

NATIONAL CODE OF PRACTICE

VEHICLE STANDARDS BULLETIN 14

TRACK WIDTH & WHEEL WIDTH:



4.2.9 Passenger Car Wheel Track

The wheel track of passenger cars (or derivatives) must not be increased by more than 25mm beyond the maximum specified by the vehicle manufacturer for the particular model. This means that the rim offset must not be changed by more than 12.5mm.

Reduction in wheel track must not be performed without approval of the relevant Registration Authority.

4.2.11 Off-Road and Goods Vehicle Wheel Track

The wheel track of off-road four wheel drive vehicles and goods vehicles (MC, NA, NB ADR category) must not be increased by more than 50mm beyond the maximum specified by the vehicle manufacturer for the particular model.

If a solid axle from another manufacturer is used, the wheel track may be increased by 50mm beyond the maximum specified by the vehicle manufacturer for that particular axle, provided all other requirements such as clearances and the tyres do not protruding outside of the vehicle bodywork.

4.2.8 Maximum Passenger Car Tyre and Rim Width

Tyres fitted to passenger cars or passenger car derivatives must not be more than 30% wider than vehicle manufacturer's widest optional tyre.

The rim width must not exceed the recommendations for the tyre fitted.

For example, if the original widest optional tyre is 185mm, the maximum tyre width is 1.3 times 185mm = 240.5mm, i.e. a 235mm wide tyre. The maximum rim width for a 235mm tyre is 9 inches if the aspect ratio is 60 or below.

OVERALL TYRE DIAMETER & WHEEL WIDTH:

4.2.4 Overall Nominal Diameter

The overall diameter of any tyre fitted to a passenger car or passenger car derivative must not be more than 15mm larger or 26mm smaller than that of any tyre designated by the vehicle manufacturer for that model.

Speedometer accuracy must be maintained for the selected tyre and rim combination to within the degree of accuracy specified in ADR 18 where applicable. It is suggested that the degree of accuracy is in accordance with the most recent version of ADR18.

Simple Tyre Size Calculators are Available (see below)

Step 1 - Original Tyre Size -- Fill in the Yellow boxes

Step 2 - Proposed Replacement Tyre Size -- Fill in the Yellow boxes

Step 3 - Bottom Right -- Read the Speedo Variance (Keep it less than 10%)

Original Tyre

Tread Width (mm)	235
Sidewall Aspect Ratio	45
Rim Diameter (in)	17
Tyre Diameter (mm)	643.30
Tyre Diameter (in)	25.33
Sidewall Height (mm)	105.75
Sidewall Height (in)	4.16
Tread Width (in)	9.25
Tyre RPM @100 kph	824.35
Tyre RPM @ 60 mph	796.00

Replacement Tyre

Tread Width (mm)	235
Sidewall Aspect Ratio	40
Rim Diameter (in)	18
Tyre Diameter (mm)	645.20
Tyre Diameter (in)	25.40
Sidewall Height (mm)	94.00
Sidewall Height (in)	3.70
Tread Width (in)	9.25
Tyre RPM @100 kph	821.92
Tyre RPM @ 60 mph	793.65

Speedometer	59.82
Error @ 60 mph	
Speedometer	99.71
Error @ 100 kph	
Difference	0.30%

