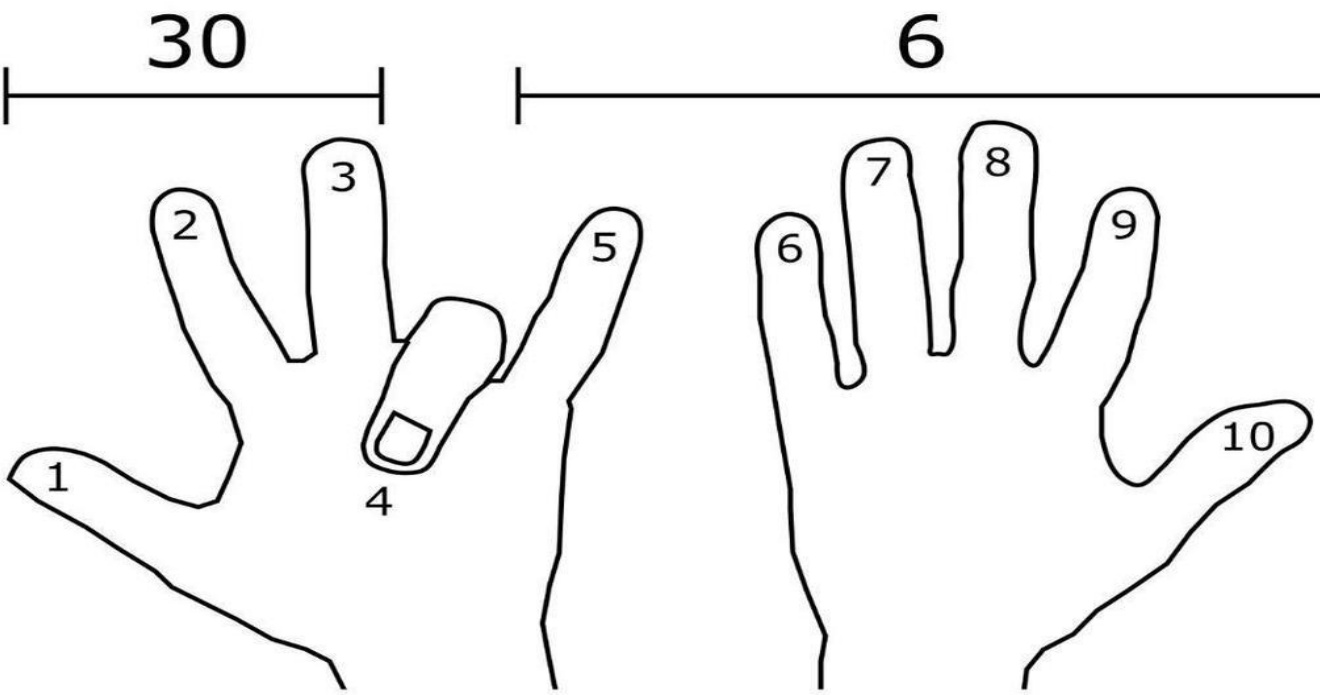
Math Tricks

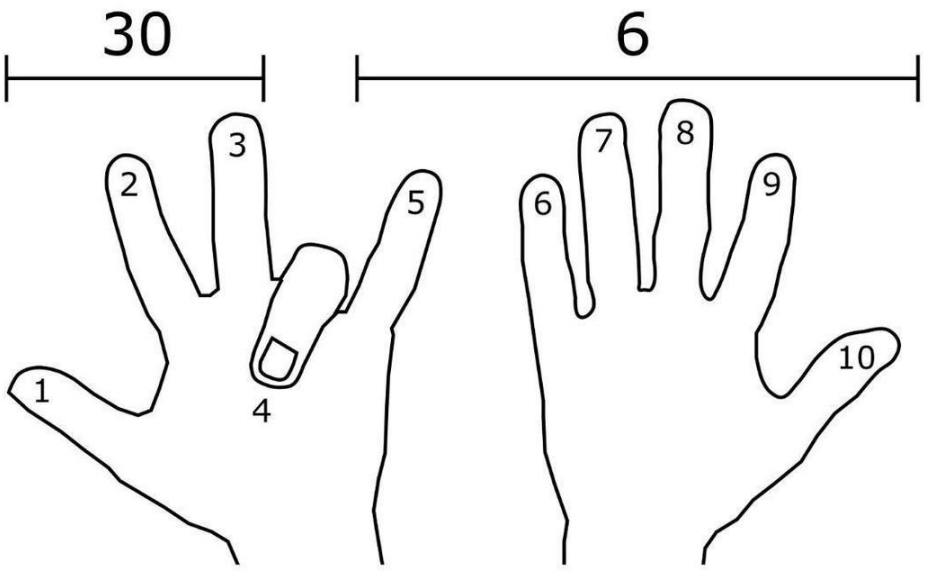


9 x 4 = 36

Fast Math Made Easy

R J Clarke

Math Tricks



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Fast Math Made Easy

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Math Tricks
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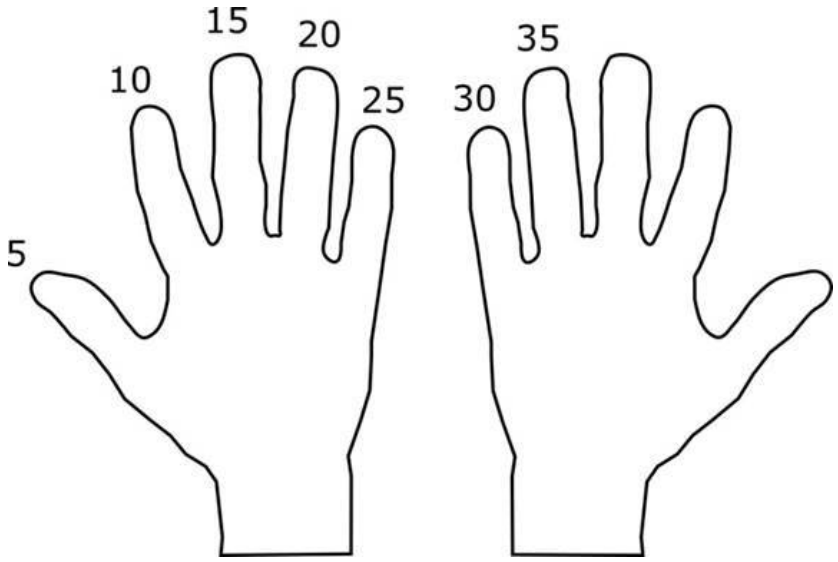
Finger Math Tricks

Finger Skip Counting

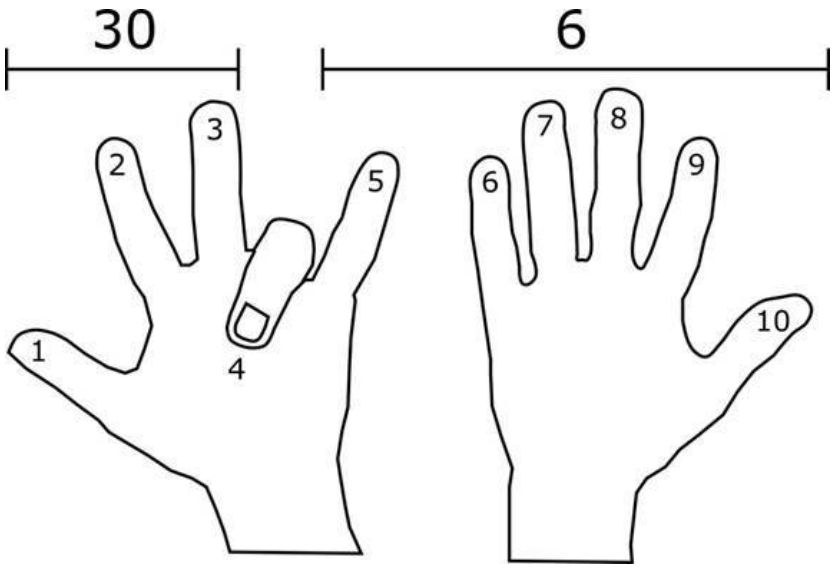
Using your fingers to skip count is an effective way to do the times tables. Start by holding both of your hands out. Then skip count in the first multiple on your fingers. Then you stop skip counting once you reach the finger that equals the second multiple

For example, if we wanted to find the answer to 5 x 7 we would keep adding 5 on each finger and stop on the seventh finger to give the answer 35



