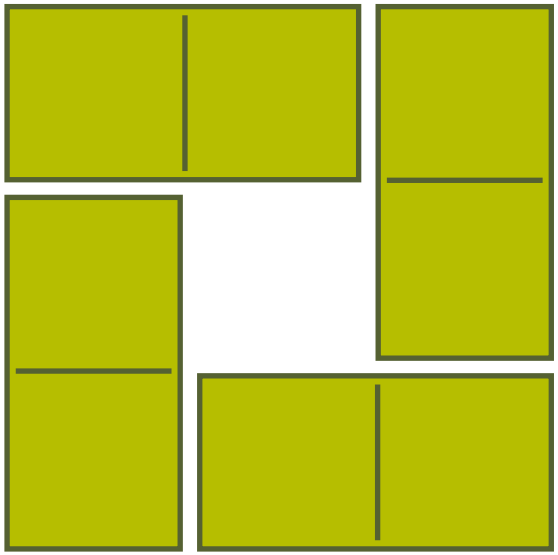
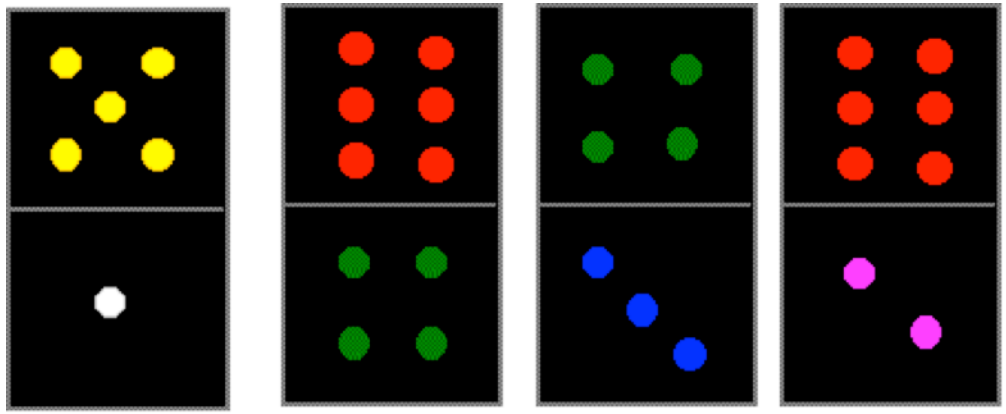
4 DOM

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.



Add Three Dice

Place three dice in a row like the diagram below.

Find a way to turn each one so that the three numbers on top of the dice total the same as the three numbers on the front of the dice.

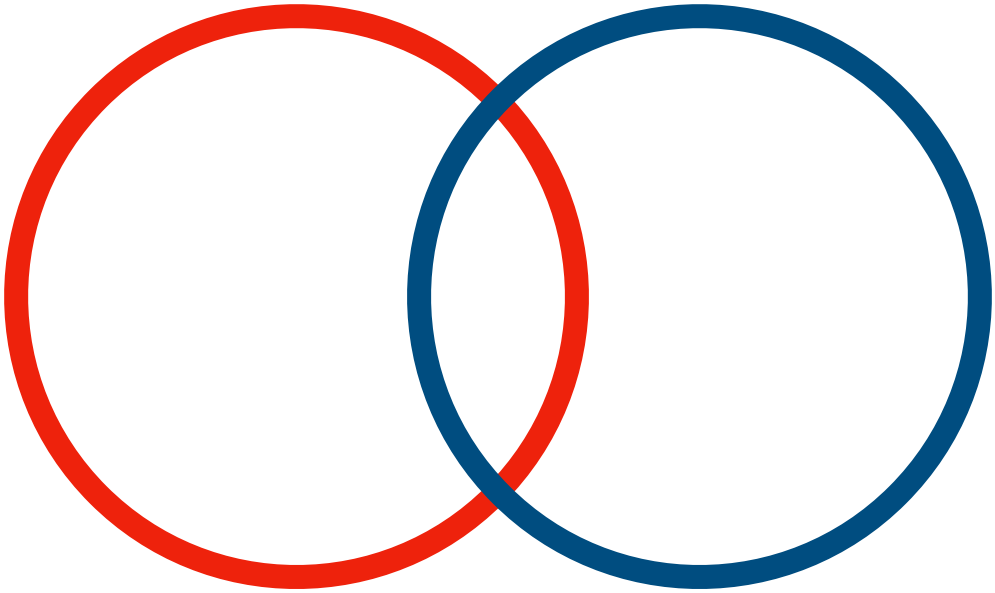
Can you find **all** the ways to do this?

You might want to record your answers.

Look at the totals on the back and bottom of the three dice – what do you notice?

Bean Bags 1

For this part of the task you will need 2 hoops and 8 bean bags (or 8 counters).



