

The hardest sudokus (new thread)

POSTREPLY

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Re: The hardest sudokus (new thread)

ghflick • Sun Oct 03, 2021 5:32 pm

QUOTE

ghflick

Posts: 100
Joined: 06 April 2016

I tried the three puzzles using YZF. Sudoku. I changed the settings so that MSLS and Junior Exocets are listed before Dynamic Chains. The first puzzle has a long solution path but after the MSLS, the next hardest step is a Death Blossom :

```
CODE: SELECT ALL

...3....8...5....2.17.....5.8...6.9.12....8....3....6.9....5...4....7.....1.6.2

Locked Candidates 1 (Pointing): 7 in b3 => r1c4<=7,r1c5<=7,r1c6<=7
Locked Candidates 1 (Pointing): 9 in b5 => r1c5<=9,r2c5<=9,r3c5<=9

MSLS:16 Cells r2578c1368, 16 Links 69r2,56r5,12r7,59r9,34c1,78c3,47c6,34c8
18 Eliminations: r7c7<=1,r4c18,r3c8,r8c1<=3,r348c8,r1c16,r3c6, r4c1<=4,r5c7<=5,r2c45<=6,r46c3<=7,r3c3<=8

Locked Pair: in r4c1,r4c3 => r4c2<=12,r6c2<=12,r6c3<=12,r4c2<=12,r4c7<=1,r4c8<=12,
Hidden Single: 2 in b6 => r6c8=2
Hidden Single: 1 in b6 => r6c7=1
Hidden Single: 1 in b9 => r7c8=1
Hidden Single: 5 in b6 => r5c8=5
Hidden Single: 5 in b4 => r6c3=5
Naked Single: r4c8=9
Hidden Single: 9 in b5 => r6c5=9
Hidden Single: 6 in r6 => r6c4=6
Naked Single: r3c8=6
Locked Candidates 1 (Pointing): 9 in b9 => r8c1<=9
Empty Rectangle : 4 in b5 connected by c1 => r2c5 <= 4
Finned X-Wing:4c48\vr29 fr13c4 => r2c6<=4
Finned Swordfish:4c168\vr259 fr7c6 => r8c4<=4
Locked Candidates 2 (Claiming): 4 in c4 => r1c5<=4,r3c5<=4
AIC Type 2: 3r4c2 = r5c1 - (3=2)r7c1 - (2=1)r4c1 - r8c1 = 1r8c2 => r8c2<=3

MSLS:13 Cells r48c45+r123c45,r4c2,r8c9,13 Links 347r4,389r8,2c4,56c5,3478b2
2 Eliminations: r2c6<=7,r8c2<=8

Almost Locked Set XZ-Rule: A=r45c7,r6c9 (3478),B=r7c7,r9c8 (348),X=8,Z=3 => r8c7<=3
Almost Locked Set XY-Wing: A=r1c24(124),B=r48c1(128),C=r8c245679(1235689),X,Y=1,5,Z=2 => r1c1<=2
Almost Locked Set XY-Wing: A=r1c24(124),B=r79c8(2457),C=r8c245679(1235689),X,Y=1,5,Z=2 => r1c6<=2
Death Blossom Complex Type 2: Set have degrees of freedom of 9-23478(7c13567) => r4c2<=4

3r7c1-(3=12478)(r13689c2)
3r7c5-(3=45678)(r12348c5)
r7c7-(3=47)(r45c7)
W-Wing: 47 in r5c6,r6c9 connected by 4r4 => r5c79<=7
Grouped Z-String Kite: 7 in r5c6,r8c2 connected by r46c2,r5c3 => r9c6 <= 7