Finger 9 Times Table

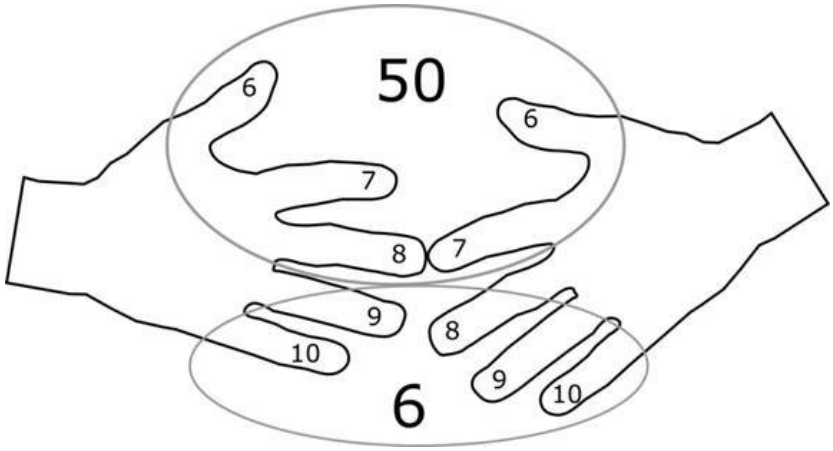
The 9 times table from 1 to 10 can be done on your hands. Simply hold both of your hands in front of you. Then imagine that each finger is numbered from 1 to 10 with the left thumb representing 1 and the right thumb representing 10. If 9 is multiplied by a number, bend the finger that represents it. In the example below, 9 is multiplied by 4 so the fourth finger is bent



To get the answer to 9 x 4, we count the fingers to the left of the bent finger. There are 3 fingers and the answer is in the tens unit so this represents 30. Next, we count the fingers on the right of the bent finger. There are 6 fingers and the answer is in the single units so this represents 6. Put the two together and the answer is 36