1 Using two hoops (as above), place the 8 bean bags into the hoops so that there are **4 in the blue hoop** and **6 in the red hoop**.

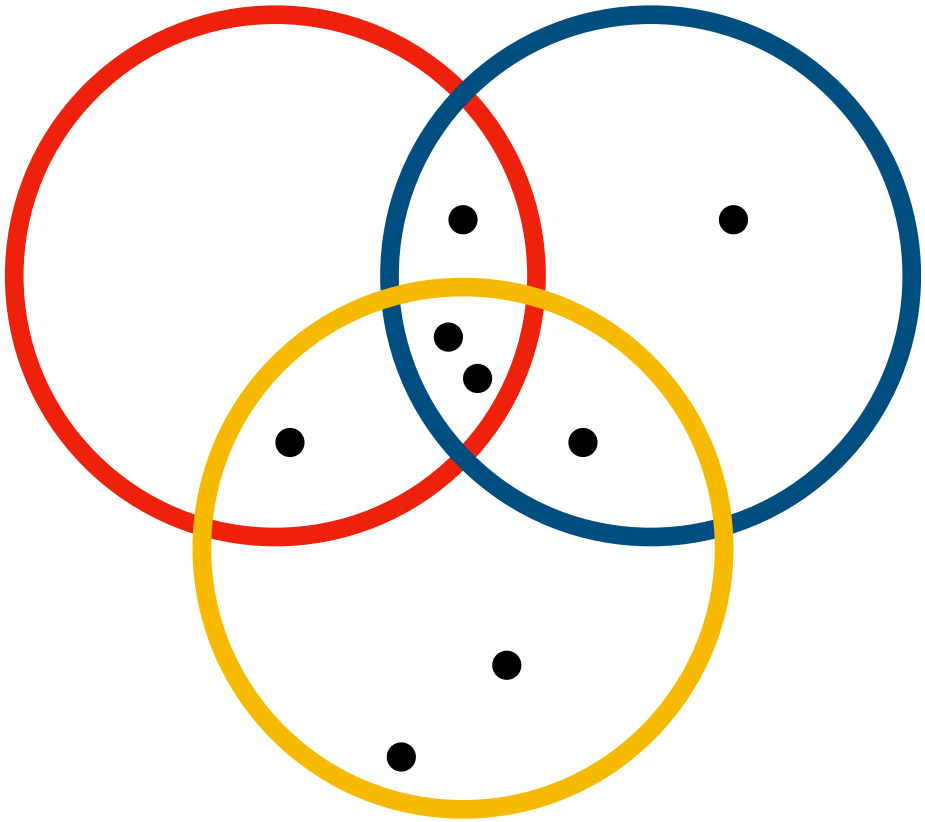
How many bags need to be in the overlap?

2 Now try with **2 in the blue hoop** and **7 in the red hoop**.

How many bags need to be in the overlap now?

Bean Bags 2

For this part of the task you will need 3 hoops and 8 bean bags (or 8 counters).



This picture shows **4 in the blue hoop**, **5 in the red hoop** and **6 in the yellow yellow hoop**.

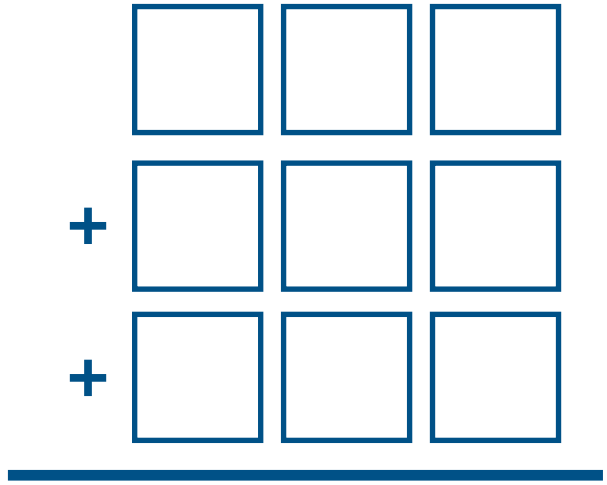
This is not the only way in which it can be done. Find **at least two more ways** to put 4 in the blue hoop, 5 in the red and 6 in the yellow.

How many different ways are there of doing this?

You might want to record your answers as you go.

Dicey Operations

This is a game for two players.



