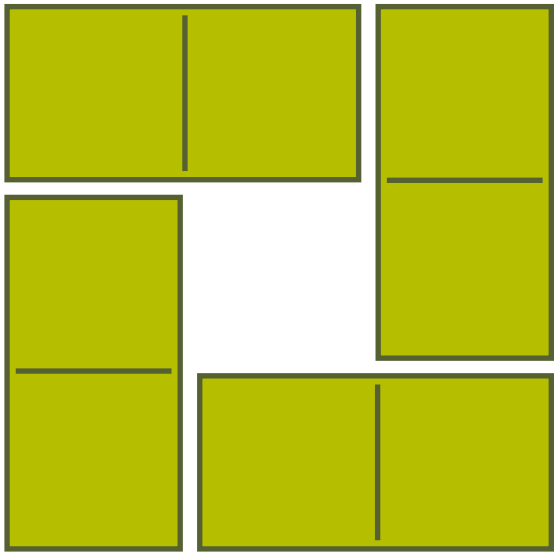
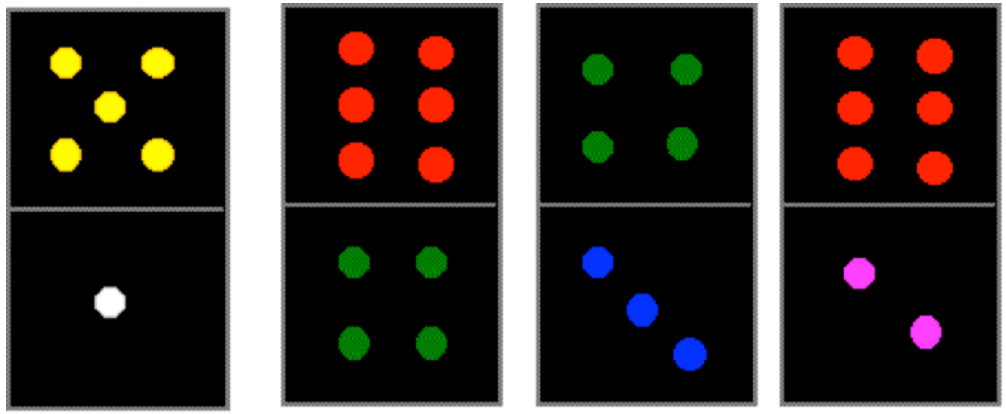
4 DOM

Use the four dominoes on the right to make a square ‘window’ like the one on the left.



The dominoes do not need to match where they touch but there must be the same number of dots on all four sides.

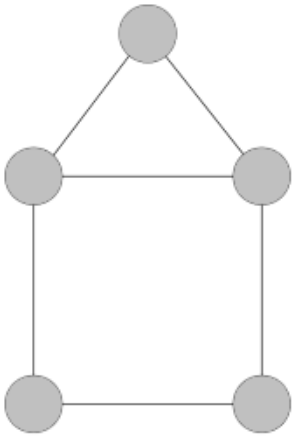


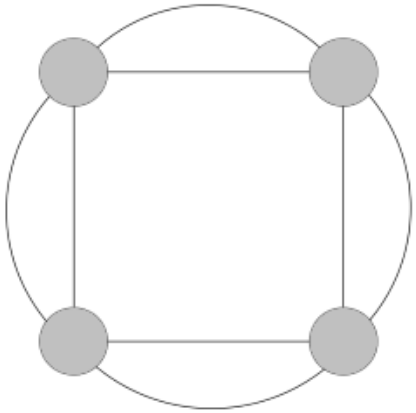
Can You Traverse It? 1

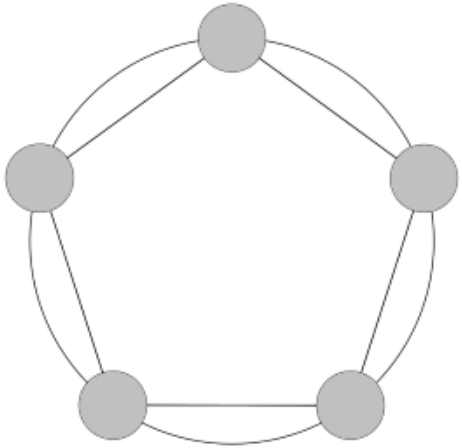
A traversable graph is one you can draw without taking your pen off the paper, and without going over any edge twice.

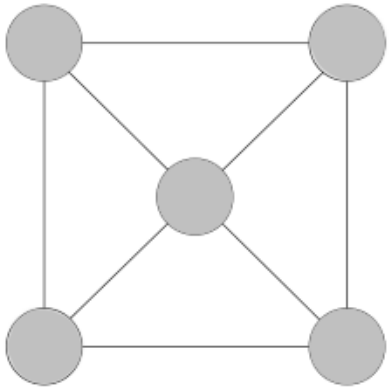
For each graph, decide whether or not it it traversable.

It might be helpful to keep a track of where you started, the route you took, and where you finished.

