 o.p.	Proof	60	48·25	12·30	0·55
34 o p.	10 u.p.	50	33·58	17·30	0·88
60 o.p.	Proof	50	31·25	20·20	1·45

NOTE.—*When only a small quantity is required to be made up, say ½ a gallon, or a gallon, or any even quantity up to 4 gallons, for which standard measures are provided, the most convenient way is to put the ascertained proportion of spirit into the proper measure, and fill up with water—the contraction being met in the act of filling. But when a large quantity is required to be made up, necessitating the use of a cask, proportion the spirit and water separately, as indicated above.*

✻ The results are here expressed in gallons and hundredths of a gallon. The equivalents in *pints* are found by line L on the Rule, or by reference to page 19.

REDUCING.—*Continued.*

SPECIAL.

REDUCING FROM O.P. TO O.P.; OR BELOW 35 U.P.

METHOD.—*Set the difference of the two strengths* on B to the Lower-Strength-Factor on A; then under the quantity of spirit will appear the true water required, allowing for contraction in bulk.*

EXAMPLE (*a*) —*How much water is required to reduce 78½ gallons of spirit from 60 o.p. to 35 o.p. ?*

Answer 15·6 Gallons.

SETTING ON RULE :—

A 126	Lower Strength Factor.	Spirit 78½ A
B 25	Difference of Strengths	Water 15·6 B

KEY. 160—135=25. The Lower-strength-factor is 126. We therefore set 25 to 126 ; then under 78½ gallons we find 15·6 gallons, the *true* water required.

EXAMPLE (*c*).—*How much water is required to reduce 58 gallons of spirit from 42 o.p. to 30 o.p. ?*

Answer 5·7 Gallons.

SETTING ON RULE:—

A 122	Lower Strength Factor.	Spirit 58 A
B 12	Difference of Strengths.	Water 5·7 B

Key. 142—130=12. The Lower-strength factor is 122. We therefore set 12 to 122 ; then under 58 gallons we find 5·7 gallons, the *true* water required.

EXAMPLE (*b*).—*How much water is required to reduce 140 gallons of spirit from 10 o.p. to 40 u.p. ?*

Answer 119 Gallons.

SETTING ON RULE: -

A 586	Lower Strength Factor.	Spirit 140 A
B 50	Difference of Strengths.	Water 119 B

KEY. 110—60=50. The Lower-strength-factor is 586. We therefore set 50 to 586 ; then under 140 gallons we find 119 gallons, the *true* water required.

EXAMPLE (*d*).—*How much water is required to reduce 41·7 gallons of spirit from 5 u.p to 45 u.p. ?*

Answer 30·6 Gallons.

SETTING ON RULE:—

A 543	Lower Strength Factor.	Spirit 41·7 A
B 40	Difference of Strengths.	Water 30·6 B

KEY. 95—55=40. The Lower-strength-factor is 543. We therefore set 40 to 543 ; then under 41·7 gallons we find 30·6 gallons, the *true* water required.

**Express all strengths in the percentage form. Thus, "proof" being 100, "overproof" is 100 plus the o.p.; "underproof" is 100 minus the u.p. For instance, 60 o.p. would be expressed 160; 35 o.p. as 135. Similarly, 36 u.p. would be expressed 64; 40 u.p. as 60; 45 u.p. as 55; 50 u.p. as 50; and so on.*

Lower Strength.	FACTORS.									
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
O P. 50	137	138	139	140	141	142	143	144	144	145
40	130	131	132	133	133	134	135	135	136	137
30	122	123	124	124	125	126	126	127	128	129
20	113	114	115	116	117	—	118	119	120	121
10	105	—	106	107	108	109	110	111	112	113
0	—	96	97	98	99	100	101	102	103	104
U.P. 30	—	—	—	—	—	—	625	615	605	595
40	586	575	570	563	553	543	533	522	511	500
50	490	480	470	461	452	443	433	423	414	404

EXERCISES.