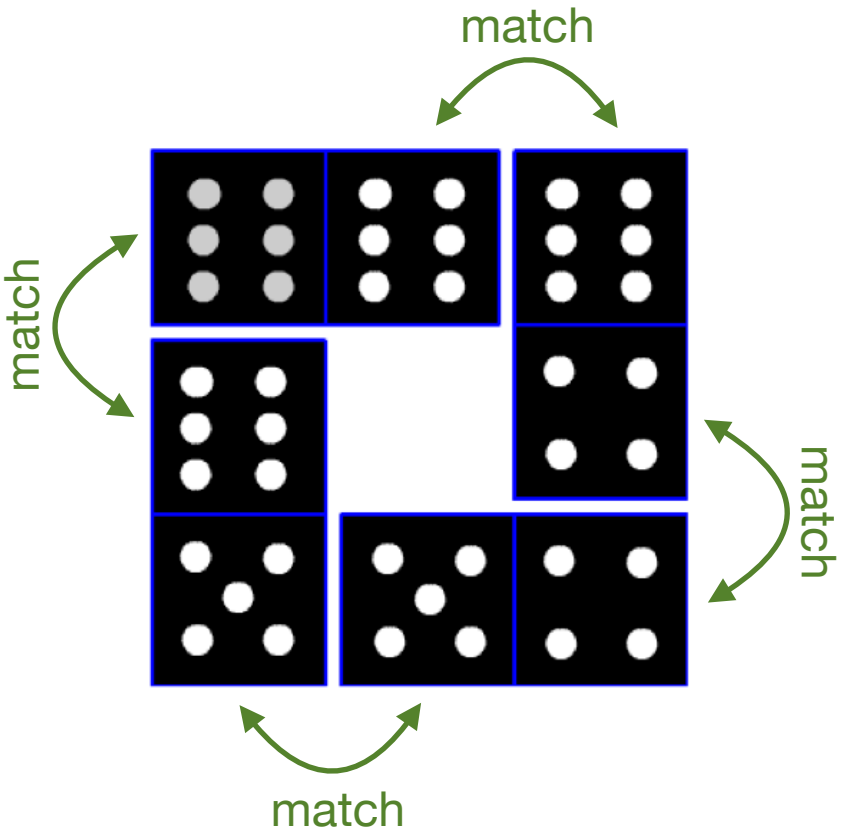
To Start: You need a die and two empty grids like the one on the right.

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 Tetrads

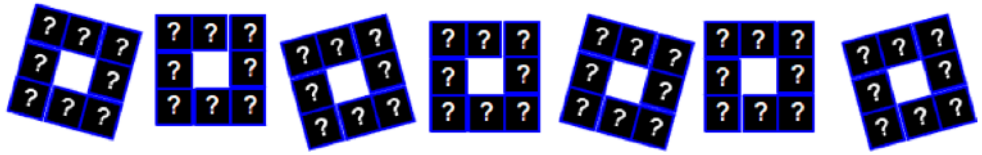
You can make a small square like the example on the right by using four dominoes.