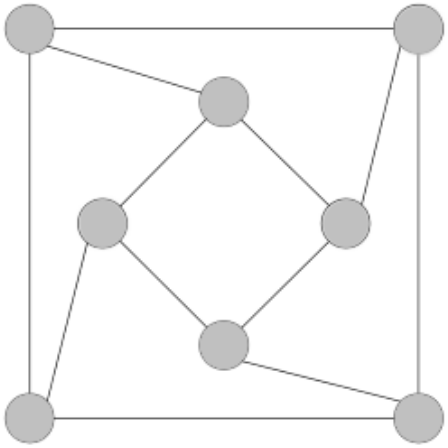


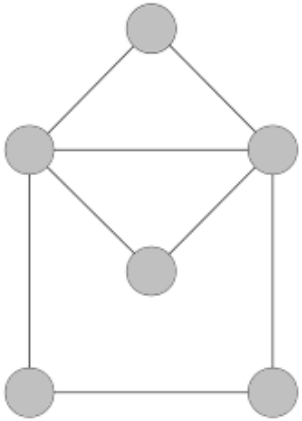


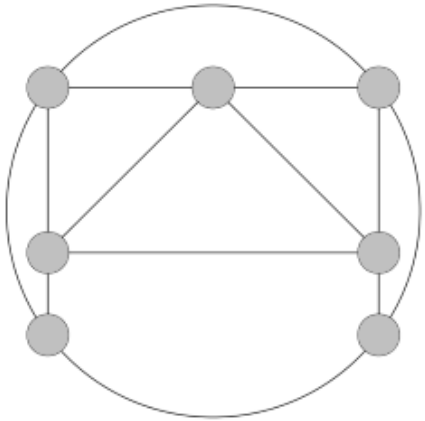


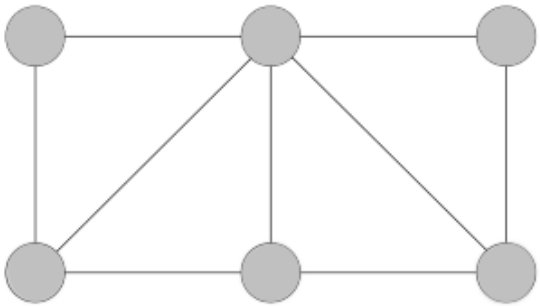


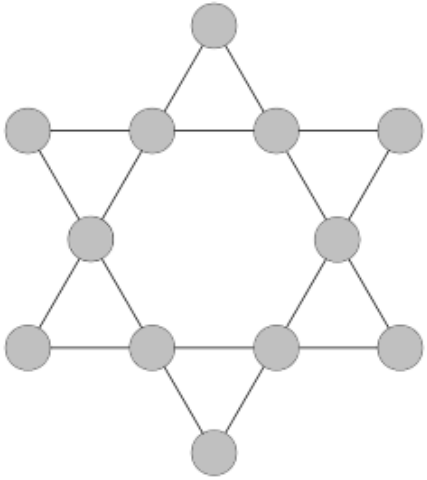
Can You Traverse It? 2

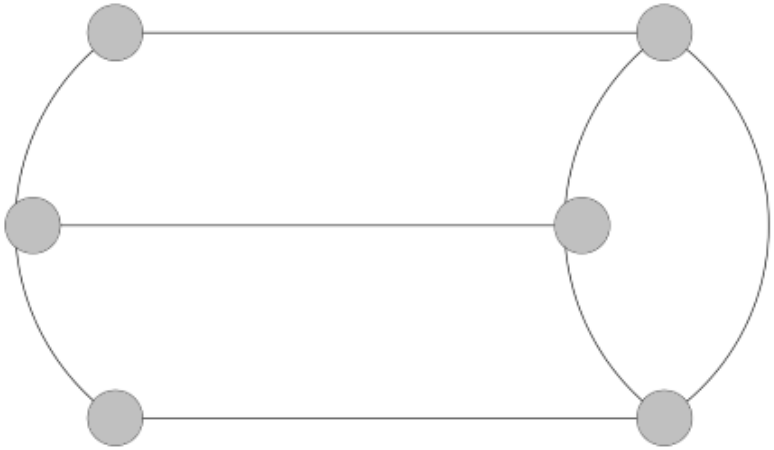












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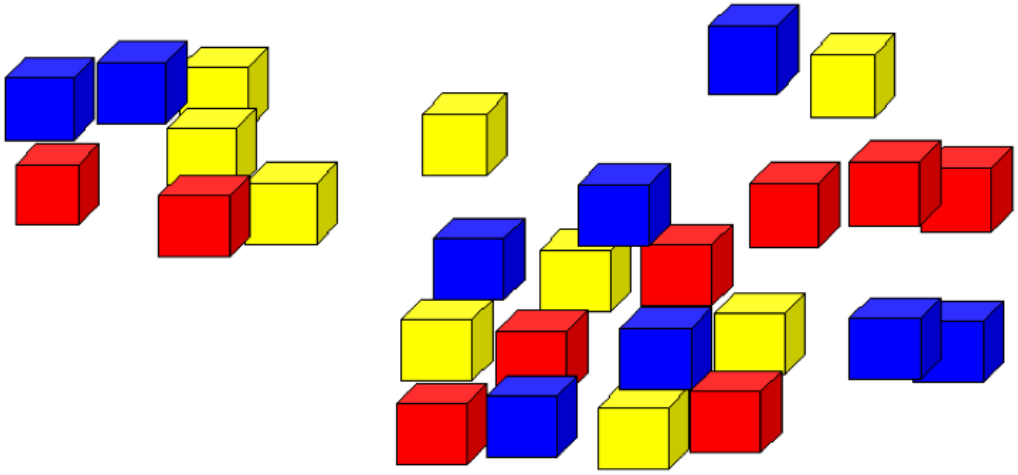
Activity 4

Creating Cubes

You have 27 cubes. There are 3 different colours and there are 9 cubes of each colour.

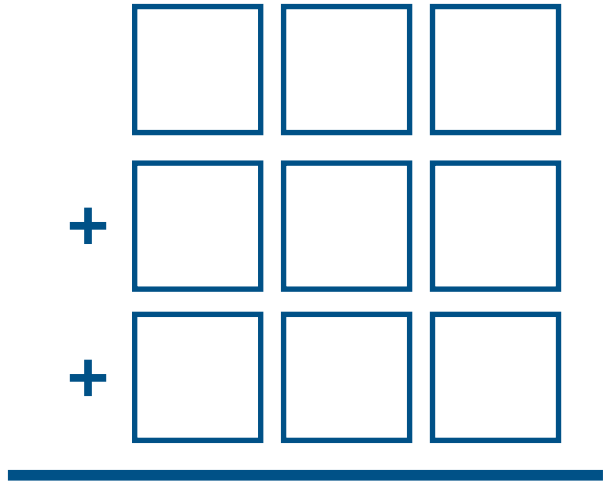


Arrange them into a large **3 by 3 by 3 cube** in this special way:

On each face of the new large cube, **no row** or **column** of cubes can contain **two** cubes of the **same** colour.

Dicey Operations

This is a game for two players.



To Start: You need a die and two empty grids like the one on the right.

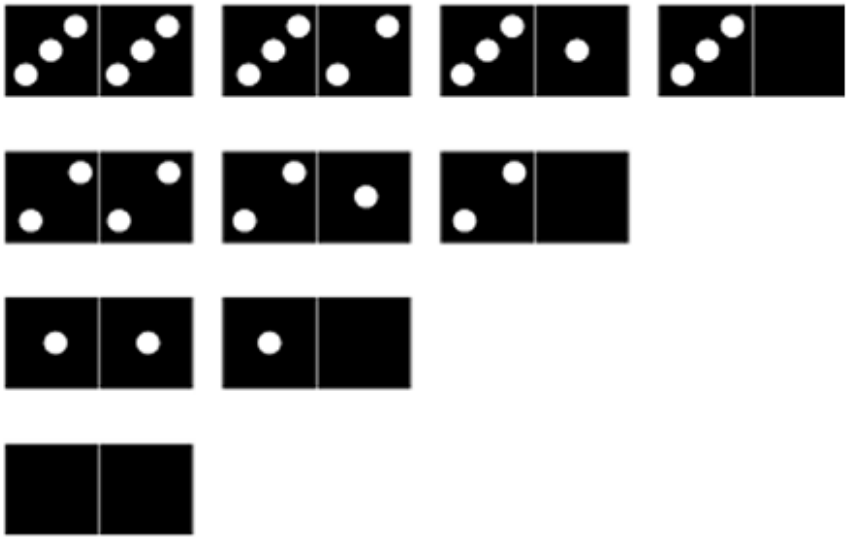
How to play: Takes turns to roll the dice and write the number you rolled into a square on your grid.