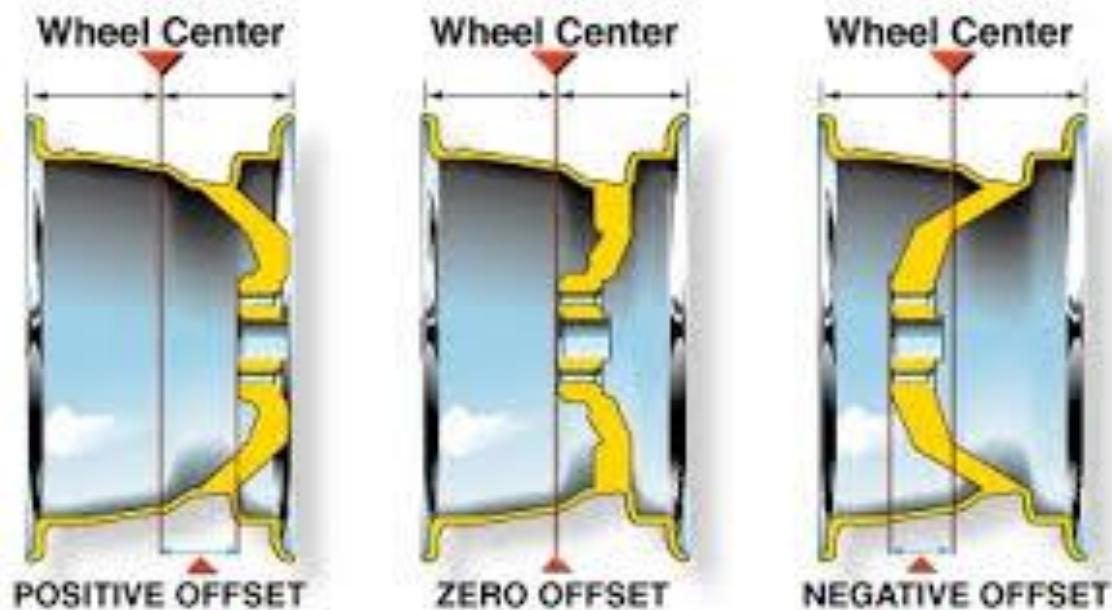


WHAT IS WHEEL OFFSET:

Wheel offset is measured from the imaginary centre line of the wheels - see diagrams below

See the middle diagram: The wheel bolt up face is exactly on the centre line.

This is a zero offset wheel - *Example: Toyota Landcruiser 80 Series uses a zero offset wheel*



See the diagram on the left: The wheel bolt up face is towards the outside (front face) of the wheel. This is a positive offset wheel. The distance from the centre line to the bolt up face, measured in millimetres is the “positive” offset - *Example: Ford Ranger PX 2012 model uses a 45 Positive offset wheel*

See the diagram on the right: The wheel bolt up face is behind the centre line of the wheel, towards the inside (back face) of the wheel. This is a negative offset wheel. The distance from the centre line to the bolt up face, measured in millimetres is the “negative” offset - *Example: Old FJ45 Landcruiser uses a 13 Negative offset wheel*

Some Points about Offset in relation to Modern Vehicles:

Most modern vehicles now have a positive offset wheel configuration.

Negative offset wheels are found on older 4x4 vehicles and some American muscle cars

Zero offset wheels are found on some older 4x4 applications.

See how a negative offset allows for the wheel to have a deep dish & visa versa, a positive offset means that the wheel face becomes more flat in dimension.

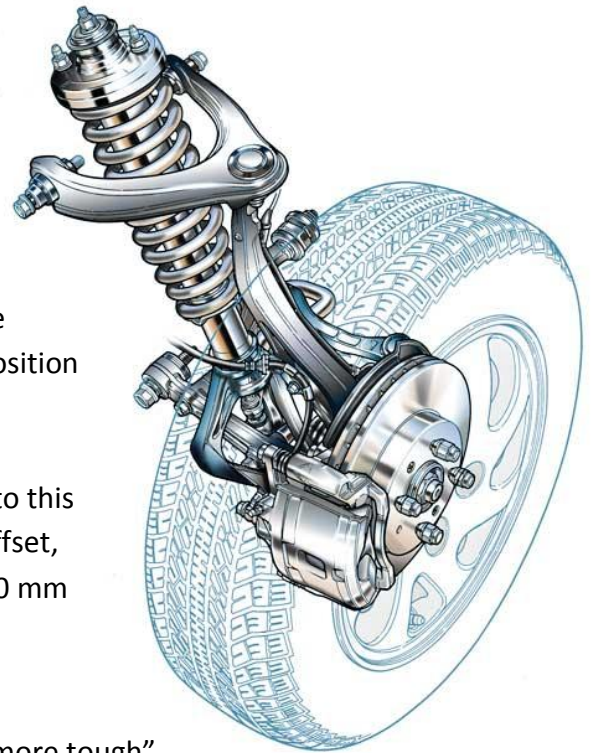
HOW DOES WHEEL OFFSET AFFECT THE POSITION OF THE WHEEL ON THE VEHICLE:

See the suspension diagram here on the right ...
The bolt up face on the disc rotor is the datum point.