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

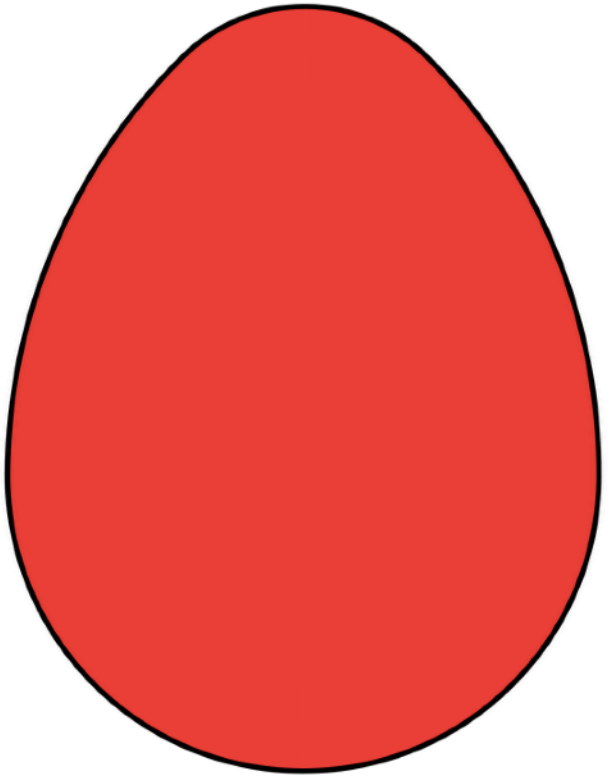
Your Task

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



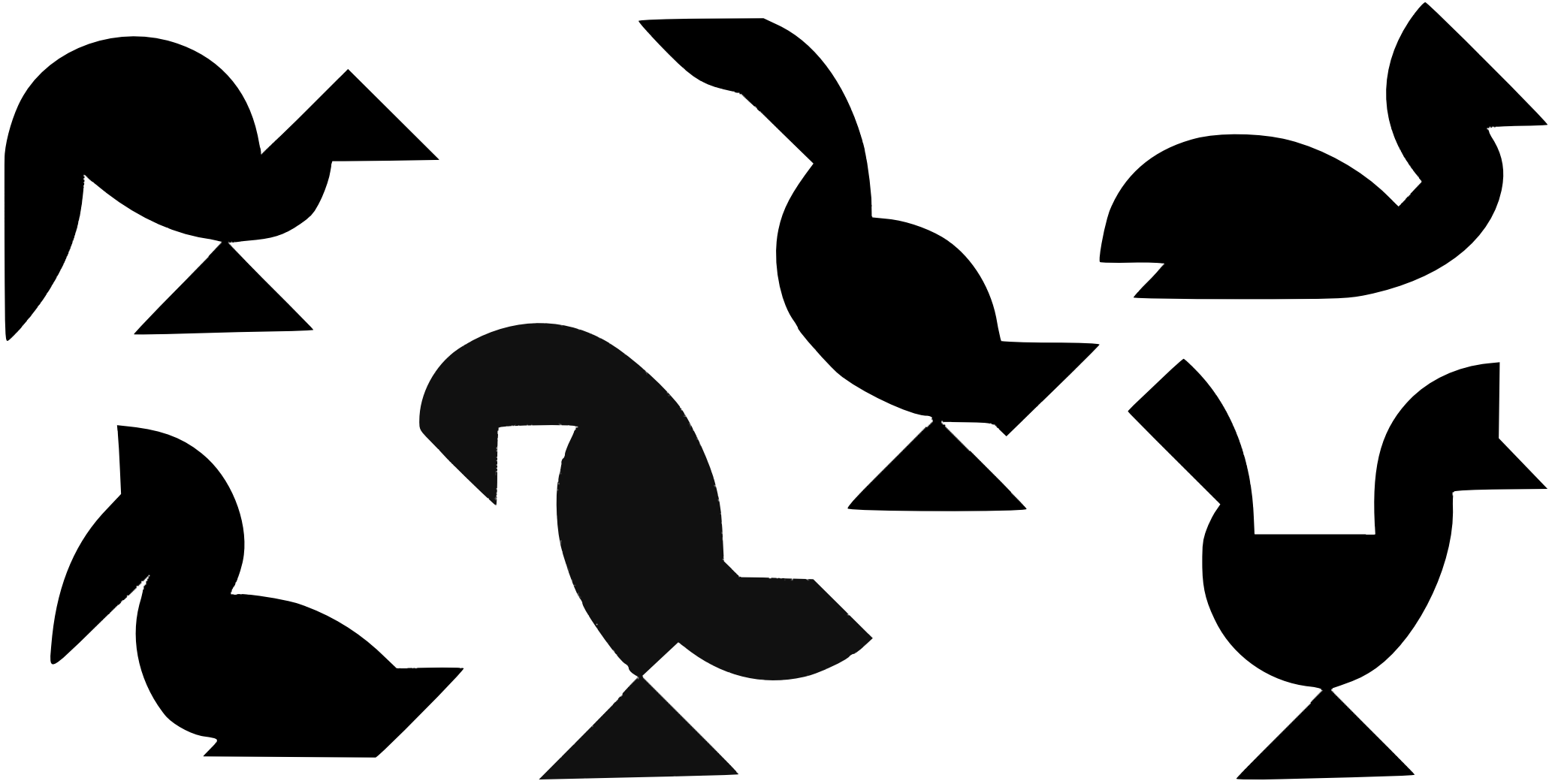
Egg Tangram 1

First, try to make this egg shape with **all 9 pieces**.



When you have done that, see if you can make some of the bird shapes on the other sheets, each bird uses **all 9 pieces**.

Egg Tangram 2



Fifteen

This is a game for two players.

Take it in turns to choose **one** of the whole numbers **1** to **9**.

Each number can be chosen only once.

To win, you must have **three** numbers that add up to **15**.

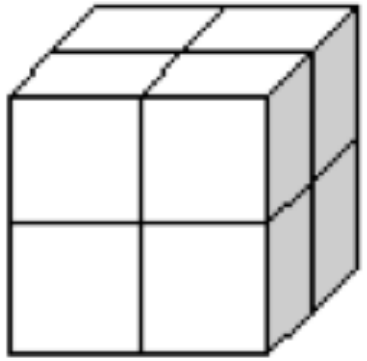
If you both have three numbers but neither player has a total of 15, continue playing until:

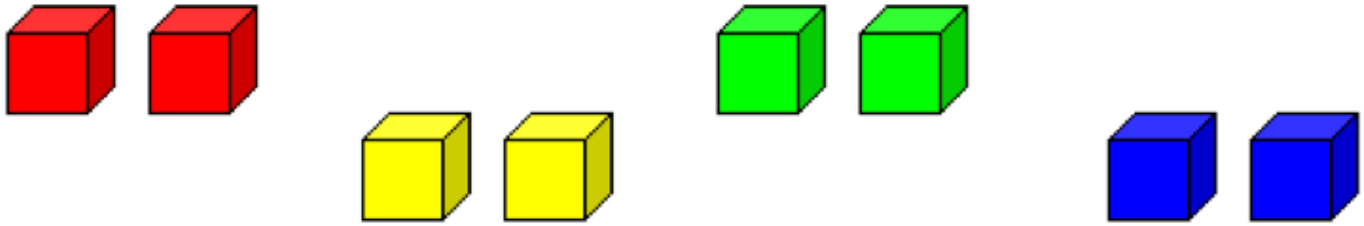
- one of you has three of numbers totalling 15 (they win), or
- there are no numbers left to choose (it is a draw).

