Did you know?

How would you work out $32 \div 8$?

- Did you use the fact that you know $8 \times 4 = 32$?

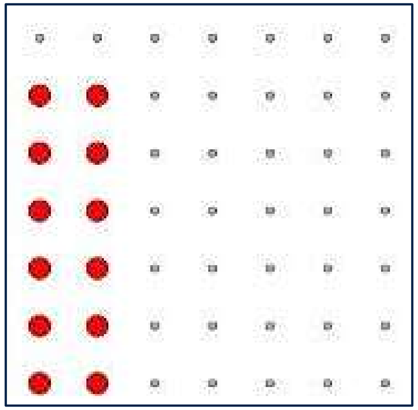
Often we use multiplication to help us do division as it is more straightforward.

- The same is true for factorising and expanding.
- It can often be easier to expand than to factorise
- So use expanding to help you factorise

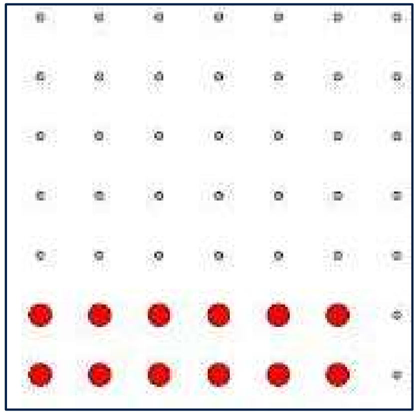
Factors and Rectangles

I have 12 red counters and a large sheet of dotted paper. How many different rectangular arrays can I make using all 12 counters?

A



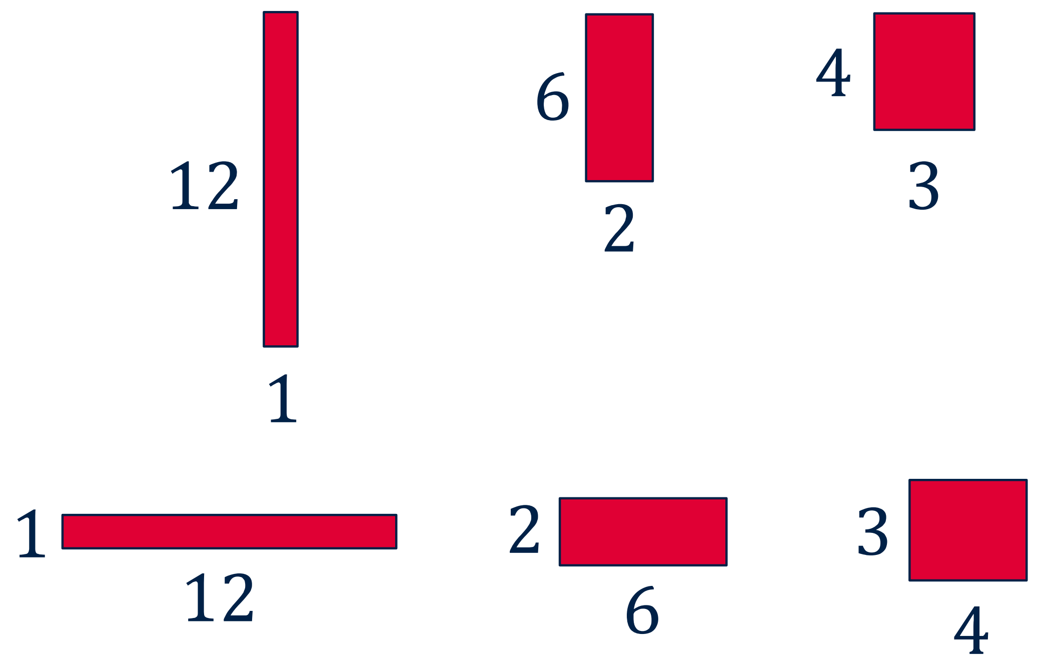
B



- An array is an arrangement of objects in rows and columns
- For this activity we will count A and B as different arrays as they have different orientations

Factors and Rectangles

This problem is equivalent to finding the number of rectangles with area 12 that have integer length sides, and counting 2 by 6 as different to 6 by 2



There are six arrays for 12 counters.