Death Blossom Complex Type 2: Set have degrees of freedom of 2-3469(2c18) => r5c9<=4
8r2c1-8r2c4(68+12345)(r145789c1)
3r2c8-(3=479)(r136c9)

Region Forcing Chain: Each 4 in r1 true in turn will all lead r1c2<=1
(4=3)r1c2
(4=3)r1c4 = (2=1)r1c2
4r1c7 - r2c8 = r9c8 - (4=5)r9c6 - r8c56 = (5=1)r8c1 = r8c2 - 1r1c2
4r1c9 - r2c8 = r9c8 - (4=5)r9c6 - r8c56 = (5=1)r8c1 = r8c2 - 1r1c2

Naked Pair: in r1c2,r1c4 => r1c7<=4,r1c9<=4
WXYZ-Wing: 5679 in r1c379,r2c6,Pivot Cell 15 r1c5 => r1c6<=9
Almost Locked Set XY-Wing: A=r1c1579(15679),B=r9c23468(345789),C=r4789c1(12359),X,Y=1,9,Z=5 => r1c6<=5

Region Forcing Chain: Each 7 in r9 true in turn will all lead r2c5<=3
7r9c2 - r6c2 = (7=4)r6c9 = r3c8 - (4=3)r2c8 - 3r2c5
(7=3)r8c3 = (9=5)r8c1 = (5=4)r9c6 = r9c8 - (4=3)r2c8 - 3r2c5
7r9c4 - r2c4 = (7=3)r2c5

Death Blossom Complex Type 2: Set have degrees of freedom of 1-34578(r2347c5) => r1c7<=9
3r3c5-(3=479)(r136c9)
9r3c5-(5=689)(r1c156)
3r7c5-(3=125689)(r8c124567)

AIC Type 2: 9r1c1 = (9=7)r1c9 = (7=4)r6c9 = r6c2 - r5c1 = 4r2c1 => r2c1<=9
AIC Type 2: 5r8c1 = (5=9)r8c1 = r1c1 - (9=7)r1c9 - (7=5)r1c7 - (5=6)r1c5 - r8c5 = 6r8c6 => r8c6<=5

Death Blossom Complex Type 2: Set have degrees of freedom of 2-12358(r8c124) => r2c8<=4
5r8c1-(5=34789)(r9c12348)
3r8c4-(3=45789)(r2c33456)
8r8c4-(8=349)(r8c79,r9c8)

Hidden Single: 4 in c8 => r9c8=4
Full House: r2c8=3
Naked Single: r9c5=5
Hidden Single: 5 in b7 => r8c1=5
Hidden Single: 1 in b7 => r8c2=1
Locked Candidates 1 (Pointing): 4 in b3 => r3c2<=4,r3c4<=4
Locked Candidates 1 (Pointing): 2 in b7 => r7c6<=2
Locked Candidates 2 (Claiming): 2 in c2 => r3c3<=2
Hidden Pair: 38 in r5c9,r8c9 => r8c9<=9
AIC Type: 9 in b9 => r8c7=9
AIC Type 2: 2r1c2 = r1c4 - r3c6 = (2=6)r8c6 = r8c5 - (6=5)r1c5 - (5=7)r1c7 - r1c9 = (7=4)r6c9 = 4r6c2 => r1c2<=4
Hidden Single: 4 in b1 => r2c1=4
Hidden Single: 4 in b4 => r6c2=4
Full House: r6c9=7
Hidden Single: 7 in b3 => r1c7=7
Hidden Single: 5 in b3 => r3c7=5
Hidden Single: 4 in b3 => r3c9=4
Full House: r1c9=9
Hidden Single: 4 in b2 => r1c4=4
Hidden Single: 5 in b2 => r1c5=5
Hidden Single: 6 in c5 => r8c5=9
Hidden Single: 9 in c1 => r9c1=9
Hidden Single: 2 in r1 => r1c2=2
Naked Single: r3c2=8
Naked Single: r3c5=3
Naked Single: r3c4=2
Hidden Single: 2 in b8 => r8c6=2
XYZ-scraeper : 3 in r4c2,r7c1 connected by r47c7 => r5c1,r9c2 <= 3
[stte]
```

