Long Multiplication

Formal Multiplication of Three-Digit Numbers and Four-Digit Numbers by Two-Digit Numbers

Expanded Long Multiplication

Complete the following calculation:

multiplicand

$$2652 \times 32$$

multiplier

Go onto the next slide to see the multiplication process for this calculation.

1. Multiply the number in the tens column by the unit multiplier.

TTh	Th	H	T	U	
		2	6	5	**2**	
			×	3	**2**	(2 × 2)
					4	

2. Multiply the number in the tens column by the unit multiplier.

TTh	Th	H	T	U	
		2	6	**5**	2
			×	3	**2**
				4	(2 × 2)
		1	**0**	**0**	(2 × 50)

3. Multiply the number in the hundreds column by the unit multiplier.

TTh	Th	H	T	U	
		2	**6**	5	2
			×	3	**2**
				4	(2 × 2)
			1	0	0 (2 × 50)
		1	**2**	**0**	**0** (2 × 600)

4. Multiply the number in the thousands column by the unit multiplier.

TTh	Th	H	T	U	
	2	6	5	2	
		×	3	**2**	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	**0**	**0**	**0**	(2 × 2000)

5. Multiply the number in the units column by the tens multiplier.

TTh	Th	H	T	U	
		2	6	5	**2**
			×	**3**	2
					4 (2 × 2)
			1	0	0 (2 × 50)
		1	2	0	0 (2 × 600)
	4	0	0	0	(2 × 2000)
			6	**0**	(30 × 2)

Remember to take into account the fact that you are multiplying a multiple of 10. There needs to be a zero in the answer holding place in the units column.

6. Multiply the number in the tens column by the tens multiplier.

TTh	Th	H	T	U	
	2	6	**5**	2	
		×	**3**	2	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	0	0	0	(2 × 2000)
			6	0	(30 × 2)
	1	**5**	**0**	**0**	(30 × 50)

7. Multiply the number in the hundreds column by the tens multiplier.

TTh	Th	H	T	U	
	2	**6**	5	2	
		×	**3**	2	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	0	0	0	(2 × 2000)
			6	0	(30 × 2)
		1	5	0	0 (30 × 50)
1	**8**	**0**	**0**	**0**	(30 × 600)

8. Multiply the number in the thousands column by the tens multiplier.

TTh	Th	H	T	U	
	2	6	5	2	
		×	**3**	2	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	0	0	0	(2 × 2000)
			6	0	(30 × 2)
	1	5	0	0	(30 × 50)
1	8	0	0	0	(30 × 600)
6	**0**	**0**	**0**	**0**	(30 × 2000)

9. Using column addition method, combine the eight separate answers.

TTh	Th	H	T	U	
	2	6	5	2	
		×	3	2	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	0	0	0	(2 × 2000)
			6	0	(30 × 2)
	1	5	0	0	(30 × 50)
1	8	0	0	0	(30 × 600)
6	0	0	0	0	(30 × 2000)
8	**^{1} 4**	**8**	**6**	**4**	

TTh	Th	H	T	U	
	2	6	5	2	
		×	3	2	
				4	(2 × 2)
		1	0	0	(2 × 50)
	1	2	0	0	(2 × 600)
	4	0	0	0	(2 × 2000)
			6	0	(30 × 2)
	1	5	0	0	(30 × 50)
1	8	0	0	0	(30 × 600)
6	0	0	0	0	(30 × 2000)
8	4	8	6	4	

Quick check 1. If your answer doesn't look right, round the multiplicand to the nearest hundred and multiplier to the nearest ten, then multiply that. If your answer is way off, you know you need to go through it again. e.g. 2700 × 30 = 81 000

Quick check 2. Sometimes your calculations will all be right, but you just haven't multiplied all the numbers. An easy way to check how many rows of numbers you should have in your answers is by multiplying the number of digits in the multiplicand by the number of digits in the multiplier. In this case, 4 × 2=8.

