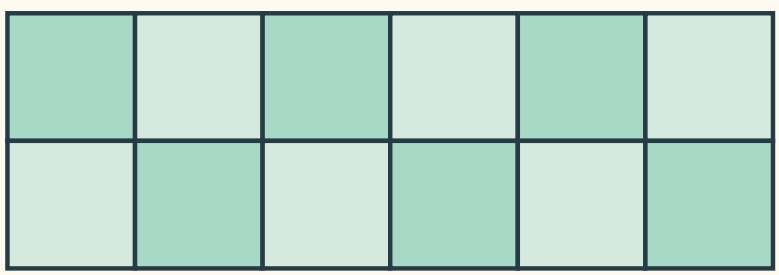
MATHS FIELD GUIDE · GRADE 4

Factors, multiples and divisibility

OPENING PROBLEM

What factor pair builds twelve?



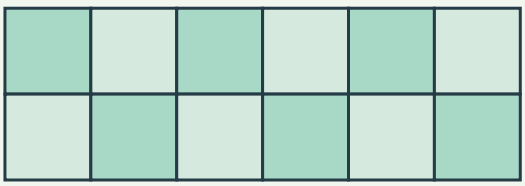
02 Read the rectangle of factors
03 Rules and worked cases
04 Arrange the seed packets
05 Make the groups equal
06 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read the rectangle of factors

Each whole-number rectangle with a fixed number of tiles gives a factor pair.

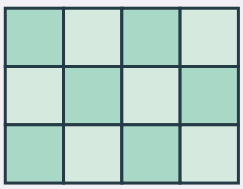
1



What factor pair builds twelve?

Two rows of six. Turning the rectangle gives the same pair reversed.

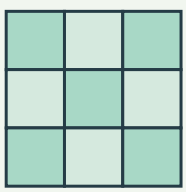
2



Which other pair also uses twelve?

Three and four. The long skinny arrangement 1 by 12 completes the list.

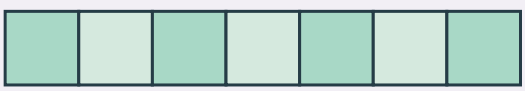
3



Why does 9 have an odd number of positive factors?

1 and 9 pair together. The middle factor 3 pairs with itself.

4



What makes seven prime?

It has only the pair 1 and 7. No whole rectangle with both sides larger than one uses seven tiles.

Factors of 16
1, 2, 4, 8, 16.

Positive multiples of 16
16, 32, 48 and onward.

CHAPTER PROBLEM

Explain how 3 × 8 = 24 tells us both a factor fact and a multiple fact.

Three and eight are factors of 24; 24 is a multiple of each.

MATHS REFERENCE · GRADE 4

Factors, multiples and divisibility

A factor of a whole number divides it exactly, leaving no remainder. A multiple is made by multiplying a number by a whole number.

Factors describe ways to build a particular total. Multiples describe the totals produced by repeated groups of a chosen size.

Four cases to recognise

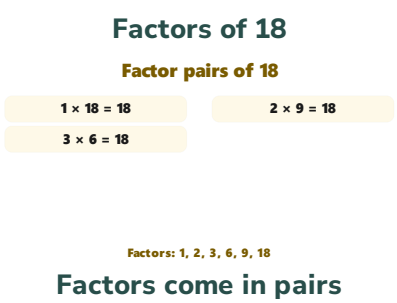
Situation	What to do and why
Find factor pairs of 18	1 × 18, 2 × 9 and 3 × 6 exhaust all pairs.
Is 7 a factor of 45?	Six sevens make 42 and leave three, so no.
Common factors of 12 and 18	Compare lists: 1, 2, 3 and 6 divide both.
First common positive multiple of 4 and 6	Lists begin 4, 8, 12 and 6, 12. First match: 12.

Read the model

Build the idea

Arrange eighteen counters into rectangular arrays: 1 by 18, 2 by 9 and 3 by 6. Each rectangle gives a factor pair.

List multiples of three: 3, 6, 9, 12, 15, 18. Eighteen appears because it contains six groups of three.

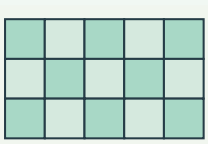


Why it works

An array works only when every row is complete. If a proposed row length leaves leftovers, it is not a factor of the total.

The same multiplication fact makes each number in the pair a factor and the product a multiple of both.

factor A whole-number divisor with no remainder.
multiple A whole-number product of a given number.
factor pair Two factors whose product is the target.



Fifteen counters, five per box. How many full boxes?

Three, with zero spare.

WORKED INVESTIGATION

Arrange the seed packets

Place 24 packets into a rectangle with complete rows. Both the row count and the number in a row must divide 24 exactly.

Look at this part	What it tells you
2 rows	12 per row
3 rows	8 per row
4 rows	6 per row

Work it through

Try five rows. Four packets in each uses twenty and leaves four, so five is not a factor of 24.

Catch the mistake

Twenty-four is a multiple of six because $6 \times 4 = 24$. Six is the factor in that relationship.

Compare the cases

Follow an example

For 24, the pair 4×6 shows that 4 and 6 are factors of 24. It also shows that 24 is a multiple of 4 and of 6.

Five is not a factor: four groups of five give 20, and four objects remain.

What changes? What stays true?

One is a factor of every positive whole number. A number is also its own factor.

Zero cannot be used as a divisor. Factor discussions here use positive whole-number factors; multiples can include zero when the convention includes it.

Change one condition

Include the one-row rectangle as well. Pairing small and large factors gives 1, 2, 3, 4, 6, 8, 12 and 24.

$17 = 3 \times 5 + 2$

Seventeen counters, five per bag. What does the two count?

Two loose counters after three full bags.

ILLUSTRATED PROBLEM SHEET

Make the groups equal

Count the groups and the amount in each group separately.

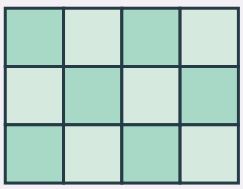
1

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.

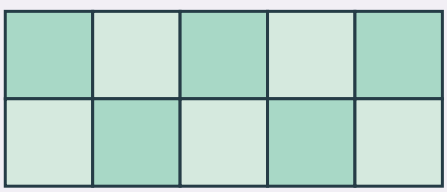
3

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

Can 24 counters form a rectangle with five equal rows? What about six rows?

Five rows would leave 4 counters. Six rows of 4 use all 24, so 6 is a factor of 24.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 Two lights flash every 4 and 6 seconds. When do they first flash together after the start?	At 12 seconds. Twelve is the first positive multiple in both lists.
02 Add one counter to every bag when there are three bags. How does the total change?	It grows by three, one for each bag.
03 Can 18 and 24 packets both be arranged in rows of six? Explain.	Yes. Eighteen makes three rows of six and 24 makes four. Six is a common factor.
04 Which number has exactly three factors, 16 or 25?	25 has 1, 5 and 25. The factors of 16 are 1, 2, 4, 8 and 16.
05 What is the greatest common factor of 20 and 30?	Ten divides both. Their remaining factors after dividing by ten are 2 and 3, with no common factor above one.

$$29 = 4 \times 5 + 9$$
$$\downarrow$$
$$29 = 5 \times 5 + 4$$

Why is the second division answer finished?

Nine spare can fill another group. Four spare cannot fill a group of five.

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