EXAMPLE.	Quantity of Spirit.	To be Reduced.		True Water Required	Apparent Bulk Measure	✻ True Bulk Measure.	✻ Extent of Con- traction.
		From	To				
	Gallons.			Gallons.	Gallons	Gallons.	Gallons.
(a)	78½	60 o.p.	35 o.p.	15·6	94·1	93·0	1·1
(b)	140	10 o.p.	40 u.p.	119·0	259·0	256·6	2·4
(c)	58	42 o.p.	30 o.p.	5·7	63·7	63·3	0·4
(d)	41·7	5 u.p.	45 u.p.	30·6	72·3	72·0	0·3
(e)	25	17 u p.	50 u.p.	16·8	41·8	41·5	0·3
(f)	80	68 o.p.	56 o.p.	6·7	86·7	86·1	0·6
(g)	120	30 o.p.	10 o.p.	22·8	142·8	141·9	0·9
(h)	51·5	20 o.p.	40 u.p.	52·5	104·0	103·0	1·0

NOTES.

* To ascertain the true bulk measure of the mixture, and the consequent contraction : *Set the reduced strength per cent. on* B *to the original strength per cent. on* A, *and read the result over the original quantity of spirit.* For instance, take example (*a*) above—viz. 78½ gallons reduced from **60** o.p. to 35 o.p. The true bulk measure in this case is 93 gallons. Found thus :—

A **160**	Original strength per cent.	True bulk 93 A
B **135**	Reduced Strength per cent.	Spirit 78½ B

REDUCING.—*Continued.*

SPECIAL FOR DISTILLERS, COMPOUNDERS AND RECTIFIERS.

REDUCING TO 11 O.P. AND 25 O.P.

On line G are placed *six* dots, in two groups of three each.

The first group is situated between 10 and 11, and is called the "11 o.p. group."

The second group is situated between 11 and 12, and is called the "25 o.p. group."

Their purpose is to show the water required to reduce spirits to the regulation strengths of 11 o.p. and 25 o.p. respectively.

The dot is said to be in the 1st, 2nd, or 3rd position, according to the place it occupies in the group.

METHOD.—*Set the difference of the two strengths on* H *to the proper group-position on* G*. *Then under the quantity of spirit will appear the true water required—allowing for contraction in bulk.*

* ⎰ Set to the 1st position if the initial strength is 60 o.p. and over.
* ⎨ Set to the 2nd position if the initial strength is 45 o.p. and over.
* ⎱ Set to the 3rd position if the initial strength is under 45 o.p.

EXAMPLE (*a*).—How much water is required to reduce 500 gallons of spirit from 65 o.p. to 11 o.p.?

Answer, 262 gallons.

G	. . .	Spirit 500	G
H 54		Water 262	H

KEY. 65—11=54. We therefore set 54 to the *1st position* in the "11 o.p. group"; then under 500 gallons we find 262, the *true* water required.

EXAMPLE (*b*).—How much water is require to reduce 500 gallons of spirit from 65 o.p. to 25 o.p.?

Answer 174 gallons.

G	. . .	Spirit 500	G
H 40		Water 174	H

KEY. 65—25=40. We therefore set 40 to the *1st position* in the "25 o.p. group"; then under 500 gallons we find 174, the *true* water required.

EXAMPLE (c).—How much water is required to reduce 500 gallons of spirit from 50 o.p. to 11 o.p. ?

Answer 188 gallons.

G . . .	Spirit 500 G
H 39	Water 188 H

KEY. 50−11=39. We therefore set 39 to the *2nd position* in the " 11 o.p. group "; then under 500 gallons we find 188, the *true* water required.

EXAMPLE (d).—How much water is required to reduce 500 gallons of spirit from 50 o.p. to 25 o.p. ?

Answer 108 gallons.

G . . .	Spirit 500 G
H 25	Water 108 H

KEY. 50−25=25. We therefore set 25 to the *2nd position* in the " 25 o.p. group "; then under 500 gallons we find 108, the *true* water required.

EXAMPLE (e).—How much water is required to reduce 500 gallons of spirit from 30 o.p. to 11 o.p. ?

Answer 90·4 gallons.

G . . .	Spirit 500 G
H 19	Water 90·4 H

KEY. 30−11=19. We therefore set 19 to the *3rd position* in the " 11 o.p. group "; then under 500 gallons we find 90·4, the *true* water required

EXAMPLE (f). How much water is required to reduce 500 gallons of spirit from 30 o.p. to 25 o.p. ?

Answer 21·3 gallons.

G . . .	Spirit 500 G
H 5	Water 21·3 H

KEY. 30—25=5. We therefore set 5 to the *3rd position* in the " 25 o.p. group "; then under 500 gallons we find 21·3, the *true* water required.

EXERCISES.

