Mathvember

By Whizz Education

Weekly challenges

Questions 1 - 4

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Weekly challenge

Week one

The usual set of dominoes have 0, 1, 2, 3, 4, 5 or 6 spots on each end.
There is only one domino for each combination.
How many dominoes are there in a set?

How many spots are there altogether in a full set of dominoes?

Some sets of dominoes go up to nine spots.
How many dots do each of these sets have altogether?

The usual set of dominoes have 0, 1, 2, 3, 4, 5 or 6 spots on each end.
There is only one domino for each combination.
How many dominoes are there in a set?

28

The 6 has seven pairs, the 5 then has six remaining pairs, the 4 has five remaining pairs and so on.
So the total number of dominoes is 7+6+5+4+3+2+1 = 28

How many spots are there altogether in a set of six spot dominoes?

168

Each dot appears eight times. The sum of the dots is 1+2+3+4+5+6=21, and 21x8=168

There are some nine spot sets of dominoes.
How many would there be in this set?

55

Same reasoning as before, and now you get 10+9+8+7+6+5+4+3+2+1=55

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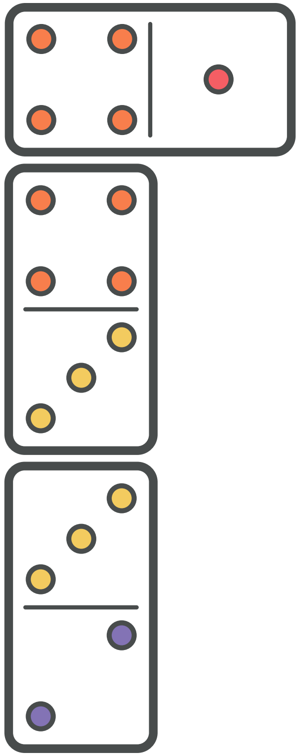
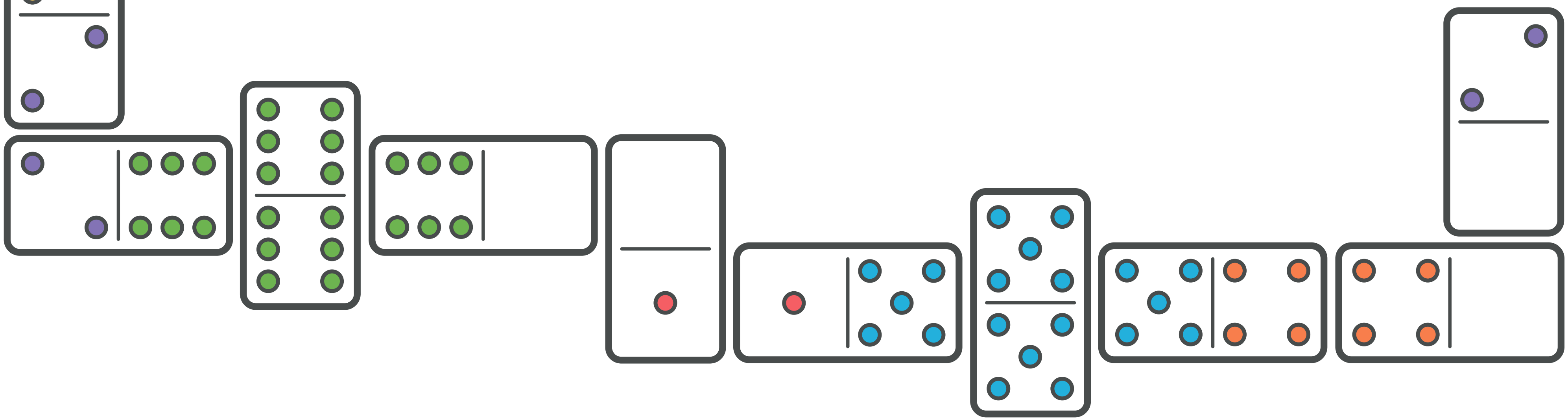
Have a go at these additional domino activities...



Play the game dominoes



Use all 28 dominoes to form a loop/square, so that the dominoes with the same number of spots meet, just like in the regular game of dominoes.

