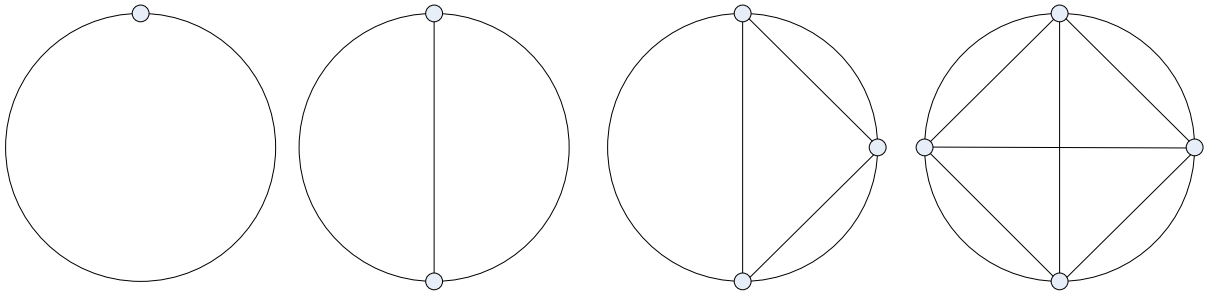
Sequences 1



Draw a large circle. Mark the centre and draw on the diameter. Measure each 20° using a protractor. Put a mark (we will call them cities) on the circumference of the circle at each 20° angle. Join up each mark to the other marks around the circle with a straight line (we will call them roads).

How many roads are there when there is one city?

How many roads are there when there are two cities?

How many roads are there when there are 3, 4 or 5 cities?

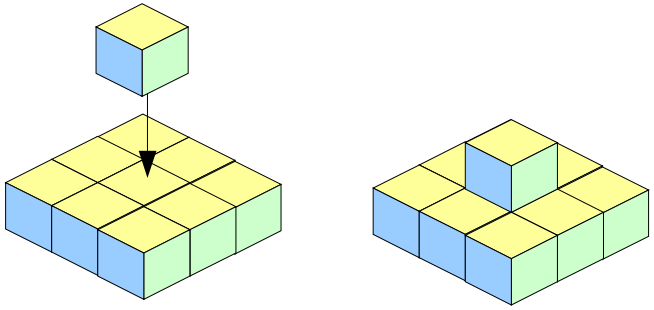
Can you use this information to work out the number of joins there will be when there are 18 cities?

What about if you had 36 cities or 72?

Can you come up with a formula to predict the number of roads for any number of cities?

If you mark your cities as points rather than big circles, your drawing will look a lot better.

Sequences 2



Build a pyramid where the top most layer is 1 brick. The second layer has one brick round every edge of the top layer. The third layer has one brick around every edge of the second layer.

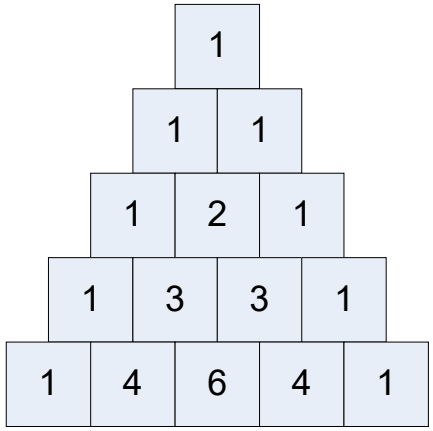
Can you work out how many bricks there are on the second layer? How many bricks are there altogether in the pyramid?

Can you work out how many bricks there are on the third layer? How many bricks are there altogether in the pyramid?

Can you work out how to find the number of bricks on any particular layer?

Can you work out how to predict the number of bricks in any sized pyramid?

Sequences 3



Look at the triangle on the left. Each number is calculated by adding the two numbers diagonally above it.

Can you predict what the next row will read?

Can you find the total for each of the rows?

Can you find a pattern between the rows and their totals?

What will the tenth row read? What is the total on the tenth row? What is the total of all the numbers up to the tenth row?

Sequences 4

0, 1, 1, 2, 3, 5, 8, 13, ... is called the *Fibonacci Sequence*.

Can you work out what the next term in the sequence is going to be? Can you work out the sum of all the terms up to the 1st term? What about the sum of the terms up to the second, third, fourth or fifth term?

Can you see a pattern that you can explain to your partner? Can you work out a way of predicting the 50th term? Can you work out a way of predicting the sum of all the terms up to the 50th term?

The numbers with commas between them are called ***sequences***. When you add up the terms and list them in totals up to the first term, total up to the second term, total up to the third term, total up to the nth term, then that is called a ***series***.

See if you can work out a formula to predict the nth term in the Fibonacci Sequence.

See if you can work out a formula to predict the nth term in the Fibonacci Series.

Using your formula, can you predict the 28th term of both the Fibonacci sequence and the series?

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
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320

Sequences 5

One of the most important sequences is that of prime numbers. A prime number is a number that has exactly two factors (itself and 1). The number 1 is NOT a prime number because this only has one factor.

Using the grid below, see if you can work out which numbers are prime numbers. Choose a primary colour and colour in the prime numbers in that primary colour.