To Win: When your grid is complete add together the three 3-digit numbers. The closest to 1000 wins.

Domino Square

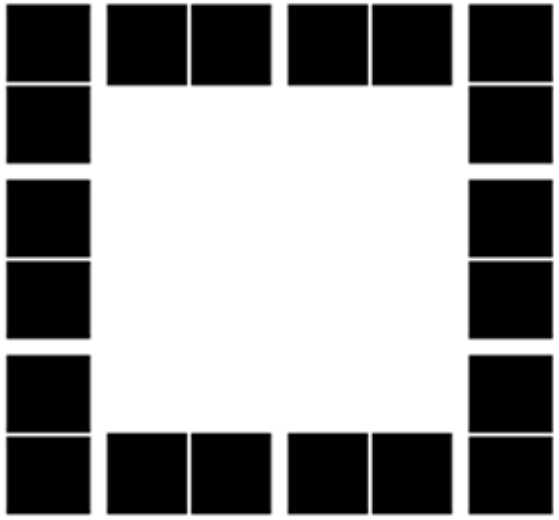
You need these 10 dominoes.

The highest is ‘double three’.



Use these dominoes to make a square so that each side has **8 dots.**

The dominoes do not have to match.



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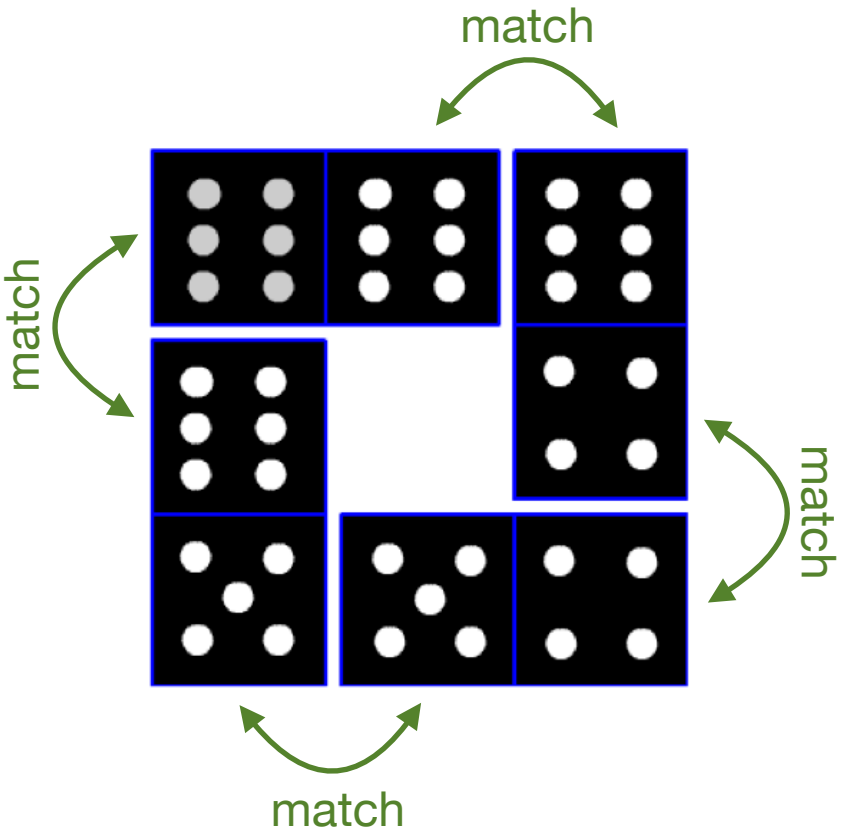
Activity 8

Domino Tetrads

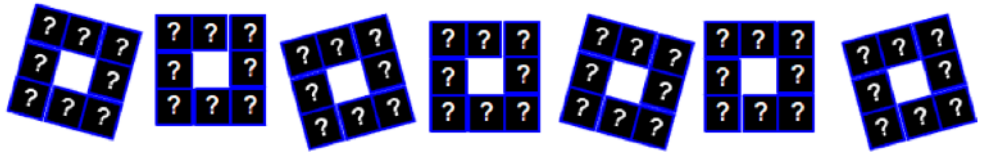
You can make a small square like the example on the right by using four dominoes.



Make sure that where the dominoes touch, the numbers of spots on each side is the same.

Your Task

Using a full set of 28 dominoes can you make 7 small squares (each with 4 dominoes)?



Factors & Multiples Game

This is a game for two players.

What you have to do:

The first player chooses an even number from the grid that is less than 50, and covers it with one of their counters.

The second player chooses a number to cover. The second player's number must be a factor **or** multiple of the first number.

Continue taking turns covering numbers with counters. Each number covered must be a factor or multiple of the previous number covered by the other player.

The first person who is unable to cross out a number loses.

For example, the game on the right started:

Player 1: **12**

Player 2: **4**

Player 1: **88**

Player 2: **11**

Player 1: **77**

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

First Connect Three

This is a game for two players.

To play the game:

On your turn roll both the dice and then choose whether to add them together other or subtract one from the other.

For example, if you rolled a 1 and a -2, your options would be:

-2 + 1 -2 - 1 1 - -2

Then place a counter on top of your answer.

You cannot cover a number which has already been covered.

If you are unable to find a number which has not been covered you must pass.

To win the game:

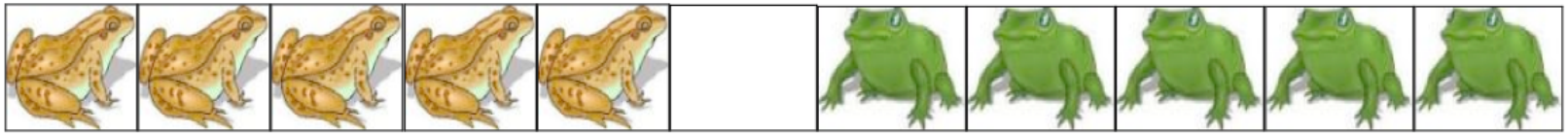
The winner is the first to complete three in a row. The row can be horizontal, vertical or diagonal.

In the game on the right the red player has won by getting 2, 6 and 10, which are all in a row.

	-5	-4	-3	-2
-1	0	1	2	3
4	5	6	7	8
9	10	11	12	

Frogs 1

There are five brown frogs and five green frogs sitting on their lily pads like this:



The aim: Swap the green frogs with the brown frogs.

The rules:

You can only **move one frog at a time**.

