MATHEMATICS

Y6 Multiplication and Division
6310

Revise multiplication

Equipment

Paper, pencil

MathSphere

<u>Concepts</u>

Children should be able to understand the operation of multiplication as the same process as repeated addition. In other words, eight fifteens is the same as adding fifteen eight times.

They should understand the following words and be able to read and write them:

times, multiply, multiplied by, product, multiple, inverse.

<u>Definitions:</u>

Product is the answer to a multiplication sum.
e.g. the product of **7** and **11** is **77**.

Multiple: The numbers in the times tables.
e.g. the multiples of **6** are   **6**, **12**, **18**, **24**, **30**, ...

Inverse: Opposite.
e.g. the inverse of multiplication is division.
e.g. the inverse of addition is subtraction.

Children should also understand the order in which operations are performed, with brackets first etc. For a full explanation and practice with this idea see the module on BODMAS.

Concepts (Continued)

Children should understand the **commutative law**, the **associative law** and the **distributive law** (but not, thankfully, the words themselves) as applied to multiplication.

Definitions:

Commutative Law. This is simply that if you swap the numbers in a multiplication sum, the answer remains the same.

e.g. **14 × 6 = 6 × 14**

N.B. This is not true for division, for example. **16 ÷ 4** is not equal to **4 ÷ 16** !

Associative Law. This says that if you have three numbers multiplied together, it does not matter if you multiply the first two or the last two first; the final answer will always be the same. (Strictly speaking, the numbers should be kept in the same order; ie the last of the three numbers should not suddenly be put at the beginning. In practice this is not critical at this level since multiplication also obeys the Commutative Law.)

e.g. **5 × 7 × 9 = (5 × 7) × 9 = 35 × 9 = 315**

Or we could do the sum in this order:

5 × 7 × 9 = 5 × (7 × 9) = 5 × 63 = 315

Distributive Law. This says that multiplication can be "spread out" over addition.

e.g. **(5 + 9) × 7 = (5 × 7) + (9 × 7) = 35 + 63 = 98**

At this level, this technique is most useful when applied to multiplication of a two or three digit number by a single digit number.
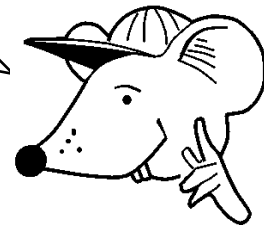
e.g. Find **24 × 7.**   We can do this sum like this:

24 × 7 = (20 + 4) × 7 = (20 × 7) + (4 × 7) = 140 + 28 = 168.

Did you know that **4 × 3.5** is the same as **3.5 × 4**?

How can you show this on a diagram?

Try it and see. Discuss this with your teacher or parent.

Which of these are true?

1. 4.5 × 3.6 = 3.6 × 4.5   **2.** 2.8 × 7 = 7 × 2.8   **3.** 1.7 × 9 = 9 × 1.7

Which of these are true?

4. The answer to 6.3 × 2.4 is greater than 6.3 and greater than 2.4.

5. The answer to 7.4 × 8.8 is bigger than 7.4, but smaller than 8.8.

6. The answer to 19 × 0.6 is smaller than 19.

7. The answer to 0.3 × 82 is smaller than 82.
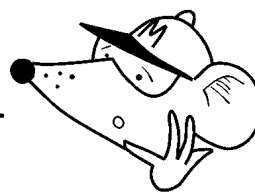
What happens when you multiply a number by **1** ?

Can you write down the answers to these sums very quickly?

   8. 9.5 × 1 ....   **9.** 6.7 × 1 ....   **10.** 1 × 0.6 ....

11. 1 × 0.06   ....   **12.** 0.3 × 1 × 2 ....

What happens when you multiply a number by **0** ?

Write down the answers to these questions as quickly as you can.

1. 9.6 × 0   **2.** 2.6 × 0   **3.** 0 × 7.5

4. 0.6 × 0   **5.** 0.07 × 0 × 2.5

6. 9.6 × 3.5 × 8.8 × 4.1 × 0   **7.** 9.5 × 0 × 0.06

Now here's a tricky one!