Finger 6, 7, 8 , 9 And 10 Times Table

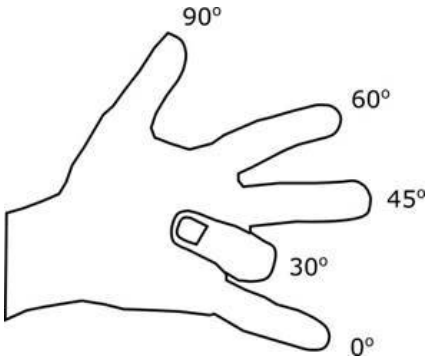
The numbers 6, 7, 8, 9 and 10 can be multiplied with each other using your hands. Begin by holding your hands in front of you so that you can see your palms. Then imagine that the fingers on each hand is numbered from 6 to 10 with 6 on the thumbs and 10 on the little fingers. If a number between 6 and 10 is multiplied by another number between 6 and 10, touch the fingers together to represent them. In the example below, 8 is multiplied by 7 so those fingers are touching



To get the answer to 8 x 7, we count the fingers that are touching as well as those above. There are 5 fingers and the answer is in the tens units so this represents 50. Next, we count the fingers below the touching fingers. There are 2 on the left and 3 on the right. These need to be multiplied together so 2 x 3 = 6. The answer is in the single units so this represents 6. Put the two together and the answer is 56

Finger Trigonometry

To do basic trigonometry on your fingers, start by holding out your left hand and imagine that each finger is numbered in degrees. The thumb represents 90 º whilst the little finger represents 0 º . Then bend the finger that corresponds to the degrees that you want to find out



To find the Sin, do the square root of the number of fingers below the bent finger. Then divide by 2

$\text{Sin}30^{\circ} = \sqrt{1} \div 2$

To find the Cos, do the square root of the number of fingers above the bent finger. Then divide by 2

$\text{Cos}30^{\circ} = \sqrt{3} \div 2$

Tan equals Sin divided by Cos. Therefore to find the Tan, do the square root of the number of fingers below the bent finger. Then divide by the square root of the number of fingers above the bent finger

$\text{Tan}30^{\circ} = \sqrt{1} \div \sqrt{3}$

Multiplication Tricks

Friendlier 5 Times Table

Halve the number that is being multiplied by 5.
Then add a zero on the end

For example:

26 x 5 = ?

$\frac{26}{2} = 13$

Then add a zero on the end to give: **130**

If there is an odd number being multiplied by 5, then you look at the number below to make it an even number. Halve it and then add a five on the end

For example:

23 x 5 = ?

$\frac{22}{2} = 11$

Then add a five on the end to give: **115**

Simpler 6 Times Table

Any even number multiplied by 6 causes the last digit of the answer to be the same

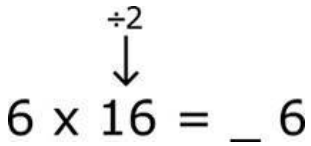
For example:

6 x 2 = 1 2

6 x 4 = 2 4

6 x 6 = 3 6

Now that we know how to find the last digit of the answer, it is time to learn how to find the first digit of the answer. Start by halving the second number so that would be 16 divided by 2 in the example below



Then add the first digit of the second number. In this example, the first digit of 16 is 1 so this number needs to be added to 8

16 / 2 = 8
8 + 1 = **9**

The first digit of the answer is 9. We then put the first and second digits together to give the final answer:

6 x 16 = **96**

Easy 11 Times Table

The easy way to do the 11 times table for small numbers from 1 to 9 is to duplicate the first digit. For example:

3 x 11 = 33
4 x 11 = 44
5 x 11 = 55

With large numbers such as: 34 x 11 = ?
Split the first number in half. For example:

3 _ 4

Then add both of the numbers together (3 + 4 = 7) and then this number goes into the middle

Therefore the answer is 3 7 4

With large numbers such as: 57 x 11 = ?
Split the first number in half. For example:

5 _ 7

5 + 7 = 12

The second digit of 12 stays in the middle.
The first digit is carried over and is added to the 5

Therefore the answer is 6 2 7

12 Times Tables And Beyond

To multiply a number by 12, the first digit of the answer is the same as the number it is being multiplied by. The other digits of the answer can be found by multiplying by 2 (the second digit of 12) and then adding the next digit to it from the right. For example:

321 x 12 = ?

1 st DIGIT: 3 = **3**
2 nd DIGIT: 3 x 2 + 2 = **8**
3 rd DIGIT: 2 x 2 + 1 = **5**
4 th DIGIT: 1 x 2 + 0 = **2**

321 x 12 = **3852**

To multiply by 13, use the same method but multiply by 3 (the second digit of 13) instead. For example:

321 x 13 = ?

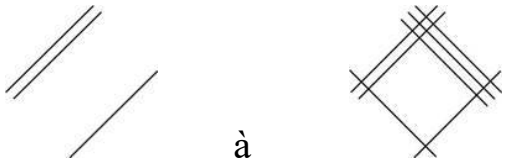
1 st DIGIT: 3 = **3**
2 nd DIGIT: 3 x 3 + 2 = **11**
3 rd DIGIT: 2 x 3 + 1 = **7**
4 th DIGIT: 1 x 3 + 0 = **3**

Since the 2 nd DIGIT answer is a double digit number, carry the first digit of the 11 over to the 1 st DIGIT answer. This gives 3 + 1 = **4**

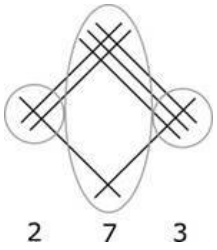
321 x 13 = **4173**

Line Multiplication

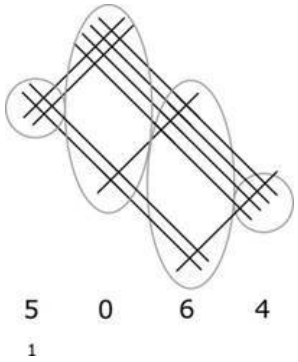
If we have the math problem of 21 x 13 = ?
Start by drawing parallel lines to represent 21. Then draw the lines in the different direction to represent 13



Next, draw a circle to separate the points of interception and count them up, starting from the right

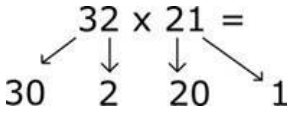


This method can also be used on harder math problems such as: 211 x 24 = ?



