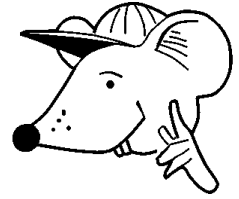# MATHEMATICS

## N.S. Yr. 5   P.53

**Understanding multiplication and its relationship to addition and division.**

# Equipment

Paper, pencil

# MathSphere

# Concepts

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,*

and they should know and recognise the multiplication sign ($\times$).

## Definitions:

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

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

**Inverse**: Opposite.
Eg. the inverse of multiplication is division.
Eg. the inverse of addition is subtraction.

# 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.

Eg.  $14 \times 6 = 6 \times 14$

N.B. This is not true for division, for example. $16 \div 4$  is not equal to $4 \div 16$ !

**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.)

Eg.  $5 \times 7 \times 9 = (5 \times 7) \times 9 = 35 \times 9 = 315$

Or we could do the sum in this order:

$5 \times 7 \times 9 = 5 \times (7 \times 9) = 5 \times 63 = 315$

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

Eg.  $(5 + 9) \times 7 = (5 \times 7) + (9 \times 7) = 35 + 63 = 98$

At this level, this technique is most useful when applied to multiplication of a two or three digit number by a single digit number.

Eg.  Find  $24 \times 7.$   We can do this sum like this:

$24 \times 7 = (20 + 4) \times 7 = (20 \times 7) + (4 \times 7) = 140 + 28 = 168.$

Did you know that **eleven sixteens** is the same as **sixteen elevens**?

How can you show this with counters or bricks?

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

Which of these are true?

**1.** $23 \times 12 = 12 \times 23$          **2.** $19 \times 25 = 25 \times 19$       **3.** $42 \times 14 = 14 \times 42$

Which of these are true?

**4.** The answer to $28 \times 45$ is greater than $28$ and greater than $45$.

**5.** The answer to $52 \times 34$ is bigger than 34, but smaller than 52.

**6**. The answer to $24 \times 18$ is smaller than 24 and smaller than 18.

**7.** The answer to $25 \times 42$ is greater than 25 and greater than 42.
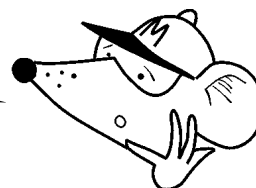
What happens when you multiply a number by **1** ?

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

**8.** $76 \times 1$          **9.** $35 \times 1$       **10.** $1 \times 34$        **11.** $1 \times 724$    **12.** $5 \times 1 \times 9$

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

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

**1.** $52 \times 0$      **2.** $98 \times 0$      **3.** $0 \times 52$      **4.** $76 \times 0$

**5.** $9 \times 0 \times 25$      **6.** $94 \times 24 \times 87 \times 62 \times 0$      **7.** $76 \times 0 \times 58$

Now here's a tricky one!

What happens if you multiply **89** by **12** and then divide the answer by **12** ?

How quickly can you work out these sums?

**8.** $67 \times 13 \div 13$      **9.** $95 \times 34 \div 34$      **10.** $62 \times 16 \div 16$

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

**11.** $45 \div 9 \times 9$      **12.** $72 \div 12 \times 12$      **13.** $450 \div 50 \times 50$

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

$45 \times 7 = 315$.   Check by dividing 315 by 7:   $315 \div 7 = 45$   Yippee!

Work out these sums and check them by dividing.

**14.** $23 \times 3$      **15.** $32 \times 7$      **16.** $24 \times 9$      **17.** $50 \times 8$

**18.** $72 \times 2$      **19.** $16 \times 5$      **20.** $23 \times 6$      **21.** $26 \times 4$

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

If I wanted to double **48**, I would double **40** and then double **8**. That makes **80 + 16**, which is **96**.

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

**1.** Double 46          **2.** 12 times 7                    **3.** 16 times 100

**4.** Multiply 92 by 1        **5.** What is the product of 25 and 4?

**6.** Is 5 a factor of 72 ?    **7.** Is 240 a multiple of 3 ?

**8.** Twelve fifteens.          **9.** Double  76.

**10.** What are all the products you can make using these four numbers:
             3,  7,  9 and 11  ?

**11.**  Multiply 342 by 7.

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,  **84 × 7** is difficult to work out in one go.