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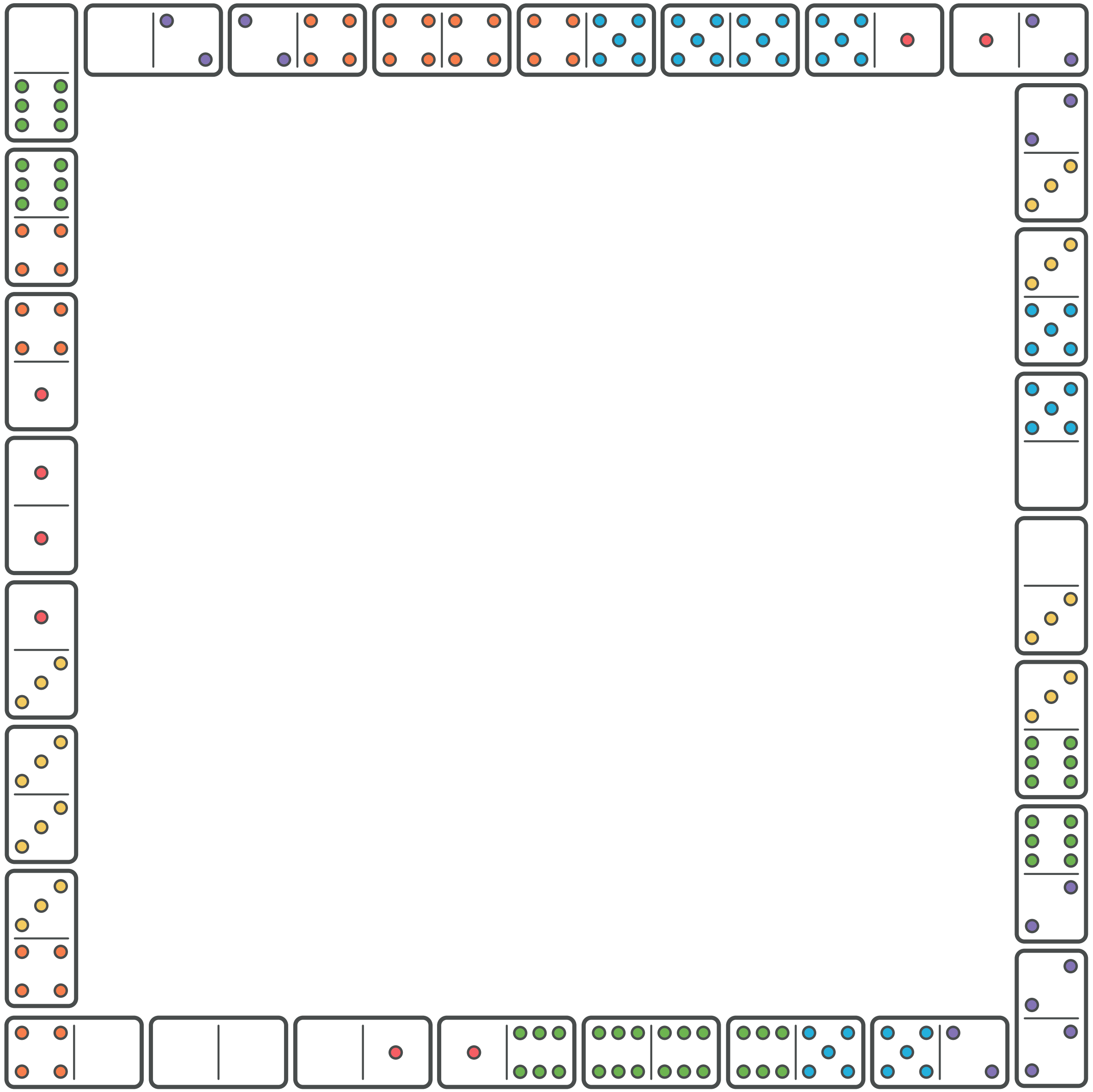
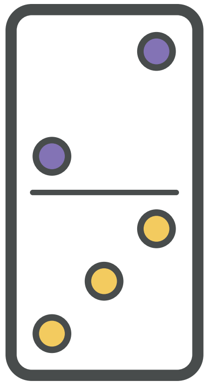
Weekly challenge
Activity 2 example