Grid Multiplication

The Grid Method can be used when multiplying a two digit number with another two digit number. Start by splitting the numbers into their tens unit. For example:



Draw a grid and fill it in with the numbers we have just got

x	20	1
30		
2		

Fill in the empty squares by multiplying the numbers on the left with the numbers on the top

x	20	1
30	600	30
2	40	2

Use basic math to add the resulting numbers

$$\begin{array}{r} 600 \\ 40 \\ 30 \\ 2 \\ \hline 672 \end{array}$$

Ancient Egyptian Multiplication

Draw two columns underneath the math problem. In the left column, start at 1 and keep doubling until it doesn't exceed the number at the top left (which is 19 in this math problem).

In the second column, keep doubling the top right number (which is 31 in this math problem)

19 x 31	
1	
2	
4	
8	
16	

à

19 x 31	
1	31
2	62
4	124
8	248
16	496

Find the numbers in the left column that will add up to the top left number. For example: 1 + 2 + 16 = 19

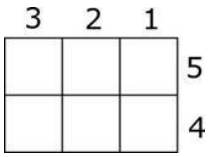
19 x 31	
(1) →	31
(2) →	62
4	124
8	248
(16) →	496

Add the numbers on the right column that correspond to the chosen numbers from the left column

31
62
496
589
1

Lattice Multiplication

If we have the math problem 321 x 54 = ?
Start by drawing a grid so that the number of boxes match the number of digits. Then draw diagonal lines



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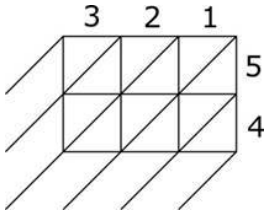
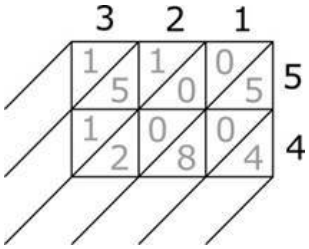
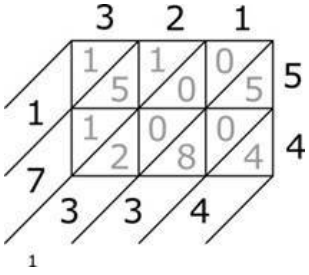


Multiply each number from the top with the number on the right. Put the tens unit in the top half and the single unit in the bottom half e.g. 1 x 5 = 05



Add the numbers up in the diagonal rows, starting from the right hand side and carry numbers if needed



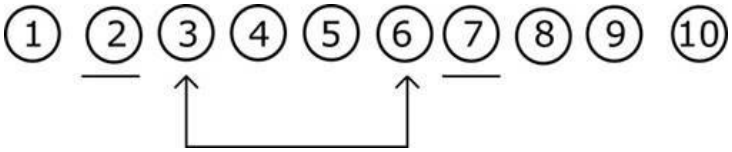
Multiply 2 digit numbers by 9

This method only works if the second digit is bigger than the first digit. For example: 46 x 9 will work but 64 x 9 won't work. Furthermore, if the first and second digits are the same, this method won't work. For example: 99 x 9 won't work

The first digit of the answer is always the same as the first digit of the 2 digit number. For example:

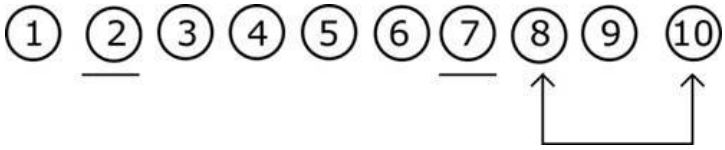
27 x 9 = 2 _ _

The second digit of the answer can be found by either writing or imagining the numbers from 1 to 10 in a horizontal line. Underline the digits belonging to the 2 digit number. Then see how many numbers are between the first and second digits



27 x 9 = 2 4 _

The third digit of the answer can be found by seeing how many digits are to the right of the second digit

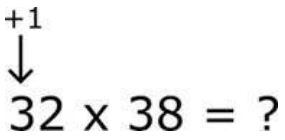


27 x 9 = 2 4 3

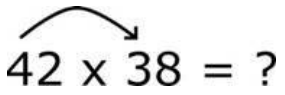
Fast Multiplication Trick

There is a simple trick you can do if you are multiplying two digit numbers together which have the same first digit and the second digits add up to 10

Increase the first digit by 1



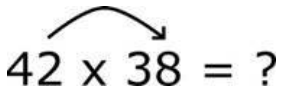
Multiply the first digit of the first number by the first digit of the second number