Split **84** into **80 + 4** and we can then do the sum like this:

**84 × 7 = (80 + 4) × 7 = 80 × 7 + 4 × 7**
$$= 560 + 28$$
$$= \underline{\textbf{588}}$$

Try this method to find these products:

**1.** $39 \times 8$          **2.** $27 \times 6$          **3.** $42 \times 5$

**4.** $34 \times 6$          **5.** $67 \times 5$          **6.** $26 \times 4$

Fill in the boxes as quickly as you can:

**7.** $11 \times 6 = \boxed{\phantom{00}}$      **8.** $6 \times 9 = \boxed{\phantom{00}}$      **9.** $8 \times 4 \times 5 = \boxed{\phantom{00}}$

**10.** $\boxed{\phantom{00}} \times 8 = 400$   **11.** $\boxed{\phantom{00}} = (14 + 3) \times 4$   **12.** $(11 \times 5) + 12 = \boxed{\phantom{00}}$

# Quick Question Sheet

Answer these questions.

You need to be **quick**
          **accurate**
          **neat.**
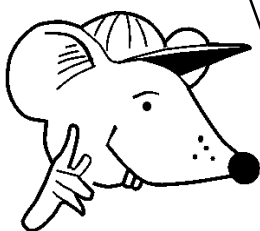
**1.** Which are true?:

**a)** $35 \times 22 = 22 \times 35$  **b)** $7 \times 7 \times 4 = 4 \times 7 \times 7$  **c)** $7 \times (5 + 9) = (7 \times 5) + 9$

**d)** $46 \times 9 = (40 + 6) \times 9$  **e)** $(45 \times 4) \times 18 = 45 \times (4 \times 18)$

**2.** Calculate:

**a)** $99 \times 1$  **b)** $1 \times 745$  **c)** $54 \times 83 \times 0 \times 94$

**d)** $13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13 + 13$  **e)** $(9 \times 0) + (0 \times 9) + 37$

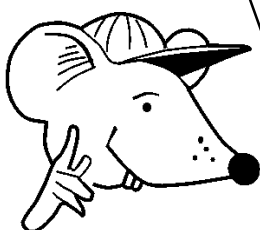**3.** Which are true?

**a)** $85 \times 84$ is greater than 84  **b)** $0 \times 58$ is equal to 58

**c)** $97 \times 1$ is equal to 97  **d)** If $65 \times 5 = 325$, then $325 \div 65 = 5$

**e)** If $640 \div 32 = 20$, then $32 \times 20 = 640$

**f)** If $24 \times 24 = 576$, then $576 \div 24 = 24$

# Quick Question Sheet

Answer these questions.

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

**1.**  Fill in the boxes:

**a)**  $8 \times 9 = \boxed{\phantom{00}}$        **b)**  $6 \times 7 = \boxed{\phantom{00}}$        **c)**  $5 \times \boxed{\phantom{00}} = 45$

**d)**  $5 \times 6 = \boxed{\phantom{00}}$        **e)**  $10 \times 6 = \boxed{\phantom{00}}$        **f)**  $8 \times \boxed{\phantom{00}} = 64$

**g)**  $7 \times 12 + \boxed{\phantom{00}} = 100$        **h)**  $35 + (\boxed{\phantom{00}} \times 2) = 55$

**2.**  Using a calculator, fill in the boxes.

**a)**  $8\,763 \times 85 = \boxed{\phantom{0000}}$        **b)**  $\boxed{\phantom{00}} \times \bigcirc = 6\,800$

**c)**  $\boxed{\phantom{00}} \times 34 = 6\,834$        **d)**  $73 \times \boxed{\phantom{00}} = 7\,373$

# Quick Question Sheet

Answer these questions.

