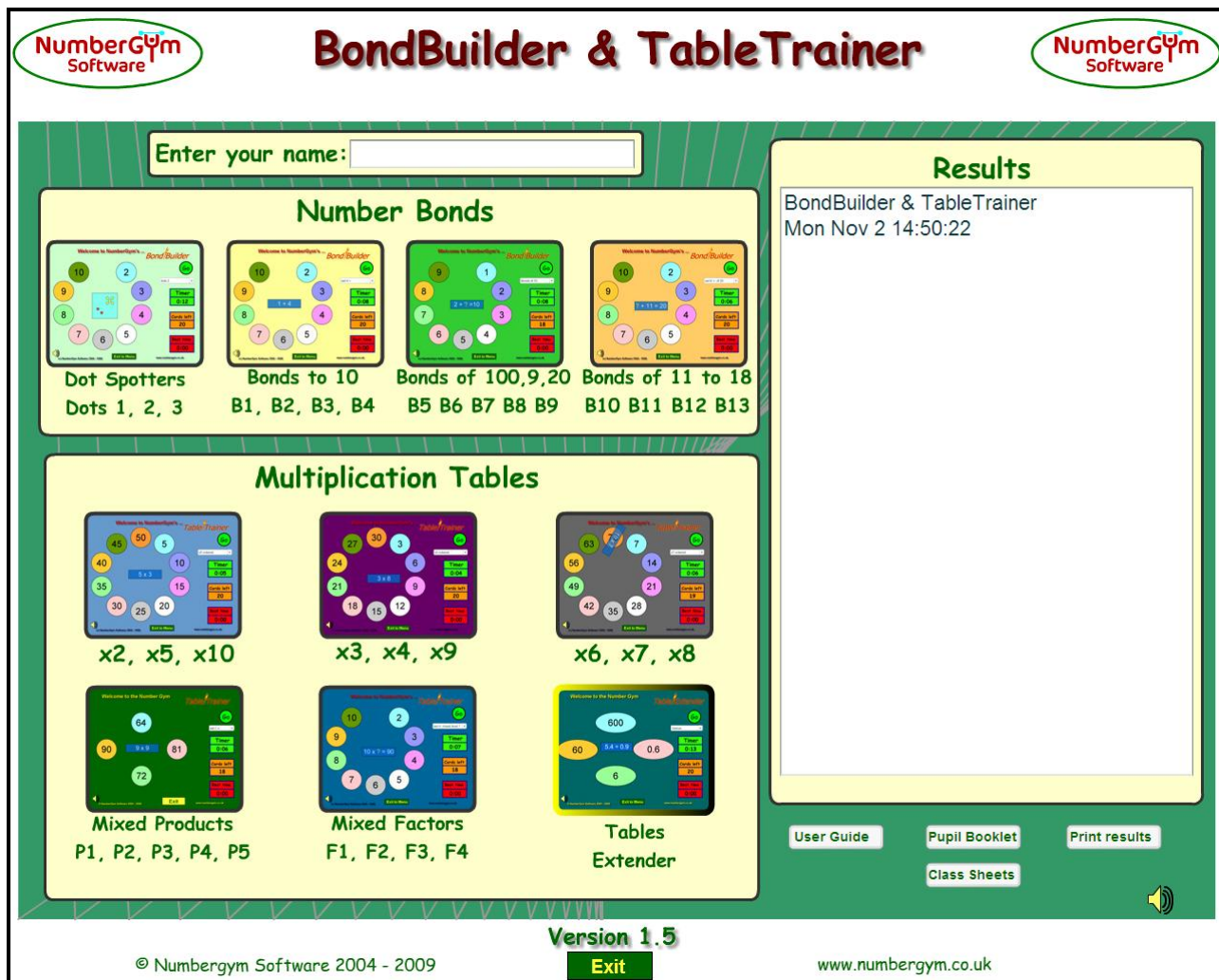




BondBuilder & TableTrainer v1.5

User Guide



What is Bond Builder & Table Trainer?

Based on an original concept by Ian Sugarman, formerly Senior Lecturer in Primary Education, Manchester Metropolitan University, *BondBuilder & TableTrainer* comprises a set of interactive challenges to help pupils learn their basic number facts: both number bonds and multiplication tables. Graded sets of cards have to be sorted against the clock.

How does it work?

Once a particular set of cards has been selected from the drop down menu on the screen, two target times will appear in the top left hand corner.