This gives the first half of the answer: 4 x 3 = 12

1 2 _ _

Next, multiply the second digit of the first number by the second digit of the second number



This gives the second part of the answer: 2 x 8 = 16

_ _ 1 6

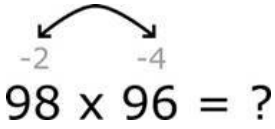
Put the two parts together and you have the answer:
1 2 1 6

Multiplication Near 100

Write above each number its difference from 100

Then to get the first half of the answer, do the sum of the first number with the difference from 100 of the second number. For example: 98 – 4 = **94**

Then to get the second half of the answer, multiply the top numbers together. For example: -2 x -4 = **08**
It is important to use 08 rather than 8 because we are working with 2 digit numbers



Put the two halves together and we have the answer:

98 x 96 = **9408**

This method can also be used when multiplying both numbers above 100. It can also be used when one number is below 100 and the other is above 100

Multiply Numbers With An Even Difference

If you are trying to multiply two different numbers together and the difference between them is an even number, then this method will work

Start by writing down the number that is between the two numbers being multiplied. Then square this number. Next, find the difference from any of the numbers to the middle number. Once you have this, square the number and minus it from the first squared number

Example 1:

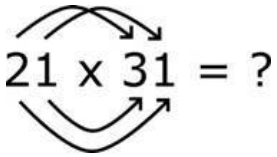
98 x 102 = ?
$100^2 - 2^2 = 9996$

Example 2:

45 x 55 = ?
$50^2 - 5^2 = 2475$

Multiplying Two Digit Numbers

Draw arrows above and below the math problem



Multiply the single digits with the corresponding top arrows:

2 x 3 = 6
1 x 1 = 1

This gives the first and last digit of the answer:

6 _ 1

To solve the middle number, multiply the single digits with the corresponding bottom arrows:

2 x 1 = 2
1 x 3 = 3

Add these together:

2 + 3 = 5

This now gives the middle digit of the answer:

6 5 1

Squaring and CubingTricks

Squaring 2 Digit Numbers Ending in 5

It is possible to square a 2 digit number really fast if its last digit is 5. To get the first half of the answer, multiply the first digit by the first digit plus 1. To get the second half of the answer, multiply the second digit by itself. For example:

$45^2 = ?$

$4(4 + 1) =$ **20**
$5 \times 5 =$ **25**

Put both halves of the answers together:

$45^2 =$ **2025**

Here is another example:

$95^2 = ?$

$9(9 + 1) =$ **90**
$5 \times 5 =$ **25**

Put both halves of the answers together:

$95^2 =$ **9025**

Squaring 3 Digit Numbers

Squaring a 3 digit number can be broken into 3 parts. For the first part, square the first digit. For the second part, multiply the first digit by the second and third digit and then multiply by 2. For the third part, square the second and third digit. If any of those answers are more than 2 digits long, then carry the digit across to the left. Here is an example:

$308^2 = ?$

1 st part: $3^2 =$ **9**
2 nd part: 3 x 8 x 2 = **48**
3 rd part: $8^2 =$ **64**

Put the 3 parts together:

$308^2 =$ **94864**

Here is another example:

$412^2 = ?$

1 st part: $4^2 =$ **16**
2 nd part: 4 x 12 x 2 = **96**
3 rd part: $12^2 =$ **144**

Since the answer in the 3 rd part is more than 2 digits long, the first digit needs to be carried over (1 + 6 = 7)

Put the 3 parts together:

$412^2 =$ **169744**

Cubing 2 Digit Numbers

To cube numbers, it helps to use a little bit of algebra. Assign the letter ‘a’ to the first digit and the letter ‘b’ to the second digit

$$\begin{matrix} a & b \\ \searrow & \swarrow \\ & 32^3 \end{matrix}$$

Then assign each digit to the following sequence:
(You may notice the pattern)

$$a^3 \quad a^2b \quad ab^2 \quad b^3$$

Once you solve the equations, the middle numbers need to be multiplied by 2. Then start from the right hand side and add the numbers vertically. So 8 can go straight down below the line. Then 12 + 24 = 36. Write 6 below the line and carry the 3 over. Then 18 + 36 = 54. Add 3 to this equals 57. Write 7 below the line and carry the 5. Then do 27 + 5 = 32 and write this below the line to give the answer: 32,768

3^3	3^2x2	$3x2^2$	2^3
27	18	12	8
	⊗2	⊗2	
	36	24	

3	2	7	6	8
	5	3		

Division Tricks

Checking Dividable Numbers

To check if a number is evenly dividable by 3, simply add each digit and divide that total by 3. For example:

Is 41566 evenly dividable by 3?

4 + 1 + 5 + 6 + 6 = 22
22 is not dividable by 3 so 41566 is not dividable by 3

To check if a number is evenly dividable by 4, simply look at the last 2 digits and divide them by 4. For example:

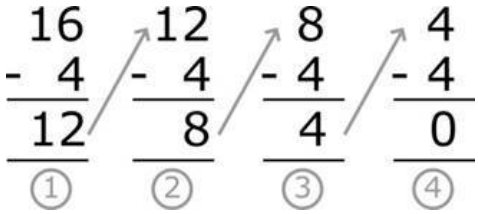
Is 38512 evenly dividable by 4?

