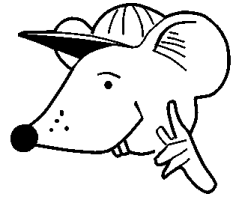


MATHEMATICS



N.S. Yr. 4 P.52

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

Equipment

Paper, pencil

MathSphere

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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.

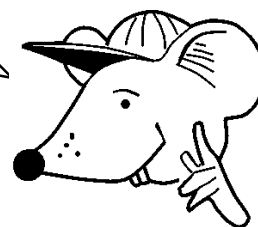
Eg. Find 24×7 . We can do this sum like this:

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

Did you know that **four twelves** is the same as **twelve fours**?

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. $5 \times 4 = 4 \times 5$

2. $8 \times 3 = 3 \times 8$

3. $16 \times 9 = 9 \times 16$

Which of these are true?

4. The answer to 6×7 is greater than 6 and greater than 7.

5. The answer to 7×12 is bigger than 7, but smaller than 12.

6. The answer to 15×6 is smaller than 15 and smaller than 6.

7. The answer to 3×12 is greater than 3 and greater than 12.



What happens when you multiply a number by **1** ?

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

8. 4×1

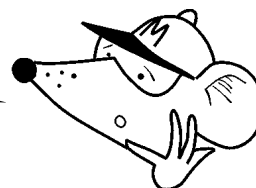
9. 56×1

10. 1×7

11. 1×345

12. $2 \times 1 \times 5$

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



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

1. 4×0

2. 56×0

3. 0×34

4. 23×0

5. $6 \times 0 \times 8$

6. $56 \times 3 \times 34 \times 12 \times 0$

7. $12 \times 0 \times 12$



Now here's a tricky one!

What happens if you multiply **45** by **7** and then divide the answer by **7** ?

How quickly can you work out these sums?

8. $45 \times 8 \div 8$

9. $12 \times 4 \div 4$

10. $15 \times 6 \div 6$

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

11. $24 \div 6 \times 6$

12. $15 \div 5 \times 5$

13. $50 \div 2 \times 2$

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

$12 \times 3 = 36$. Check by dividing 36 by 3: $36 \div 3 = 12$ Yippee!

Work out these sums and check them by dividing.

14. 13×2

15. 16×5

16. 8×4

17. 23×7

18. 15×5

19. 54×9

20. 15×8

21. 45×7

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

If I wanted to double **12**, I would double **10** and then double **2**. That makes **20 + 4**, which is **24**.



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

1. Double 25
2. 8 times 3
3. 6 times 10
4. Multiply 18 by 1
5. What is the product of 12 and 7?
6. Is 5 a factor of 60 ?
7. Is 32 a multiple of 5 ?
8. Three thirteens.
9. Double 25.
10. What are all the products you can make using these four numbers:
2, 4, 5 and 10 ?
11. Multiply 123 by 3.

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, 43×6 is difficult to work out in one go.

Split **43** into **40 + 3** and we can then do the sum like this:

$$\begin{aligned} 43 \times 6 &= (40 + 3) \times 6 = 40 \times 6 + 3 \times 6 \\ &= 240 + 18 \\ &= \underline{258} \end{aligned}$$



Try this method to find these products:

1. 52×7 2. 15×5 3. 25×5

4. 16×8 5. 23×7 6. 45×9

Fill in the boxes as quickly as you can:

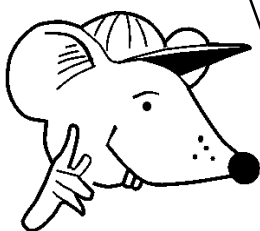
7. $8 \times 2 = \square$ 8. $2 \times 8 = \square$ 9. $5 \times 3 \times 4 = \square$

10. $\square \times 5 = 25$ 11. $\square = (4 + 2) \times 5$ 12. $(8 \times 3) + 7 = \square$

Quick Question Sheet

Answer these questions.

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



1. Which are true?:

a) $6 \times 7 = 7 \times 6$ b) $4 \times 3 \times 2 = 4 \times 2 \times 3$ c) $5 \times (4 + 3) = (5 \times 4) + 3$

d) $28 \times 4 = (20 + 8) \times 4$ e) $(6 \times 3) \times 5 = 6 \times (3 \times 5)$

2. Calculate:

a) 26×1 b) 1×357 c) $4 \times 2 \times 0 \times 8$

d) $8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 + 8$ e) $(4 \times 0) + (0 \times 6) + 3$

3. Which are true?

a) 43×28 is greater than 43

b) 0×16 is equal to 16

c) 16×1 is equal to 16

d) If $27 \times 9 = 243$, then $243 \div 27 = 9$

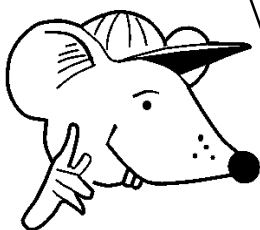
e) If $270 \div 15 = 18$, then $15 \times 18 = 270$

f) If $16 \times 16 = 256$, then $256 \div 16 = 2$

Quick Question Sheet

Answer these questions.