Four Colours

Fit these 8 cubes together to make a cube.

On each face there must be one of each colour.





Is there more than one way to do it?

Mixed Up Socks

Start with three pairs of socks.

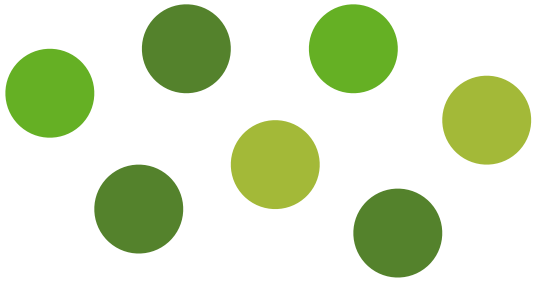
Mix them up so that each pair has two different socks in it.

Now can you mix them so that each pair is different from the other pairs?

Now try it with four pairs of socks. Can you find more than one way to do it?

How many ways are there to do it? How do you know you have found all the ways?

NIM



This is a game for two players.

To Start: Place the 7 counters in a group.

How you play: Takes turns to pick up either one or two counters.

To Win: The player that picks up the last counter loses.

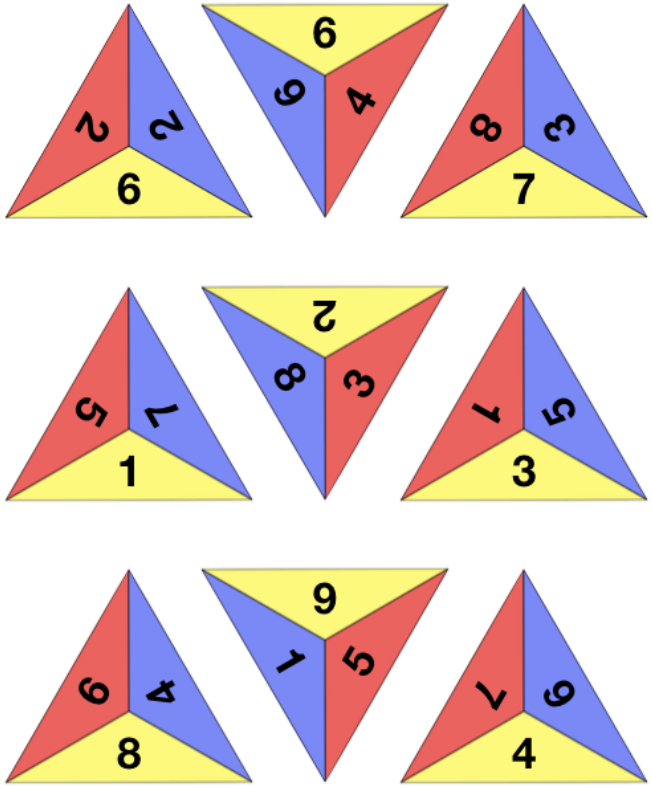
Can you find a winning strategy that guarantees you will win?

Does it matter who goes first?

One Big Triangle

Here are nine triangles. Each one has three numbers on it.

Your challenge is to arrange these triangles to make one big triangle, so the numbers that touch add up to 10.

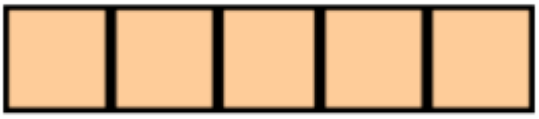


Penta Place 1

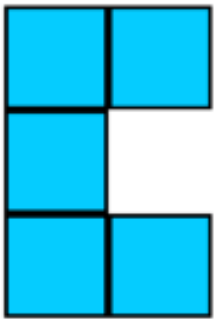
Penta people always build their houses using **five square rooms on one level** (the ground level).

The houses can be made in a variety of different shapes, but a room **must be joined to at least one other room by a wall.**

Here is an example of a Penta house,
viewed from above:



Here is different example:



What you have to do:

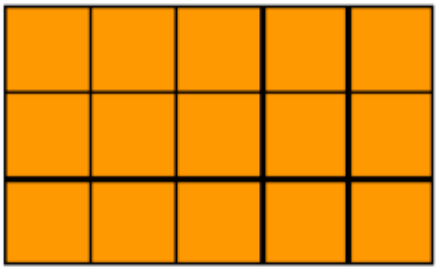
Try to find all possible Penta house shapes that are possible.
Use multilink cubes where each room is one cube.