Bunk Beds

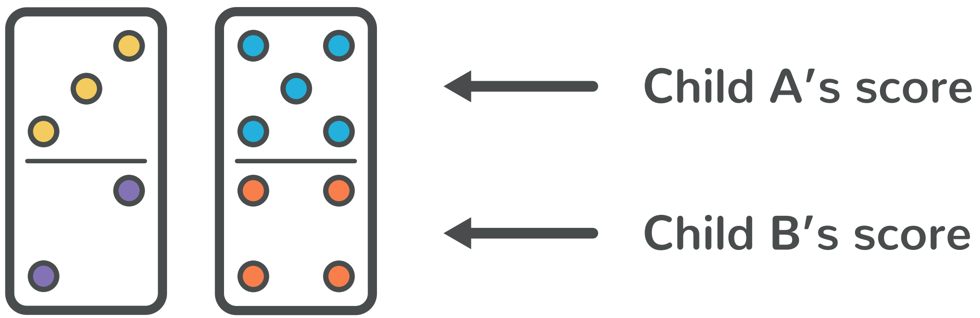
You need a double six set of dominoes.
Place all dominoes face down on the table.
Children work in pairs.
Child A chooses a domino and places it vertically:



They can choose whether they want it with 3 on the top or 3 on the bottom.

Bunk Beds

Child B takes another and places it to the right of the first domino:

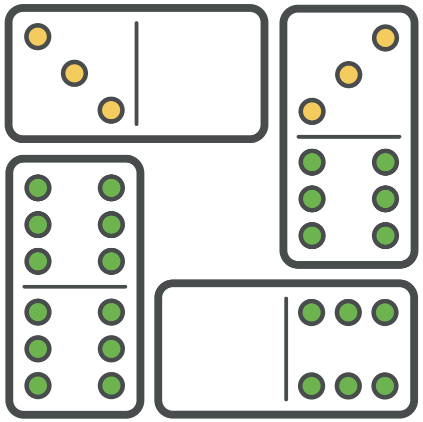


Child A has scored 35, Child B has scored 24. If it was agreed beforehand that the highest number wins, then Child A wins, if the lower number then Child B wins. Start a tally for scoring. The first to ten wins. It is a good idea to take turns over which child goes first and who is in the top/bottom bunk! An extension would be to allow both children two choices of dominoes so they have to decide which domino is more advantageous to winning the game.

Multiples

Putting all the dominoes into sets of 4 to make squares, see how many squares you can make which have sides that are a multiple of three.

This time, the sides do not need to be the same and their ends do not need to match.



Which dominoes will not be able to be used?

This same activity can be repeated for multiples of four and five.

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Weekly challenge

Week two

Carl Friedrich Gauss (1777-1855) made significant contributions to the world of mathematics.

The most well-known story is from when Gauss was still at primary school. One day Gauss' teacher asked his class to add together all the numbers from 1 to 100, assuming that this task would occupy them for quite a while. The teacher was shocked when young Gauss, after a few seconds thought, wrote down the answer. The teacher couldn't understand how his pupil had calculated the sum so quickly in his head, but the eight year old Gauss pointed out that the problem was actually quite simple.

Can you work out Gauss's method?

Can you work out Gauss's method?

You might want to use some equipment to help you like multi-link, cuisenaire rods or Numicon

Have a go at finding the sum of numbers from 1-10 first.

Then try finding the sum of all the numbers between 1 - 50.
If it seems to take too long, think of how you might pair up the numbers to speed up your calculation.

How would you find the sum all the numbers from 1 to 100?