If the OE (original equipment) wheel is made at 55 Pos
(*Example: Ford Ranger & Mazda BT50 2012 models*) and we fit another 55 Pos wheel onto these vehicles, then the position of the wheel relative to the mudguard does not change.

However if we fit an aftermarket 45 Pos offset wheel onto this Vehicle, such as the CSA Raptor 18x8" wheel at 45 Pos offset, then the wheel & tyre assembly is moved outwards by 10 mm per side. This will have the following effects:

1. It will increase the overall Track Width by 20 mm
2. It will fill up the guards making the appearance "more tough"
3. It will stabilise the vehicle as the wider track widens the footprint on the road

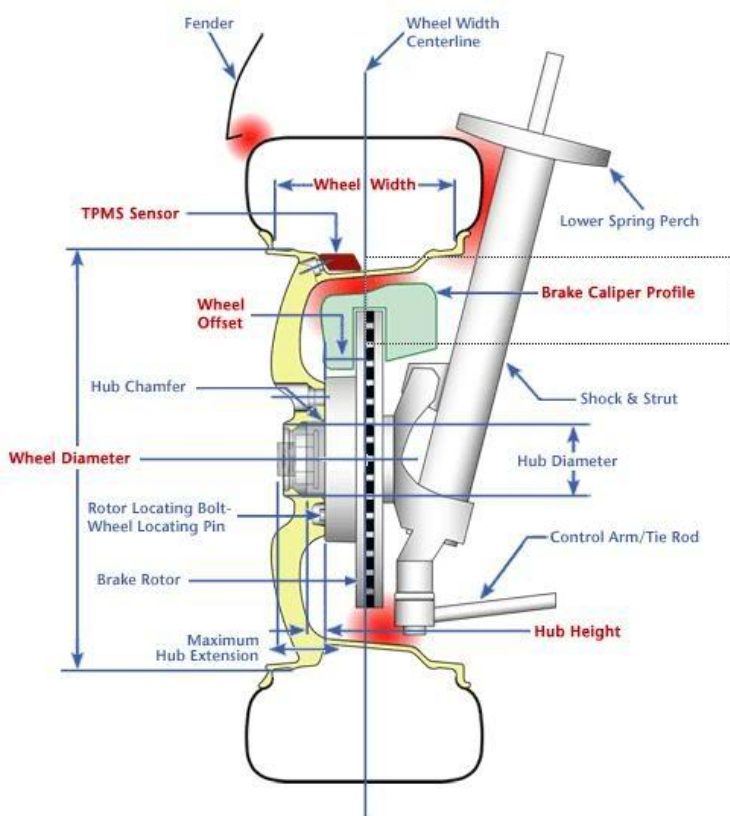


The Rules in Relation to Track Width - Which is affected by Wheel Offset

Track width on Passenger Cars must not be increased by more than 26 mm

Track width on Offroad and 4x4 Vehicles must not be increased by more than 50 mm

A reduction in track width is not permitted



THE WHEEL OFFSET CHANGES THE WHEEL POSITION RELATIVE TO ALL OTHER COMPONENTS:

See on this diagram, the **wheel offset** is an important factor in determining the position of the wheel & tyre assembly, in relation to the **brake calliper** and also the shock absorber strut tower.

This diagram shows a positive offset wheel – The bolt up face is toward the outside (front face) of the wheel.

This is a typical modern front wheel drive suspension configuration.

POSITIVE OFFSET - WHEEL MOVES INBOARD

NEGATIVE OFFSET - WHEEL MOVES OUTBOARD

SO IN RELATION TO THE “**ORIGINAL VEHICLE OFFSET**” (OEM OFFSET)

