The Mobius strip

Name ___________________ Room ____ Date ___________

Cut a sheet of paper lengthwise to make three strips, 3-4 cm wide.

Take one of the strips. Give it **half a twist** before gluing the ends together. What you have made is called a **Mobius strip**.

Draw a line all the way along the middle of the Mobius strip.

How many sides does the strip have? One or two? ___________

Cut the Mobius strip along the middle. Write down what happens.

____

____

Take another strip. Give it **a full twist** before gluing the ends together. Cut the strip along the middle. Write down what happens.

____

____

Make another Mobius strip from the last strip. Draw a line all along the strip about a third of the way from the edge. Cut the strip along the line. Write down what happens.

____

____

Now you can colour your strips!

How many colours do we need to colour a map?

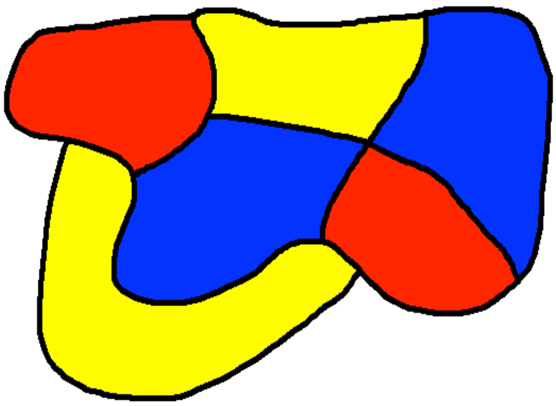
Name ____________________ Room ____ Date ___________

When we colour a map of countries (or states), we must use different colours for *adjacent* countries (countries that are next to each other).

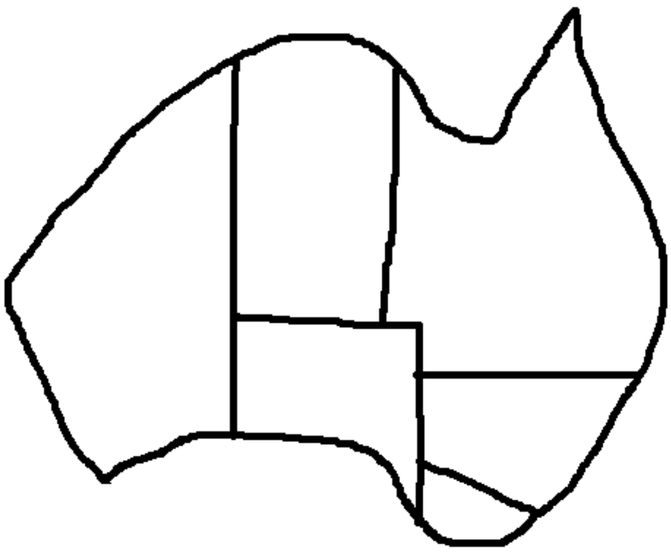
Why is that? ____

We try to use as few colours as we possibly can.

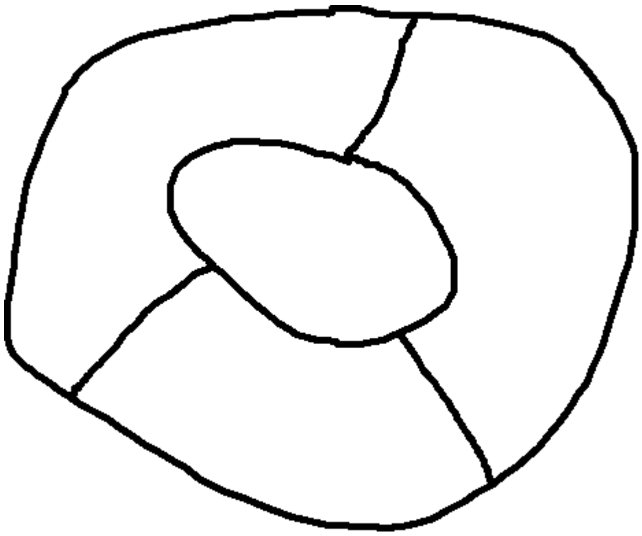
Here is a map that can be coloured with three colours. The blue countries meet in just a point, so they can have the same colour.



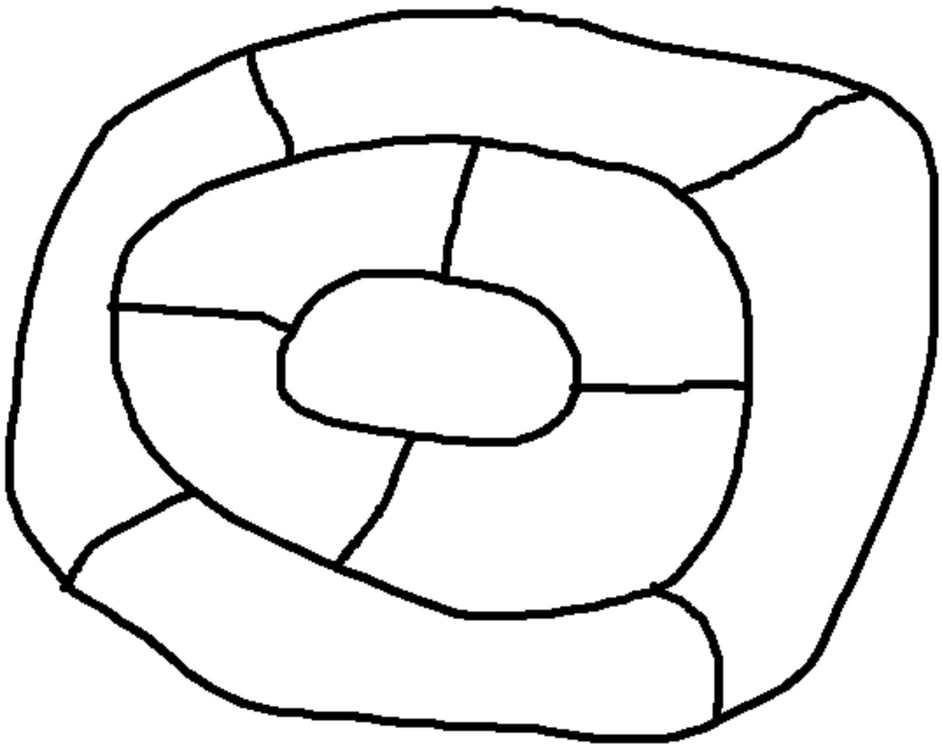
Can you colour this map of Australia with three colours?