Now have a go at this...
Find the sum of 3 + 4 + 5 ......95 + 96 + 97

Weekly challenge
Answer

Gauss had added the numbers in pairs - the first and the last, the second and the second to last and so on

For example numbers 1 - 10;
1 +10 = 11
2 + 9 = 11
3 + 8 = 11
4 + 7 = 11
5 + 6 =11

So there are 5 pairs that add up to 11,

Total from 1 to 10 = 55

Total from 1 to 50 = 1275

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Weekly challenge
Answer

1 + 2 + 3 + 4 + ... + 97 + 98 + 99 + 100

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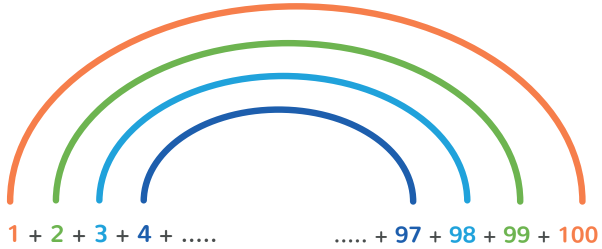
**Weekly challenge
Answer**



Gauss noticed that if he was to split the numbers into two groups (1 to 50 and 51 to 100), he could add them together vertically to get a sum of 101.

1 + 2 + 3 + 4 + 5 + ... + 48 + 49 + 50

100 + 99 + 98 + 97 + 96 + ... + 53 + 52 + 51

1 + 100 = 101

2 + 99 = 101

3 + 98 = 101

.....48 + 53 = 101

49 + 52 = 101

50 + 51 = 101

So the total 1 -100 would be 50 lots of 101, which is 5050.

Gauss's method can be described by the following formula

$$\textbf{Number of pairs x Sum of each pair} = \left(\frac{n}{2}\right)(n+1) = \frac{n(n+1)}{2}$$

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Weekly challenge

Week three

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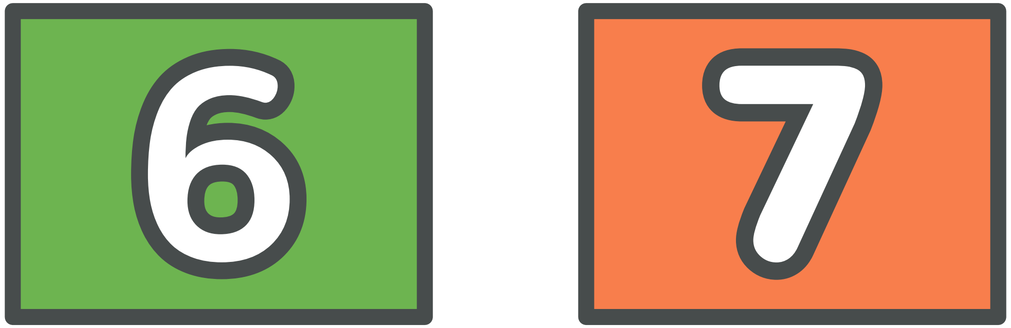
**Weekly challenge
Question**

Using only the numbers 6 and 7 is it possible to make 100?



How will you record your answer?

Explore all possibilities.

Don't forget to use apparatus to help you or write out the multiples for each number.

What other pairs of numbers from 2 to 9 will combine to make 100?

Are there pairs that will not work?

Consider these questions:

Why do smaller number value pairs have more solutions than larger number pairs?

Is it always possible to make 100 when 2 is combined with another number?

5 x 6 = 30 10 x 7 = 70 so 30 + 70 = 100

12 x 6 = 72 4 x 7 = 28 so 72 + 28 = 100

To answer the next part of the problem students may want to write down the multiples of each number.

They can then search for pairs of numbers that total 100.

For example, with 4 and 8:

1 x 4 = 4 12 x 8 = 96 so 4 + 96 = 100

13 x 4 = 52 6 x 8 = 48 so 52 + 48 = 100

5 x 4 = 20 10 x 8 = 40 so 20 + 80 = 100

The pairs that do not work are 3 & 6, 3 & 9, and 6 &9

Why do smaller number value pairs have more solutions than larger number pairs?

They have more multiples

Is it always possible to make 100 when 2 is combined with another number?

Yes, as all of the others numbers have some multiples that are even

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Weekly challenge

Week four

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Weekly challenge
Question

Look carefully at how the oranges are stacked in this picture.

How is the stack built?

(Try building the pile of oranges with cubes)

How many oranges are there in each row?