Compact Long Multiplication Method

Complete the following calculation:

multiplicand

$$4533 \times 54$$

multiplier

Go onto the next slide to see the multiplication process for this calculation.

1. Multiply the number in the units column by the unit multiplier and carry the tens over to the tens column.

TTh	Th	H	T	U
	4	5	3	3
		×	5	4
				2
			1	

2. Multiply the number in the tens column by the unit multiplier and carry over the hundreds to the hundreds column. Remember to add on the tens that were carried over.

TTh	Th	H	T	U
	4	5	**3**	3
		×	5	**4**
			3	2
		1	1	

3. Multiply the number in the hundreds column with the unit multiplier and carry the thousands over to the thousands column. Remember to add on the hundreds that were carried over.

TTh	Th	H	T	U
	4	**5**	3	3
		×	5	**4**
		1	3	2
	2		1	1

4. Multiply the number in the thousands column with the unit multiplier and carry the ten thousands over to the ten thousands column. Remember to add on the thousands that were carried over.

TTh	Th	H	T	U
	4	5	3	3
		×	5	**4**
1	**8**	1	3	2
	2	1	1	

5. Add the place value holder.

TTh	Th	H	T	U
	4	5	3	3
		×	5	4
1	8	1	3	2
	2	1	1	
				0

6. Multiply the number in the units column by the tens multiplier and carry the hundreds over to the hundreds column.

TTh	Th	H	T	U
	4	5	3	**3**
		×	**5**	4
1	8	1	3	2
	2	1	1	
			5	0
		1		

7. Multiply the number in the tens column by the tens multiplier and carry over the thousands to the thousands column. Remember to add on the hundreds that were carried over.

TTh	Th	H	T	U
	4	5	**3**	3
		×	**5**	4
1	8	1	3	2
	2	1	1	
		6	5	0
	1	1		

8. Multiply the number in the hundreds column with the tens multiplier and carry the ten thousands over to the ten thousands column. Remember to add on the thousands that were carried over.

TTh	Th	H	T	U
	4	**5**	3	3
		×	**5**	4
1	8	1	3	2
	2	1	1	
	6	6	5	0
2	1	1		

9. Multiply the number in the thousands column with the tens multiplier and carry the hundred thousands over to the hundred thousands column. Remember to add on the ten thousands that were carried over.

HTh	TTh	Th	H	T	U
		4	5	3	3
			×	5	4
	1	8	1	3	2
		2	1	1	
2	2	6	6	5	0
	2	1	1		

10. Use column addition to add together the answers.

	HTh	TTh	Th	H	T	U
			4	5	3	3
				×	**5**	4
			1	8	1	3	2
				2	1	1	
+		2	2	6	6	5	0
			2	1	1		
		2	**4**	**4**	**7**	**8**	**2**
			1				

Now try these multiplication problems using long multiplication:

1. 465 × 12
2. 281 × 50
3. 118 × 23
4. 214 × 63
5. 9411 × 54
6. 4365 × 87
7. 8044 × 49
8. 2232 × 89
9. 9573 × 76
10. 4307 × 93