The second puzzle is essentially cracked with an early MSLS :

```
CODE: SELECT ALL

..2...67..4...8.....9.....3.....7.5.8...4..1.3...2...9..5....6.1.1.3...2..6.7

Hidden Single: 3 in b6 => r5c7=3
Locked Candidates 1 (Pointing): 2 in b4 => r4c5<=2,r4c6<=2
Locked Candidates 2 (Claiming): 4 in c2 => r7c3<=4,r8c3<=4,r9c3<=4

MSLS:16 Cells r1689c1358, 16 Links 13r1,67r6,27r8,13r9,89c1,45c3,45c5,89c8
19 Eliminations: r1c49<=1,r8c7<=2,r9c6<=3,r346c5,r4c3,r6c6<=4,r34c5,r2c3<=5, r6c6,r8c2<=7,r3c18,r7c1<=8,r2c8,r4c1<=9

Hidden Single: 4 in b4 => r6c3=4
Locked Pair: in r4c1,r4c3 => r5c2<=6,r6c1<=6,r4c5<=6,r4c9<=6,
Naked Single: r4c5=1
Hidden Single: 1 in b6 => r5c9=1
Hidden Single: 6 in b6 => r6c8=6
Hidden Single: 6 in b5 => r5c5=6
Hidden Single: 2 in b5 => r5c6=2
Hidden Single: 2 in b2 => r3c5=2
2-String Kite: 8 in r6c7,r7c4 connected by r4c4,r6c8 => r7c7 <= 8
Empty Rectangle : 5 in b5 connected by r5 => r7c1 <= 7
Sue de Coq: r23c7 - (124589) (r23c8 - (123), r488c7 -(4589)) => r1c8<=1 r1c8<=3 r7c7<=4
Locked Candidates 2 (Claiming): 1 in r1 => r2c2<=1,r3c1<=1
AIC Type 1: 4r3c2 = r8c7 - (4=8)r7c9 - r7c4 = (8=3)r4c4 = 4r4c6 => r3c6<=4
AIC Type 2: 4r3c7 = r8c7 - (4=8)r7c9 - r7c4 = r4c4 - r6c6 = 8r6c7 => r3c7<=8
AIC Type 1: 4r4c6 = (4=8)r4c4 = r7c4 - (8=4)r7c9 => r7c5<=4
Grouped AIC Type 2: 9r2c8 = r4c6c - (9=7)r5c4 - (7=5)r6c5 - r89c5 = 5r9c6 => r2c6<=5
Grouped AIC Type 2: 4r4c8 = (4=5)r9c8 = r89c5 - (5=7)r6c5 - (7=9)r5c4 => r4c6<=9
Almost Locked Set XY-Wing: A=r7c48(478),B=r468c8(4589),C=r5c4(79),X,Y=7,9,Z=8 => r7c6<=8
AIC Type 2: 3r1c5 = r9c5 - (3=7)r7c6 - r8c5 = r6c5 - (7=9)r6c1 - r6c6 = 9r2c6 => r2c6<=3
Almost Locked Set XY-Wing: A=r1c3c3(133),B=r7c7(13),C=r2c2349r9(1235679),X,Y<=3,2,Z=1 => r7c3<=1
Almost Locked Set XY-Wing: A=r2c236789(1235679),B=r23469c8(345789),C=r3c8(13),X,Y=1,3,Z=7 => r2c4<=7
Almost Locked Set XY-Wing: A=r6c167(5789),B=r123c4,r1c5,r3c6(134579),C=r5c4,r6c5(579),X,Y=5,9,Z=7 => r3c1<=7
X-Wing: r7c5\vr88 => r8c3<=7
AIC Type 2: r1c3 = r9c3 - r9c8 = (1=2)r7c7 = r8c8 - (2=5)r8c3 => r1c3<=5
Locked Candidates 1 (Pointing): 5 in b1 => r8c2<=5,r8c2<=5
AIC Type 2: 5r2c2 = (5=8)r3c2 = (8=6)r3c9 = 6r2c9 => r2c9<=5r2c2<=6
AIC Type 1: (2=6)r4c1 - (6=3)r3c1 - r2c3 = (3=2)r2c8 = 2r6c8 => r8c1<=2
XYZ-Wing: 4789 in r8c2,r6c1,r8c2,Pivot Cell 15 r8c1 => r8c3<=9
Hidden Pair: 79 in r6c1,r8c1 => r8c1<=8
Unique-ness Test 15: 26 35 14r7c13: 2\bu1c1 + 1*conjugate pairs(2c1) => r7c3 <= 6
Sashimi X-Wing:8r38\vc29 fr8c78 => r7c9<=8
Naked Single: r7c9=4
Hidden Single: 4 in b3 => r3c7=4
Hidden Pair: 12 in r2c7,r7c7 => r2c7<=59
Locked Candidates 2 (Claiming): 5 in c7 => r4c9<=5
AIC Type 2: 4r1c4 = (4=3)r3c5 = r9c5 - (3=7)r7c6 - (7=9)r2c6 => r1c4<=9
Locked Candidates 2 (Claiming): 9 in r1 => r2c9<=9
Naked Single: r2c9=6
Hidden Single: 6 in c3 => r4c3=6
Hidden Single: 2 in b4 => r4c1=2
AIC Type 2: (8=9)r1c9 - r9c8 = r9c2 - (9=7)r8c1 - r7c3 = (7=3)r2c3 = (3=2)r2c8 = 2r8c8 => r8c8<=8
X-Wing:8c18\vr19 => r9c26,r1c9<=8
Hidden Single: 8 in b8 => r7c4=8
W-Wing: 45 in r1c4,r9c6 connected by 4r4 => r3c6<=5
Naked Pair: in r3c5,r7c6 => r2c6<=7,
Naked Single: r2c6=9
Locked Candidates 2 (Claiming): 7 in r2 => r3c2<=7
XYZ-Wing: 489 in r8c2,r8c7,r8c2 => r8c1 <= 9
[stte]
```