Target Times

Quick thinking: 1:30

TOTAL RECALL: 1:00

This is intended to act as a motivator to persevere and improve the time taken and also provides recognition of an “interim” level of achievement that some teachers

might want to regard as a satisfactory indicator of the right to proceed to the next level. Many pupils however are perfectly capable of recording the faster time, since recall implies “no thinking time needed” and all that is taking time is the management of the mouse.

Some of the sets require a small amount of information processing e.g. translating a subtraction into a known addition fact, or a division into a tables fact – these have a more generous target time or fewer cards to sort.

Individual and class record sheets are provided via buttons on the main menu to enable teachers and pupils to keep track of their progress. These are provided in spreadsheet format to enable teachers to cut and paste their class-list into the Class Record Sheets.

Pupils enter their name on the menu at the start of a session and their achievements are recorded on the results page for optional printing at the end of the session.

The progressive nature of the sets of cards allows children to progress at a rate that corresponds to their ability and effort. The completion of each level can trigger some recognition of the achievement and pupils can take pride in their progress.

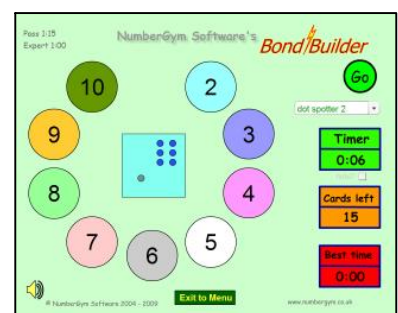
Number facts are basically expressions of a relationship between three numbers. *e.g. the trio of numbers: 3, 5, 8 can be expressed as addition or subtraction facts.*

But a key factor in learning the third number when presented with the other two is to frequently see and hear those three numbers together. This is why children should be encouraged to **say what each card says** and not just look. This way they will get auditory as well as visual and kinaesthetic reinforcement from the activity.

BondBuilder Stage 1 - Dot Spotters

There are 3 of these activities, with an increasing level of challenge.

Numbers are presented not as numerals but as patterned images of dots from 1 to 6 which can soon be recognised immediately without counting – this is called **subitising**. When these images are combined, pupils are encouraged to count on from the larger number rather than count all the dots.



Recognising these spatial representations of numbers, pupils then have to associate them with the image of the written numeral...

e.g. I see six dots and another one, that means I need to drag this card to (the numeral) 7

After regular exposure pupils should begin to

- recognise the images of the dot patterns from 1 to 6, and
- recall the totals of some combinations and not have to count them.

Bond Builder Stage 2 – Bonds up to 10

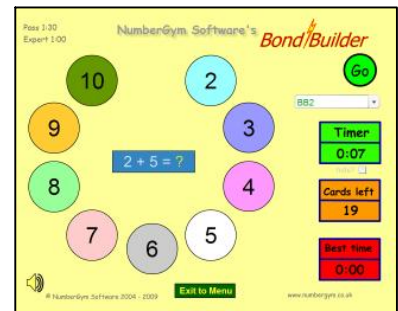
B1 to B4 The dot patterns are now replaced with numerals.

B1 substitutes numerals for the dot combinations.

B2 introduces the idea of a missing number, either as one of the addends or as the sum of the two addends.

B3 extends the application of knowledge of addition facts to solve simple subtractions.

B4 extends the range of facts to all the complements of 10 both as addition and as subtraction facts.



Bond Builder Stage 3 – Specific number bonds

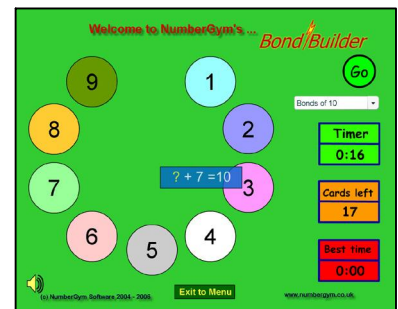
B5 to B9 Here we focus on specific sets of number bonds:

B5: Bonds of 100, in multiples of 10,

B6: Bonds of 9,

B7: Bonds of 100, in multiples of 5,

B8/9: Bonds of 20, in two parts.



Bond Builder Stage 4 – Bonds of 11 to 19

B10 to B13

B10 extends the range of facts to pairs of numbers involving 5, 6 and 7 that sum from 11 to 19. The correct **sum** has to be selected.