You need to be **quick**
                     **accurate**
                     **neat.**
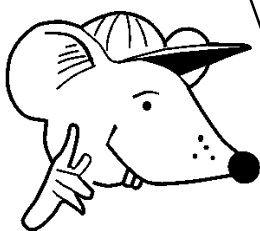
**1.** Which are true?:

**a)** $9 \times 8 = 8 + 9$     **b)** $(8 \times 5) + 3 = 8 + (5 \times 3)$   **c)** $(12 \times 9) \times 5 = 12 \times (9 \times 5)$

**d)** $89 \times 6 = (80 + 9) \times 6$       **e)** $(24 \times 34) \times 0 = 24 \times (0 \times 34)$

**2.** Calculate:

**a)** $174 \times 1$   **b)** $1 \times 796$   **c)** $0 \times 34 \times 23 \times 43$

**d)** $13 + 13 + 13 + 13 + 13 + 13 + 13$       **e)** $(0 \times 37) + (76 \times 0) + 25$
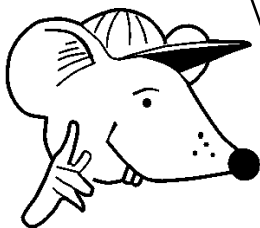
**3.** Which are true?

**a)** $76 \times 25$ is greater than 76          **b)** $0 + 73$ is equal to 73

**c)** $74 \times 1$ is greater than 74          **d)** If $98 \times 7 = 686$, then $686 \div 7 = 98$

**e)** If $850 \div 17 = 50$,  then $17 \times 850 = 50$

**f)** If $75 \times 75 = 5625$, then $5625 \div 75 = 75$

# Quick Question Sheet

Answer these questions.

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

**1.** Fill in the boxes:

**a)** $10 \times 5 = \boxed{\phantom{00}}$      **b)** $23 \times 4 = \boxed{\phantom{00}}$      **c)** $8 \times \boxed{\phantom{00}} = 72$

**d)** $90 \times 2 = \boxed{\phantom{00}}$      **e)** $4 \times 15 = \boxed{\phantom{00}}$      **f)** $7 \times \boxed{\phantom{00}} = 77$

**g)** $8 \times 4 + \boxed{\phantom{00}} = 60$      **h)** $68 + (\boxed{\phantom{00}} \times 3) = 92$

**2.** Using a calculator, fill in the boxes.

**a)** $7\,633 \times 86 = \boxed{\phantom{0000}}$      **b)** $\boxed{\phantom{00}} \times \bigcirc = 7878$

**c)** $\boxed{\phantom{00}} \times 45 = 4\,590$      **d)** $70 \times \boxed{\phantom{00}} = 42\,000$

# Answers

**Page 4**
**1.** True    **2.** True    **3.** True    **4.** True    **5.** False    **6.** False    **7.** True
      Number stays the same when multiplied by 1
**8.** 76        **9.** 35        **10.** 34        **11.** 724    **12.** 45

**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 89.
**8.** 67        **9.** 95        **10.** 62
Yes, it is.
**11**. 45    **12**. 72        **13**. 450
**14.** 69    **15**. 224    **16**. 216    **17**. 400    **18**. 144    **19**. 80    **20**. 138    **21**. 104

**Page 6**
**1.** 92          **2.** 84          **3.** 1 600        **4.** 92        **5.** 100        **6.** No        **7.** Yes
**8.** 180      **9.** 152
**10.** 21, 27, 33, 63, 77, 99, 693, 297, 231, 189, 2 079
**11.** 2 394

**Page 7**
**1.** 312        **2.** 162        **3.** 210        **4.** 204        **5.** 335    **6.** 104
**7.** 66          **8.** 54          **9.** 160    **10.** 50        **11.** 68    **12.** 67

**Page 8**

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

**2. a)** 99        **b)** 745    **c)** 0            **d)** 130        **e)** 37

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

**Page 9**

**1. a)** 72          **b)** 42        **c)** 9          **d)** 30          **e)** 60          **f)** 8        **g)** 16        **h)** 10

**2. a)** 744 855    **b)**  Any pair whose product is 6 800 (eg $340 \times 20$)

      **c)** 201    **d)** 101

**Page 10**
**1. a)** False        **b)**  False        **c)** True        **d)** True        **e)** True
**2. a)** 174        **b)** 796        **c)** 0          **d)** 91        **e)** 25
**3  a)** True        **b)** True        **c)** False        **d)** True          **e)**  False        **f)** True

# Answers

**Page 11**

**1. a)** 50    **b)** 92    **c)** 9    **d)** 180    **e)** 60    **f)** 11    **g)** 28    **h)** 8

**2. a)** 656 438          **b)** Any pair whose product is 7 878 (eg. $101 \times 78$)

**c)** 102        **d)** 600