Penta Place 2

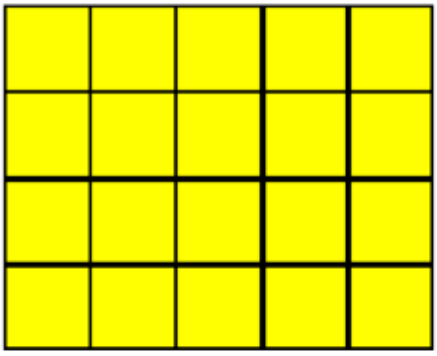
New Penta houses are being built in Penta Place.

The homes are built right next to each other and are arranged and fitted together to create rectangles.

1) Use **three of the Penta houses** you created and fit them together to make a 3x5 rectangle like this one.

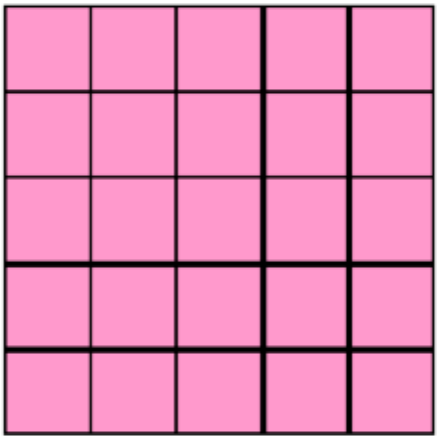


2) Can you make other sized rectangles using **three of the Penta houses**?



3) Try to find **four of the Penta houses** that fit together to make a larger rectangle like the one on the left.

4) On the right is a 5 by 5 square. Use **five of the Penta houses** to construct a similar square.



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).

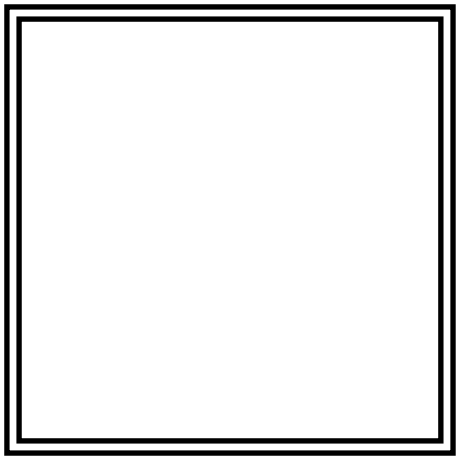
To Win

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

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...

Teddy Bear Line-Up

To Start

Line up all 16 teddy bears so that there are:

- four greens next to each other,
- then four yellows next to each other,
- then four blues next to each other,
- and finally four reds next to each other.

The Challenge

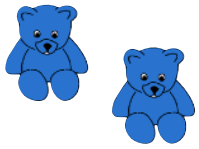
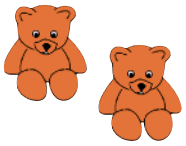
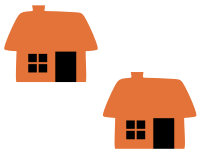
Swap two bears with each until no two bears of the same colour are next to each other.

The Big Question

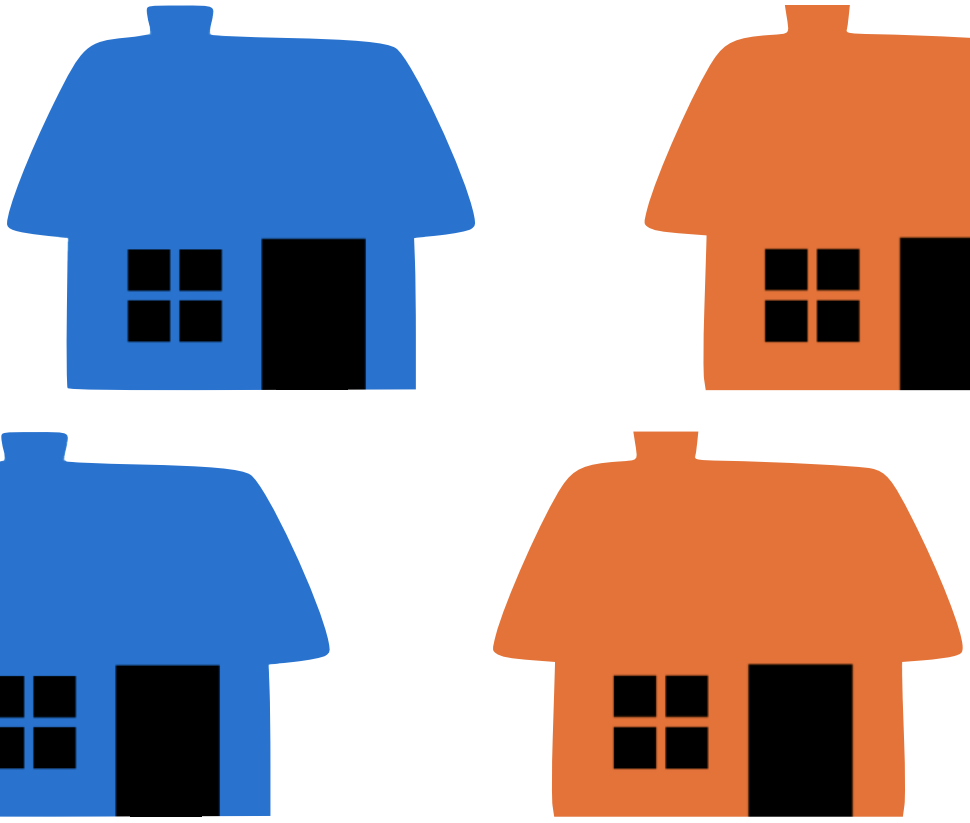
What's the least number of moves you can take to rearrange the bears as described?

