**Directions for Manual Calculator Math Program: Multiplication**

**(For best results, always have blank Scratch paper and pencils available for trial and error while doing all problems**

The trick about multiplication is realizing that there are Equal **groups** or **sets** of numbers that are being added.

The multiplication problem, 2 X 3 =, can best be understood initially when anyone sees (visually) the problem as it truly is:

Here we have two sets of three stars. When we say “three times two” we are actually saying “two sets of three.” By adding up all of the stars in the two sets we come up with the number total of 6, which is the answer to the equation 2 X 3 = 6.

The equation can also be set up this way, as three sets of two:

And the equation 3 X 2 = has the same Answer or Quotient as 2 X 3 =.

It is best to have multiplication tables available for first time students until the tables can be memorized.

**Math skills: Multiplication tables**

**1 X 1 = 1 2 x 1 = 2 3 X 1 = 3 4 X 1 = 4 5 X 1 = 5**

**1 X 2 = 2 2 X 2 = 4 3 X 2 = 6 4 X 2 = 8 5 X 2 = 10**

**1 X 3 = 3 2 X 3 = 6 3 X 3 = 9 4 X 3 = 12 5 X 3 = 15**

**1 X 4 = 4 2 X 4 = 8 3 X 4 = 12 4 X 4 = 16 5 X 4 = 20**

**1 X 5 = 5 2 X 5 = 10 3 X 5 = 15 4 X 5 = 20 5 X 5 = 25**

**1 X 6 = 6 2 X 6 = 12 3 X 6 = 18 4 X 6 = 24 5 X 6 = 30**

**1 X 7 = 7 2 X 7 = 14 3 X 7 = 21 4 X 7 = 26 5 X 7 = 35**

**1 X 8 = 8 2 X 8 = 16 3 X 8 = 24 4 X 8 = 32 5 X 8 = 40**

**1 X 9 = 9 2 X 9 = 18 3 X 9 = 27 4 X 9 = 36 5 X 9 = 45**

**1 X 10 =10 2 X 10 =20 3 X 10 =30 4 X 10 = 40 5 X 10 =50**

**6 X 1 = 6 7 X 1 = 7 8 X 1 = 8 9 X 1 = 9 10 X 1 = 10**

**6 X 2 = 12 7 X 2 = 14 8 X 2 = 16 9 X 2 = 18 10 X 2 =20**

**6 X 3 = 18 7 X 3 = 21 8 X 3 = 24 9 X 3 = 27 10 X 3 = 30**

**6 X 4 = 24 7 X 4 = 28 8 X 4 = 32 9 X 4 = 36 10 X 4 = 40**

**6 X 5 = 30 7 X 5 = 35 8 X 5 = 40 9 X 5 = 45 10 X 5 = 50**

**6 X 6 = 36 7 X 6 = 42 8 X 6 = 48 9 X 6 = 54 10 X 6 = 60**

**6 X 7 = 42 7 X 7 = 49 8 X 7 = 56 9 X 7 = 63 10 X 7 = 70**

**6 x 8 = 48 7 X 8 = 56 8 X 8 = 64 9 X 8 = 72 10 X 8 = 80**

**6 X 9 = 54 7 X 9 = 63 8 X 9 = 72 9 X 9 = 81 10 X 9 = 90**

**6 X 10 =60 7 X 10 =70 8 X 10 =80 9 X 10 =90 10 X 10=100**

**11 X 1 = 11 12 X 1 = 12 0 X 1 = 0**

**11 X 2 = 22 12 X 2 = 24 0 X 2 = 0**

**11 X 3 = 33 12 X 3 = 36 0 X 3 = 0**

**11 X 4 = 44 12 X 4 = 48 0 X 4 = 0**

**11 X 5 = 55 12 X 5 = 60 0 X 5 = 0**

**11 X 6 = 66 12 X 6 = 72 0 X 6 = 0**

**11 X 7 = 77 12 X 7 = 84 0 X 7 = 0**

**11 X 8 = 88 12 X 8 = 96 0 X 8 = 0**

**11 X 9 = 99 12 X 9 = 108 0 X 9 = 0**

**11 X 10 =110 12 X 10 =120 0 X 10 = 0**

When doing a simple multiplication problem, such as 7 X 12:

 **12**
 **X7**

The client first determines that, in doing multiplication, the numbers on the right side of the equation are multiplied first, therefore the 7 and the 2 are first considered.