STRENGTH.		QUANTITY.		BULK.		Extent of Contraction
Present Strength.	Required Strength.	Spirit.	True Water Required.	Apparent Bulk.	True Bulk. *	
O.P.	O.P.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
64	11	500	257·0	757·0	738·8	18·2
66	25	1250	445·0	1695·0	1660·0	35·0
52	25	420	98·0	518·0	510·8	7·2
18	11	280	18·6	298·6	297·7	0·9

✻ To find True Bulk, see page 79.

REDUCING.

SPECIAL FOR GAY-LUSSAC'S HYDROMETER.

METHOD.—*Set the difference of the two strengths on B to the Lower-Strength Factor on* A*; then under the quantity of spirit in litres will appear the true water required in litres—allowing for contraction in bulk.*

LOWER STRENGTH.		FACTORS.									
		0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Gay-Lussac	**70**	660	669	678	687	696	705	714	723	732	741
	60	570	579	588	597	606	615	624	633	642	651
	50	480	489	498	507	516	525	534	543	552	561
	40	390	399	408	417	426	435	444	453	462	471
	30	290	300	310	320	330	340	350	360	370	380

EXAMPLE (*a*).—*How much water is required to reduce 545 litres of spirit from 75 to 50 Gay-Lussac ?*

Answer 284 litres.

SETTING ON RULE:—

A	480	Lower Strength Factor.	Spirit 545 A
B	25	Difference of Strengths.	Water 284 B

KEY. 75—50 = 25. The lower-strength factor is 480. We therefore set 25 to 480 ; then under 545 litres we find 284 litres, the true water required.

EXAMPLE (*b*).—*How much water is required to reduce 280 litres of spirit from 80 to 60 Gay-Lussac ?*

Answer 98 litres.

SETTING ON RULE:—

A	570	Lower Strength Factor.	Spirit 280 A
B	20	Difference of Strengths.	Water 98 B

KEY. 80—60 = 20. The lower-strength factor is 570. We therefore set 20 to 570 ; then under 280 litres we find 98 litres, the true water required.

EXERCISES.

EXAMPLE	Quantity of Spirit. Litres.	To be Reduced		True Water Required. Litres.	Apparent Bulk Measure. Litres.	※ True Bulk Measure. Litres.	※ Extent of Contraction. Litres.
		From	To				
a	545	75	50	284	829	820	9
b	280	80	60	98	378	373	5
c	126	73	55	43	169	167	2
d	500	68	48	216	716	709	7
e	1000	69	47	483	1483	1468	15

※ To ascertain the true bulk measure, and the consequent extent of contraction: *Set the reduced strength on* B *to the original strength on* A, *and read the result over the original quantity of spirit.* For instance, take example (*a*) above—viz. 545 litres reduced from 75 to 50. The true bulk measure in this case is 820 litres. Found thus :—

A	75 Original Strength	Bulk 820 A
B	50 Reduced Strength	Spirit 545 B

FOREIGN GAUGING.—Contenting.

[.*. The Rule, used in conjunction with the Table of Factors given below, calculates the capacities of casks in litres from dimensions taken in centimetres. The general gauging directions on pages 42 and 43 are equally applicable here—except, of course, that the scale of allowances given must be made to correspond with the new unit of measurement: remembering that one-tenth of an inch is equivalent to ·254 centimetre. Bearing in mind, however, that a well-proportioned cask with a full quarter requires no allowance, while 4% off the length would probably be sufficient to meet the demands of the worst cask dealt with in ordinary practice, it will be seen that the scale, after all, fluctuates within circumscribed limits, and only needs the exercise of a little care to ensure successful application.]