Teddy Town 1

In Teddy Town, there are:

2 blue teddies 	2 yellow teddies 
2 blue houses 	2 yellow houses 

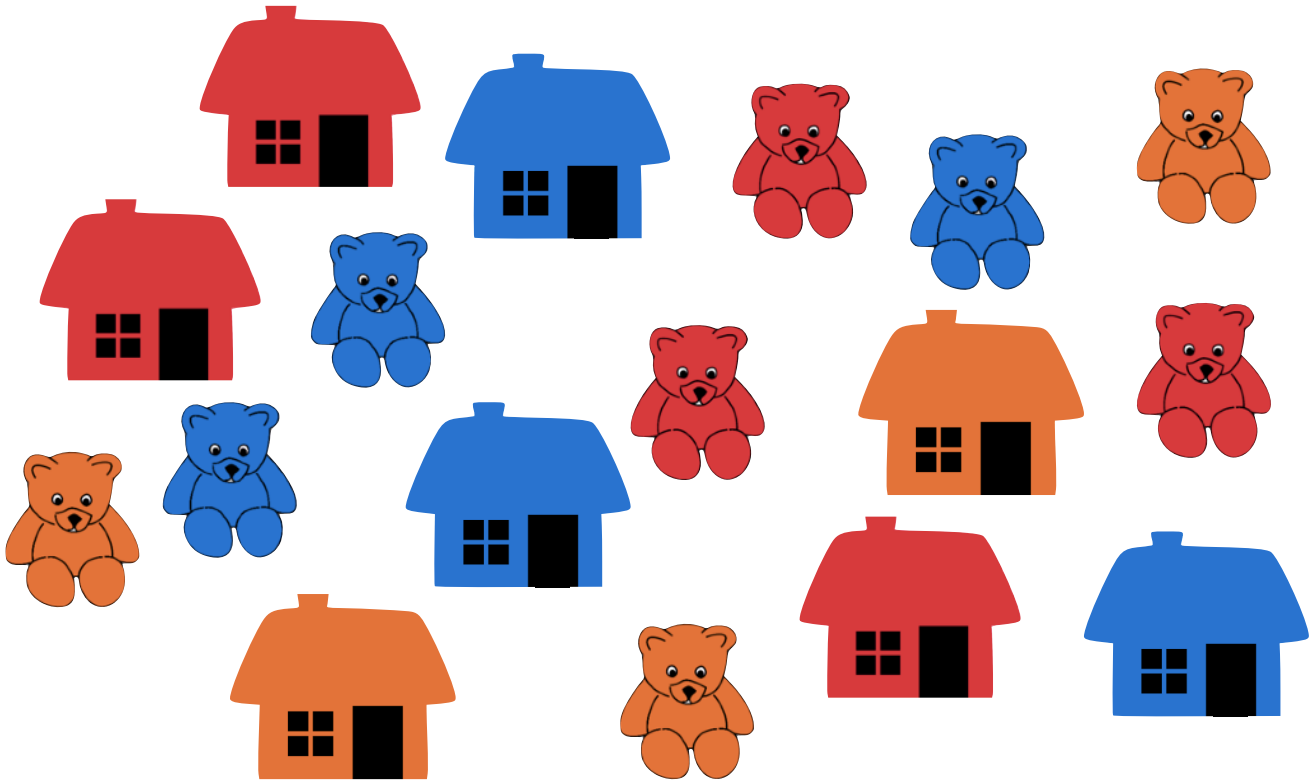
Can you put each teddy into a house so that all four combinations are different from each other?



