



EduTrend Contents

EDUTECH · MATHEMATICS · PRIMARY

Find All the Ways

An open problem: how many ways can you make 12?

Ages 7–10

Level: Foundation

45 minutes

Pairs · up to 30

Activity 01

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 pupil worksheets · assessment checklist

ACTIVITY 01 · AT A GLANCE

Find All the Ways

Pairs use 12 counters to make arrays: equal rows with none left over. They record each array as a multiplication fact, such as $3 \times 4 = 12$. The challenge is to find them all and explain how they know. Pairs then try other numbers and notice which make only one array.

Learning outcomes

By the end of the session pupils can:

- build arrays with counters;
- write multiplication facts;
- work systematically;
- explain how they know all are found.

KEY WORDS

array · row · column · factor · multiply · systematic

CURRICULUM LINKS

Science: sorting and grouping. Art: patterns. PE: team sizes.

1

NOTICE

What do we see?

2

REPRESENT

Concrete, picture, symbol

3

EXPLORE

Try and look for patterns

4

CONJECTURE

What might always be true?

5

JUSTIFY

Explain why

6

CONNECT

Where else does it apply?

Materials (per pair)

- 12–20 counters
- Squared paper
- Worksheets 1, 2 and 3

Before the session

- Count counters into bags.
- Prepare squared paper.
- Plan pairs.
- Print worksheets.

SAFETY

Keep counters on desks and off the floor to avoid slips.

ACTIVITY 01 · SESSION PLAN

Step by step

Ask “How do you know you have them all?” before praising any list.

Time	What happens	Say or ask
0–5 min Hook	Show a 3×4 array.	<i>“What do you notice?”</i>
5–20 min Explore	Find arrays for 12.	<i>“Is there another?”</i>
20–30 min Record	Write facts in order.	<i>“What order helps?”</i>
30–40 min Extend	Try 7, 16 and 20.	<i>“Which number has only one?”</i>
40–45 min Justify	Share reasons.	<i>“How do you know you found them all?”</i>

CHALLENGE CARD (print or copy onto the board)

Find every array that makes 12, record each as a multiplication fact and explain how you know you have found them all.

ACTIVITY 01 · FACILITATOR NOTES

The maths know-how in brief

An array arranges objects in equal rows. Each array shows a multiplication fact and its turnaround, such as 3×4 and 4×3 . The numbers that make arrays are factors.

Working systematically, for example starting with 1 row, then 2, then 3, helps pupils know when they have found every possibility. Numbers with only two factors are prime.

Common ideas to listen for

- “ 3×4 and 4×3 are unrelated.” They are the same array turned.
- “Bigger numbers have more arrays.” 13 has only one.
- “I found lots, so I have them all.” Check systematically.

Adapting the activity

Support

Use 6 or 8 counters.

Stretch

Find the number under 30 with the most arrays.

WORKSHEET 1

Arrays for 12

Name: _____

Class: _____ Date: _____

Record each array.

Arrays for 12

Rows	In each row	Fact
1		
2		
3		
4		
5		
6		

WORKSHEET 2

Other numbers

Try more numbers.

Other numbers

Number	Arrays found	Only one?
7		
16		
20		

WORKSHEET 3

How we know

Explain your reasoning.

How we know we found them all

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight pupils; copy as needed.

Pupil	Builds arrays	Works systematically	Justifies completeness

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

Find All the Ways is a sample activity from the EduTrend Contents Edutech Mathematics programme (primary, level: foundation). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

© 2026 EduTrend Contents. This activity may be printed and copied for use with pupils in your own school, club or home. It may not be resold or published elsewhere. Photos: Yanhao Fang / Unsplash.