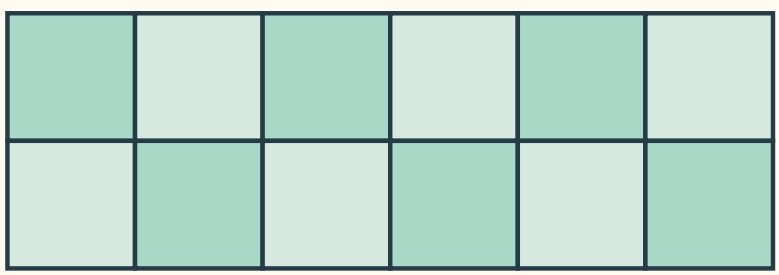
MATHS FIELD GUIDE · GRADE 5

Factors, multiples and common meeting points

OPENING PROBLEM

What factor pair builds twelve?



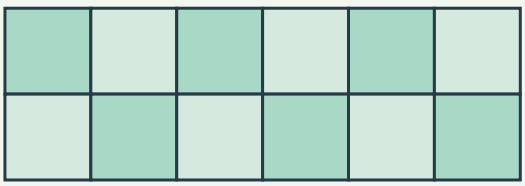
02 Read the rectangle of factors
03 Rules and worked cases
04 Two flashing lights
05 Compare the models
06 Use the prime powers as building blocks
07 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read the rectangle of factors

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

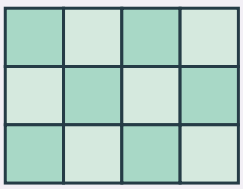
1



What factor pair builds twelve?

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

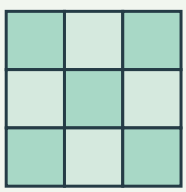
2



Which other pair also uses twelve?

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

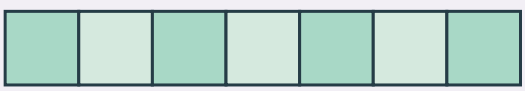
3



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

Find the LCM of three and four. Explain how you checked.

12. It is the first positive number in both multiple lists.

MATHS REFERENCE · GRADE 5

Factors, multiples and common meeting points

A factor of a positive whole number divides it exactly. A factor pair multiplies to make that number.

A multiple is the result of multiplying a number by a whole number. We use positive multiples when finding the least common multiple.

Cases to recognise

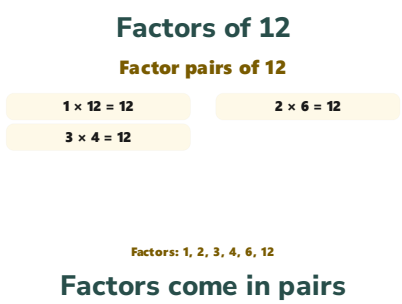
Situation	What to do and why
Pack 36 pens and 48 clips in the greatest number of identical kits	HCF = 12. Each kit gets three pens and four clips.
Buses arrive every 9 and 15 minutes, together at noon	The first common positive multiple is 45. Next meeting: 12:45.

Read the model

Build factor pairs

Arrange twelve tiles into complete rectangles: 1 by 12, 2 by 6, or 3 by 4.

The factors are 1, 2, 3, 4, 6 and 12. Five is not a factor because twelve cannot make complete groups of five.

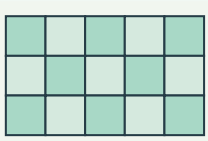


Factors and multiples have different jobs

Three is a factor of twelve; twelve is a multiple of three.

A positive number has a finite list of positive factors. Its positive multiples keep going.

factor A number that divides another exactly.
multiple A number made by whole-number multiplication.
LCM The least positive common multiple.



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

Three, with zero spare.

WORKED INVESTIGATION

Two flashing lights

One lamp flashes every six seconds and another every eight. Both flash at time zero. List elapsed times to find their next shared flash.

Look at this part	What it tells you
First lamp	6, 12, 18, 24
Second lamp	8, 16, 24
First shared time after zero	24 s

Work it through

Factor 6 = 2 × 3 and 8 = 2 × 2 × 2. A shared multiple needs three twos and one three, giving 24.

Catch the mistake

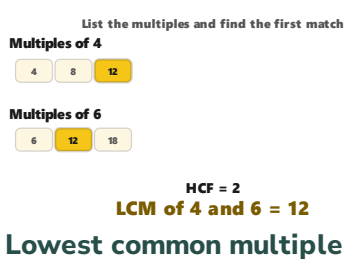
Forty-eight seconds works, but an earlier shared flash occurs at 24. A common multiple need not be the least one.