B11 applies the addition knowledge gained in **B10** by asking for a missing **bond**.

B12 takes the range a little further to include facts by representing these same facts as **subtractions**.

B13 consolidates these facts by **mixing** the representations of a missing bond with subtractions.

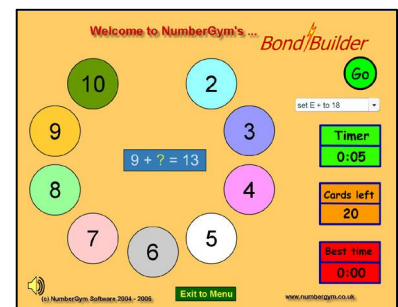


Table Trainer - Specific tables

The multiplication tables from 2 to 10 are presented in groups of 3, corresponding to the order of priority that most schools tend to adopt.

The first group explores the **multiples of 2, 5 and 10** with the products

- arranged in order
- arranged randomly
- as division facts

The second group tackles the **3, 4 and 9** multiplication tables.

The third group, the **6, 7 and 8** multiplication tables.

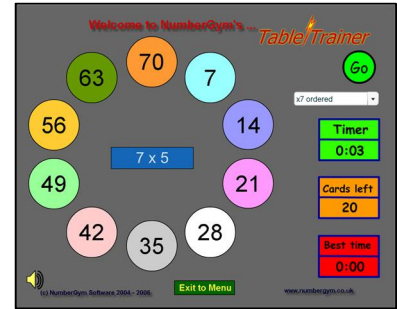


Table Trainer – Mixed Products A (see appendix 1 for data sets)

P1 to P5 Four alternative products are offered and the correct one must be selected.

P1: 2, 5 and 10 times tables.

P2: 3, 4 and 9 times tables.

P3: Divisions of these factors that have **remainders**.

P4: 6, 7 and 8 times tables.

P5: Divisions of these factors that have remainders.

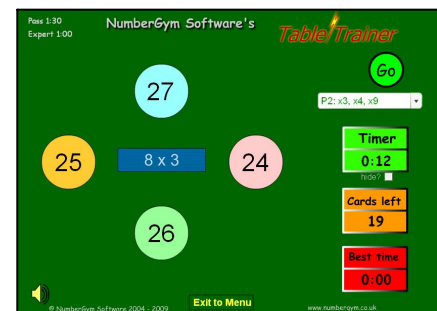
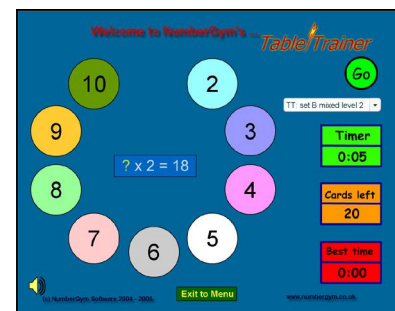


Table Trainer – Mixed Factors (see appendix 1 for data sets)

F1 to F4

These cards replicate those in previous sets but are presented in the form of needing to elicit the **MISSING FACTOR**.

Again we offer a set of division facts and then another smaller set where remainders exist.



NOTE

We would recommend that pupils are encouraged to develop a really thorough knowledge of each set of facts before progressing to the next set. Although it is tempting to allow them to zoom through the levels, when they show enthusiasm, it is important to remind ourselves that we are aiming for an enduring rather than a fleeting knowledge. That is why we recommend that a suitable route for pupils to take through the TableTrainer section is:

P1	F1	P2	F2	P3	P4	F3	F4	P5
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How to teach the multiplication tables

It is perhaps appropriate to offer a reminder here that we see **BondBuilder & TableTrainer** essentially as an instrument for **assessing** pupils' progress in learning basic facts.

Of course, many pupils will also discover that regular use of it will actually develop their knowledge and not simply test it.

But there is great benefit from helping pupils to develop strategies for calculating the answers as opposed to simply recalling them. Many children find memorisation extremely difficult and they need to be offered an alternative if their memory lets them down.

One such way is to use the activity Times Table Challenge from **The Number Gym** menu.

Welcome to the Number Gym

It's time to take the Times Tables Challenge

3 x 4

2 4 8

2			16
3	6		
4	8		
5		20	
6			48
7	14		
8	16		
9			72
10			80

Settings

2 4 8

3 6 9

7 11 12

5 10

ordered random

up to 10x up to 12x

you choose next cell computer chooses

pre-fill some entries?

