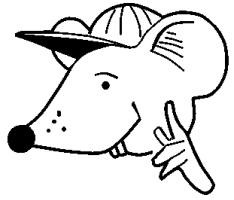


MATHEMATICS



N.S. Yr. 5 P.67

**Develop and refine written methods
for multiplication.**

Equipment

Pencil, paper.

MathSphere

© MathSphere P.O. Box 1234 Worthing BN13 2UJ www.mathsphere.co.uk

Concepts

Children should understand that approximating an answer is important in many contexts and may be used to see if the answer to a problem looks reasonable.

In many cases, an approximate answer is all that is needed. Eg. If it calculated that a house needs 32.6 litres of paint for redecoration, one would probably buy 35 or even 40 litres as paint in 5 litre cans.

In this module, we are looking at estimating an answer and then using ideas that lead to a formal, written method of multiplication.

Method 1.

Eg. 526×6

First an approximate answer.

The answer to 526×6 is approximately $500 \times 6 = 3\,000$

Now perform the sum by using the fact that 526 is $500 + 20 + 6$.

$$\begin{aligned} 526 \times 6 &= (500 + 20 + 6) \times 6 = (500 \times 6) + (20 \times 6) + (6 \times 6) \\ &= 3\,000 + 120 + 36 \\ &= \underline{3\,156} \end{aligned}$$

Method 2.

This method can be used when multiplying by two or more digits.

Eg. 38×24

First an approximate answer: 38×24 is approximately $40 \times 20 = 800$

Split the two numbers into $(30 + 8) \times (20 + 4)$ and multiply each part in the first number by each part in the second number. This is best done in a table.

	30	8
20	600	160
4	120	32

Add up the four answers:

$$\begin{aligned} 38 \times 24 &= 600 + 160 + 120 + 32 \\ &= 912 \end{aligned}$$

Concepts (Contd)

We are now moving towards standard written methods. Do not forget to encourage estimated answers with the children.

Method 3.

Eg. 526×6

Writing **method 1** vertically, we have:

$\begin{array}{r} 526 \\ \times 6 \\ \hline 3000 \\ 120 \\ \underline{36} \\ 3156 \end{array}$	(500 × 6) leading to:	$\begin{array}{r} 526 \\ \times 6 \\ \hline 3156 \\ \underline{13} \end{array}$
--	--------------------------	---

Method 4.

Eg. 38×24

$$\begin{array}{r} 38 \\ \times 24 \\ \hline 760 \\ \underline{152} \\ 912 \\ \underline{1} \end{array}$$

(38 × 20) (38 × 4)

Method 5. Extending these ideas to simple decimals.

Eg. 3.7×6

$$\begin{array}{rcl} 3.0 \times 6 & = & 18.0 \\ 0.7 \times 6 & = & \underline{4.2} \\ & & 22.2 \end{array}$$

N.B. (Particularly to parents working with children at home). There are a lot of ideas covered in this module and children will need some considerable time to understand them all. Spread the work out over several months and make sure children understand each step thoroughly before moving to the next.



Now that you can do some multiplication sums in your head, we are going to see how you can write down more difficult ones.

Always begin with an estimate of the answer.

Let's say we want to multiply **375** by **4**.

First, we estimate the answer: **375×4** is approximately **$400 \times 4 = 1\ 600$**

Now, let's do the sum. First we split the first number into hundreds, tens and units and then we multiply each part by **4**.

$$375 \times 4 = (300 + 70 + 5) \times 4$$

Then we multiply the **300** by **4** and the **70** by **4** and the **5** by **4** :

$$\begin{aligned} \text{So: } 375 \times 4 &= (300 + 70 + 5) \times 4 \\ &= 300 \times 4 \quad + 70 \times 4 \quad + 5 \times 4 \\ &= 1\ 200 \quad + 280 \quad + 20 \end{aligned}$$

$$\text{So: } 375 \times 4 = \underline{1\ 500}$$

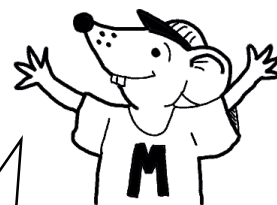
Here is another one to look at:

Multiply 624 by 7

First we estimate: **624×7** is approximately **$600 \times 7 = 4\ 200$**

$$\begin{aligned} 624 \times 7 &= (600 + 20 + 4) \times 7 \\ &= 600 \times 7 \quad + 20 \times 7 \quad + 4 \times 7 \\ &= 4\ 200 \quad + 140 \quad + 28 \end{aligned}$$

$$\text{So: } 624 \times 7 = \underline{4\ 368}$$



Nothing to it, old bean!