12 is dividable by 4 so 38512 is dividable by 4

Division By Subtracting

To divide a number by using subtraction, you need to count the number of times you can subtract until the number reaches zero

In this example, 16 can be subtracted by 4 a total of 4 times until it reaches 0. Therefore, 16 dived by 4 equals 4



Dividing By 5

Any number can easily and quickly be divided by 5 by using this method. In the example, begin by multiplying both the top and bottom numbers by 2

$$\frac{62}{5}\ \begin{matrix}(x2)\\(x2)\end{matrix} \quad \text{à} \quad \frac{124}{10} = ?$$

Then delete the bottom number. Since we are now dividing by 10, move the decimal place of the top number by one place to the left to give the answer of 12.4

This method can also work when dividing by other numbers. This is how we could divide by 20:

$$\frac{70}{20}\ \begin{matrix}(x5)\\(x5)\end{matrix} \quad \text{à} \quad \frac{350}{100} = ?$$

Then delete the bottom number. Since we are now dividing by 100, move the decimal place of the top number by two places to the left to give the answer of 3.50

Dividing By 9

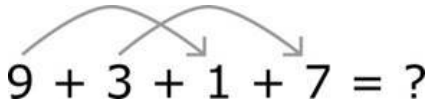
Any number can easily be divided by 9 with this method. In the example, begin by writing the same number as the first digit, which gives 3. Then do 3 + 5 = 8 and write this as the second digit of the answer. Then do 8 + 7 = 15 and write the 1 above the 8 and write the 5 as the third digit of the answer. Then do 15 + 9 = 24 and write 2 above the 5 and write 4 as the fourth digit of the answer. Lastly, do 24 + 3 = 27 and this is written as the remainder. You then need to do 27 divided by 9. This equals 3 so write this above the last digit of the answer. If the remainder didn't divide perfectly, write the whole number that did and what's left will be a remainder at the final answer

Finally, add the digits above the answer to those underneath them to give the final answer. In the example, you will need to do 1 + 8 = 9, 2 + 5 = 7 and 3 + 4 = 7

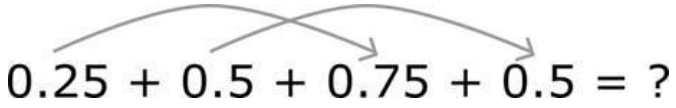
Addition Tricks

Addition By Grouping

Addition can be easier to do if you group numbers together that would add up to 10. In the example below, 9 + 1 = 10 and 3 + 7 = 10. This can then be easily added up to give 20



This method can also be used when adding decimal numbers. For example:



Addition Without Carrying

Most people are taught to add numbers from the right to the left. Unfortunately, this method often creates the need to carry a number over if the sum is over 9

$$\begin{array}{r} 25 \\ +\ 46 \\ \hline 71 \\ \hline {\scriptstyle 1} \end{array}$$

A different method is to add the numbers from the left to the right. This eliminates the need to carry numbers over

The numbers on the left side are in the tens column. This means that the 2 represents 20 and the 4 represents 40. Begin by doing the following:

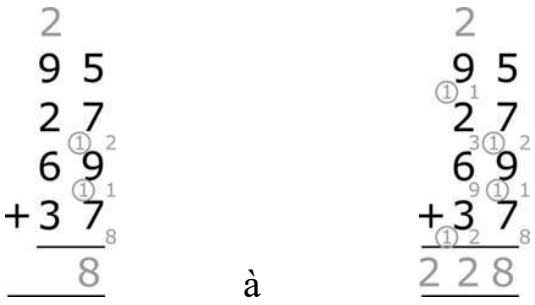
20 + 40 = 60
60 + 5 = 65
65 + 6 = 71

$$\begin{array}{r} 25 \\ +\ 46 \\ \hline 71 \\ \hline \end{array}$$

Addition With Simple Counting

With this addition trick, you only need to be able to count up to 18 to be able to solve any addition problem

In the example, we first look at the right column and do 5 + 7 = 12. Underneath the 7, write 1 and 2. Then you do 2 + 9 = 11 and write it underneath. Then you do 1 + 7 = 8 and write it underneath. The bottom digit on the right is the last digit of the answer. Circle any 1's on the left and count them up. Write the total, which is 2 above the left column



We then look at the left column and continue adding downwards using the same technique. The bottom digit on the right is the second last digit of the answer. Count the 1's and this gives the first digit of the answer

This technique can also be used to add 3 digit numbers and higher as well as long strings of single digit numbers

Addition Shortcut

Adding a series of numbers can be made simpler with this method. Start by adding the first digit of each number and write it down. In the example below, this equals 7

$$2475 + 4921 + 1538 = ?$$

Then add the second digit of each number and write this underneath. You must shift the single digits one place to the right. Repeat this process for the third and fourth digit. Afterwards, add up the numbers to give an answer

$$\begin{array}{r} 7 \\ 18 \\ 12 \\ 14 \\ \hline 8934 \end{array}$$

If there are different sized numbers such as:

5471 + 283 + 16 = ?

Write a zero in front of the digits to make them all the same length. For example:

5471 + 0283 + 0016 = ?