The client looks at the table and determines that 7 X 2 = 14. The four is then placed under the line beneath the 7, like this.

 **12**
 **X7
 4**

And then the 1 from the fourteen is placed above the 1 in the number 12, like this:

 **1
 12**
 **X7
 4**

Next, the client looks at the table and sees that 7 X 1 equals 7. However, the seven as the answer must now be added to the 1 from the 14. & + 1 = 8. Therefore the number placed under the X under the line beside the 4 is an 8, like this:

 **1
 12**
 **X7
 84**

Have the client read the finished equation 7 X 12 = 84.

In a complex equation such as 23 X 721 =, it is important to break down every step, so that each step follows the next sequentially.

**721
X23**

When beginning the multiplication process, it must be realized that 721 is first multiplied by the 3 in 23 and then 721 is then multiplied by the 2 in 23. Also, multiplying being on the right hand side always, so the 3 in 23 is first multiplied by the 1 in 721.

The client looks at the table and sees that 3 X 1 equals 3. The client then places the 3 under the line beneath the 3 in 23 like this:

 **721
X23
 3**

The client then looks at the table and sees that 3 X 2 = 6, and places the 6 under the line beside the 3, like this:

**721
X23
 63**

The client then looks at the table and sees that 3 X 7 = 21, and places the 21 under the line beside the 63, like this:

**721
X23
2163**

Next, the client looks at the 2 in twenty three and looks at the table to see that 2 X 1 = 2, and the places the 2 underneath the 6 beneath the number 2163, like this:

**721
X23
2163
 2**

 Next, the client looks at the 2 in twenty three and looks at the table to see that 2 X 2 = 4, and the places the 4 underneath the 1 beneath the number 2163, like this:

**721
X23
2163
 42**

Next, the client looks at the 2 in twenty three and looks at the table to see that 2 X 7 = 14, and the places the 14 underneath the 2 beneath the number 2163, like this:

**721
X23
2163**

 **14 42**

 Next the client draws a line under the two products of 3 times 721 and 2 times 721 to add them together, like this

**721
X23
2163**

 **+ 1442**

Then the client adds the numbers together. The three drops down, as there is nothing to add to it.

**721
X23
2163**

 **+ 1442**

 **3**

The six plus the 2 equals 8, which goes beside the 3, like this.

**721
X23
2163**

 **+ 1442**

 **83**

The 1 plus the 4 equals 5, which goes beside the 83, like this:

**721
X23
2163**

 **+ 1442**

 **583**

The two plus the four equals 6, which goes beside the 583, like this:

**721
X23
2163**

 **+ 1442**

 **6583**

And the 1 drops down like this:

**721
X23
2163**

 **+ 1442**

 **16583**Have the client read the equation, 23 X 721 = 16,583.

In an even more complex multiplication problem, 574 X 846 =, there are many more steps that need to be considered:

 **846
X574**

When beginning the multiplication process, it must be realized that 846 is first multiplied by the 4 in 574 and then 846 is then multiplied by the 7 in 574, and then 846 is then multiplied by the 5 in 574. Also, multiplying begins on the right hand side always, so the 4 in 574 is first multiplied by the 6 in 846.

The client looks at the table and sees that 4 X 6 equals 24. The client then places the 4 in 24 under the line beneath the 4 in 574 like this:

 **846
X574
 4**

The client then places the 2 in 24 up above the 4 in 846, like this:

 **2**

 **846
X574
 4**

The client looks at the table and sees that 4 X 4 equals 16. The client then adds 16 +2 to make 18.The client then places the 8 in 18 under the line beneath the 7 in 574 like this:

 **2**

 **846
X574
 84**

The client then places the 1 in 18 above the 8 in 846, like this:

 **1 2**

 **846
X574
 84**

The client looks at the table and sees that 4 X 8 equals 32. The client then adds 32 + 1 to make 33.The client then places the 33 under the line beneath the 5 in 574 like this:

 **1 2**

 **846
X574
 3384**

Next, the client looks at the 7 in 574 and looks at the table to see that 7 X 6 = 42, and then places the 2 underneath the 8 beneath the number 3384, like this:

 **1 2**

 **846
X574
 3384
 2**

Next the client places the 4 in 42 above the 4 in 846 like this (in **red** for clarification):