The third puzzle has an early MSLS but remains unsolved without 'Brute Force'.

Error Launching Web Browsers On Smart Tv

Krist_snowflakeFussy • Mon Oct 04, 2021 9:46 pm

QUOTE

Krist_snowflakeFussy

Posts: 1
Joined: 01 October 2021
Location: Lithuania

Please tell me, can anyone come across such an error on Smart.
When you open web Browsers, it writes like this (photo in the attached file)
... What can you do ... Thank you

In search of love, xxx me somebody 🙏

Re: The hardest sudokus (new thread)

Day mith • Tue Oct 05, 2021 6:21 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Finished the last bit of rating I was doing for the update. I'm going to go through the thread in the next couple days to get puzzles from others.

Re: The hardest sudokus (new thread)

Day mith • Wed Oct 06, 2021 5:35 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

I believe these are all the puzzles posted by someone other than me since the 2020-10 update:

```
jco
98.7....7.6..9..5.....4.8.6.....5.3.....2.1.89.4.....1.2....3.5. ER/EP/ED=11.8/11.8/10.4
98.7....7.6..8..5.....4.6.9.....3.5.....2.1.9.4.7.....1.3.....5.2. ER/EP/ED=11.8/11.8/10.3
98.7....7.6..8..5.....4.8.9.....3.5.....2.1.9.6.4.....5.2....1.3. ER/EP/ED=11.8/11.8/10.5
98.7....7.6..8..5.....4.8.9..3.4..2.1.5.9.6.....4.3....1.2. ER/EP/ED=11.8/11.8/10.3
98.7....7.6..8..5.....8.6.4.....5.3.....2.1.7.4.9.....1.2....3.5. ER/EP/ED=11.7/11.7/11.1
98.7....7.6..9..5.....4.6.8.....5.3.....2.1.9.4.7.....3.5....1.2. ER/EP/ED=11.7/11.7/11.1
98.7....7.6..8..5.....4.9.6.....5.3.....2.1.78.4.....1.5....3.2. ER/EP/ED=11.7/11.7/10.7 (*)
98.7....7.6..8..5.....4.8.9.....3.5.....2.1.7.6.4.....5.3....1.2. ER/EP/ED=11.7/11.7/3.4
98.7....7.6..8..5.....4.8.9.....5.3.....2.1.74.6.....1.5....3.2. ER/EP/ED=11.7/11.7/11.3 (*)
98.7....7.6..5..4.....5.6.7.....4.3.....2.1.7.8.9.....1.2....3.4. (ER/EP/ED=11.7/11.7/10.6)
(these were "generated" with YZF and are just morphs of puzzles already in the database, but I will double-check that)

hendrik_monrad
98.7....6..5.8..4....3.7.9.5..3....4.....2.1.6..1.2..9.....89.6..11.8/1.2/1.2
98.7....6..8.....5.4..3.8.9..7....86....4.2.9.6.3..15.....2.1.11.7/11.7/8.0
98.7....6..85....4.3...9.8.7.....2.1.....2.5.7.6..9..5....1....43.11.7/1.2/1.2
98.7.6..5.69....4..8..3...5.6.2.....8.4.....2.97.....3.7.....2.31.11.7/1.7/2.6
98.76..5.54....75.4.9.7.4.9.5.9..5.3..2....4....81.7.9.8.4.....11.6/1.2/1.2
98.76.5.75.....4.5.978.....3.4.9.58.....24....8.7.9.2.38....9.1..11.6/1.2/1.2