Frogs can only move **one square at a time.**

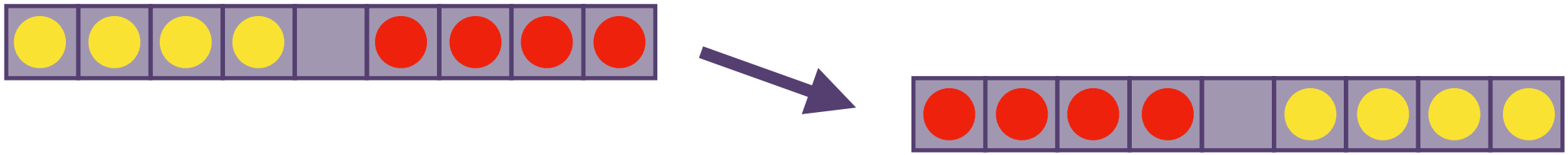
Frogs can jump over another frog, but only one at a time.

The **brown** frogs can only move (or jump) **right.**
The **green** frogs can only move (or jump) **left.**

Frogs 2

Instead of using real frogs, use some counters. Choose one of the grids to start on and set up your counters (smaller grids are best to start on).

Move and jump the frogs until they have swapped completely swapped ends.



What is the smallest number of moves it takes to swap all the frogs over?

Try putting more frogs at one end than the other.

Gabriel's Problem 1

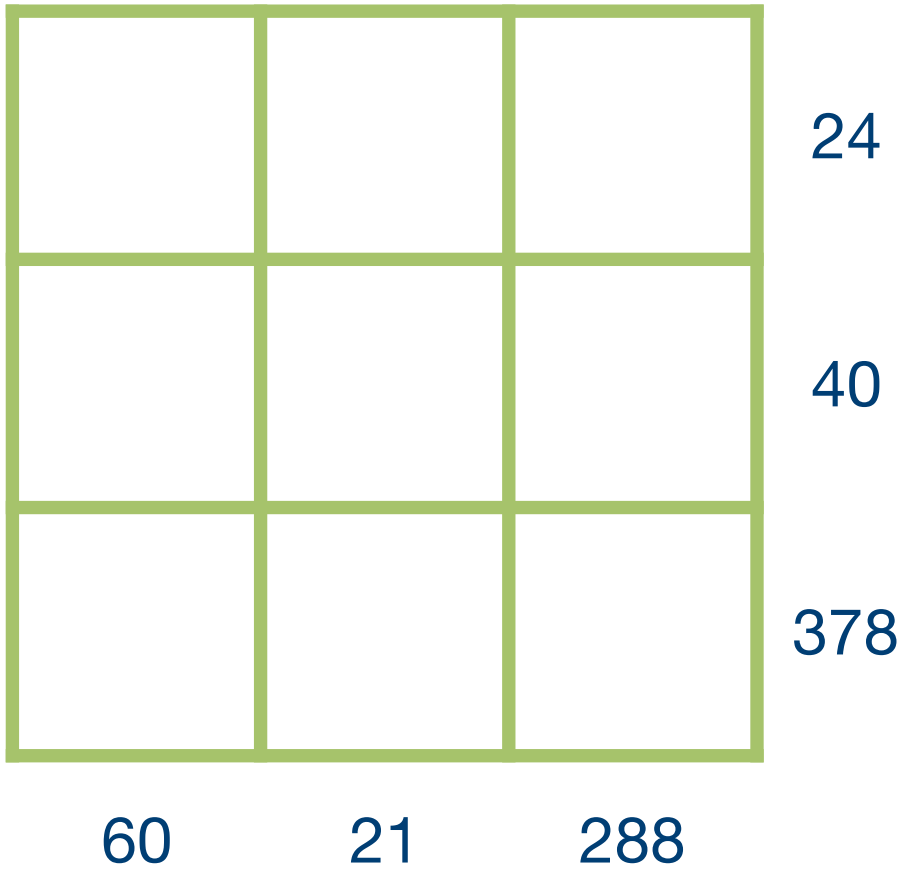
Gabriel wrote the numbers 1-9 in a 3x3 grid.

He then multiplied together all the numbers in each row and wrote the resulting product next to that row. He also multiplied the numbers in each column together, and wrote the product under that column.

He then rubbed out the numbers 1-9.

Can you work out where Gabriel placed the numbers 1-9 in the grid?

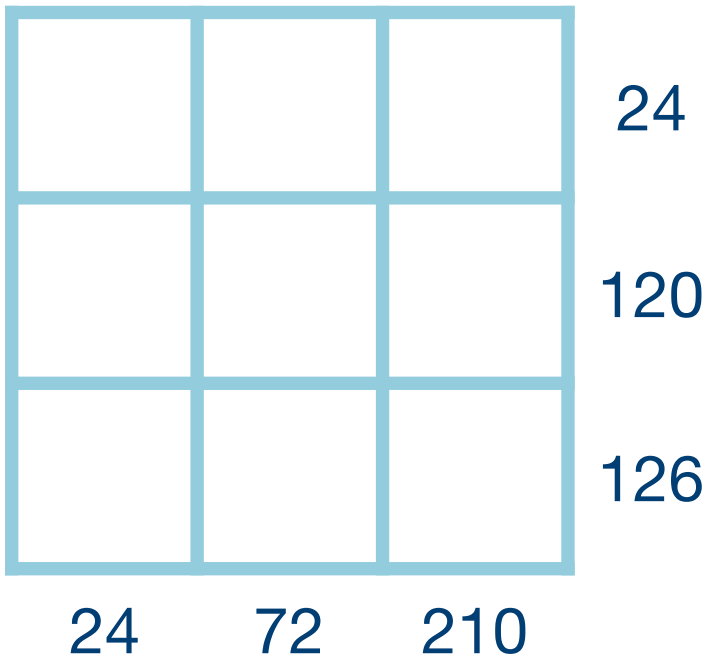
Did you have enough information, not enough, or exactly the right amount?

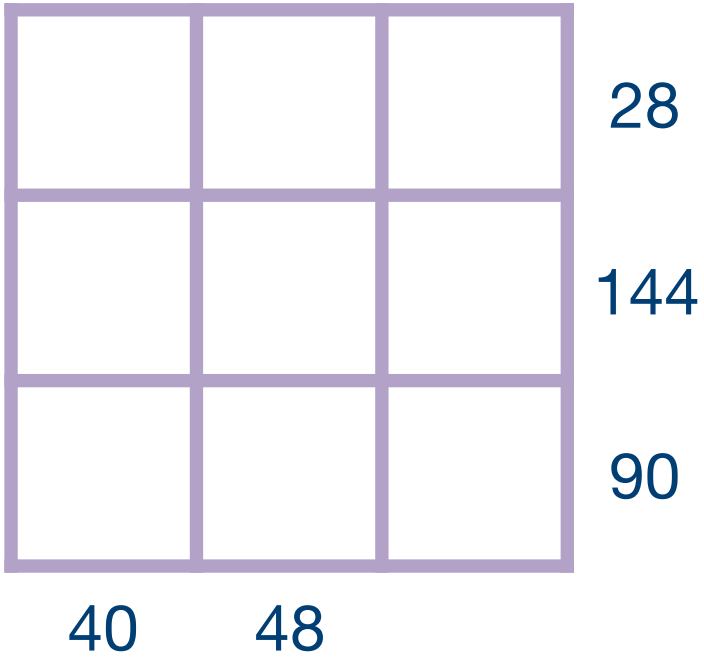


Gabriel's Problem 2

Can you place the numbers 1-9 in the grid to give the marked products in each row and column?