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



1. Fill in the boxes:

a) $8 \times 5 = \square$ b) $4 \times 6 = \square$ c) $3 \times \square = 21$

d) $7 \times 9 = \square$ e) $8 \times 3 = \square$ f) $4 \times \square = 36$

g) $8 \times 4 + \square = 39$ h) $41 + (\square \times 3) = 56$

2. Using a calculator, fill in the boxes.

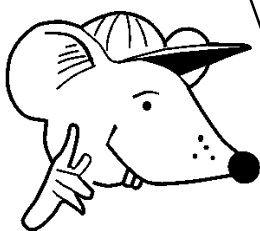
a) $4\,213 \times 27 = \square$ b) $\square \times \bigcirc = 4\,200$

c) $\square \times 18 = 1\,818$ d) $23 \times \square = 4\,669$

Quick Question Sheet

Answer these questions.

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



1. Which are true?:

- a) $8 \times 5 = 5 + 8$ b) $(7 \times 4) + 6 = 7 + (4 \times 6)$ c) $(7 \times 2) \times 6 = 7 \times (2 \times 6)$
d) $57 \times 5 = (50 + 7) \times 5$ e) $(4 \times 9) \times 0 = 5 \times (0 \times 3)$

2. Calculate:

- a) 45×1 b) 1×722 c) $0 \times 3 \times 8 \times 7$
d) $6 + 6 + 6 + 6 + 6 + 6 + 6$ e) $(0 \times 7) + (8 \times 0) + 6$

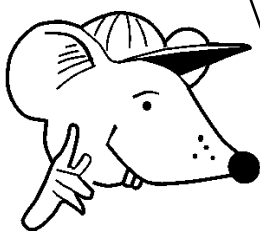
3. Which are true?

- a) 57×22 is greater than 22 b) $0 + 45$ is equal to 45
c) 37×1 is greater than 37 d) If $49 \times 8 = 392$, then $392 \div 8 = 49$
e) If $520 \div 13 = 40$, then $13 \times 520 = 40$
f) If $22 \times 22 = 484$, then $484 \div 22 = 22$

Quick Question Sheet

Answer these questions.

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



1. Fill in the boxes:

a) $7 \times 3 = \square$ b) $9 \times 5 = \square$ c) $5 \times \square = 45$

d) $6 \times 8 = \square$ e) $3 \times 15 = \square$ f) $6 \times \square = 42$

g) $9 \times 5 + \square = 50$ h) $23 + (\square \times 4) = 51$

2. Using a calculator, fill in the boxes.

a) $6\,348 \times 95 = \square$ b) $\square \times \bigcirc = 5656$

c) $\square \times 27 = 5427$ d) $40 \times \square = 8\,000$

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. 4 9. 56 10. 7 11. 345 12. 10

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 45.

8. 45 9. 12 10. 15

Yes, it is.

11. 24 12. 15 13. 50

14. 26 15. 80 16. 32 17. 161 18. 75 19. 486 20. 120 21. 315

Page 6

1. 50 2. 24 3. 60 4. 18 5. 84 6. Yes 7. No 8. 39
 9. 50
 10. 8, 10, 20, 40, 50, 200 etc.
 11. 369

Page 7

1. 364 2. 75 3. 125 4. 128 5. 161 6. 405
 7. 16 8. 16 9. 60 10. 5 11. 30 12. 31

Page 8

1. a) True b) True c) False d) True e) True
 2. a) 26 b) 357 c) 0 d) 80 e) 3
 3. a) True b) False c) True d) True e) True f) False

Page 9

1. a) 40 b) 24 c) 7 d) 63 e) 24 f) 9 g) 7 h) 5
 2. a) 113 751 b) Any pair whose product is 4 200 (eg 21×200)
 c) 101 d) 203

Page 10

1. a) False b) False c) True d) True e) True
 2. a) 45 b) 722 c) 0 d) 42 e) 6
 3 a) True b) True c) False d) True e) False f) True

Answers

Page 11

1. a) 21 b) 45 c) 9 d) 48 e) 45 f) 7 g) 5 h) 7

2. a) 603 060 b) Any pair whose product is 5 656 (eg. 28×202)

c) 201 d) 200