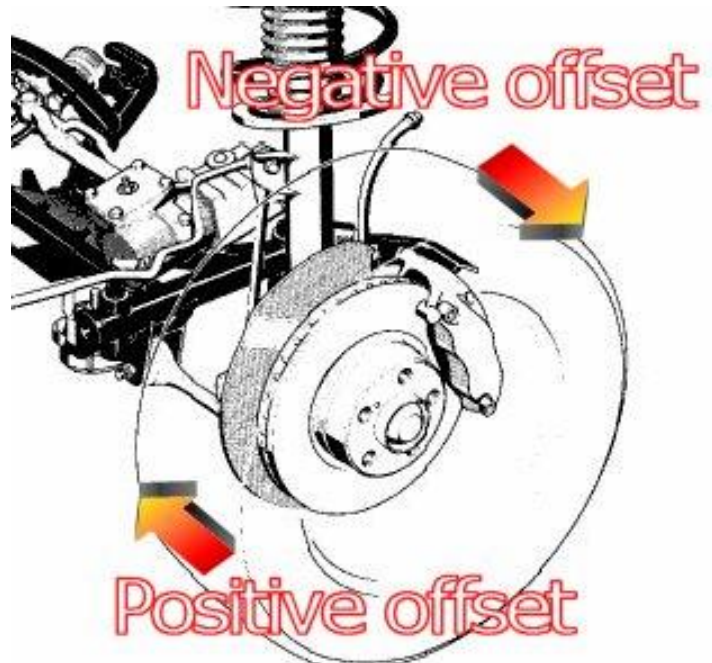
Higher Offset = More Positive Offset

If we fit a more positive offset wheel, then the wheel is moved inboard.

Lower Offset = More Negative Offset

If we fit a more negative offset wheel then the wheel is moved outboard.

This diagram represents the affect that varying the offset has in relation to the position of the wheel & tyre assembly under the guard of the vehicle.



HOW TO MEASURE OFFSET:

Offset is hard to measure as it is the distance from the **Imaginary Centre Line** of the wheel to the mounting surface of the wheel.

However offset can be calculated by measuring the **Back Spacing** on a wheel.

The Back Spacing of the wheel is the distance from the extreme back edge of the rim to the wheel mounting face. *(See the diagram on the next Page and the offset calculation chart)*

WHAT IS X FACTOR:

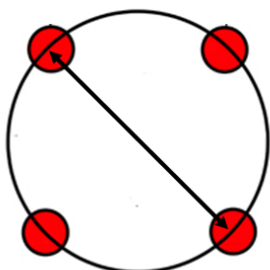
Another common wheel term is **X Factor**.

X Factor is a term that refers to calliper clearance (or brake clearance) behind the spoke.

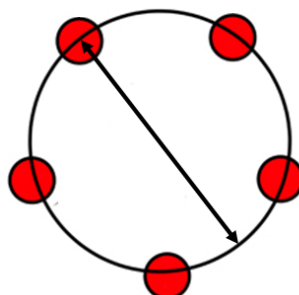
A lower offset will increase the X Factor or increase the brake clearance behind the spoke of the wheel.

PCD = PITCH CIRCLE DIAMETER (BOLT PATTERN):

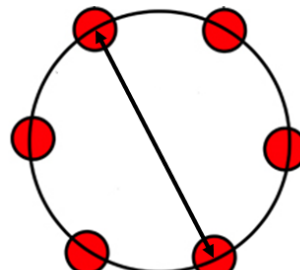
4 Stud
Middle of two
holes directly
opposite each other