Diameters in Centimetres	0	1	2	3	4	5	6	7	8	9	Diameters in Centimetres
20 Head	·1040	·1149	·1261	·1381	·1506	·1636	·1769	·1897	·2040	·2192	Head 20
20 Bung	·2080	·2298	·2522	·2762	·3012	·3272	·3538	·3794	·4080	·4384	Bung 20
30 Head	·2349	·2510	·2678	·2852	·3028	·3213	·3389	·3568	·3745	·3949	Head 30
30 Bung	·4698	·5020	·5356	·5704	·6056	·6426	·6778	·7136	·7490	·7898	Bung 30
40 Head	·4165	·4372	·4602	·4819	·5050	·5285	·5528	·5773	·6027	·6284	Bung 40
40 Bung	·8330	·8744	·9204	·9638	1·0100	1·0570	1·1056	1·1546	1·2054	1·2568	Bung 40
50 Head	·6547	·6817	·7090	·7299	·7619	·7871	·8166	·8466	·8770	·9081	Head 50
50 Bung	1·3194	1·3634	1·4180	1·4598	1·5238	1·5742	1·6332	1·6932	1·7540	1·8162	Head 50
60 Head	·9397	·9719	1·0044	1·0377	1·0714	1·1057	1·1318	1·1670	1·2070	1·2482	Bung 50
60 Bung	1·8794	1·9438	2·0088	2·0754	2·1428	2·2114	2·2636	2·3340	2·4140	2·4964	Head 60
70 Head	1·2794	1·3227	1·3513	1·3945	1·4385	1·4783	1·5084	1·5387	1·5902	1·6218	Bung 60
70 Bung	2·5588	2·6454	2·7026	2·7890	2·8770	2·9566	3·0168	3·0774	3·1804	3·2636	Head 70
80 Head	1·6742	1·7169	1·7580	1·8012	1·8486	1·8924	1·9390	1·9733	2·0197	2·0729	Head 70
80 Bung	3·3484	3·4338	3·5160	3·6024	3·6972	3·7848	3·8780	3·9466	4·0396	4·1458	Bung 70
90 Head	2·1024	2·1624	2·2049	2·2611	2·3098	2·3492	2·3979	2·4500	2·5009	2·5661	Bung 80
90 Bung	4·2048	4·3248	4·4097	4·5222	4·6196	4·6984	4·7958	4·9000	5·0018	5·1322	Head 90
100 Head	2·6018	2·6726	2·7133	2·7677	2·8227	2·8663	2·9335	2·9907	3·0579	3·1200	Bung 90
100 Bung	5·2036	5·3452	5·4266	5·5354	5·6454	5·7326	5·8670	5·9814	6·1158	6·2400	Head 100
											Bung 100

METHOD:—*Set the sum of the two Factors to 10 on line A; then under the length will appear the content or capacity of the Cask.*

EXAMPLE (a).—Find the capacity of a Brandy Hogshead from the following dimensions:—

Length. Centimetres.	Head. Centimetres.	Bung. Centimetres.
86	57	66

Answer 267 litres.

SETTING ON RULE:—

A 86 Length	10 A
B 267 Capacity	3·11 B

KEY.—The head factor = ·8466
The bung factor = 2·2636

3·1102

Setting this 3·11 to 10 on Line A, we find that 86 cm. length = 267 litres capacity.

EXAMPLE (b).—Find the capacity of a Claret Hogshead from the following dimensions:—

Length. Centimetres.	Head. Centimetres.	Bung. Centimetres.
74	56	64

Answer 218 litres.

SETTING ON RULE:—

A 74 Length	10 A
B 218 Capacity	2·95 B

KEY.—The head factor = ·8166
The bung factor = 2·1428

2·9594

Setting this 2·95 to 10 on line A, we find that 74 cm. length = 218 litres capacity.

NOTE.—*If the diameters are greater than 100 centimetres, halve them and quadruple the results. Thus, suppose 140 Head, 200 Bung. Halving them we get 70 Head, 100 Bung—the factors for which amount to 6·4830. Multiplying by 4 we get 25·9320, the true sum.*

FOREIGN GAUGING.—Ullaging.

LYING CASKS.—*Set the Bung-Diameter on* C *to* 100 *on* D ; *then under the Wet will appear the Segment. Set this Segment to either of the two 10's on line* A ; *then under the Capacity in litres will appear the Ullage-quantity in litres.*

STANDING CASKS.—*Set the Length on* C *to* 100 *on* E ; *then under the Wet will appear the Segment. Set this Segment to either of the two 10's on line* A ; *then under the Capacity in litres will appear the Ullage-quantity in litres.*

EXAMPLE.—Find the Ullage of a Lying Cask from the following particulars :—

Bung. Centimetres.	Wet. Centimetres.	Content. Litres.
52	34	136

Answer 96½ litres.

EXAMPLE.—Find the Ullage of a Standing Cask from the following particulars :—

Length. Centimetres.	Wet. Centimetres.	Content. Litres.
86	50	272

Answer 159 litres.

