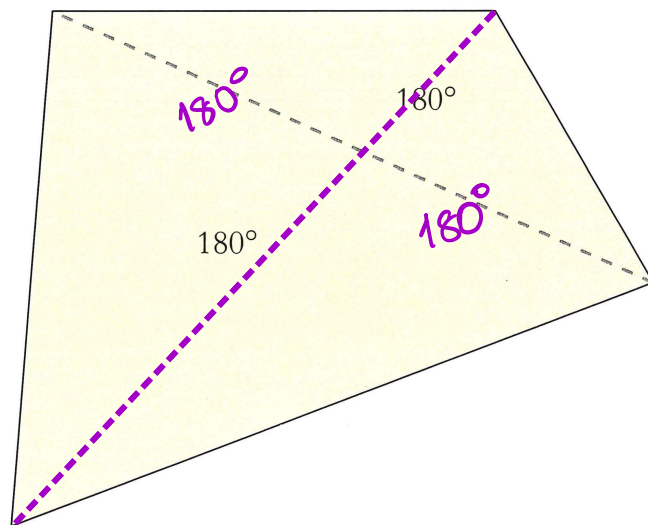


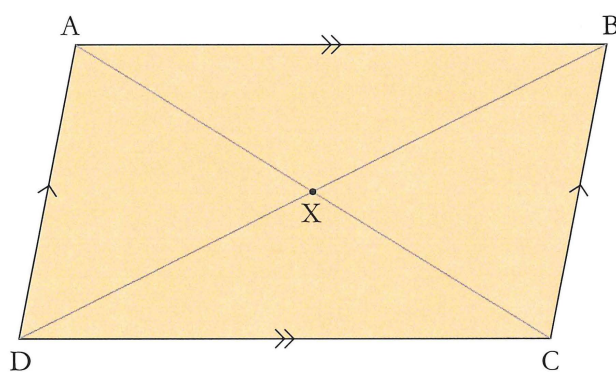
Quadrilaterals

A quadrilateral is the next polygon up to a triangle in the series and is defined as a plane figure bounded by **four** straight lines. Now since a four sided figure can be split into **two** triangles by drawing in a diagonal.



And since the angle sum of a triangle is 180° , then a quadrilateral must have an angle sum of $(2 \times 180^\circ)$ i.e. 360°

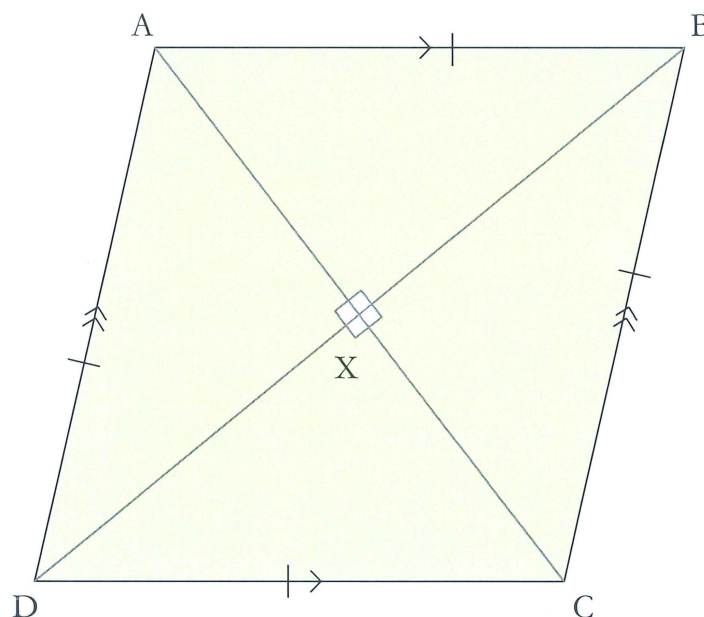
Parallelogram



Properties.

- The opposite sides are equal in length $AB = CD$ and $AD = BC$
- The opposite sides are parallel to each other i.e. $AB \parallel CD$ and $AD \parallel BC$.
- The opposite angles are equal to each other i.e. $\angle DAB = \angle BCD$ and $\angle ADC = \angle ABC$
- The diagonals bisect each other i.e. $AX = XC$ and $DX = XB$

Rhombus



This is a special parallelogram in that its four sides are equal in length.