98.7....7.6.5....4.3..2.5.4.9....82..2....1.7.1..2.....63.....19.11.6/1.6/2.6
98.7....6..85....4.3..9.8.6..2.....32.5.6.7.....85.....124.11.6/1.2/1.2
98.7.6.5.9.84.....46.78.....86...3.5.4..4..79.....28.....8.1..11.6/1.2/1.2
98.7.6.5.9.4.....48..46.78.....86...3.5.4..4..79.....28.....8.1..11.6/1.2/1.2
98.7.6.5.75.98.....76.9..5.4.....37..5.8..8..2..7.....715..11.6/1.2/1.2
98.76..5..49...3....4..5.9.7..5..5..2.11..9.2.6.8...3..1..11.6/1.6/2.6
98.76..5..7.....5.987..4..9.....83.32...3..9.57.5.7.3.....1..11.6/1.2/1.2
98.76.5.54..7....5..848.9...7.7.5.....32.9.4..75..12.....11.6/1.2/1.2
98.76..54..7....5..848.9..5.7.7.5.....32.9.4..75..12.....11.6/1.2/1.2
98.7.6.5.46.....9.837.9.5.....2.7....6.4.1..9.7.5.671.....1..5.11.6/1.2/1.2
98.7....6.5.4.....6.8.4..7.7.....3.2.71..9.3..4.1.6.....25..SER = 11.7/11.7/4.3
98.7.6.7..9....5..4..3..7.8..9.6.42..1..9.6.3..2.....15.SER = 11.6/1.6/2.6
98.7.6..5.9....4.79..3..6.3.....7.6296.98..18.....6.....SER = 11.6/1.2/1.2
98.7.6.7.6.5....4.8.5.9.7..7.3..6.....21.....59..71..1..6.SER = 11.6/1.2/1.2
98.7.6.7.6.5....4.8.5.9.7..6.....3..2..1.....59..71..71..6.SER = 11.6/1.2/1.2

JPF
.....1..12....34..5.....6..27....53.8.5.4..378.....1....9..94..7...11.8/1.2/1.2
.....1..21....34..5.....6..27....53.8.5.4..378.....6....9..94..7...11.7/11.7/2.6
.....1..21....34..5.....6..27....53.8.5.4..378.....9..94..7...11.3/1.2/1.2
.....1..23....45..6..7..3.5..84.9.8.6.469.....2..1..18..4..11.3/1.2/1.2
.....1..21....34..5.....6..27....53.8.3.4..378.....6..9..7...11.3/1.2/1.2
.....1..12....34..5.....6..7.8....43.9.3.5.598.....2..7..73..9..11.2/1.2/1.2
.....1..23....45..6..7..2.5..48.8.4.6.659.....3..1..14....8..11.1/1.2/1.2
.....1..21....34..5.....6..27....53.8.5.4..378.....9...6..4..7...11.0/1.1/2.6
.....1..12....34..5.....6..24....37..7.3.5..548.....1....9..93..7...11.0/1.2/1.2

999_Springs
(several non-minimals, will check all the minimals against the database)

Some of the above are already in my local database, but if I hadn't posted them here already I will update the "creator" field accordingly. 🙏

Will scrape the patterns game later.
```

Re: The hardest sudokus (new thread)

Day yzswf • Wed Oct 06, 2021 8:15 pm

QUOTE

yzswf

Posts: 592
Joined: 16 April 2019

mith wrote:

(these were "generated" with YZF and are just morphs of puzzles already in the database, but I will double-check that)

All these puzzles are taken from the database, so you don't need to recheck .These puzzles are only provided for the convenience of players to learn JE, MSLS and other technologies.