How many colours do you need to colour this map?   _____ colours.



How many colours do you need to colour this map?   _____ colours.



More than 170 years ago, mathematicians started to wonder whether every map could be coloured with at most four colours. It took more than a century before the answer was found!

Now you can invent your own maps and see if you can colour them with only four colours!

Networks

Name ______________________ Room ______ Date ____________

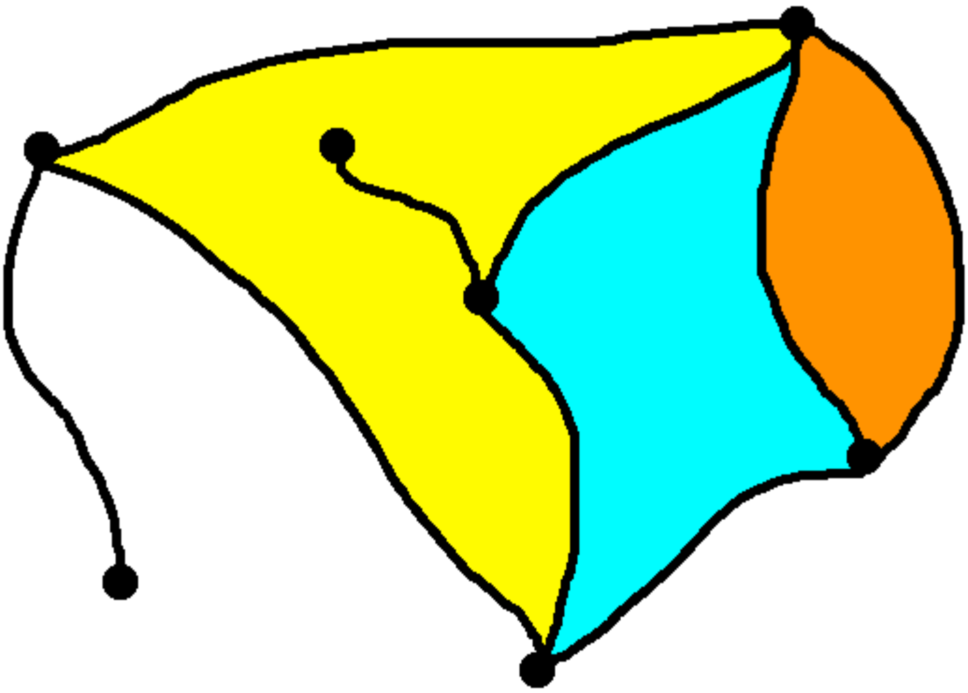
Put some dots on a sheet of paper. The dots are called **nodes***.*

Join some of the dots by lines. The lines are called **paths***.*

There are two rules:

- Paths must not cross. But they can meet at a node.
- There must be paths joining any two nodes.

If you have followed the two rules, then you have a **network***.*



This network has 7 nodes, 9 paths, and 3 **faces.**

A network can represent many things, for example:

- Cities with roads joining them.
- A network of computers, like the internet.
- Castles with tunnels between them.

What else could a network represent?

____

Make up three networks and draw them on this page.
Don’t make them too big! You can colour them if you like.

Count the number of nodes, paths, and faces in each network.
Put your numbers into a table.

	nodes	paths	faces
network 1			
network 2			
network 3			

Can you spot a pattern in your table? ___________________________________

Skip counting and the sieve of Eratosthenes Sheet 1

Name ________________ Room ____ Date ____________

Here is a table with the numbers from 1 up to 100.

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

Cross out the number 1.

Count by 2s. Cross out all the numbers except 2 itself.

Count by 5s. Cross out all the numbers except 5 itself.

Count by 3s. Cross out all the numbers except 3 itself.

Count by 7s. Cross out all the numbers except 7 itself.

Skip counting and the sieve of Eratosthenes Sheet 2

The numbers that are left are called __________ __________

or just __________.

How many primes are there between 1 and 100? __________

Is that more than half or less than half of all the numbers between 1

and 100? __________________________

What is the smallest prime? __________

What is the biggest prime smaller than 100? __________

Can you find two primes next to each other? __________

Can you find two primes with just one number between them? Find as many as you can.

____

Two primes with just one number between them are called **twin primes.**

Are there any even primes? ____________________