What happens if you multiply **8.6** by **7** and then divide the answer by **7** ?

How quickly can you work out these sums?

8. 8.6 × 1.4 ÷ 1.4   **9.** 5.4 × 0.7 ÷ 0.7   **10.** 6.2 × 4.3 ÷ 4.3

Is the same true if we divide first and then multiply?

11. 88 ÷ 1.1 × 1.1   **12.** 9.6 ÷ 16 × 16   **13.** 34.17 ÷ 1.7 × 1.7

We can use this idea to check our multiplication sums, like this:

27 × 65 = 1 755.   Check by dividing 1 755 by 65:   1 755 ÷ 65 = 27

Work out these sums and check them by dividing.

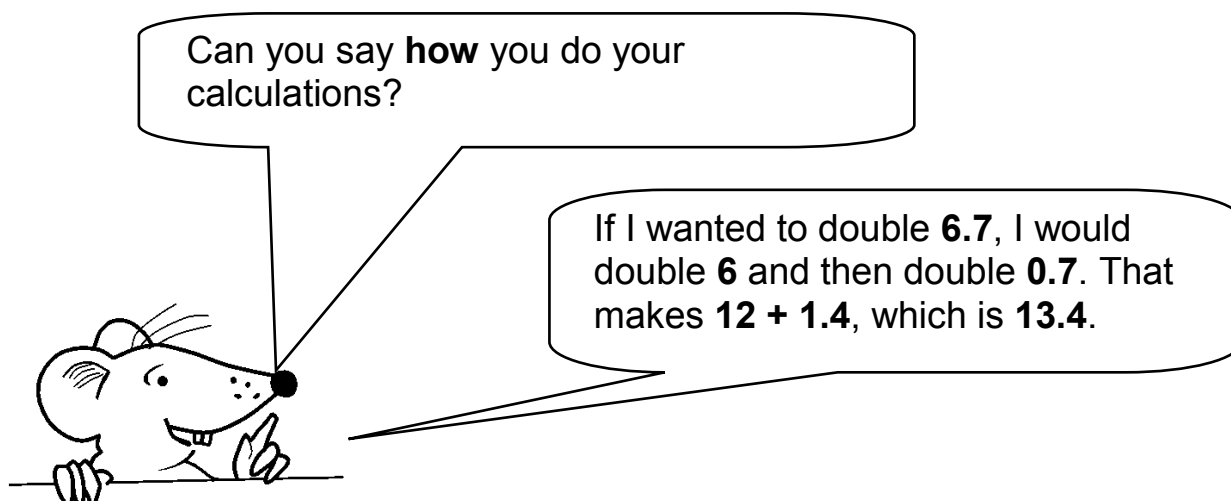**14.** 94 × 27   **15.** 74 × 35   **16.** 4.2 × 5   **17.** 9.6 × 4.3

18. 84 × 56   **19.** 94 × 12   **20.** 79 × 40   **21.** 84 × 32

Can you say **how** you do your calculations?

If I wanted to double **6.7**, I would double **6** and then double **0.7**. That makes **12 + 1.4**, which is **13.4**.

Say **how** you would do these calculations and then do them:

1. Double 9.4   **2.** 2.7 times 10   **3.** 9.6 times 100

4. Multiply 6.5 by 1   **5.** What is the product of 2.5 and 6?

6. Is 15 a factor of 75 ?   **7.** Is 240 a multiple of 6 ?

8. Eight lots of four point three.   **9.** Double 13.8.

10. Find some of the products you can make using these five numbers in pairs:

0.3,   2.5,   0.04,   1.2   and   0.4 ?

11. Multiply 254 by 9.

Play a game with a friend. You give your friend a sum like the ones above. Your friend tells you **how** to do it and then works it out. Your friend must not do the sum until they have told you how to do it.
Then it is your friend's turn to give you a sum. Hard work, eh!

Sometimes we can split a number to make it easier to multiply.