One of these two grids has more than one solution.

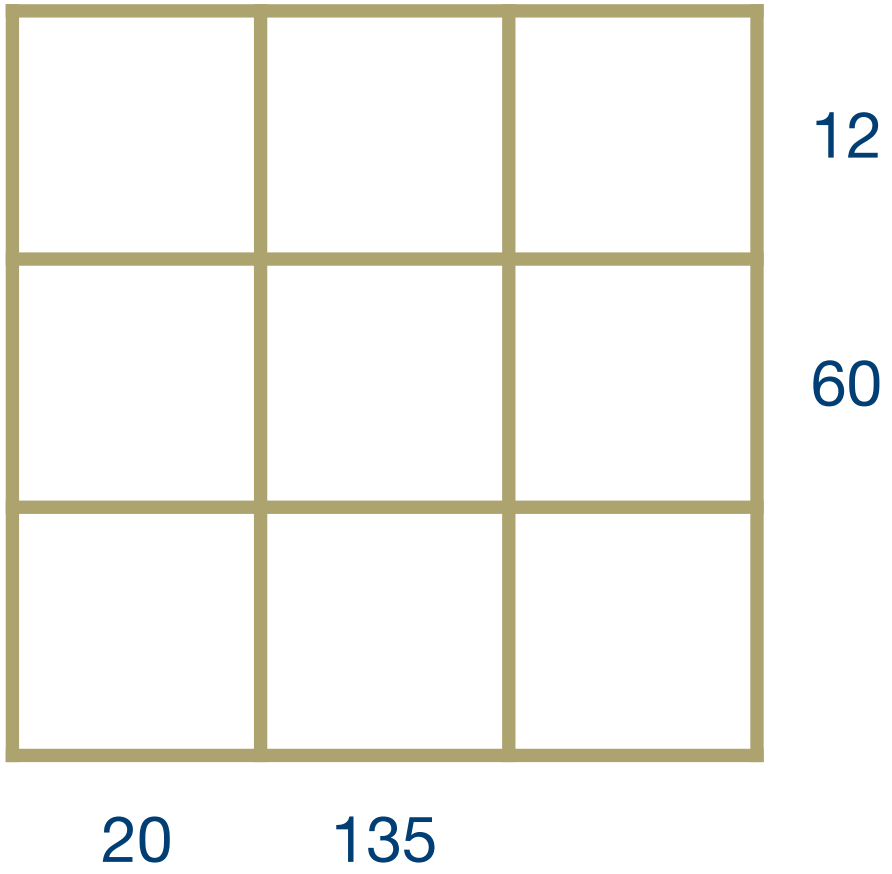




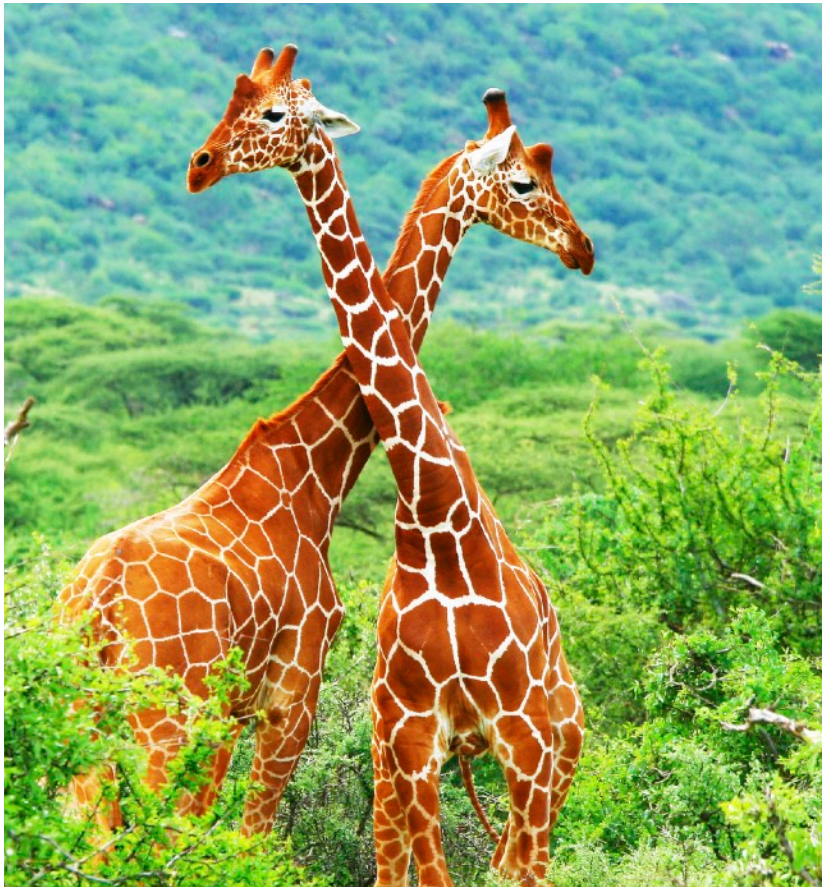
Gabriel's Problem 3

To make this grid, Gabriel used the numbers **1**, **2**, **3**, **4**, **5**, **6**, **9**, **10** and **12**.

Can you place these numbers in the grid to give the marked products in each row and column?



Largest Product



$3 + 3 + 4 = 10$
$3 \times 3 \times 4 = 36$

$3.3 + 6.7 = 10$
$3.3 \times 6.7 = 22.11$

What is the greatest product that can be made from numbers that add up to 10?

$5 + 5 = 10$
$5 \times 5 = 25$

$1 + 9 = 10$
$1 \times 9 = 9$

$1 + 2 + 3 + 4 = 10$
$1 \times 2 \times 3 \times 4 = 24$

Last Biscuit

This is a game for two players.

To Start

Put 4 biscuits in one jar and 8 in the other.

How you play

Take turns to take biscuits off the board following the rules below.

To Win

The winner is the person who takes **the last biscuit** (or biscuits).

Rules:

When it's your turn you can either:

1) take any number of biscuits from just one jar

or

2) take the same number of biscuits from both jars.