Compare the cases

Find a shared meeting point

Positive multiples of four include 4, 8, 12, 16, 20. Positive multiples of six include 6, 12, 18, 24.

Twelve is the first number in both lists. It is their least common multiple, or LCM.



Why the least matters

A light flashes every four seconds. Another flashes every six seconds. They flash together at the start.

After twelve seconds they first flash together again. The LCM finds that first positive shared interval.

Change one condition

Packing six red and eight blue lamps into identical kits instead asks for a common factor. Two kits can each hold three red and four blue.

17 = 3 × 5 + 2

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

Two loose counters after three full bags.

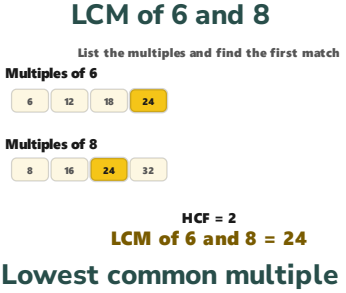
FACTORS, MULTIPLES AND COMMON MEETING POINTS

Compare the models

A factor is not a multiple rule

Multiplying the two numbers gives a common multiple, but not always the least one.

For six and eight, 48 is a common multiple. Their LCM is 24.



Check a result

A proposed LCM must divide exactly by both original numbers.

Then check that no smaller positive common multiple works. Estimation checks size, but does not prove an exact factor.

Use what you know

For four and eight, every multiple of eight is already a multiple of four.

Their LCM is eight. You do not need a long list when one number is a multiple of the other.

Explain your reasoning

Is five a factor of twenty? Is twenty a multiple of five?

Yes to both: $5 \times 4 = 20$.

Two more worked cases

Situation	Reasoning
Is 49 prime?	$7 \times 7 = 49$. A square can have an odd number of factors.
Two numbers are coprime. Must both be prime?	8 and 9 share only 1 although both are composite.

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

Why is the second division answer finished?

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

ILLUSTRATED PROBLEM SHEET

Use the prime powers as building blocks

Prime exponents record how many copies of each prime a number contains.

1

$$72 = 8 \times 9$$
$$\downarrow$$
$$2^3 \times 3^2$$

Why do two different factor trees end alike?

Their terminal prime factors, counted with multiplicity, are unique apart from order.

2

Number	Power of 2	Power of 3
24	3	1
36	2	2

Read the HCF from the exponents.

Take the smaller exponent in each column. HCF = $2^2 \times 3 = 12$.

3

Number	Power of 2	Power of 3
24	3	1
36	2	2

What is the first shared multiple?

Take the larger exponents. LCM = $2^3 \times 3^2 = 72$.

4

$$108 = 2^2 \times 3^3$$
$$\downarrow$$
$$108 \times 3 = 2^2 \times 3^4$$

Which smallest positive integer makes 108 a square when multiplied by it?

Three supplies the missing partner for the odd exponent. The result is 18^2.

$180 = 2^2 \times 3^2 \times 5$
multiply by 5 for a square.

$180 \div 5 = 36$
a square already.

CHAPTER PROBLEM

A learner says the LCM of five and ten is fifty. What went wrong?

Fifty is a common multiple, but ten is the least positive one.

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 Why is 1 excluded from the primes?	It has only one positive divisor. Allowing extra factors of 1 would also make prime-factor lists non-unique.
03 Lights flash every nine and twelve seconds. When is the next joint flash after time zero?	Multiples of nine are 9, 18, 27, 36. Multiples of twelve are 12, 24, 36. The first match is 36 seconds.
04 Three signals repeat every 4, 6 and 10 seconds. When do all repeat together?	LCM needs $2^2 \times 3 \times 5 = 60$ seconds.
05 Why is 1 neither prime nor composite?	It has exactly one positive factor. Primes have two and composite numbers have more than two.

23 people
↓
5 seats per car
↓
4 full cars + 3 people

How many cars are needed?

Five cars. Four is the number of full groups, but three passengers still need seats.

BANANALEARN LEARNING LIBRARY

Where will your maths take you next?

GRADE 5 MATHS

Choose your next problem.

Explore more illustrated guides and practise a related topic.

Browse Grade 5 guides →

Keep exploring

GRADE 5 · TOPIC GUIDE

Decimals are place-value units

Open guide →

GRADE 5 · TOPIC GUIDE

Add and subtract matching decimal units

Open guide →

Visit bananalearn.com →