5 Stud
Centre of one hole
to the invisible line
of the Bolt Circle



6 Stud
Middle of two
holes directly
opposite each other

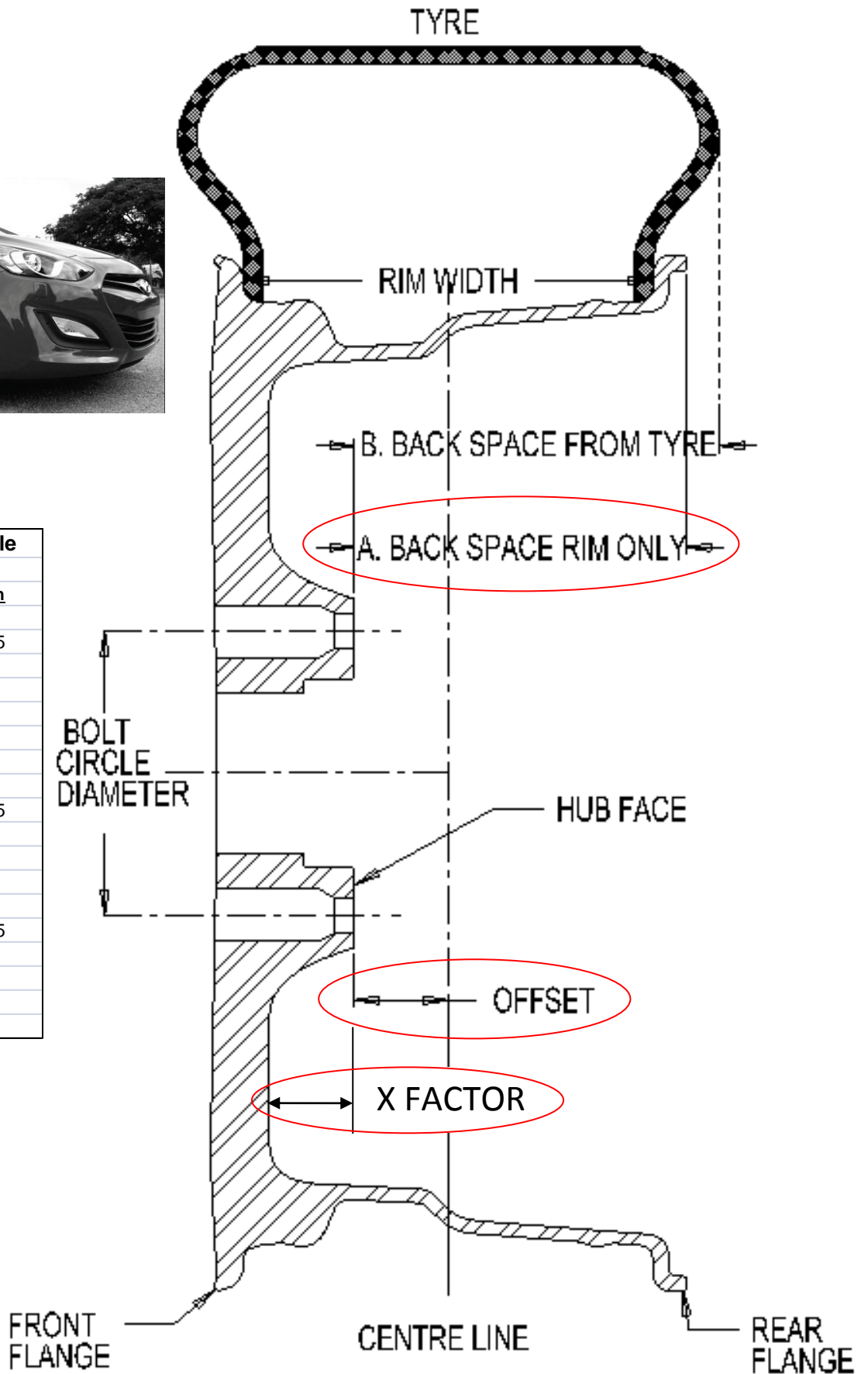


TERMINOLOGY:



Bolt Circle Conversion Table
PCD = Pitch Circle Diameter

PCD in Inches	PCD in mm
4 x 3.94	4 x 100
4 x 4.25	4 x 107.95
4 x 4.33	4 x 110
4 x 4.50	4 x 114.3
4 x 5.12	4 x 130
4 x 5.51	4 x 140
5 x 3.94	5 x 100
5 x 4.25	5 x 107.95
5 x 4.50	5 x 114.3
5 x 4.53	5 x 115
5 x 4.72	5 x 120
5 x 4.75	5 x 120.65
5 x 5.12	5 x 130
5 x 5.50	5 x 139.7
5 x 5.90	5 x 150
6 x 4.50	6 x 114.3



HOW TO CALCULATE OFFSET IF BACK SPACE IS KNOWN:

"B" CENTRELINE OFFSET FOR VARIOUS RIM WIDTHS											
"A" BACKSPACE MEASUREMENT	5.0 RIM	5.5 RIM	6.0 RIM	6.5 RIM	7.0 RIM	7.5 RIM	8.0 RIM	8.5 RIM	9.0 RIM	9.5 RIM	10.0 RIM
85	10	4	-3	-9	-15	-22	-28	-35	-41	-48	-54
86	11	5	-2	-8	-14	-21	-27	-34	-40	-47	-53
87	12	6	-1	-7	-13	-20	-26	-33	-39	-46	-52
88	13	7	0	-6	-12	-19	-25	-32	-38	-45	-51
89	14	8	1	-5	-11	-18	-24	-31	-37	-44	-50
90	15	9	2	-4	-10	-17	-23	-30	-36	-43	-49
91	16	10	3	-3	-9	-16	-22	-29	-35	-42	-48
92	17	11	4	-2	-8	-15	-21	-28	-34	-41	-47
93	18	12	5	-1	-7	-14	-20	-27	-33	-40	-46
94	19	13	6	0	-6	-13	-19	-26	-32	-39	-45
95	20	14	7	1	-5	-12	-18	-25	-31	-38	-44
96	21	15	8	2	-4	-11	-17	-24	-30	-37	-43
97	22	16	9	3	-3	-10	-16	-23	-29	-36	-42
98	23	17	10	4	-2	-9	-15	-22	-28	-35	-41
99	24	18	11	5	-1	-8	-14	-21	-27	-34	-40
100	25	19	12	6	0	-7	-13	-20	-26	-33	-39
101	26	20	13	7	1	-6	-12	-19	-25	-32	-38
102	27	21	14	8	2	-5	-11	-18	-24	-31	-37
103	28	22	15	9	3	-4	-10	-17	-23	-30	-36
104	29	23	16	10	4	-3	-9	-16	-22	-29	-35
105	30	24	17	11	5	-2	-8	-15	-21	-28	-34
106	31	25	18	12	6	-1	-7	-14	-20	-27	-33
107	32	26	19	13	7	0	-6	-13	-19	-26	-32
108	33	27	20	14	8	1	-5	-12	-18	-25	-31
109	34	28	21	15	9	2	-4	-11	-17	-24	-30
110	35	29	22	16	10	3	-3	-10	-16	-23	-29
111	36	30	23	17	11	4	-2	-9	-15	-22	-28
112	37	31	24	18	12	5	-1	-8	-14	-21	-27
113	38	32	25	19	13	6	0	-7	-13	-20	-26
114	39	33	26	20	14	7	1	-6	-12	-19	-25
115	40	34	27	21	15	8	2	-5	-11	-18	-24
116	41	35	28	22	16	9	3	-4	-10	-17	-23
117	42	36	29	23	17	10	4	-3	-9	-16	-22
118	43	37	30	24	18	11	5	-2	-8	-15	-21
119	44	38	31	25	19	12	6	-1	-7	-14	-20
120	45	39	32	26	20	13	7	0	-6	-13	-19
121	46	40	33	27	21	14	8	1	-5	-12	-18
122	47	41	34	28	22	15	9	2	-4	-11	-17
123	48	42	35	29	23	16	10	3	-3	-10	-16
124	49	43	36	30	24	17	11	4	-2	-9	-15
125	50	44	37	31	25	18	12	5	-1	-8	-14
126	51	45	38	32	26	19	13	6	0	-7	-13
127	52	46	39	33	27	20	14	7	1	-6	-12
128	53	47	40	34	28	21	15	8	2	-5	-11
129	54	48	41	35	29	22	16	9	3	-4	-10
130	55	49	42	36	30	23	17	10	4	-3	-9
131	56	50	43	37	31	24	18	11	5	-2	-8
132	57	51	44	38	32	25	19	12	6	-1	-7
133	58	52	45	39	33	26	20	13	7	0	-6
134	59	53	46	40	34	27	21	14	8	1	-5
135	60	54	47	41	35	28	22	15	9	2	-4
136	61	55	48	42	36	29	23	16	10	3	-3
137	62	56	49	43	37	30	24	17	11	4	-2
138	63	57	50	44	38	31	25	18	12	5	-1
139	64	58	51	45	39	32	26	19	13	6	0
140	65	59	52	46	40	33	27	20	14	7	1
141	66	60	53	47	41	34	28	21	15	8	2
142	67	61	54	48	42	35	29	22	16	9	3
143	68	62	55	49	43	36	30	23	17	10	4
144	69	63	56	50	44	37	31	24	18	11	5
145	70	64	57	51	45	38	32	25	19	12	6
146	71	65	58	52	46	39	33	26	20	13	7
147	72	66	59	53	47	40	34	27	21	14	8
148	73	67	60	54	48	41	35	28	22	15	9
149	74	68	61	55	49	42	36	29	23	16	10
150	75	69	62	56	50	43	37	30	24	17	11