Core Task

1.				
		1	6	1
x			2	3

2.				
		2	3	2
x			2	6

3.				
		6	1	4
x			1	8

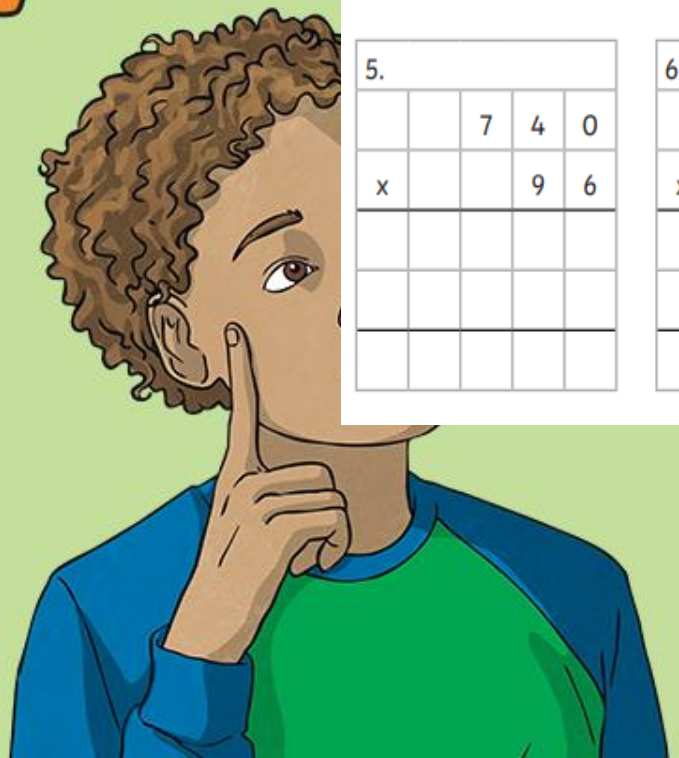
4.				
		9	6	9
x			9	5

5.				
		7	4	0
x			9	6

6.				
		3	6	2
x			5	8

7.				
		3	0	5
x			7	1

8.				
		3	7	0
x			6	4



Stretch task

1.

		2	1	9	0
x				6	9

2.

		1	3	4	2
x				5	2

3.

		1	5	2	1
x				7	3

4.

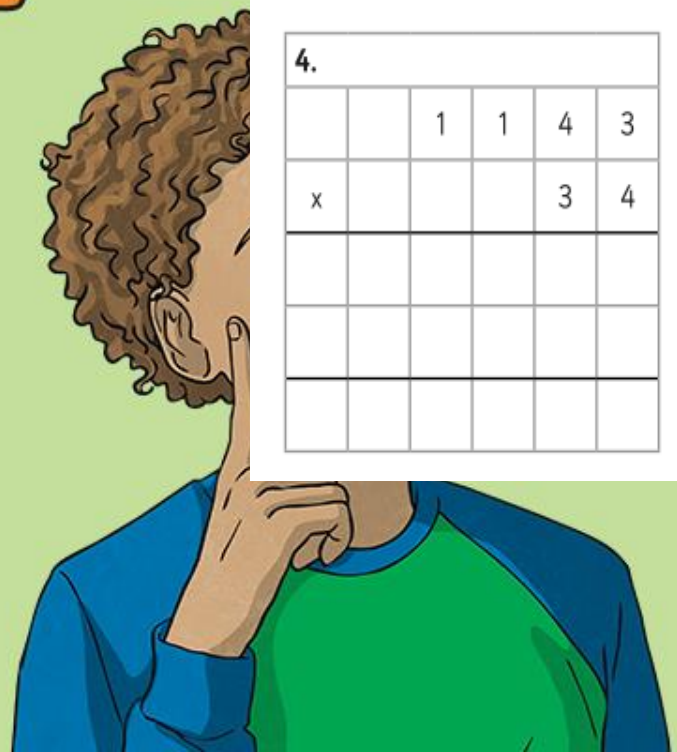
		1	1	4	3
x				3	4

5.

		2	4	6	8
x				2	7

6.

		1	8	9	5
x				4	6	



Challenge task

1. 95_3 × _6
   57558
   287790

2. 2_1_ × 26
   15672
   52240

3. 15_3 × 6_
   13617
   90780

6. __22 × 64
   17288
   259320

7. 23__ × 75
   11665
   163310

8. 3_93 × _4
   15972
   279510

11. 9815 × __
    58890
    490750

12. 53_9 × 7_
    37303
    373030

13. 5_15 × _3
    15645
    417200

16. 2_5_ × 66
    17130
    171300

17. 4_00 × 2_
    39200
    98000

18. 43_8 × _8
    35184
    131940