SETTINGS ON RULE:—

1st

C 34 Wet	Bung 52 C
D 71 Segment	100 D

2nd

A 136 Content	10 A
B 96½ Ullage	Segment 71 B

SETTINGS ON RULE:—

1st

C 50 Wet	Length 86 C
E 58½ Segment	100 E

2nd

A 272 Content	10 A
B 159 Ullage	Segment 58½ B

KEY.—We set the Bung 52 to 100 on D, and find that Wet 34 shows 71 segment. Setting this segment to 10 on line A, we find that 136 litres content gives 96½ litres ullage.

[See footnote ✤ below.]

KEY.—We set the Length 86 to 100 on E, and find that Wet 50 shows 58½ segment. Setting this segment to 10 on line A, we find that 272 litres content gives 159 litres ullage.

[See footnote † below.]

Bung. Centimetres	Wet. Centimetres	Content. Litres.	Ullage. Litres.
66	50	273	227
53	34	127	88
88	77	500	472

Length. Centimetres	Wet. Centimetres	Content. Litres.	Ullage. Litres.
71	46	140	92½
124	82	546	367
83	63½	255	202

NOTE.—When reading quantities on rule over 100 litres, observe the directions given on page 3. Thus, by mentally adding a nought, or removing a decimal point, we multiply the figures tenfold. Thus, 1 becomes 10, 10 becomes 100, 100 becomes 1000. Similarly, 10·4 becomes 104, 11 becomes 110, 12·6 becomes 126, 2 becomes 20 or 200; and so on.

✤ The foregoing remarks equally apply to line C. For instance, if the length or diameter of a Cask is over 60 centimetres, the series may be continued by starting afresh from the figure 6. Thus, 6·1 becomes 61, 7 becomes 70, 9 becomes 90, 10 becomes 100, 12 becomes 120; and so on.

† In this way, if we have, say, 86 length 50 wet, we read as though it were 8·6 length 5·0 wet.

WEIGHING.

METHOD :—*Ascertain from line F the number of lbs.
per gallon corresponding to the hydrometer
strength. Set this result to 10 on line A;
then over the total net pounds will be found
the quantity in the Cask.* ❊

EXAMPLE (a).—Find the content
of a cask of spirits from the follow-
ing particulars :—

Net Weight.				Hydrometer Strength.
Cwt.	Qrs.	Lbs.	Pounds.	
2 :	3 :	5	or 313	@ Proof.

Answer 34 gallons.

SETTING ON RULE.—

Line F	Proof.
	9·187 lbs.

A 34 gallons	10 A
B 313 lbs.	9·187 B

KEY.—Line F tells us that spirit
@ Proof weighs 9·187 lbs. per gallon.
Setting this 9·187 to 10 on line A,
we find that 313 lbs = 34 gallons.

EXAMPLE (b).—Find the content
of a cask of spirits from the follow-
ing particulars :—

Net Weight.				Hydrometer Strength.
Cwt.	Qrs.	Lbs.	Pounds.	
4 :	2 :	7	or 511	@ 21·0 o p.

Answer 57¼ gallons.

SETTING ON RULE :—

Line F	21 o.p.
	8·911 lbs

A 57¼ gallons	10 A
B 511 lbs.	8·911 B

KEY.—Line F tells us that spirit
@ 21 o.p. weighs 8·911 lbs. per
gallon. Setting this 8·911 to 10 on
line A, we find that 511 lbs. = 57¼
gallons.

EXERCISES.

Gross.	Tare.	Net Weight.	Hyd Strength.	Lbs. per gall.	Gallons.
cwt. qrs. lbs.	cwt. qrs. lbs.	cwt.qrs.lbs. Pounds			
1 : 3 : 1	0 : 1 : 26	1 : 1 : 3 = 143	15·0 u.p.	9·36	15¼
3 : 2 : 19	0 : 2 : 27	2 : 3 : 20 = 328	38·5 o.p.	8·653	37¾
11 : 0 : 22	1 : 2 : 10	9 : 2 : 12 = 1076	23·4 o.p.	8·878	121

❊ *Equally applicable to Jars, Glass Vases, and other vessels. For the
purpose of Stocktaking, mark the Tare on the package, so that it may be
deducted when taking the Gross Weight.*

⁎ Particularly useful on Racking and Blending Floors, where casks
are filled from the Vat, &c. Also invaluable for checking losses in transit
by calculating on the difference between the two gross weights.

SIMPLE INTEREST.

METHOD.—*Set the rate of Interest expressed in shillings to 100 on line* A; *then under the Principal in Pounds will be found the Interest in shillings for one year. Set this result to 365 days; then under any number of days will be found the Interest in shillings and pence.*

EXAMPLE 1.