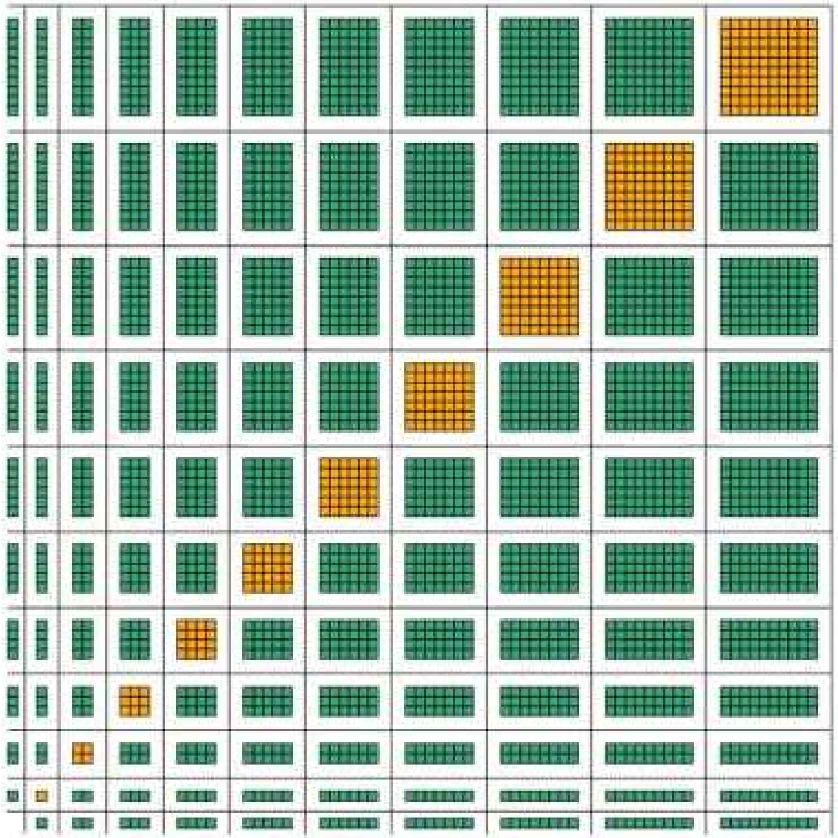
Factoring and Rectangles

How many different arrays are there for:

- 7 counters?
- 15 counters?
- 25 counters?
- A prime number of counters?
- What is special about numbers with an odd number of arrays?

Factoring and Rectangles Solutions

No of Counters	No of Arrays	
7	2	$(1 \times 7), (7 \times 1)$
15	4	$(1 \times 15), (3 \times 5), (5 \times 3), (15 \times 1)$
25	3	$(1 \times 25), (5 \times 5), (25 \times 1)$
Prime	2	$(1 \times p), (p \times 1)$
1	1	(1×1)
Square number	Odd number	



Remember the Visual Multiplication Square from the Expanding session? How does that help?

Factorising 1

Fully factorise the following:

1. $5x - 30$
2. $9x + 6$
3. $x^2 + 6x$
4. $6y^3 - 12y$
5. $7a^2b + 21ab - 14a$
6. $12x^2 + 12xy + 12y^2$
7. $3t(t - 1) + 7(t - 1)$
8. $2x(x^2 + 3) - 5(x^2 + 3)$

Factorising 1

Solutions on the next slide….

Factorising 1 Solutions

Fully factorise the following:

1. $5x - 30$ → $= 5(x - 6)$
2. $9x + 6$ → $= 3(3x + 2)$
3. $x^2 + 6x$ → $= x(x + 6)$
4. $6y^3 - 12y$ → $= 6y(y^2 - 2)$

Unsure about any of these? Search Factorising single brackets. Next try Skills check 2….

Factorising 1 Solutions

Fully factorise the following:

5. $7a^2b + 21ab - 14a$ → $= 7a(ab + 3b - 2)$

6. $12x^2 + 12xy + 12y^2$ → $= 12(x^2 + xy + y^2)$

7. $3t(t-1) + 7(t-1)$ →

The common factor to take out is $(t-1)$

$3t(t-1) + 7(t-1)$

$= (t-1)(3t+7)$

8. $2x(x^2+3) - 5(x^2+3)$ →

The common factor to take out is (x^2+3)

$2x(x^2+3) - 5(x^2+3)$

$= (x^2+3)(2x-5)$

Unsure about any of these? Search Factorising single brackets. Next try Skills check 2….

Factorising 2

Fully factorise the following:

1. $7x + 28$
2. $14 - 21x$
3. $y^2 - 8y$
4. $3t^4 + 9t^2$
5. $3x^3y - 12xy^2 + 6xy$
6. $8a^3b + 6y^2b - 10b$
7. $6x(x + 3) + 5(x + 3)$
8. $7y(3 - 2y) - 2(3 - 2y)$

You can do this for fun - or move on if you correctly completed Skills check 1.

Factorising 2

Solutions on the next slide….

Factorising 2 Solutions

Fully factorise the following:

1. $7x + 28$ → $= 7(x + 4)$
2. $14 - 21x$ → $= 7(2 - 3x)$
3. $y^2 - 8y$ → $= y(y - 8)$
4. $3t^4 + 9t^2$ → $= 3t^2(t^2 + 3)$

Factorising 2 Solutions

Fully factorise the following:

5. $3x^3y - 12xy^2 + 6xy$ → $= 3xy(x^2 - 4y + 2)$

6. $8a^3b + 6y^2b - 10b$ → $= 2b(4a^3 + 3y^2 - 5)$

7. $6x(x+3) + 5(x+3)$ →

   The common factor to take out is $(x+3)$

   $6x(x+3) + 5(x+3)$

   $= (x+3)(6x+5)$

8. $7y(3-2y) - 2(3-2y)$ →

   The common factor to take out is $(3-2y)$

   $7y(3-2y) - 2(3-2y)$

   $= (3-2y)(7y-2)$