Done

Timer

0:18

results

swap sides

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Edit to Menu

www.numbergym.co.uk

This important activity allows you to highlight the ways in which particular tables are linked. For example, above, the doubling and halving relationship between the 2, 4 and 8 tables can be highlighted and worked on. For example, if you know that $7 \times 2 = 14$, then this product can be doubled for 7×4 .

Similarly the activity makes it easy for you to establish the relationship between the 3 and 6 times tables.

Teaching the tables in this way should provide an excellent basis for pupils to make progress with their tables knowledge which can be **demonstrated** using **TableTrainer**.

Table Trainer – Extension work

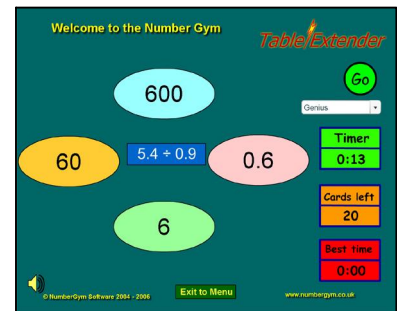
Finally we supply three sets of truly challenging problems where knowing the relevant multiplication tables forms only the first step to the solution.

These sets extend the ability to recall multiplication facts into the ability to use them in the context of Place Value calculations.

Whereas the sets of cards outlined above are intended to encourage committing facts to memory – even to take a guess, hoping that the number that comes to mind is the correct one – these sets of cards require some thought.

The recall of the correct multiplication fact becomes incidental to the ability to reason the place of those digits in the decimal number system.

Consequently the default target time has been extended.



We always welcome suggestions for improving our software and are not averse to receiving compliments.

You can contact us in the following ways:

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phone: +44 (0)1727 759 439

write to:
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Appendix 1 – The Data Sets

Bond Builder Stage 1

Dots 1	Dots 2	Dots 3
1	1, 1	1, 3
2	1, 2	1, 4
3	1, 3	1, 5
4	1, 4	1, 6
5	1, 5	2, 2
6	1, 6	2, 3
1, 1	2, 1	2, 4
2, 1	2, 2	2, 5
3, 1	2, 2	2, 1, 2
4, 1	2, 3	2, 2, 2
	3, 1	3, 3
	3, 2	3, 4
	3, 3	3, 3, 1
	3, 3	4, 2
	4, 1	4, 3
	5, 1	4, 4
	6, 1	4, 2, 1
		5, 5

Bond Builder Stage 2: Bonds up to 10

B1	B2	B3	B4
1 + 4	2 + ? = 5	3 - 1	? + 2 = 10
2 + 1	2 + 5 = ?	4 - 2	? + 3 = 10
2 + 2	2 + 6 = ?	5 - 1	? + 4 = 10
2 + 3	3 + ? = 5	5 - 2	? + 6 = 10
3 + 2	3 + ? = 6	6 - 1	? + 7 = 10
3 + 3	3 + 2 = ?	6 - 2	? + 8 = 10
3 + 5	3 + 4 = ?	6 - 3	3 + ? = 10
4 + 2	4 + ? = 6	6 - 4	4 + ? = 10
4 + 3	4 + ? = 8	7 - 1	5 + ? = 10
4 + 5	4 + 2 = ?	7 - 2	6 + ? = 10
5 + 1	4 + 4 = ?	7 - 5	7 + ? = 10
5 + 2	5 + ? = 10	8 - 1	8 + ? = 10
5 + 3	5 + ? = 7	8 - 2	10 - 2 = ?
5 + 4	5 + ? = 8	8 - 4	10 - 3 = ?
5 + 5	5 + 2 = ?	8 - 6	10 - 4 = ?
6 + 1	6 + 2 = ?	9 - 1	10 - 6 = ?
6 + 2	7 + 1 = ?	9 - 2	10 - 7 = ?
6 + 3	7 + 2 = ?	9 - 3	10 - 8 = ?