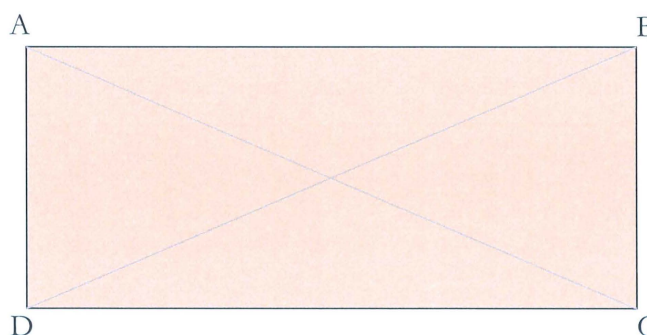
Properties.

- The opposite sides are equal in length.
- The opposite sides are parallel to each other
- The opposite angles are equal to each other
- The diagonals bisect at right angles and the diagonals bisect the angles through which they pass - $\angle AXB = \angle BXC = \angle CXD = \angle DXA = 90^\circ$

and $\angle DAC = \angle BAC$, $\angle ABD = \angle CBD$, $\angle BCA = \angle DCA$ and $\angle CDB = \angle ADB$

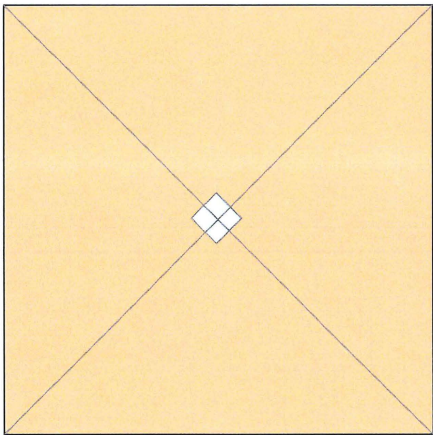
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Rectangle



This can be described as a parallelogram with each of its four angles equal to 90° . Consequently it possesses all the properties of a parallelogram.

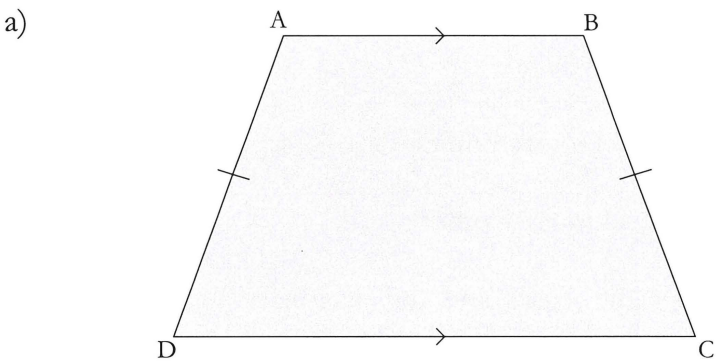
Square



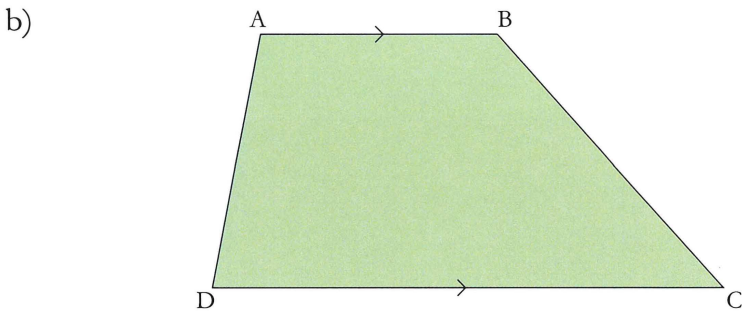
This has all the properties of a parallelogram, rhombus and rectangle.