Let's try one together.

You fill in the boxes.



Multiply 348 by 5. Estimate: $300 \times 5 = 1\,500$

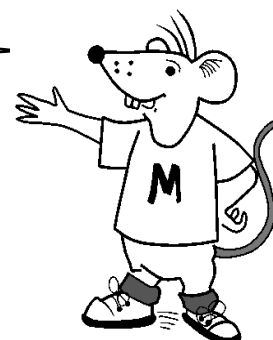
$$348 \times 5 = (\square + \square + 8) \times 5$$

$$= \square + \square + 40$$

So: $348 \times 5 =$

Ready for another.

You fill in all the boxes this time.



Multiply 746 by 8. Estimate: $700 \times 10 = 7\,000$

$$746 \times 8 = (\square + \square + \square) \times 8$$

$$= \square + \square + \square$$

So: $746 \times 8 =$

Now try these on your own. Don't forget to do an estimate first.



a. 228×4

b. 316×5

c. 485×6

d. 217×8

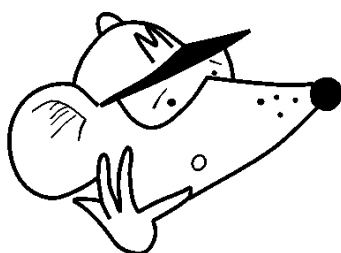
e. 653×8

f. 968×3

g. 548×7

h. 999×3

If we have a two digit number multiplied by a two digit number, we can split each number into tens and units and multiply both parts of the first number by both parts of the second number.



Sounds tricky, Subby!

No, it's dead simple.
Watch this.....



Let's multiply 36×43 **Estimate:** $40 \times 40 = 1\ 600$

Split **36** into **30 + 6** and **43** into **40 + 3**

Put the first numbers along the top of a table and the second down the side, like this:

Now multiply the numbers at the top by the numbers down the side and put the answers in the table.

	30	6
40	1 200	240
3	90	18

All you need to do now is to add them up:

$$36 \times 43 = 1\ 200 + 240 + 90 + 18 = \underline{1\ 548}$$

Now try these yourself. Don't forget to do an estimate.

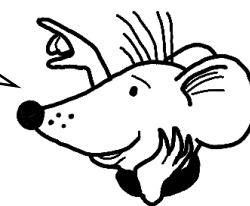
a. 53×27 **b.** 42×35 **c.** 52×36 **d.** 62×29

e. 58×36 **f.** 83×26 **g.** 61×43 **h.** 73×73

Let's multiply **527** by **4**.

Estimate: $500 \times 4 = 2\ 000$

We can also set these sums out vertically, like this:



$$\begin{array}{r}
 527 \\
 \times \underline{4} \\
 \hline
 2000 \quad (500 \times 4) \\
 80 \quad (20 \times 4) \\
 \underline{28} \quad (7 \times 4) \\
 2108
 \end{array}$$

So the answer is 2 108

Let's try another one.



Let's multiply **639** by **7**. **Estimate:** $600 \times 7 = 4\ 200$

$$\begin{array}{r}
 639 \\
 \times \underline{7} \\
 \hline
 4200 \quad (600 \times 7) \\
 210 \quad (30 \times 7) \\
 \underline{63} \quad (9 \times 7) \\
 4473
 \end{array}$$

So the answer is 4 473

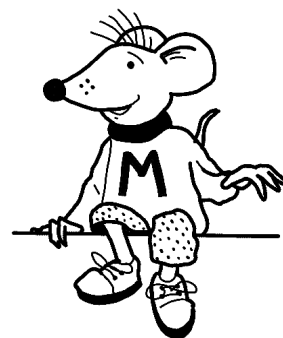
Now try these on your own. Don't forget to do an estimate.



- a.** 425×4 **b.** 635×2 **c.** 624×6 **d.** 941×5
e. 526×7 **f.** 747×4 **g.** 888×8 **h.** 316×9

Here is a slightly different method.