Bond Builder Stage 3: Bonds of 100, 9, 20

B5 100 in 10s	B6 Bonds of 9	B7 100 in 5s	B8 20 part 1	B9 20 part 2
$10 + ? = 100$	$1 + ? = 9$	$5 + ? = 100$	$11 + ? = 20$	$1 + ? = 20$
$20 + ? = 100$	$2 + ? = 9$	$15 + ? = 100$	$12 + ? = 20$	$2 + ? = 20$
$30 + ? = 100$	$3 + ? = 9$	$25 + ? = 100$	$13 + ? = 20$	$3 + ? = 20$
$40 + ? = 100$	$4 + ? = 9$	$35 + ? = 100$	$14 + ? = 20$	$4 + ? = 20$
$50 + ? = 100$	$5 + ? = 9$	$45 + ? = 100$	$15 + ? = 20$	$5 + ? = 20$
$60 + ? = 100$	$6 + ? = 9$	$55 + ? = 100$	$16 + ? = 20$	$6 + ? = 20$
$70 + ? = 100$	$7 + ? = 9$	$65 + ? = 100$	$17 + ? = 20$	$7 + ? = 20$
$80 + ? = 100$	$8 + ? = 9$	$75 + ? = 100$	$18 + ? = 20$	$8 + ? = 20$
$90 + ? = 100$	$? + 1 = 9$	$85 + ? = 100$	$19 + ? = 20$	$9 + ? = 20$
$? + 10 = 100$	$? + 2 = 9$	$? + 15 = 100$	$? + 11 = 20$	$? + 1 = 20$
$? + 20 = 100$	$? + 3 = 9$	$? + 25 = 100$	$? + 12 = 20$	$? + 2 = 20$
$? + 30 = 100$	$? + 4 = 9$	$? + 35 = 100$	$? + 13 = 20$	$? + 3 = 20$
$? + 40 = 100$	$? + 5 = 9$	$? + 45 = 100$	$? + 14 = 20$	$? + 4 = 20$
$? + 50 = 100$	$? + 6 = 9$	$? + 55 = 100$	$? + 15 = 20$	$? + 5 = 20$
$? + 60 = 100$	$? + 7 = 9$	$? + 65 = 100$	$? + 16 = 20$	$? + 6 = 20$
$? + 70 = 100$	$? + 8 = 9$	$? + 75 = 100$	$? + 17 = 20$	$? + 7 = 20$
$? + 80 = 100$		$? + 85 = 100$	$? + 18 = 20$	$? + 8 = 20$
$? + 90 = 100$		$? + 95 = 100$	$? + 19 = 20$	$? + 9 = 20$

Bond Builder Stage 4: Bonds of 11 to 18

B10	B11	B12	B13
$4 + 7$	$4 + ? = 12$	$11 - 5$	$6 + ? = 15$
$4 + 9$	$5 + ? = 11$	$12 - 7$	$7 + ? = 15$
$5 + 6$	$5 + ? = 12$	$13 - 4$	$8 + ? = 15$
$5 + 7$	$5 + ? = 13$	$13 - 5$	$9 + ? = 15$
$5 + 8$	$6 + ? = 13$	$13 - 6$	$7 + ? = 16$
$5 + 9$	$6 + ? = 14$	$13 - 7$	$8 + ? = 16$
$6 + 6$	$7 + ? = 12$	$13 - 8$	$9 + ? = 16$
$6 + 7$	$7 + ? = 13$	$13 - 9$	$8 + ? = 17$
$6 + 8$	$8 + ? = 13$	$14 - 7$	$9 + ? = 17$
$7 + 7$	$8 + ? = 14$	$14 - 8$	$15 - 6$
$8 + 7$	$8 + ? = 15$	$14 - 9$	$15 - 7$
$8 + 6$	$9 + ? = 12$	$15 - 6$	$15 - 8$
$8 + 4$	$9 + ? = 13$	$15 - 7$	$15 - 9$
$9 + 9$	$9 + ? = 14$	$15 - 8$	$16 - 7$
$9 + 8$	$9 + ? = 15$	$15 - 9$	$16 - 9$
$9 + 7$	$9 + ? = 16$	$16 - 7$	$17 - 8$
$9 + 6$	$9 + ? = 17$	$16 - 9$	$17 - 9$
$9 + 5$	$9 + ? = 18$	$17 - 9$	$18 - 9$