For example, **3.6 × 8** is difficult to work out in one go.

Split **3.6** into **3 + 0.6** and we can then do the sum like this:

3.6 × 8 = (3 + 0.6) × 8 = 3 × 8 + 0.6 × 8
                                  = 24 + 4.8
                                  = 28.8

Try this method to find these products:

1. 3.4 × 2   **2.** 3.5 × 3   **3.** 4.2 × 5

4. 9.6 × 4   **5.** 8.5 × 4   **6.** 4.6 × 8

Fill in the boxes as quickly as you can:

7. 1.2 × 4 = ☐   **8.** 15 × 8 = ☐   **9.** 12 × 2 × 5 = ☐

10. ☐ × 3 = 6.9   **11.** ☐ = (1.3 + 1.2) × 4

12. (1.4 × 5) + 6.5 = ☐

Quick Question Sheet
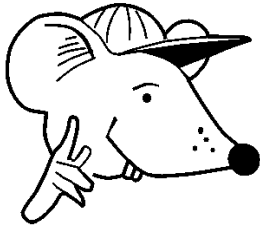
Answer these questions.

You need to be **quick**
                accurate
                neat.

1. Which are true?:

a) $9.6 \times 6.7 = 6.7 \times 9.6$ **b)** $1.3 \times 7 \times 6.7 = 6.7 \times 7 \times 1.3$

c) $23 \times (34 + 16) = (23 \times 34) + 16$

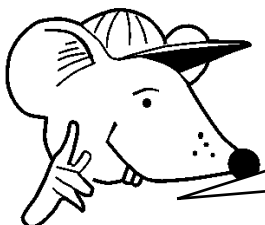**d)** $4.7 \times 9 = (4 + 0.7) \times 9$ **e)** $(1.3 \times 5) \times 10 = 1.3 \times (5 \times 10)$

2. Calculate:

a) 9.7×1 **b)** 1×87.6 **c)** $8.5 \times 45.6 \times 0 \times 5.4$

d) $1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5 + 1.5$

e) $(8.6 \times 0) + (0 \times 4.4) + 3.4$

3. Which are true?

a) 8.6×2.3 is greater than 8.6 **b)** 0×8.4 is equal to 8.4

c) 9.6×0.6 is less than to 9.6

d) If $4.3 \times 6 = 25.8$, then $25.8 \div 6 = 4.3$

e) If $16.38 \div 4.2 = 3.9$, then $4.2 \times 3.9 = 16.38$

f) If $32 \times 32 = 1\ 024$, then $1\ 024 \div 32 = 32$

<u>Quick Question Sheet</u>

Answer these questions.

You need to be **quick
                    accurate
                    neat.**

1. Fill in the boxes:

a) 1.2 × 5 = ☐   **b)** 23 × 7 = ☐   **c)** 5 × ☐ = 125

d) 8 × 2.4 = ☐   **e)** 10 × 4.7 = ☐   **f)** 16 × ☐ = 48

g) 4 × 23 + ☐ = 108   **h)** 50 + (☐ × 2) = 55

2. Using a calculator, fill in the boxes.

a) 23.7 × 95 = ☐   **b)** ☐ × ◯ = 0.4

c) ☐ × 100 = 6.56   **d)** 45 × ☐ = 4.5

Quick Question Sheet
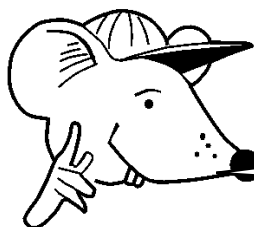
> Answer these questions.
>
> You need to be **quick**
>   **accurate**
>   **neat.**

1. Which are true?:

a) 0.6 × 8 = 8 + 0.6   **b)** (23 × 52) + 9 = 23 + (52 × 9)

c) **(**1 × 9) × 5.8 = 12 × (9 × 5)   **d)** 8.9 × 6 = (8 + 0.9) × 6

e) (8.4 × 5.6) × 0 = 8.4 × (0 × 5.6)

