

Circle regions — Up to 10 points

Name: _____

Date: _____



Join every pair of points on a circle and count the regions. The pattern doubles, then it does not.

- 1 5 dots are placed around the edge of a disc and a straight line is drawn between every pair, nudged so that no three lines pass through a single inside point.

Into how many regions is the disc cut?

Why Start with the whole disc: one region. Each chord you draw adds one region, plus one more for every crossing it makes inside. The chords are every pair of the 5 points, $C(5,2) = 10$. The inside crossings are every set of FOUR points, because each foursome's chords cross exactly once: $C(5,4) = 5$. Adding those, $10 + 5 = 15$, and the one region you started with makes $15 + 1 = 16$. The doubling 2, 4, 8, 16 would say 16 — but from six points on, it is wrong.

16

- 2 10 points are marked on a circle and every pair of them is joined by a straight chord, with the points placed so that no three chords cross at the same inside point.

Into how many regions is the circle cut?

Why

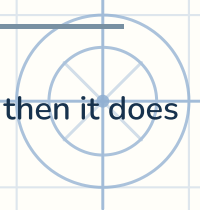
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Join every pair of points on a circle and count the regions. The pattern doubles, then it does not.

- 3 4 dots are placed around the edge of a disc and a straight line is drawn between every pair, nudged so that no three lines pass through a single inside point.

Into how many regions is the disc cut?

Why

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- 4 8 points are marked on a circle and every pair of them is joined by a straight chord, with the points placed so that no three chords cross at the same inside point.

Into how many regions is the circle cut?

Why

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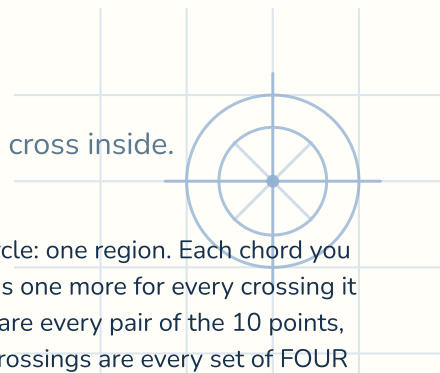
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Circle regions · Up to 10 points — Answer key

If they are stuck

- Do not trust the doubling. Count the chords, then the places two chords cross inside.



1. Start with the whole disc: one region. Each chord you draw adds one region, plus one more for every crossing it makes inside. The chords are every pair of the 5 points, $C(5,2) = 10$. The inside crossings are every set of FOUR points, because each foursome's chords cross exactly once: $C(5,4) = 5$. Adding those, $10 + 5 = 15$, and the one region you started with makes $15 + 1 = 16$. The doubling 2, 4, 8, 16 would say 16 — but from six points on, it is wrong.

3. Start with the whole disc: one region. Each chord you draw adds one region, plus one more for every crossing it makes inside. The chords are every pair of the 4 points, $C(4,2) = 6$. The inside crossings are every set of FOUR points, because each foursome's chords cross exactly once: $C(4,4) = 1$. Adding those, $6 + 1 = 7$, and the one region you started with makes $7 + 1 = 8$. The doubling 2, 4, 8, 16 would say 8 — but from six points on, it is wrong.

2. Start with the whole circle: one region. Each chord you draw adds one region, plus one more for every crossing it makes inside. The chords are every pair of the 10 points, $C(10,2) = 45$. The inside crossings are every set of FOUR points, because each foursome's chords cross exactly once: $C(10,4) = 210$. Adding those, $45 + 210 = 255$, and the one region you started with makes $255 + 1 = 256$. The doubling 2, 4, 8, 16 would say 512 — but from six points on, it is wrong.

4. Start with the whole circle: one region. Each chord you draw adds one region, plus one more for every crossing it makes inside. The chords are every pair of the 8 points, $C(8,2) = 28$. The inside crossings are every set of FOUR points, because each foursome's chords cross exactly once: $C(8,4) = 70$. Adding those, $28 + 70 = 98$, and the one region you started with makes $98 + 1 = 99$. The doubling 2, 4, 8, 16 would say 128 — but from six points on, it is wrong.