Trapezium

This is a quadrilateral with **one** pair of sides parallel but **not** equal in length. There are basically two types:-

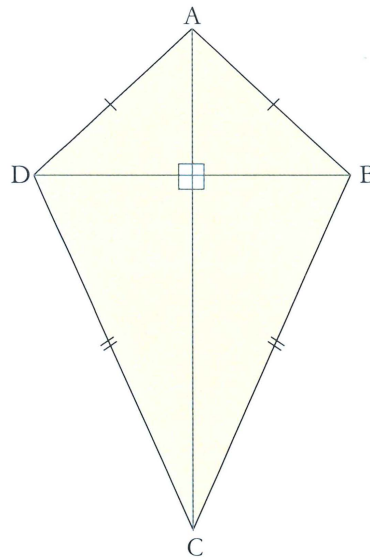


This type is called an isosceles trapezium. It has the one pair of parallel sides and its non-parallel sides are equal in length. ($AD = BC$)



This type has just one pair of sides parallel $AD \neq BC$

Kite



- This type of quadrilateral has two pairs of sides equal in length $AD=AB$ and $DC=BC$.
- The diagonal AC is a line of symmetry and therefore bisects the angles $\angle DAB$ and $\angle DCB$.
- The angles $\angle ADC$ and $\angle ABC$ are also equal to each other and the two diagonals AC and DB bisect each other at right angles.

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Math103 General Mathematics Second Midterm Examination 03.12.2022 13:00		
Last Name :	Instructors : S. Kozpınar and A. Göktepe	Signature
Name :	Time : 13:00	
ID Number :	Duration : 40 minutes	
20 Questions on 4 Pages	Each Question is 5 Points	TOTAL 100 POINTS
	YOUR SCORE	:

1. The octal number 357_8 expressed in Denary is: $3 \times 8^2 + 5 \times 8^1 + 7 \times 8^0 = 3 \times 64 + 40 + 7 = 192 + 47 = 239$
- a) 239 b) 324 c) 427

2. Convert 459_{10} into Hexadecimal: $10=A \quad 11=B \quad 12=C \quad 13=D \quad 14=E \quad 15=F$
- a) 3DE b) 2AF c) 1CB

$$\begin{array}{r} 459 \\ 448 \\ \hline 11 \\ 12 \end{array} \quad \begin{array}{r} 216 \\ 288 \\ \hline 11 \\ 12 \end{array} \quad \begin{array}{r} 1 \quad C \quad B \\ 1 \quad 12 \quad 11 \\ 1 \quad C \quad B \end{array}$$

3. The correct answer for the following arithmetic operation are:

$$\begin{array}{r} 5084 \\ 611_8 \\ - 345_8 \\ \hline 244 \end{array}$$

- a) 246 b) 244 c) 264
4. When the Hexadecimal numbers E536E and AE465 are added, the correct answer is:

a) 1937D3 b) 1827E2 c) 1747F4

$$\begin{array}{r} E536E \\ + AE465 \\ \hline 1937D3 \end{array}$$

5. Simultaneous equations are given by $2x + 3y = 12$ and $3x + 2y = 3$. What is the value of y?

a) -2 b) 6 c) 3

$$\begin{array}{r} 3/2x + 3y = 12 \\ -2/3x + 2y = 3 \\ \hline 6x + 9y = 36 \\ -6x - 4y = -6 \\ \hline 5y = 30 \Rightarrow y = 6 \end{array}$$

6. If $\log_5 3 = 0.6826$, then $\log_5 75^2$ is: $\log_5 75^2 = \log_5 (3 \times 5^2)^2 = 2 \log_5 (3 \times 5^2)$
- a) 5.3652 b) 3.6826 c) 4.6352
- $$\log ab = \log a + \log b$$
- $$= 2[\log_5 3 + \log_5 5^2] = 2[0.6826 + 2] = 2 \times 2.6826 = 5.3652$$

7. In common logarithmic form, the characteristic of the number 0.00002872 is:

a) $\bar{3}$

b) $\bar{4}$

c) $\bar{5}$

8. Evaluate $\log(412.2)$, by using "Log table" given at Page 4:

a) 2.1269

b) 2.3978

c) 2.6151

$6149 + 2 = 6151$

2.6151

41 from row of log table

2 from columns of the first part the next 2 from columns of the second part

9. Find the gradient of the straight line that passes through the points $(3,10)$ and $(6,16)$:

$y = mx + c$ $m = ?$

a) 2

b) 3

c) 4

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{16 - 10}{6 - 3} = \frac{6}{3} = 2$