How many altogether? How do you know?

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Weekly challenge
Question

Could you make a different shape with the same number of oranges?

If you add one extra layer underneath this pile of oranges,
how many oranges would you have then?

Can you spot a pattern?

How many layers of oranges would you have if you had 200 oranges?

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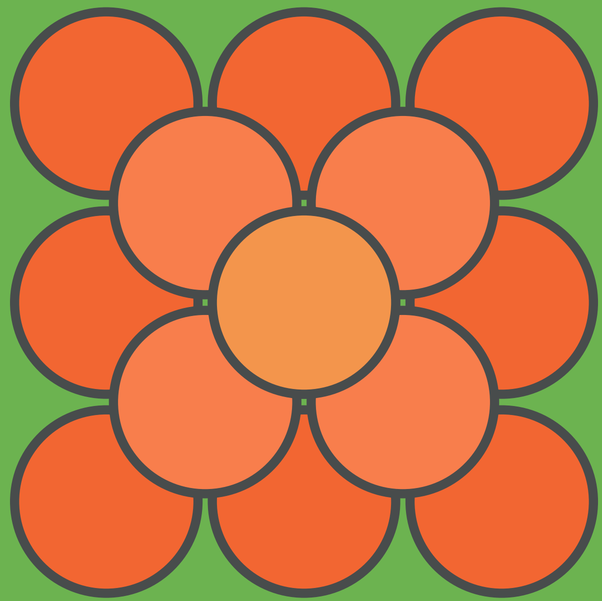
Weekly challenge
Answer

How is the stack built?

Making squares of 9 oranges, then 4 oranges, then 1



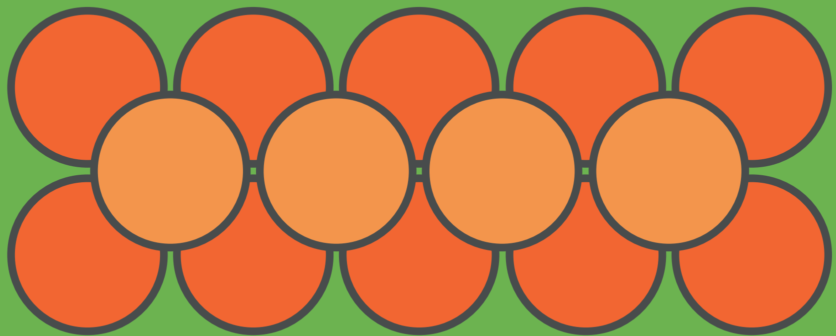
How many oranges are there in each row?

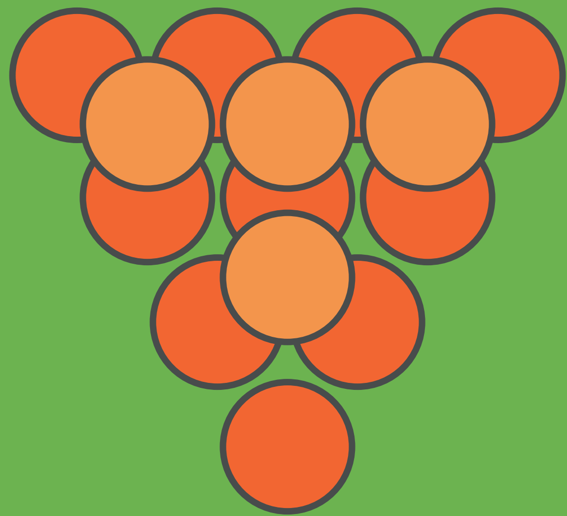
1, 4, 9

How many altogether? How do you know?

14 oranges, bottom layer is 3 x 3, next layer 2 x 2, next 1 x 1

Could you make a different shape with the same number of oranges?





There may be many variations

If you add one extra layer underneath this pile of oranges,
how many oranges would you have then?

You would have 30 oranges altogether, you will have added 16 oranges.

Can you spot a pattern?

Going up in the sequence of square numbers

How many layers of oranges would you have if you had 200 oranges?

8 layers (1, 4, 9, 16, 25, 36, 49, 64)