Lay the sum out vertically again and carry any tens into the tens column and hundreds into the hundreds column like this:



Let's multiply 534 by 8. Estimate: $500 \times 8 = 4\,000$

30×8 is 240, plus the 30 we have just carried from the units column is 270.

So we put the 7 in the tens column and carry the 2 hundreds into the hundreds column.

$$\begin{array}{r} 534 \\ \times 8 \\ \hline 4272 \\ \hline 23 \end{array}$$

4×8 is 32, so we put the 2 in the units column and carry the 3 tens into the tens column.

So the answer is 4 272

Here is another example.

Let's multiply 476 by 7. Estimate: $500 \times 7 = 3\,500$

70×7 is 490, plus the 40 we have just carried from the units column is 530.

So we put the 3 in the tens column and carry the 5 hundreds into the hundreds column.

$$\begin{array}{r} 476 \\ \times 7 \\ \hline 3332 \\ \hline 54 \end{array}$$

6×7 is 42, so carry the 4 into the tens column.



So the answer is 3 332

Now try these! Don't forget the estimate first.

a. 652×6

b. 623×4

c. 347×3

d. 734×8

e. 723×2

f. 645×5

g. 218×9

h. 207×3



When we have a two digit number multiplied by a two digit number, we can still put the numbers underneath each other.



Let's multiply 43 by 26. Estimate: $40 \times 30 = 1\ 200$

$$\begin{array}{r} 43 \\ \times 26 \\ \hline 860 \\ 258 \\ \hline 1118 \end{array} \quad \begin{array}{l} (43 \times 20) \\ (43 \times 6) \end{array}$$

So the answer is 1 118

Here is another example.

Let's multiply 52 by 34. Estimate: $50 \times 30 = 1\ 500$

$$\begin{array}{r} 52 \\ \times 34 \\ \hline 1560 \\ 208 \\ \hline 1768 \end{array} \quad \begin{array}{l} (52 \times 30) \\ (52 \times 4) \end{array}$$



So the answer is 1 768

Now try these! Don't forget the estimate first.

a. 42×25 b. 28×16 c. 73×42 d. 56×73

e. 84×67 f. 45×48 g. 85×22 h. 64×56



Lastly, we can use what we have learnt to multiply some decimals.



Let's multiply 6.4 by 6. **Estimate:** $6 \times 6 = 36$

$$\begin{array}{r} 6.0 \times 6 = 36.0 \\ 0.4 \times 6 = \underline{2.4} \\ \hline 38.4 \end{array}$$

Notice how the units and the tenths are lined up vertically.

So the answer is 38.4

Here is another example.

Let's multiply 7.8 by 8. **Estimate:** $8 \times 8 = 64$

$$\begin{array}{r} 7.0 \times 8 = 56.0 \\ 0.8 \times 8 = \underline{6.4} \\ \hline 62.4 \end{array}$$

Notice again how the units and the tenths are lined up vertically.

So the answer is 62.4

Now try these! Don't forget the estimate first.

a. 4.1×5 b. 3.7×2 c. 6.8×5 d. 3.4×7

e. 2.8×4 f. 3.5×6 g. 3.9×9 h. 8.8×8



Answers**Page 5**

$$348 \times 5 = (300 + 40 + 8) \times 5 = 1\,500 + 200 + 40 = 1\,740$$

$$746 \times 8 = (700 + 40 + 6) \times 8 = 5\,600 + 320 + 48 = 5\,968$$

- a. 912 b. 1 580 c. 2 910 d. 1 736
e. 5 224 f. 2 904 g. 3 836 h. 2 997

Page 6

- a. 1 431 b. 1 470 c. 1 872 d. 1 798
e. 2 088 f. 2 158 g. 2 623 h. 5 329

Page 7

- a. 1 700 b. 1 270 c. 3 744 d. 4 705
e. 3 682 f. 2 988 g. 7 104 h. 2 844

Page 8

- a. 3 912 b. 2 492 c. 1 041 d. 5 872
e. 1 446 f. 3 225 g. 1 962 h. 621

Page 9

- a. 1 050 b. 448 c. 3 066 d. 4 088
e. 5 628 f. 2 160 g. 1 870 h. 3 584

Page 10

- a. 20.5 b. 7.4 c. 34.0 d. 23.8
e. 11.2 f. 21.0 g. 35.1 h. 70.4