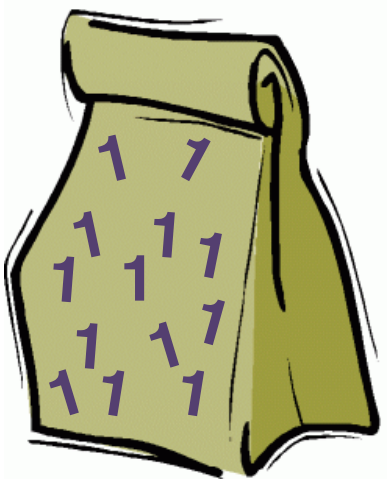
Think carefully and see if you can discover a winning strategy.

Do you think it matters who goes first?

Make 37

Four bags contain a large amount of 1s, 3s, 5s and 7s.

Pick any ten numbers from the bags so that their total is 37.



Pentanim

This is a game for two players.

To Start

Put 10 counters onto the ‘Pentanim’ game board, one in each space.

How you play

Take turns to pick up either one counter or two adjacent counters ('adjacent' means that they are connected by a line and there are no other counters in between).

To Win

The winner is the player who picks up the last counter or the last two counters.

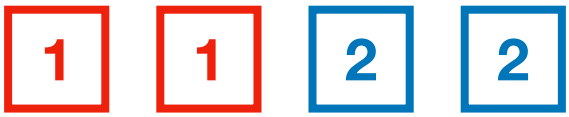
Sandwiches 1

1) Start with two 1's, two 2's and two 3's (as below).

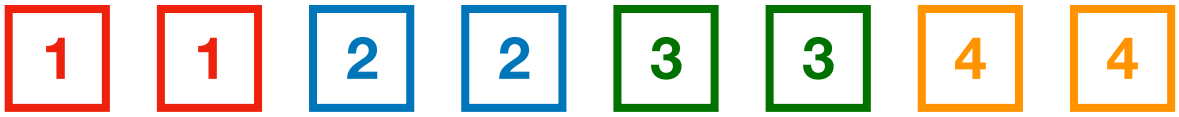
Arrange these six digits in a line so that:

- between the two 1's there is one digit
- between the two 2's there are two digits
- and between the two 3's there are three digits

2) Now, try to do it if you only have two 1's and two 2's (one digit between the 1's and two digits between the 2's). **Can it be done?**

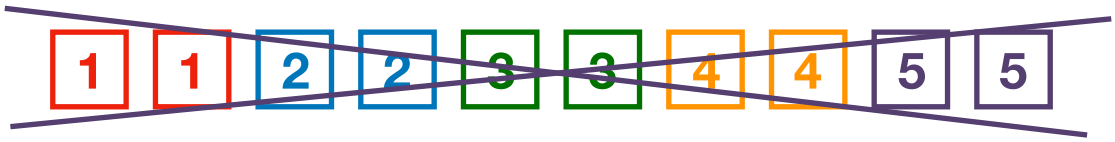


3) It is possible to add two 4's and then arrange all the numbers as in part **(1)** but now with four digits between the two 4's.

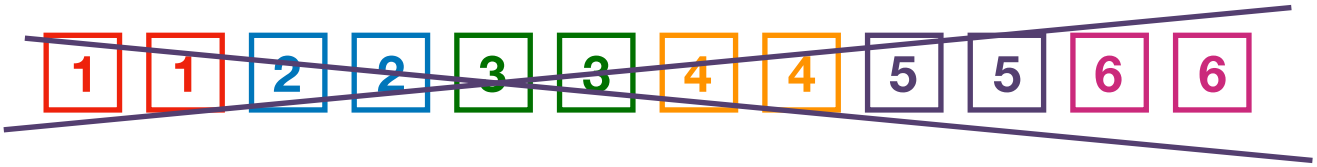


Sandwiches 2

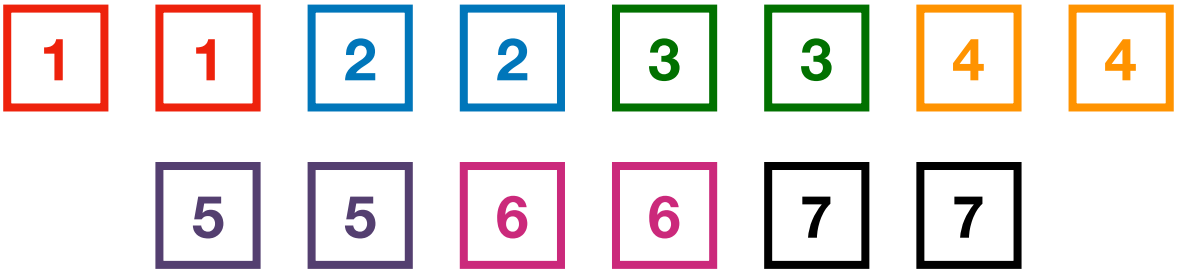
4) If you try to add two 5's (as below) it is **impossible** to arrange them in a 'sandwich'!



It's also **impossible** to do if you also add two 6's.



However, it can be done when you add two 7's! Can you manage it?

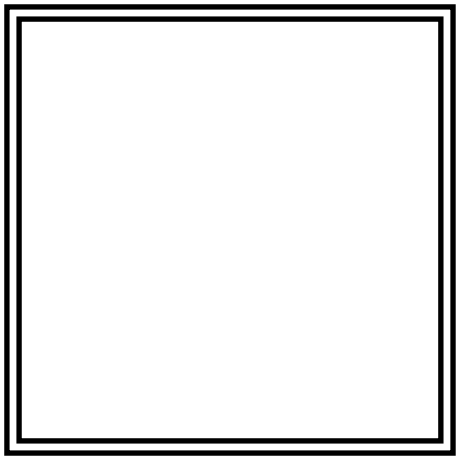


5) There is more than one way of doing this – try to find at least two arrangements that work with all seven digits.

Square Tangram

The first puzzle is to make a square using just four of the pieces...

This will fit in the smallest square outline in the middle of the sheet.



Now try making a square using all five pieces...

It should fit the next square outline, only slightly larger than the centre square.

For an extra challenge:

Ask for another set of the five pieces and try making one large square with all ten pieces...

Sticky Numbers

Look at the following line of numbers:

10	15	21	4	5

They are arranged so that each pair of adjacent numbers adds up to a square number:

$$10 + 15 = 25$$
$$15 + 21 = 36$$
$$21 + 4 = 25$$
$$4 + 5 = 9$$

Your Task

Try to arrange the numbers 1 to 17 in a line so that each adjacent pair adds up to a square number.

Can you arrange them in more than one way? If not, can you explain why your solution is the only one?

Teacups

Arrange the cups and saucers into the four by four grid so that:

- Every **row** has only one cup of each colour and one saucer of each colour.
- Every **column** has is only one cup of each colour and one saucer of each colour.