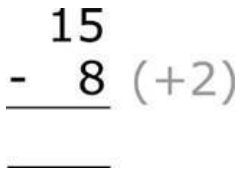
This can then be solved using the method described above

Subtraction Tricks

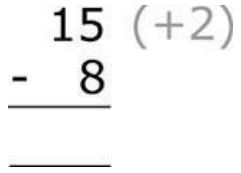
Subtract By Adding

This method works when subtracting a single digit from any teen value

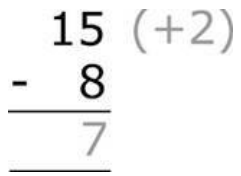
Start by finding the difference of the bottom number to 10. In the example, this is +2



Then move that difference up next to the first number



Then add the difference to the second digit of the first number. In the example, this would be 5 + 2 = 7



Subtracting By Rounding

A quick way of doing subtractions is to round the bottom number up and add on the difference at the end

$$\begin{array}{r} 76 \\ -\ 49 \quad (50) \\ \hline \qquad\ (+1) \\ \hline \end{array}$$

In the example above, you would solve it by doing:

76 – 50 = 26
26 + 1 = 27

$$\begin{array}{r} 76 \\ -\ 49 \quad (50) \\ \hline \ \ 27 \ (+1) \\ \hline \end{array}$$

Subtracting From 1000

To subtract from 1000 the quick and easy way, start by crossing the 1, writing 0 above it and borrowing it to the adjacent 0, thus turning it into a 10. Then cross the 10, write 9 above it and borrow 1 to the adjacent 0, thus turning it into a 10. Then repeat this for the next number on the right

```
  0 9 9
  1 1 1
 1000
-  473
------
```

Then start from the right side and subtract each of the top digits from those below. For example:

10 – 3 = 7
9 – 7 = 2
9 – 4 = 5

```
  0 9 9
  1 1 1
 1000
-  473
------
   527
------
```

To subtract from 10,000 you would simply subtract each digit below from 0, 9, 9, 9, 10

To subtract from 100,000 you would simply subtract each digit below from 0, 9, 9, 9, 9, 10

Subtraction Without Borrowing

Subtracting with large numbers often creates the need to borrow from another number if a number is smaller than what it is trying to take. In the example below you can see that 3 – 2 equals 1. However, 5 - 9 wouldn't go so 1 would need to be borrowed from the 4. This then created 15 – 9 which equals 6. Then 3 – 3 equals 0 and 4 – 2 equals 2

$$\begin{array}{r} {\scriptstyle 3\ 1} \\ 4453 \\ -\ 2392 \\ \hline 2061 \end{array}$$

However, there is a much simpler method that can be used which doesn't require any borrowing. In the example below, you would do 3 – 2 which equals 1. Then you notice that 5 – 9 doesn't go so you then look at the next digit to the left and see that 45 – 39 does go so you write 06. Then it's just 4 – 2 which equals 2

$$\begin{array}{r} 4453 \\ -\ 2392 \\ \hline 2061 \end{array}$$

Super Easy Subtraction

This is an easy subtraction technique that uses a one up, one down method instead of borrowing. If the top number can't take the number underneath it, add a 1 to it to represent a tens unit. Then add a 1 to the number on the left of the bottom number and add them together. Here is an example:

The top 4 can't take the bottom 5 so you need to add a 1 to the 4 to turn it into 14. By doing this, you'll have to put a 1 below next to the 3. This turns that 3 into a 4 because 1 + 3 = 4

$$\begin{array}{r} 5^{1}2^{1}14 \\ -\ 2^{1}635 \\ \hline 9 \end{array}$$

The top 1 can't take the bottom 4 (1 + 3) so add a 1 to the top 1 to turn it into 11. By doing this, you'll have to put a 1 below next to the 6. This turns that 6 into a 7 because 1 + 6 = 7. Repeat the process of one up, one down when a number can't take another number and you will be able to fill in the answer

$$\begin{array}{r} 5^{1}2^{1}14 \\ -\ 2^{1}^{1}635 \\ \hline 79 \end{array} \text{ à } \begin{array}{r} 5^{1}^{1}2^{1}14 \\ -\ 2^{1}^{1}^{1}635 \\ \hline 579 \end{array} \text{ à } \begin{array}{r} 5^{1}^{1}^{1}2^{1}14 \\ -\ 2^{1}^{1}^{1}635 \\ \hline 2579 \end{array}$$

Square and Cube Root Tricks

Quick Square Roots

This square root trick involves knowing the answer to some square roots already. Here is an example of what this trick can be used on:

$$\sqrt{39} = ?$$

To solve the above example, think of a square root that will give a whole number that is less than the square root we are trying to solve

$$\sqrt{36} = 6$$

The answer to this will now give the whole number answer to the square root of 39. To find the remaining fraction, we need to do two things. Firstly, to get the bottom part of the fraction, multiply the 6 that we have just got with 2. Thus, 6 x 2 = 12

$$6\frac{}{12}$$

Secondly, to get the top part of the fraction, find the difference between the whole numbers in the square roots. Therefore, the difference between 39 and 36 equals 3. This can then be written on top of the fraction

$$\sqrt{39} = 6\frac{3}{12}$$

Quick Cube Roots

To find the cube root of a number, you will need to write down or remember the following cubes:

$1^3 = \underline{1}$
$2^3 = \underline{8}$
$3^3 = 2\underline{7}$
$4^3 = 6\underline{4}$
$5^3 = 12\underline{5}$
$6^3 = 21\underline{6}$
$7^3 = 34\underline{3}$
$8^3 = 51\underline{2}$
$9^3 = 72\underline{9}$
$10^3 = 100\underline{0}$