Re: The hardest sudokus (new thread)

Day mith • Wed Oct 06, 2021 9:20 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

That's what I suspected, but thank you for the confirmation 🙏

Re: The hardest sudokus (new thread)

Day jco • Wed Oct 06, 2021 9:55 pm

QUOTE

jco

Posts: 396
Joined: 09 June 2020

mith wrote:

That's what I suspected, but thank you for the confirmation 🙏

I should have deleted that listing as soon as mith made me aware that they were all known puzzles. My interest at that time was on SK-loops (practicing to identify them), but got distracted/curious with the unusually high (for me, at that time) ratings of that puzzles. Anyway, it was a mistake to post them and I should have deleted them as soon as I read mith's observation. Now I deleted that content (except the one after mith's observation, explaining basically the same as above). My apologies.

Re: The hardest sudokus (new thread)

Day mith • Thu Oct 07, 2021 2:34 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

No worries!

Re: The hardest sudokus (new thread)

Day mith • Thu Oct 14, 2021 6:58 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Our modem got zapped by lightning a few nights ago, so I've been occupied getting our internet back up. Will get back on this soon.

Re: The hardest sudokus (new thread)

Day mith • Tue Oct 26, 2021 8:27 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Havent forgotten about this! I will definitely be getting the update out before next Thursday (having foot surgery and will have trouble getting to this computer for a few weeks after), but hopefully sooner.

Re: The hardest sudokus (new thread)

Day mith • Wed Nov 03, 2021 9:42 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

I should stop committing to dates, life keeps getting in the way. 🙏

In the meantime, I went ahead and pulled all my 10.6+ puzzles (which weren't in a previous update) along with 10.2+ for 19c, 35c, and 36c. You can view them here: <https://drive.google.com/file/d/1DEYdWz... sp=sharing>

Since I'm having surgery tomorrow and won't be able to get up to this computer for a while, I'm just going to go ahead and start my scripts running again and maybe there will be some nice surprises waiting when I check in a few weeks.

Re: The hardest sudokus (new thread)

Day mith • Wed Nov 03, 2021 10:06 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

The above is a lot of puzzles (394844). If all you care about is the 11.6+ puzzles, here are those (535): <https://drive.google.com/file/d/1xnXn1... sp=sharing>

Re: The hardest sudokus (new thread)

Day mith • Wed Nov 03, 2021 10:37 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Here are all of the 11.6+ puzzles now in my database (1161 puzzles): https://drive.google.com/file/d/1_N6oN4... sp=sharing

(the last two numbers in each file are gs#s q1 and q2 respectively)

Re: The hardest sudokus (new thread)

Day mith • Thu Nov 04, 2021 0:09 pm

QUOTE

mith

Posts: 862
Joined: 14 July 2020

```
CODE: SELECT ALL

123 - - - - - | - - - 123
+ 123 123 123 123 -
+-----+
- 123 - - - - - | - - - 123
+ 123 - - - - - | - - - 123

In sudoku format: Show

Marek
```

Updating on this technique, yokokusha of the CTC discord came up with an elegant permutation parity argument, which generalizes nicely to other triplet patterns, and rangsk recorded a follow-up video to our series (the last episode of which featured a puzzle with this property), explaining the new approach (my approach in the episode amounted to "however one digit is placed, you are left with a bivalue oddagon on the other digits): <https://youtu.be/V7RC1h3vZ8h>

Re: The hardest sudokus (new thread)

Day mith • Wed Dec 08, 2021 12:07 am

QUOTE

mith

Posts: 862
Joined: 14 July 2020

Havent been able to make it up to the office much since my surgery, but I've left the scripts running and have a new 11.8 (and some 11.7s):

```
CODE: SELECT ALL

21c
.....1.23....24.5....2.3..1..6....72.6...9...3...7.6..4..8....9..5.... ED=11.7/1.5/1.5
.....1.23....24.5....3....1.4..6..2..9.....8..8..7...6.92....9..5..4.. ED=11.7/1.5/1.5

22c
.....1...23....45...6...5...17...7.8...6.9...5...3.56...7..8.4....2...5..9 ED=11.8/1.2/1.2
.....1...23....45...6...5...17...7.8...6.9...5...3.56...7..8.4....2...5..9 ED=11.7/1.2/1.2
```

