MATHS FIELD GUIDE · GRADE 2

Multiplication describes equal groups

OPENING PROBLEM

Three bags, three marbles each. How many?

A 

B 

C 

02 Make the groups equal
03 Rules and worked cases
04 The seed trays
05 Turn rows into a count
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Make the groups equal

Count the groups and the amount in each group separately.

1

A ○○○

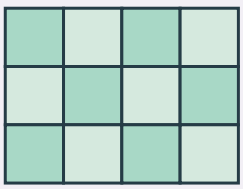
B ●●●

C ○○○

Three bags, three marbles each. How many?

Three plus three plus three is nine.

2



How does a rectangle show twelve?

Three rows of four. You can also see four columns of three.

3

A ○○

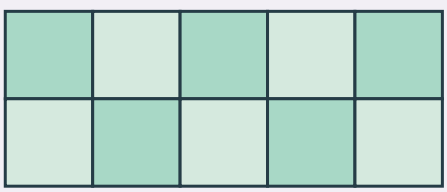
B ●●

C ○

Can you count these as three twos?

One group is short. There are five, one fewer than six.

4



Cover one full column. What is left?

Two rows of four, or eight counters.

Four pairs
eight objects.

Four groups with one missing from a pair
seven objects.

CHAPTER PROBLEM

Why can 3 × 4 and 4 × 3 give the same total?

Turning a three-by-four array makes a four-by-three array without changing its twelve counters.

MATHS REFERENCE · GRADE 2

Multiplication describes equal groups

Multiplication finds the total of equal-sized groups. We need to know how many groups there are and how many objects are in each.

An array arranges objects in equal rows and equal columns. It helps us see multiplication rather than only memorise facts.

Four cases to recognise

Situation	What to do and why
Four shelves hold three books each	Four equal groups give 4 × 3 = 12.
A 2 by 6 dot array is turned	It becomes 6 by 2. No dots leave, so both products equal 12.
Five rows of four with one row covered	Four visible rows give 16. The hidden row brings the total to 20.
Rows contain 3, 3 and 2	Count eight directly. Three full rows of three would need one more.

Read the model

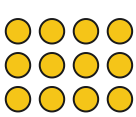
Build the idea

Make three rows with four counters in each row. The total can be described as 4 + 4 + 4, or 3 × 4.

Read 3 × 4 as three groups of four in this chapter. Count the rows, count one row and then count all the counters.

3 × 4

3 rows of 4



3 × 4 = 12

Array - equal groups

Why it works

Repeated addition adds the same amount for every group. Multiplication records that repeated structure in a shorter way.

Turn the array. Four rows of three contain the same counters as three rows of four. Both have a total of twelve.

multiply Find a total from equal groups.
array Objects in equal rows and columns.
product The result of multiplication.

A 
B 

Share eight equally between two children. How many each?

Four. Each pair of turns gives both children one.

WORKED INVESTIGATION

The seed trays

A gardener plants four seeds in each of three trays. Count in fours once for each tray to find twelve seeds.

Look at this part	What it tells you
One tray	4
Two trays	8
Three trays	12

Work it through

Draw three rows of four dots. Turn the drawing a quarter turn and count four rows of three. The same twelve dots appear in both arrays.

Catch the mistake

Three trays with 4, 4 and 2 seeds have ten seeds. Three times four only describes trays with four in every tray.

Compare the cases

Follow an example

Four trays hold five cups each. One tray has 5; two have 10; three have 15; four have 20.

Write $4 \times 5 = 20$. The 4 counts trays, the 5 counts cups per tray and the 20 counts all cups.

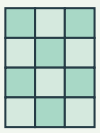
What changes? What stays true?

Groups of 4, 4 and 3 are not three equal groups of four. We must inspect the groups before choosing multiplication.

One group of five has five objects. Zero groups of five have no objects. These cases help explain multiplying by one and zero.

Change one condition

Add a fourth tray with four seeds. The total increases by four, from twelve to sixteen.



Twelve counters go into groups of three. How many groups?

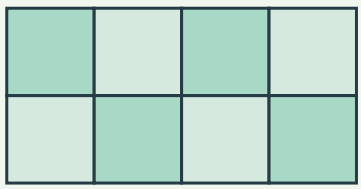
Four complete rows.

ILLUSTRATED PROBLEM SHEET

Turn rows into a count

A complete array has equal-length rows and equal-height columns.

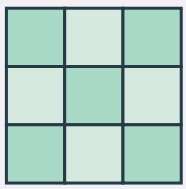
1



Count by rows. Count again by columns.

Two fours make eight. Four twos give the same total.

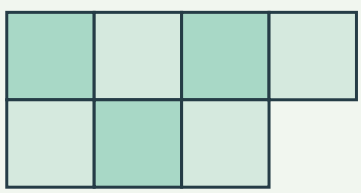
2



What is special about a square array?

It has just as many rows as columns. Three threes make nine.

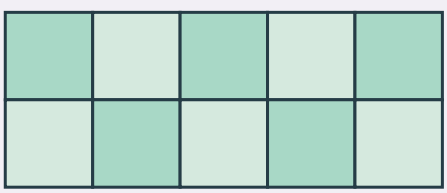
3



One place is empty. May you still count eight objects?

No. Eight places minus one empty place gives seven objects.

4



A new column joins this array. How many objects join?

Two. Each of the two rows gains one object.

Two rows of five
ten spaces.

One empty space in that array
nine objects.

CHAPTER PROBLEM

Draw three plates with four grapes on each. How many grapes are there?

4 + 4 + 4 = 12. Three equal groups of four contain twelve grapes.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 Add one counter to every bag when there are three bags. How does the total change?	It grows by three, one for each bag.
02 Could six counters make two full rows and also three full rows?	Yes. Use two rows of three or three rows of two.
03 Five trays each hold three seeds. How many more seeds fill a sixth tray and what will the total be?	Add three seeds. Six equal trays of three hold 18 seeds.
04 A 4 by 5 array loses the rightmost column. How many dots remain?	Four dots leave, one from each row. Four rows of four give 16.
05 Five bags have three apples each. One apple falls out. How many remain in the bags?	Start with fifteen, then subtract one: fourteen.

A ○○○
B ○○○
C ○○○

Nine are shared among three. How can you check?

Three groups of three rebuild nine.

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