$\begin{aligned} -1/10 &= 3m + c \\ -10 &= -3m - c \\ +16 &= 6m + c \\ \hline 6 &= 3m \Rightarrow m = 2 \end{aligned}$

10. Find the value of "c" if the straight-line $y = mx + c$ passes through the point $(2,1)$ and has a gradient of 5:

a) 5

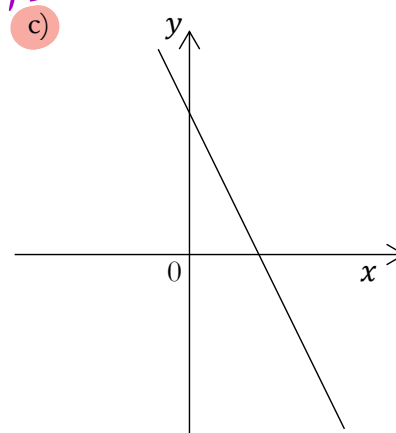
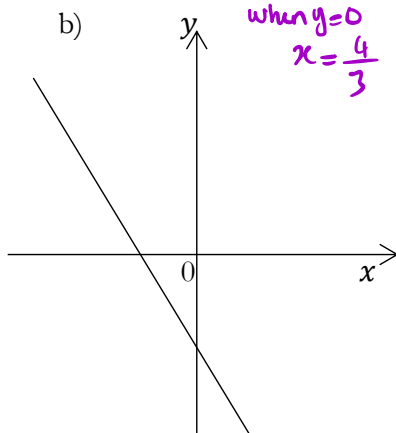
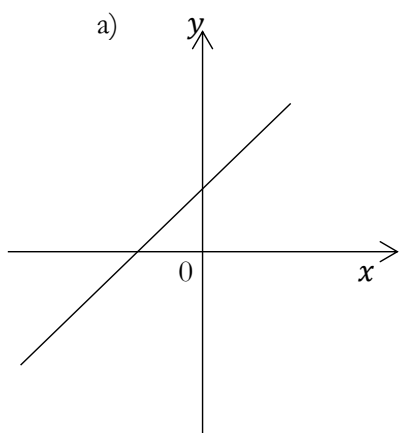
b) -9

c) -5

$y = 5x + c$
 $1 = 5 \times 2 + c$

$c = 1 - 10 = -9$

11. Which one of the following diagrams represent the graph of the linear equation $y = -3x + 4$:



when $x = 0$, $y = 4$
when $y = 0$, $x = \frac{4}{3}$

12. Which of the following equations produce a reciprocal curve?

a) $y = x^2 + x + 4$

b) $y = \frac{2}{x} + 7$

c) $y = 3x - x^3 + 4x^2$

13. At what point does the straight line represented by the equation $7y = 10 - 6x$ cross the y axis?

a) 10

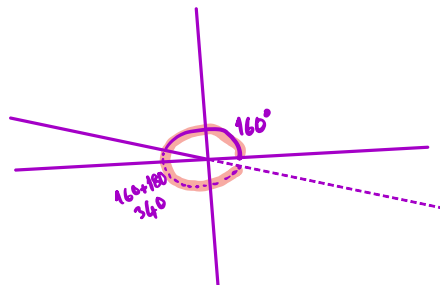
b) $-\frac{6}{5}$

c) $\frac{10}{7}$

This means $x = 0$
so $7y = 10$
 $y = \frac{10}{7}$

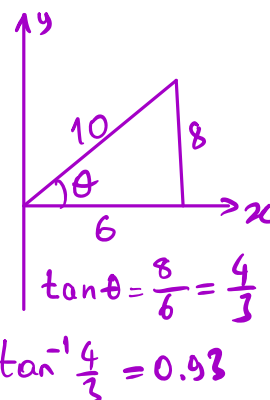
14. Express the point $(r, \theta) = (-7, 160^\circ)$ in Cartesian coordinates (x, y) .