2. Calculate:

a) 4.56 × 1   **b)** 1 × 0.03   **c)** 0 × 9.4 × 5.6 × 0.03

d) 2.5 + 2.5 + 2.5 + 2.5 + 2.5 +2.5   **e)** (0 × 8.6) + (6.7 × 0) + 4.5

3. Which are true?

a) 0.5 × 26 is greater than 2   **b)** 0 + 0.03 is equal to 0.03

c) 9.9 × 1 is greater than 9.9

d) If 76 × 22 = 1 672, then 1 672 ÷ 22 = 76

e) If 6.5 ÷ 0.5 = 13, then 13 × 6.5 = 0.5

f) If 8.5 × 8.5 = 72.25, then 72.25 ÷ 8.5 = 8.5

<u>Quick Question Sheet</u>

Answer these questions.

You need to be **quick**
                    accurate
                    neat.

1. Fill in the boxes:

a) 1.4 × 3 = ⬜   **b)** 4.5 × 4 = ⬜

c) 32 × ⬜ = 320   **d)** 4.5 × 8 = ⬜

e) 6 × 1.5 = ⬜   **f)** 12 × ⬜ = 120

g) 55 × 4 + ⬜ = 234   **h)** 58 + (⬜ × 4) = 60

2. Using a calculator, fill in the boxes.

a) 45.7 × 7.5 = ⬜   **b)** ⬜ × ⬭ = 24.8

c) ⬜ × 327 = 8 502   **d)** 8 × ⬜ = 18.4

Answers

Page 4
1. True   **2.** True   **3.** True   **4.** True   **5.** False   **6.** True   **7.** True
   Number stays the same when multiplied by 1
8. 9.5   **9.** 6.7   **10.** 0.6   **11.** 0.06   **12.** 0.6

Page 5
When you multiply by 0 the number becomes 0.
1. 0   **2.** 0   **3.** 0   **4.** 0   **5.** 0   **6.** 0   **7.** 0
The number returns to 8.6.
8. 8.6   **9.** 5.4   **10.** 6.2
Yes, it is.
11. 88   **12**. 9.6   **13**. 34.17
14. 2 538   **15**. 2 590   **16**. 21   **17**. 41.28   **18**. 4 704   **19**. 1 128
20. 3 160   **21**. 2 688

Page 6
1. 18.8   **2.** 27   **3.** 960   **4.** 6.5   **5.** 15   **6.** Yes   **7.** Yes
8. 34.4   **9.** 27.6
10. 0.75,   0.012, 0.36,   0.12, 0.1, 3, 1, 0.048, 0.016, 0.48   **11.** 2 286

Page 7
1. 6.8   **2.** 10.5   **3.** 21   **4.** 38.4   **5.** 34.0   **6.** 36.8
7. 4.8   **8.** 120   **9.** 120   **10.** 2.3   **11.** 10   **12.** 13.5

Page 8

1. a) True   **b)** True   **c)** False   **d)** True   **e)** True

2. a) 9.7   **b)** 87.6   **c)** 0   **d)** 15   **e)** 3.4

3. a) True   **b)** False   **c)** True   **d)** True   **e)** True   **f)** True

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Page 9

1. a) 6   **b)** 161   **c)** 25   **d)** 19.2   **e)** 47   **f)** 3   **g)** 16   **h)** 2.5

2. a) 2 251.5   **b)** Any pair whose product is 0.4 (eg 0.2×2)

c) 0.0656   **d)** 0.1

Page 10
1. a) False   **b)** False   **c)** False   **d)** True   **e)** True
2. a) 4.56   **b)** 0.03   **c)** 0   **d)** 15   **e)** 4.5
3. a) True   **b)** True   **c)** False   **d)** True   **e)** False   **f)** True

Answers

Page 11

1. a) 4.2   **b)** 18   **c)** 10   **d)** 36   **e)** 9   **f)** 10   **g)** 14   **h)** 0.5

2. a) 342.75   **b)** Any pair whose product is 24.8 (eg. 6.2×4)

c) 26   **d)** 2.3