Teddy Town 2

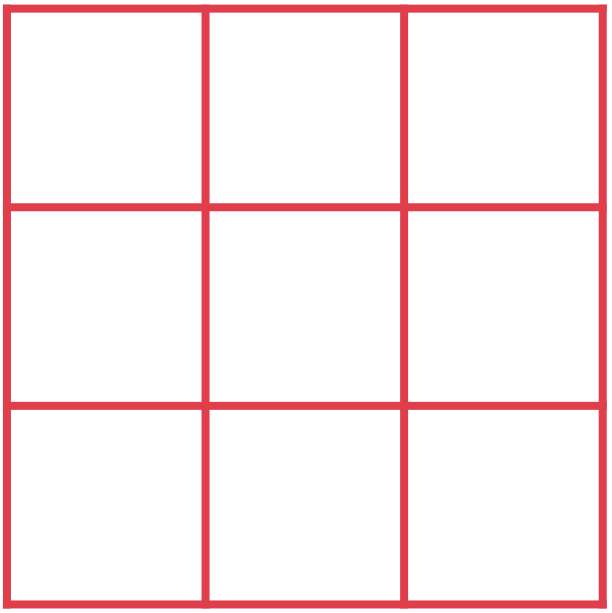
Teddy town has grown and there are now **three** different colours of teddies and houses: red, yellow and blue.

In Teddy Town there are now 9 teddies and 9 houses:



Can you make nine different combinations of teddies in houses?

Teddy Town 3

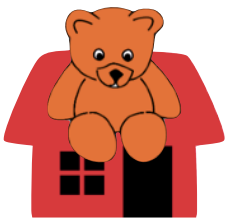


To the right is a small map of Teddy Town, where the streets are very special.

If you walk along any street in any direction all the houses are a different colour and the teddies living in the houses are different colours too.

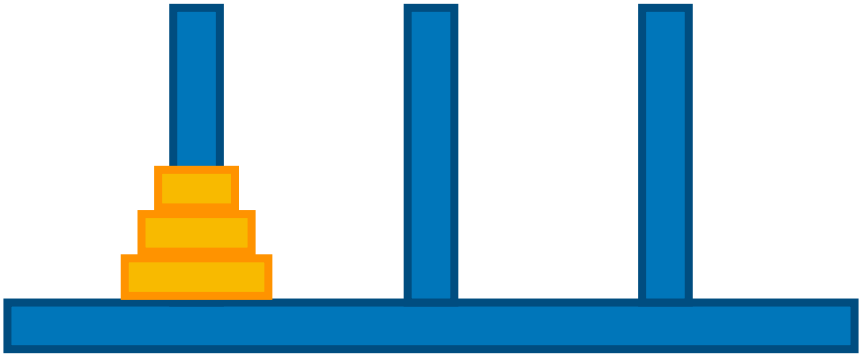
In other words, looking at the map grid, each row and column must have different coloured houses and different coloured teddies.

Can you arrange the nine different combinations you've found on the large scale map?



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

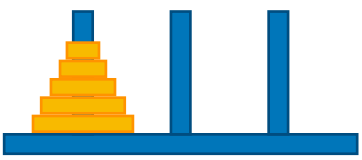
Move all three pieces to the right peg/area.

The Rules

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

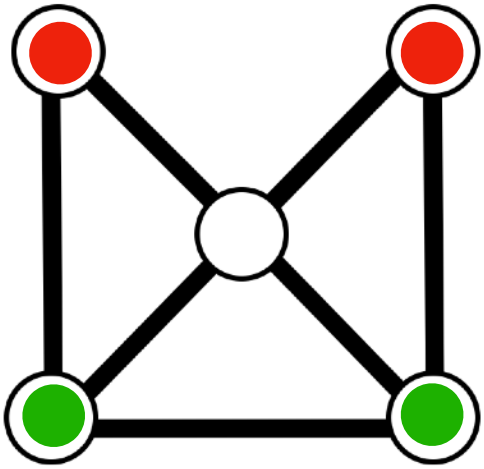
What is the smallest number of moves you complete it in?

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



Two Stones

This game is for two players. Each player plays with two counters of the same colour.



To Start

Place two stones at the top and two at the bottom as shown on the right.

To Play

Players take turns at sliding one stone along a line to an empty spot. (So the first move will always be to the middle).

To Win

You have to block the other player so that they cannot move.

Next Game

At the start of each game the players should swap positions.

In China this game is known as **Pong hau k'i** and in Korea it is called **Ou-moul-ko-no**.

Two Digit Targets

Arrange the digits 0-9 in the five boxes below to make two-digit numbers as close to the targets as possible. You can use each digit once only.

a) Largest even number

b) Largest odd number

c) Smallest odd number

d) Largest multiple of 5

e) Number closest to 50

For a challenge, use all your answers in the sum:

a + b - c + d + (difference between e and 50)

What is the highest total you can make?

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?