Table Trainer: Mixed Products

P1 x2,5,10	P2 x3,4,9	P3 remainders	P4 x6,7,8	P5 remainders
2 x 4	3 x 3	16 ÷ 3	4 x 6	64 ÷ 9
6 x 2	3 x 4	20 ÷ 3	6 x 6	74 ÷ 9
7 x 2	6 x 3	9 ÷ 4	7 x 6	48 ÷ 7
8 x 2	7 x 3	13 ÷ 2	8 x 6	85 ÷ 9
2 x 9	8 x 3	14 ÷ 3	6 x 9	58 ÷ 8
3 x 5	3 x 9	15 ÷ 2	9 x 6	59 ÷ 7
5 x 3	4 x 4	23 ÷ 5	6 x 7	65 ÷ 8
5 x 4	5 x 4	32 ÷ 5	7 x 7	74 ÷ 8
4 x 5	4 x 6	42 ÷ 5	7 x 8	56 ÷ 9
5 x 5	7 x 4	23 ÷ 4	7 x 9	48 ÷ 7
5 x 6	8 x 4	30 ÷ 4	4 x 8	39 ÷ 6
5 x 7	9 x 3	27 ÷ 4	8 x 4	59 ÷ 6
5 x 8	9 x 4	23 ÷ 10	9 x 8	
9 x 5	6 x 9	46 ÷ 10	8 x 7	
10 x 4	9 x 7	57 ÷ 10	8 x 8	
2 x 10	9 x 8		9 x 9	
7 x 10	8 x 9		8 x 8	
10 x 8	9 x 9		8 x 9	

Table Trainer: Mixed Factors

F1 x2, 5, 10	F2 x3, 4, 9	F3 x6, 7, 8	F4 ÷4, 6, 7, 8, 9
? x 2 = 6	? x 3 = 12	? x 6 = 24	81 ÷ 9
? x 2 = 8	? x 3 = 18	? x 6 = 36	72 ÷ 9
? x 2 = 12	? x 3 = 21	? x 6 = 42	72 ÷ 8
? x 2 = 14	? x 3 = 24	? x 6 = 48	64 ÷ 8
? x 2 = 16	? x 3 = 27	? x 6 = 54	63 ÷ 7
? x 2 = 18	? x 4 = 12	? x 7 = 21	63 ÷ 9
? x 5 = 15	? x 4 = 16	? x 7 = 28	56 ÷ 7
? x 5 = 20	? x 4 = 24	? x 7 = 42	56 ÷ 8
? x 5 = 25	? x 4 = 28	? x 7 = 49	54 ÷ 9
? x 5 = 30	? x 4 = 32	? x 7 = 56	54 ÷ 6
? x 5 = 35	? x 4 = 36	? x 7 = 63	49 ÷ 7
? x 5 = 40	? x 9 = 27	? x 8 = 16	48 ÷ 6
? x 5 = 45	? x 9 = 36	? x 8 = 24	48 ÷ 8
? x 10 = 40	? x 9 = 45	? x 8 = 32	42 ÷ 7
? x 10 = 60	? x 9 = 54	? x 8 = 40	42 ÷ 6
? x 10 = 70	? x 9 = 63	? x 8 = 56	36 ÷ 6
? x 10 = 80	? x 9 = 72	? x 8 = 64	36 ÷ 4
? x 10 = 90	? x 9 = 81	? x 8 = 72	32 ÷ 4

Table Trainer extension work

Whizz-kid	Clever-clogs	Genius
30 x 4	120 ÷ 4	12 ÷ 0.4
4 x 60	180 ÷ 9	18 ÷ 0.9
3 x 80	150 ÷ 5	15 ÷ 0.5
60 x 3	210 ÷ 7	21 ÷ 0.7
7 x 30	280 ÷ 4	280 ÷ 0.4
70 x 4	320 ÷ 8	320 ÷ 0.8
7 x 80	360 ÷ 4	360 ÷ 0.4
50 x 30	480 ÷ 6	4.8 ÷ 0.6
20 x 40	540 ÷ 9	5.4 ÷ 0.9
80 x 30	560 ÷ 7	1.2 ÷ 0.3
70 x 30	150 ÷ 50	1.5 ÷ 0.5
40 x 90	210 ÷ 70	0.6 x 4
200 x 7	280 ÷ 40	3 x 0.7
6 x 300	320 ÷ 80	5 x 0.4
7 x 600	360 ÷ 90	60 x 0.3
900 x 5	480 ÷ 80	0.7 x 30
700 x 90	540 ÷ 60	20 x 0.04
30 x 500	560 ÷ 70	0.7 x 0.5
6 x 200	270 ÷ 30	0.6 x 0.9
400x 5	630 ÷ 90	0.4 x 700