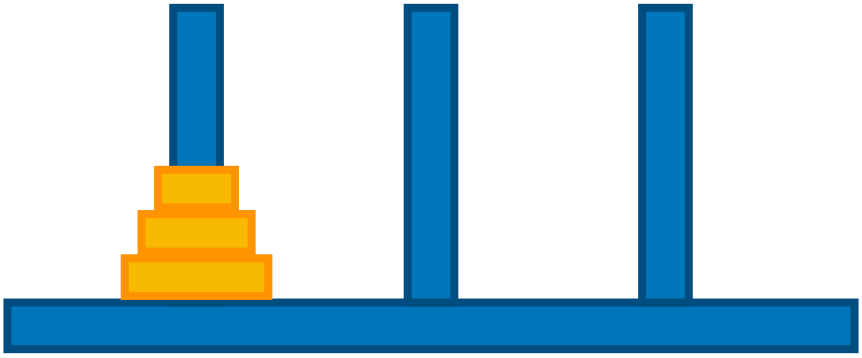
AND

Put each cup on top of a saucer so that there are no repeated combinations.

For example, you could have a blue cup on a blue saucer, a red cup on a blue saucer, a blue cup on a red saucer, etc…

The Tower of Hanoi

This is a very old puzzle from Asia which is sometimes called “The Tower of Brahma”.



To Start

Put the three smallest pieces on the left peg/area and in order of size (with the largest on the bottom).

The Aim

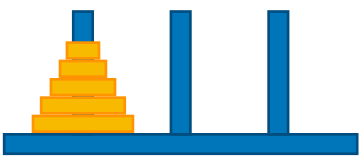
Move all three pieces to the right peg/area.

The Rules

- You can only move one piece at a time.
- You may not place a larger piece on top of a smaller piece.

What is the smallest number of moves you complete it in?

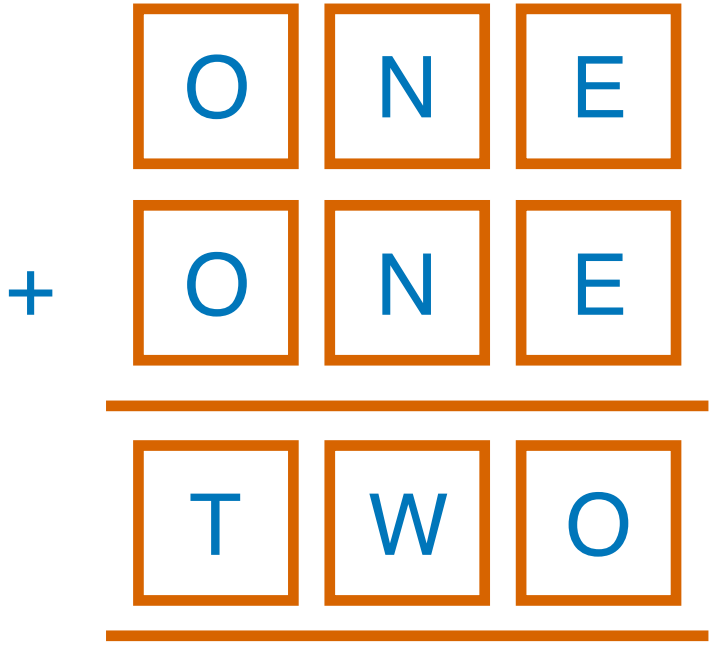
Now try starting with 4 pieces on the left, then with 5 and so on…

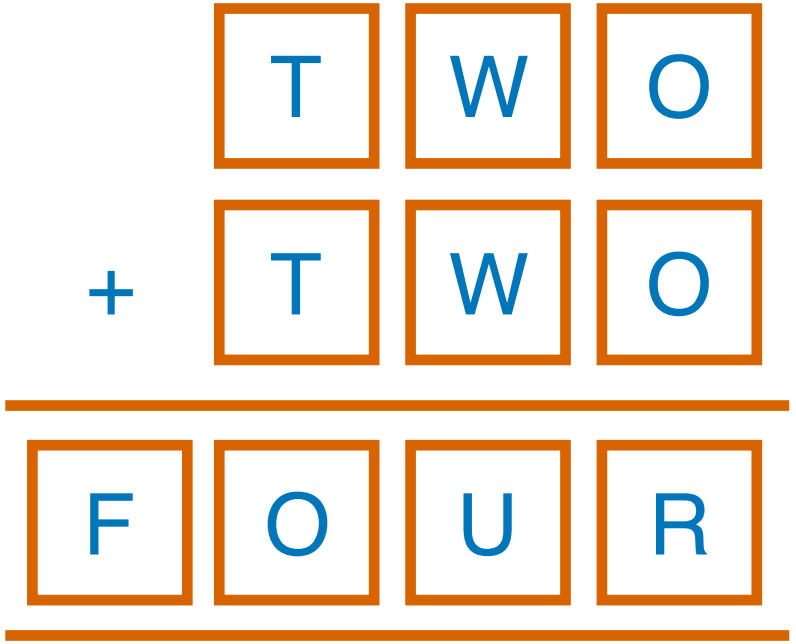


Two and Two

How many solutions can you find to the two sums below?

Each of the different letters stands for a different number.



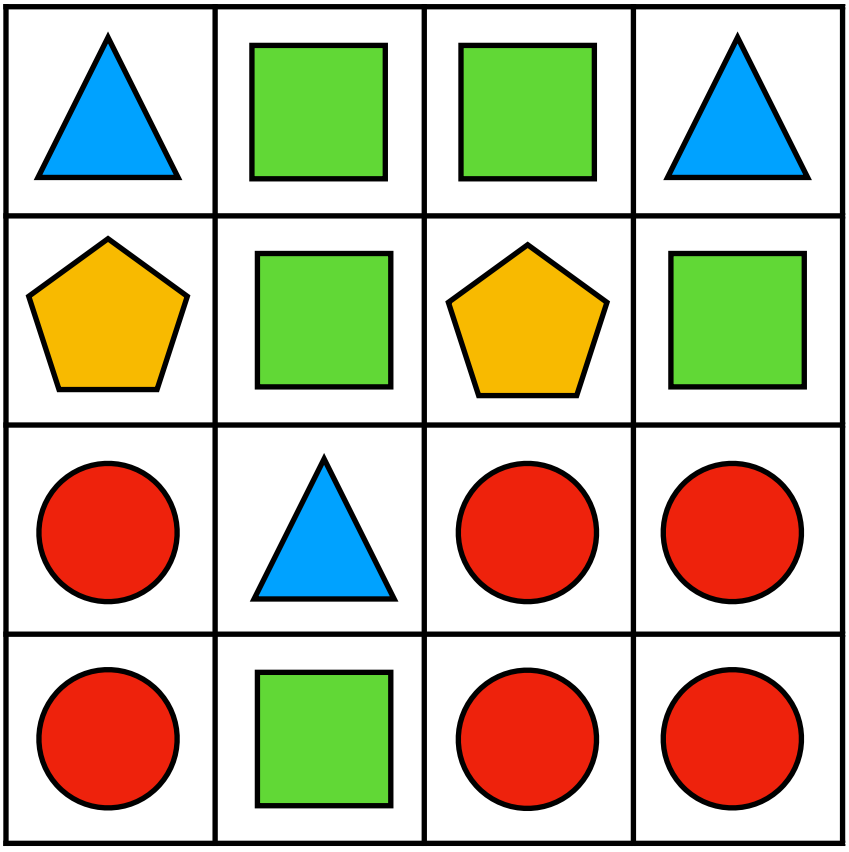


What's it Worth?

