Multiplication

Multiplication is used when a number is repeatedly added to itself for a number of times. The sign used for multiplication is a cross (**x**).

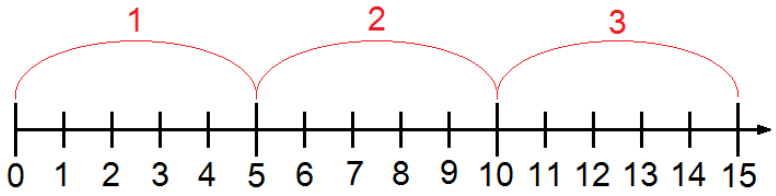
Example: 5 groups of 3 is the same as adding 3 to itself for 5 times

The number of equal groups is called multiplier

$3 + 3 + 3 + 3 + 3 = 15$

$3 \times 5 = 15$

The answer of the multiplication is called the Product.



The same Product will result when 5 is multiplied by 3

$5 \times 3 = 15$

When you multiply by 1 the answer stays the same

$5 \times 1 = 5$

$23 \times 1 = 23$

When you multiply by 0 the answer is always 0

$5 \times 0 = 0$

$23 \times 0 = 0$

Multiplying by 10, 100, or 1000

When a number is multiplied by 10, the number being multiplied will get 10 times bigger. The number will get 100 times bigger when multiplied by 100 and 1000 times bigger when multiplied by 1000

Example: 10 groups of 25

$25 \times 10 = 250$

H	T	U
	2	5
		x 10
2	5	0

When multiplying by 10 all the digits move one place to the left and a 0 is added in the Units or Ones place

Multiplication

Example: 100 groups of 25

$25 \times 100 = 2500$

Th	H	T	U
		2	5
		x 1	0 0
2	5	0	0

When multiplying by 100 all the digits move two places to the left and zeros are added in the Units and Tens places

Example: 1000 groups of 25

$25 \times 1000 = 25000$

Th	H	T	U
		2	5
		x 1	0 0 0
25	0	0	0

When multiplying 1000 all the digits move three places to the left and zeros are added in the Hundreds, Units and Tens places

Multiplying decimals by 10 and 100

A decimal number will also get 10 or 100 times bigger when multiplied by 10 or 100. The decimal point moves one place to the right when multiplying by 10 and two places to the right when multiplying by 100.

Example 1: 10 groups of 2.5

$2.5 \times 10 = 25.0$

$2.5 \times 10 = 25$

T	U	.	t
	2	.	5
	x 1		0
2	5	.	0

Just as when multiplying whole numbers by 10 all the digits will move one place to the left

Multiplication

Example 2: 10 groups of 7.83

$7.83 \times 10 = 78.3$

The decimal point moves one place to the right since 10 has one zero

H	U	.	t	h
	7	.	8	3
				x 10
7	8	.	3	0

All the digits will move one place to the left and 0 can be added in the hundredths place

Example 3: 100 groups of 7.83

$7.83 \times 100 = 783.0$ $\quad$ $7.83 \times 100 = 783$

The decimal point moved two places to the right since 100 has one two zeros

H	T	U	.	t	h
		7	.	8	3
					x 100
7	8	3	.	0	0

All the digits move two places to the left. Zeros can be added in the tenths and hundredths places

Example 4: 100 groups of 28.09

$28.09 \times 100 = 2809.0$ $\quad$ $28.09 \times 100 = 2809$

The decimal point moved two places to the right since 100 has one two zeros

Th	H	T	U	.	t	h
		2	8	.	0	9
						x 100
2	8	0	9	.	0	0

All the digits move two places to the left. Zeros can be added in the tenths and hundredths places

Multiplication

Multiplication by Partitioning involves breaking down numbers into Units, Tens and Hundreds. Each different place value will be multiplied separately by the multiplier. The resulting product of each multiplication will be added together for the final answer.

Example 1: 56 x 4 = 224

Tens	50 x 4 =	200
Units	6 x 4 =	24

H	T	U	
2	0	0	+
	2	4	
2	2	4	

H	T	U
	2	
	5	6
		x 4
2	2	4

Multiplying the **U**nits 6 x 4 = 24

(*2* is moved to the Tens column and 4 is placed in the Units column)

Multiplying the **T**ens 5 x 4 = 20

adding *2* (*2* + 20 = 22)

Example 2: 615 x 9 = 5535

Hundreds	600 x 9 =	5400
Tens	10 x 9 =	90
Units	5 x 9 =	45

Th	H	T	U	
	1			
5	4	0	0	+
		9	0	
		4	5	
5	5	3	5	

Th	H	T	U
	1	*4*	
	6	1	5
			x 9
5	5	3	5

Multiplying the **U**nits 5 x 9 = 45

(*4* is moved to the Tens column)

Multiplying the **T**ens 1 x 9 = 9

adding *4* (*4* + 9 = *1*3)

(*1* is moved to the Hundreds column)

Multiplying the **H**undreds 6 x 9 = 54

adding *1* (*1* + 54 = 55)

Multiplication

Multiplying in parts can also be very useful when **multiplying by two-digit numbers**. This also involves breaking down any numbers into digits of different place value, multiplying by ones and tens separately and lastly add.