FIND *the Simple Interest on £75 for 42 days at 2½ per cent.*

Answer 4s. 3d.

SETTING ON RULE.

1st.

A £75 Principal 100 A
B 37·5 Shillings   50 B

2nd.

A 42 Days	Days 365 A
B 4s. 3d.	Shillings 37·5 B

EXPLANATION.

2½ per cent = £2 10s. or 50 Shillings per cent, which we set to 100 on line A. Then under the Principal £75, we find 37·5 shillings, the Interest for one year. We set this result to 365 days, then under 42 days we find 4s. 3d., the Answer.

EXAMPLE 2.

FIND *the Simple Interest on £36 5s. for 184 days at 3½ per cent.*

Answer 12s. 9d.

SETTING ON RULE.

1st.

A £36¼ Principal 100 A
B 25·37 Shillings 70 B

2nd.

A 184 Days	Days 365 A
B 12s. 9d.	Shillings 25·37 A

EXPLANATION.

3½ per cent. = £3 10s. or 70 shillings per cent. which we set to 100 on line A. Then under the Principal £36¼, we find 25·37 shillings, the Interest for one year. We set this result to 365 days, then under 184 days we find 12s. 9d., the Answer

COMPOUND INTEREST.

Years.	2½ per cent.	3 per cent.	3½ per cent.	4 per cent.	4½ per cent.	5 per cent.	6 per cent.	Years.
1	·02500	·03000	·03500	·04000	·04500	·05000	·06000	1
2	·05063	·06090	·07123	·08160	·09203	·10250	·12360	2
3	·07689	·09273	·10872	·12486	·14117	·15763	·19102	3
4	·10381	·12551	·14752	·16986	·19252	·21551	·26248	4
5	·13141	·15927	·18769	·21665	·24618	·27628	·33823	5
6	·15969	·19405	·22926	·26532	·30226	·34010	·41852	6
7	·18869	·22987	·27228	·31593	·36086	·40710	·50363	7
8	·21840	·26677	·31681	·36857	·42210	·47746	·59385	8
9	·24886	·30477	·36290	·42331	·48610	·55133	·68948	9
10	·28008	·34392	·41060	·48024	·55297	·62889	·79085	10
11	·31209	·38423	·45997	·53945	·62285	·71034	·89830	11
12	·34489	·42576	·51107	·60103	·69588	·79586	1·01220	12
13	·37851	·46853	·56396	·66507	·77220	·88565	1·13293	13
14	·41297	·51259	·61869	·73168	·85194	·97993	1·26090	14
15	·44830	·55797	·67535	·80094	·93528	1·07893	1·39656	15
16	·48451	·60471	·73399	·87298	1·02237	1·18287	1·54035	16
17	·52162	·65285	·79468	·94790	1·11331	1·29202	1·69276	17
18	·55966	·70243	·85749	1·02582	1·20848	1·40662	1·85434	18
19	·59865	·75351	·92250	1·10685	1·30786	1·52695	2·02560	19
20	·63862	·80611	·98979	1·19112	1·41171	1·65330	2·20714	20

METHOD:—Set the proper Factor to 10 on line A; then under the Principal in pounds will appear the Compound Interest in pounds and decimal parts.

EXAMPLE (a).— Find the Compound Interest on £75 for 10 years at 2½ per cent. per annum.

Answer £21.

SETTING ON RULE:—

A £75 Principal	10 A
B £21 Compound Interest	Factor 28 B

KEY.—The factor for 10 years at 2½ per cent = ·28008. We therefore set 28 to 10 on line A; then under £75, the Principal, we find £21, the Compound Interest.

EXAMPLE (b).—Find the Compound Interest on £36 5s. for 4 years at 3½ per cent per annum.

Answer £5 6s. 4d.

SETTING ON RULE:—

A £36¼ Principal	10 A
B *£5·32 Compound Interest	Factor 147 B

KEY.—The factor for 4 years at 3½ per cent = ·14752. We therefore set 147 to 10 on line A; then under £36¼, the Principal, we find £5·32* the Compound Interest.

* The Rule here expresses the Answer 5·32, meaning 5 pounds and 32 hundredths of a pound. Any decimal of a pound may be converted to shillings and pence by multiplying by 20 and 12. Thus £5·32 = £5 6s. 4d.