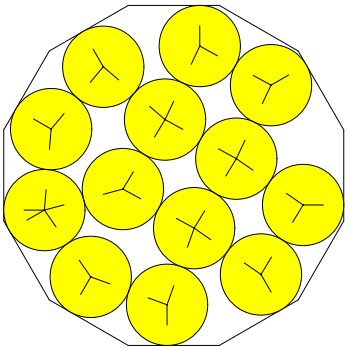
# N = 13

**13 circles in a dodecagon**



radius = 0.230908167326 density = 0.725856146978
ratio = 4.330725983325 contacts = 27

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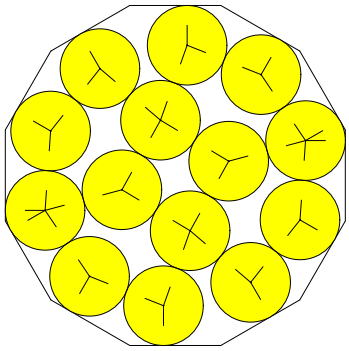
# N = 14

**14 circles in a dodecagon**



radius = 0.225999527680 density = 0.748810139846
ratio = 4.424788008476 contacts = 30

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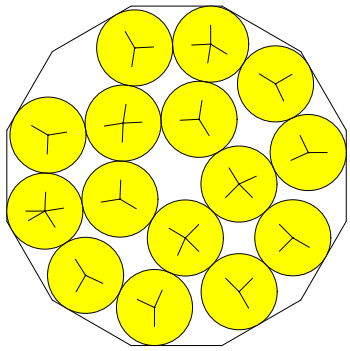
# N = 15

**15 circles in a dodecagon**



radius = 0.216453515072 density = 0.735951445752
ratio = 4.619929593979 contacts = 31

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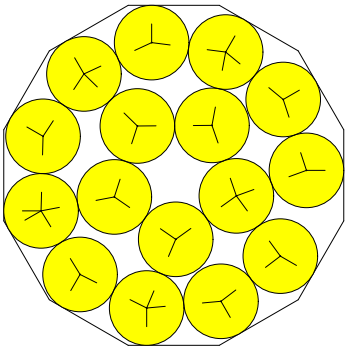
# N = 16

**16 circles in a dodecagon**



radius = 0.211918467266 density = 0.752464835355
ratio = 4.718795926089 contacts = 33

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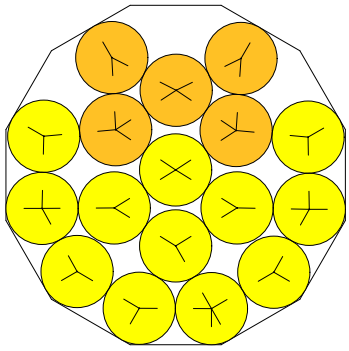
# N = 17

**17 circles in a dodecagon**



radius = 0.205484903721 density = 0.751687592636
ratio = 4.866537550405 contacts = 35

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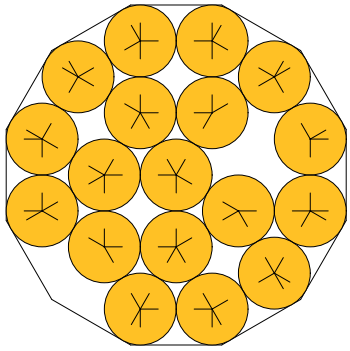
# N = 18

**18 circles in a dodecagon**



radius = 0.204124145232 density = 0.785398163398
ratio = 4.898979485566 contacts = 54

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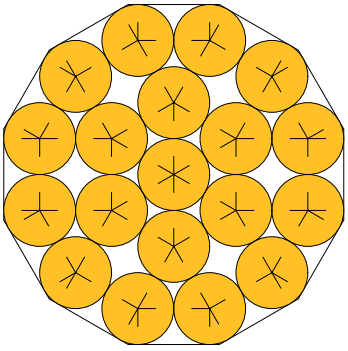
# N = 19

**19 circles in a dodecagon**



radius = 0.204124145232 density = 0.829031394697
ratio = 4.898979485566 contacts = 60

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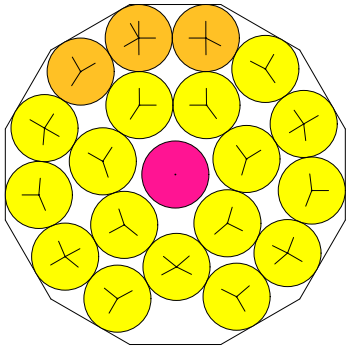
# N = 20

**20 circles in a dodecagon**



radius = 0.190550724215 density = 0.760466033783
ratio = 5.247946467363 contacts = 39

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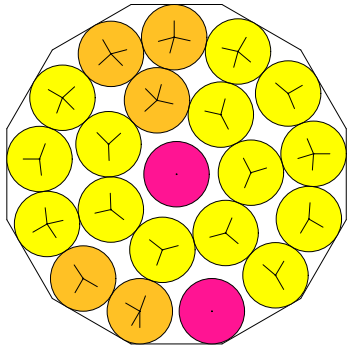
# N = 21

**21 circles in a dodecagon**



radius = 0.186129703363 density = 0.761867211308
ratio = 5.372597613011 contacts = 39

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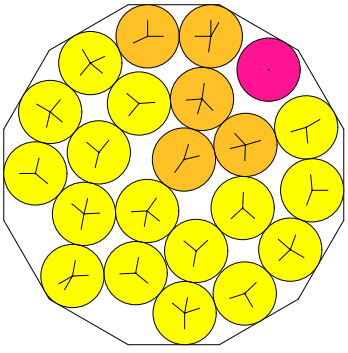
# N = 22

**22 circles in a dodecagon**



radius = 0.179638465950 density = 0.743446932991
ratio = 5.566736471022 contacts = 43

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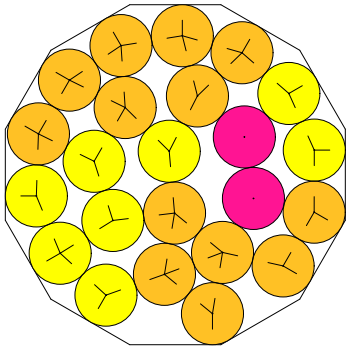
# N = 23

**23 circles in a dodecagon**



radius = 0.176340572223 density = 0.748964003860
ratio = 5.670844703488 contacts = 43

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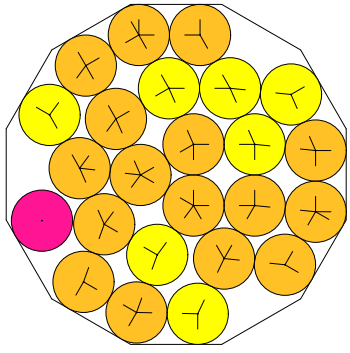
# N = 24

**24 circles in a dodecagon**



radius = 0.173878839335 density = 0.759859547709
ratio = 5.751131096954 contacts = 51

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