Example 1: 36 x 25 = 900

Both numbers need to be partitioned into Units and Tens

H	T	U
	3	0
		x 20
6	0	0

H	T	U
	3	0
		x 5
1	5	0

36
x 25
30 +
150
120
600
900
1

H	T	U
		6
		x 20
1	2	0

	T	U
		6
		x 5
	3	0

	30	6
20	600	120
5	150	30

Example 1: 27 x 18 = 468

Both numbers need to be partitioned into Units and Tens

H	T	U
	2	0
		x 10
2	0	0

H	T	U
	2	0
		x 8
1	6	0

27
x 18
56 +
160
70
200
486
1

T	U
	7
	x 10
7	0

T	U
	7
	x 8
5	6

	20	7
10	200	70
8	160	56

Multiplication

Multiplication with decimals

When multiplying a decimal number by a whole number, the number of digits after the decimal point has to remain the same in the product (answer of the multiplication).

Examples:

$3.7 \times 5 = 18.5$

One decimal place

T	U	.	t
	3		
	3	.	7
			x 5
1	8	.	5

$12.2 \times 8 = 97.6$

One decimal place

T	U	.	t
1	*1*		
1	2	.	2
			x 8
9	7	.	6

Breaking down the decimal number into whole numbers and tenths

$3.7 \times 5 = 18.5$

Whole numbers $3 \times 5 = 15$

Tenths $0.7 \times 5 = 3.5$

One decimal place

T	U	.	t
1	5	.	0 +
	3	.	5
1	8	.	5

$12.2 \times 8 = 97.6$

Whole numbers $12 \times 8 = 96$

Tenths $0.2 \times 8 = 1.6$

One decimal place

T	U	.	t
9	6	.	0 +
	1	.	6
9	7	.	6

Multiplication Worksheet

Work out the following multiplications to find the missing product:

a) 7 x 5 = ____ b) 1 x 3 = ____ c) 9 x 4 = ____
d) 2 x 8 = ____ e) 10 x 3 = ____ f) 6 x 7 = ____

Work out the following:

a) 4.5 x 10 = _____ b) 1.2 x 10 = _____ c) 69.8 x 10 = _____
d) 2.5 x 100 = _____ e) 100 x 3.33 = _____ f) 100 x 0.07 = _____

Complete all steps by breaking down numbers into Units, Tens and Hundreds:

Example: 384 x 7 = 2688

	Hundreds	Tens	Units
	300	80	4
7	2100	560	28

Th	H	T	U
2	1	0	0 +
	5	6	0
		2	8
2	6	8	8

300 x 7 = 2100 80 x 7 = 560 4 x 7 = 28

a) 273 x 4 = _____

	Hundreds	Tens	Units
	200	70	3
4	____	____	____

Th	H	T	U
			+

300 x 7 = _____ 70 x 4 = _____ 3 x 4 = _____

b) 103 x 6 = _____

	Hundreds	Tens	Units
	100	0	3
6	____	____	____

Th	H	T	U
			+

100 x 6 = _____ 0 x 6 = _____ 3 x 6 = _____

Work out the following:

a) 2.5	b) 1.9	c) 42.8	d) 26.2	e) 75.3
x 10	x 8	x 3	x 4	x 5
____	____	____	____	____

Multiplication Worksheet

Work out the following multiplications to find the missing product:

a) 7 x 5 = 35 b) 1 x 3 = 3 c) 9 x 4 = 36
d) 2 x 8 = 16 e) 10 x 3 = 30 f) 6 x 7 = 42

Work out the following:

a) 4.5 x 10 = 45 b) 1.2 x 10 = 12 c) 69.8 x 10 = 698
d) 2.5 x 100 = 25 e) 100 x 3.33 = 333 f) 100 x 0.07 = 7

Complete all steps by breaking down numbers into Units, Tens and Hundreds:

Example: 384 x 7 = 2688

	Hundreds	Tens	Units
	300	80	4
7	2100	560	28

Th	H	T	U
2	1	0	0 +
	5	6	0
		2	8
2	6	8	8

300 x 7 = 2100 80 x 7 = 560 4 x 7 = 28

a) 273 x 4 = 1092

	Hundreds	Tens	Units
	200	70	3
4	800	280	12

Th	H	T	U
	8	0	0 +
	2	8	0
		1	2
1	0	9	2

300 x 7 = 2100 70 x 4 = 280 3 x 4 = 12

b) 103 x 6 = 2688

	Hundreds	Tens	Units
	100	0	3
6	600	0	12

H	T	U
6	0	0 +
		0
	1	8
6	1	8

100 x 6 = 600 0 x 6 = 0 3 x 6 = 18

Work out the following:

a) 2.5 b) 1.9 c) 42.8 d) 26.2 e) 75.3
x 10 x 8 x 3 x 4 x 5
25 15.2 128.4 104.8 376.5