Each symbol has a numerical value.

The total for the symbols is written at the end of each row and column.

Can you find the missing total that should go where the question mark has been put?



Who's Who? 1

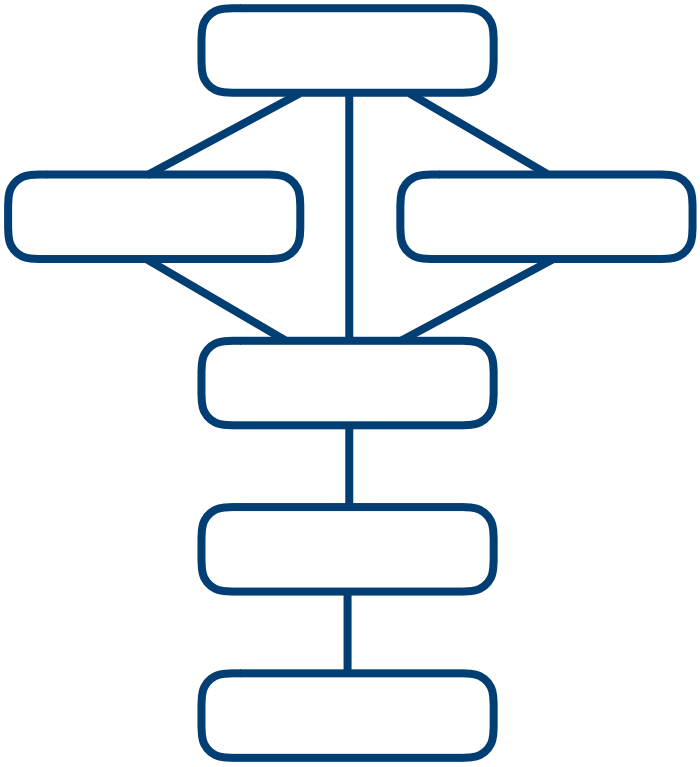
We can represent a group of friends by drawing a graph.

Each node (circle) represents a person.

An edge (line) joins two nodes if and only if those two people are friends.

Below is a graph showing a group of friends.

Can you work out who's who using the clues?

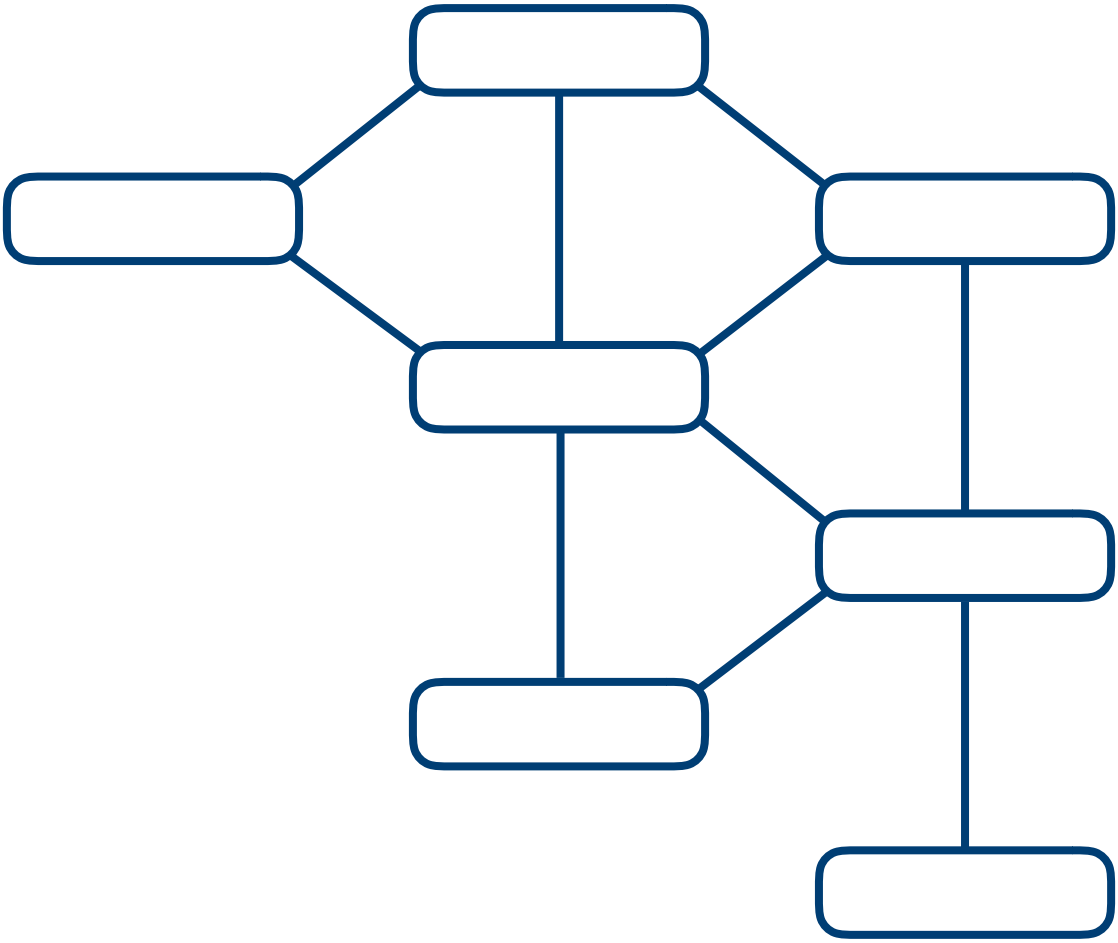


1. Alan has 3 friends, Barney, Charlie, and Daniel.
2. Barney and Ed are both friends with Charlie.
3. Ed is Frank's only friend.

Who's Who? 2

Here is a second network of friends.

Again, **use the clues below to figure out who's who**.



1. Bella and Ciara are friends
2. Emily and Ciara are not friends
3. Bella is Fiona's only friend
4. Anna has more friends than anyone else
5. Daphne has three friends
6. Gill and Daphne are not friends
7. Emily has two friends