- a) $(7 \cos(320^\circ), 7 \sin(320^\circ))$
- b) $(7 \cos(330^\circ), 7 \sin(330^\circ))$
- c) $(7 \cos(340^\circ), 7 \sin(340^\circ))$

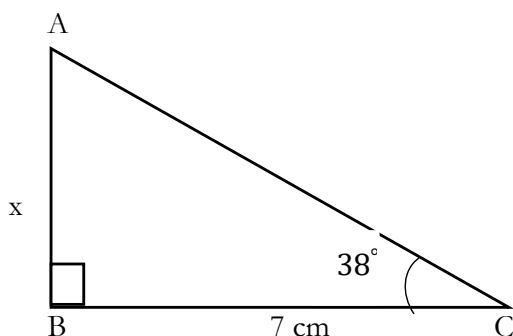


15. Express the point $(6, 8)$ in Polar coordinates (r, θ) if $\tan^{-1}\left(\frac{3}{4}\right) = 0.64^\circ$ and $\tan^{-1}\left(\frac{4}{3}\right) = 0.93^\circ$

- a) $(10, 0.93^\circ)$
- b) $(9, 0.64^\circ)$
- c) $(10, 0.64^\circ)$



16. In the following right-angled triangle ABC, the expression for the length x is:



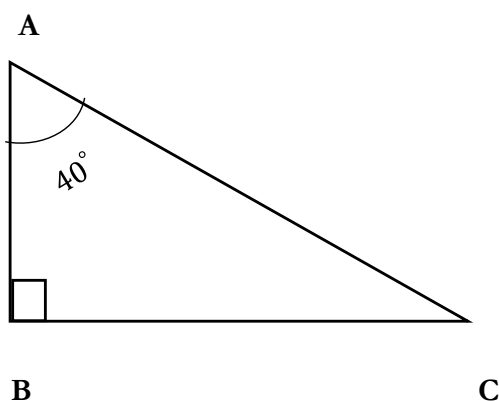
- a) $7 \tan(38^\circ)$

b) $\frac{7}{\tan(38^\circ)}$

c) $\frac{\tan(38^\circ)}{7}$

$\frac{x}{7} = \tan 38^\circ$
 $x = 7 \tan 38$

17. What is the expression for $\sin(40^\circ)$?



a) $\frac{BC}{AB}$

b) $\frac{AB}{AC}$

c) $\frac{BC}{AC}$

18. Convert 23.875_{10} into bicimal:

a) 10111.111_2

b) 10110.1111_2

c) 10011.110_2

$$\begin{array}{r} 23 \\ 11 \\ 5 \\ 2 \\ 2 \\ 2 \\ \hline 0 \end{array} \begin{array}{l} 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 1 \end{array}$$

① 5
 ① 4
 ① 3

10111

$0.875 \times 2 = 1.750$
 $0.75 \times 2 = 1.50$
 $0.50 \times 2 = 1.00$
 .111
 10111.111

19. Express -13 using two's complement.

a) 100011

b) 110011

c) 101001

$$\begin{array}{r} -32 \quad 16 \quad 8 \quad 4 \quad 2 \quad 1 \\ 1 \quad 1 \quad 0 \quad 0 \quad 1 \quad 1 \\ \hline \end{array} = -13$$

20. The solutions of the equation $y = 7x^2 - 11x + 2$ are:

a) $\frac{13}{14} - \frac{\sqrt{52}}{14}, \frac{13}{14} + \frac{\sqrt{52}}{14}$

$$x_1 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

$a=7, b=-11, c=2$

$$x_1 = \frac{11 - \sqrt{121 - 4 \cdot 7 \cdot 2}}{2 \cdot 7} = \frac{11}{14} - \frac{\sqrt{65}}{14}$$

b) $\frac{21}{7} - \frac{\sqrt{47}}{7}, \frac{21}{7} + \frac{\sqrt{47}}{7}$

$$x_2 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

$$x_2 = \frac{11}{14} + \frac{\sqrt{65}}{14}$$

c) $\frac{11}{14} - \frac{\sqrt{65}}{14}, \frac{11}{14} + \frac{\sqrt{65}}{14}$

Log Table



	0	1	2	3	4	5	6	7	8	9	Mean Difference								
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	8	12	17	21	25	29	33	37
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	10	14	17	21	24	28	31
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	22	25
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	13	16	18	21	24
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	16	18	20
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	19
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13

31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5679	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8