 **4**

 **1 2**

 **846
X574
 3384
 2**

Next, the client looks at the 7 in 574 and looks at the table to see that 7 X 4 = 28, and then adds the Red 4 to 28 to get 32, and the places the 2 underneath the last 3 to the right beneath the number 3384, like this:

 **4**

 **1 2**

 **846
X574
 3384
 22**

Next the client places the 3 in 32 above the 8 in 846 like this (in **red** for clarification):

 **3 4**

 **1 2**

 **846
X574
 3384
 22**

Next, the client looks at the 7 in 574 and looks at the table to see that 7 X 8 = 56, and then adds the Red 3 to 56 to get 59, and then places the 59 underneath the first 3 beneath the number 3384, like this:

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

Next, the client looks at the 5 in 574 and looks at the table to see that 5 X 6 = 30, and then places the 0 underneath the last 3 to the right beneath the number 5932, like this:

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **0**

Next the client places the 3 in 30 above the 4 in 846 like this (in **BLUE** for clarification):

 **3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **0**

Next, the client looks at the 5 in 574 and looks at the table to see that 5 X 4 = 20, and then adds the **BLUE 3** to 20 to get 23, and then places the 3 underneath the 9 beneath the number 5922, like this:

 **3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **30**

Next the client places the 2 in 23 above the 8 in 846 like this (in **BLUE** for clarification):

 **2 3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **30**

Next, the client looks at the 5 in 574 and looks at the table to see that 5 X 8 = 40, and then adds the **BLUE 2** to 40 to get 42, and then places the 42 underneath the 5 beneath the number 5932, like this:

 **2 3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **4230**

In order to add the numbers (products) 3384, 5922, and 4230, the client draws a line under the number 4230, like this:

 **2 3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **4230**

The 4 in 3384 drops down like this:

 **2 3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **4230**

 **4**The 8 + 2 equals 10, and the zero in the ten goes beside the 4, like this:

 **2 3**

 **3 4**

 **1 2**

 **846
X574
 3384**

 **5922**

 **4230**

 **04**

And the 1 in the ten goes above the last 3 in 3384, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1**

**3384**

 **5922**

 **4230 \***

 **04**

Next, the 1 + 3 + 2 equals 6, which is placed beside the 0, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1**

**3384**

 **5922**

 **4230**

 **604**

Next, the 3 + 9 + 3 equals 15. The 5 is then placed beside the 6, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1**

**3384**

 **5922**

 **4230**

 **5604**

And the 1 in the 15 goes above the last 5 in 5922, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1 1**

**3384**

 **5922**

 **4230**

 **5604**

Next, the 1 + 5 + 2 equals 8. The 8 is then placed beside the 5, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1 1**

**3384**

 **5922**

 **4230**

 **85604**

Then the 4 is dropped down to complete the equation, like this:

 **2 3**

 **3 4**

 **1 2**

 **846** **X574
 1 1**

**3384**

 **5922**

 **4230**

 **485604**

The client can then state that 846 X 574 = 485,604.

1. 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

 4 6 2 0 4 2 7 0 1 7 8 3 3 5 4 0 9 4 6 3

X 1 3 X3 1 X3 4 X3 4 X 6 X 14 X2 2 X 5 X11 X1 3

 3 2 1 9 2 5 3 7 4 2 7 3 5 1 7 7 1 0 4 2 0 5

X1 5 X 7 X2 1 X 5 X1 6 X2 8 X3 3 X2 9 X 2 3 X 3 5

 3 0 4 6 0 7 9 0 4 7 0 2 4 1 5 6 2 7 7 1 4 4 0 2 0

X 4 3 X 1 7 X 3 6 X 1 9 X 2 2 X 3 1 X 3 2 X 2 0 4

 **3 4 6 7 0 2 5 9 3 3 3 6 8 1 7 2 6 6**

**X 1 2 5 X 3 6 X 3 7 4 X 4 7 2 X6 4 0 X 7 1**

 **4 5 5 3 4 0 1 9 8 7 0 4 3 8 3 6 1 1**

**X 3 8 8 X 2 9 X 5 6 6 X 2 4 6 X 3 2 5 X8 4 3**

 **5 0 5 7 7 7 4 9 8 8 8 2 9 8 4 8 2 7**

**X 2 3 8 X3 3 3 X2 1 4 X 3 4 7 X6 2 3 X 3 4 6**