The last digit of the cubed answers above are all underlined because they can be matched with the last digit of the number being cubed. Then the number from the left column is the last digit of the answer

$\sqrt[3]{658503} = \_\,7$

The last 3 digits of the question is always ignored and what is left is circled. Find which cube root from 1 to 10 that the circled number is between. Then out of those 2 numbers, choose the lowest number from the left column to give the first digit of the answer

$\sqrt[3]{658503} = 8\,7$

The answer will always be 2 digits long if the number being cube rooted is between 4 to 6 digits long

Fraction and Percentage Tricks

Subtracting Fractions

Fraction subtraction looks difficult but it isn't if you know the trick. Let's look at the example below:

$$\frac{4}{5} - \frac{1}{3} = ?$$

Firstly, you need to make the denominators (The bottom numbers) the same so to do this, you multiply them together. In the example, 5 x 3 = 15

$$\frac{4}{5} - \frac{1}{3} = \frac{\quad}{15}$$

Then, multiply the numerator (The top number) of the first fraction by the denominator of the second fraction. In the example, 4 x 3 = 12

Next, you need to multiply the numerator of the second fraction by the denominator of the first fraction. In the example, 1 x 5 = 5

$$\frac{4}{5} - \frac{1}{3} = \frac{12 - 5}{15}$$

Once you subtract the values, you will have the answer

$$\frac{4}{5} - \frac{1}{3} = \frac{7}{15}$$

Convert Fractions To Decimal

A fraction is the same as the numerator (top number) divided by the denominator (bottom number) e.g.

$$\frac{3}{8} = 3 \div 8$$

This can be solved by using long division. Start by writing the denominator on the left and the numerator on the right side of the line. Add a decimal and some zeros to make it easier to work with. More zeros can be added to the end if needed at a later stage

$$8\overline{)3.000}$$

Then you need to start doing the math. Firstly, 8 doesn't go into 3 so we write 0 on the top. We then carry the 3 to the next zero which turns it into a 30. Now this enables 8 to go into 30 three times so we write 3 on top. However, there is a remainder of 6 so this gets carried over to the next zero. This enables 8 to go into 60 seven times so we write 7 on top and carry 4. Lastly, 8 goes into 40 five times so we write a 5 on top and since there is no remainder, this is the end of the division

$$\begin{array}{r} 0.375 \\ 8\overline{)3.^{3}0^{6}0^{4}0} \end{array}$$

Convert Recurring Decimals To Fractions

A recurring decimal number is when the numbers after the decimal point repeat forever. If we want to convert this number into a fraction, we will need to use a little bit of algebra. Multiply both sides by 10. Minus one x from both sides. Lastly, make x on its own by moving the number to the other side of the equation.

$0.4444\ldots = x$
$4.444\ldots = 10x$
$4 = 9x$

$\frac{4}{9} = x$

For recurring decimal numbers that don't repeat the same numbers, it is important to get both of the repeating digits on the left side of the decimal point. In the example below, both sides have been multiplied by 100 to do this

$0.4343\ldots = x$
$43.43\ldots = 100x$
$43 = 99x$

$\frac{43}{99} = x$

Convert Fractions To Percentages

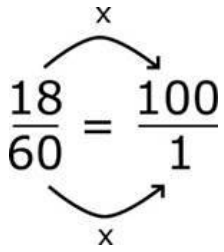
Any fraction can be converted to a percentage. It is important to understand that a percentage is basically anything out of 100

$$\frac{18}{60} = \ ?$$

To turn eighteen sixtieths into a percentage, write 100 over 1 on the right hand side

$$\frac{18}{60} = \frac{100}{1}$$

Next, multiply the top numbers with each other. Then multiply the bottom numbers with each other



Finally, the fraction can be simplified by crossing out the same number of zeros on the top and bottom

$$\frac{1800}{60} = \frac{180}{6} = 30\%$$

Percentages Made Easy

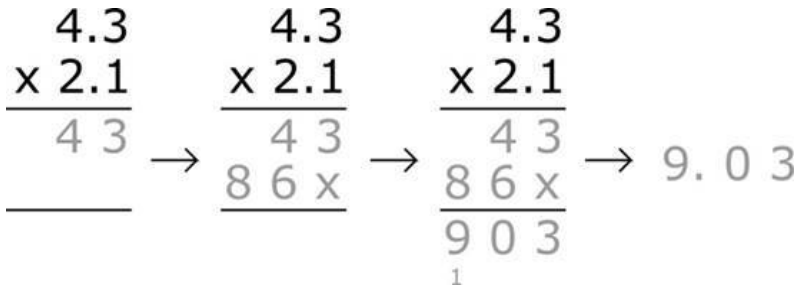
To find the percentage of any number, simply divide both sides by 10. This can be done by moving the decimal point one place to the left. Then multiply both sides together. Here are some examples:

50% of 200 = ?
5.0 x 20.0 = 100
(5.0 is the same as 5 and 20.0 is the same as 20)

20% of 14 = ?
2.0 x 1.4 = 2.8

15% of 40 = ?
1.5 x 4.0 = 6

43% of 21 = ?
4.3 x 2.1 = ?
(Multiplying decimal numbers involves a few steps)



1) Do 1 x 3 = 3. Then do 1 x 4 = 4
2) Write an x to represent a blank space
3) Do 2 x 3 = 6. Then do 2 x 4 = 8
4) Add up the numbers
5) Move the decimal point two places to the left