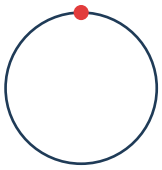
Dots on a Circle

Does the pattern hold?

Name: _____

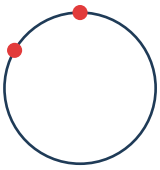
Part 1 Count the regions

For each circle, connect **every** pair of red dots with a straight line. Then count how many separate regions the inside of the circle is split into. Write the count under each circle.



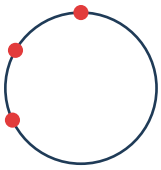
1 dot

Regions: _____



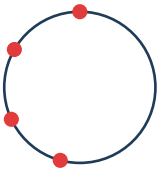
2 dots

Regions: _____



3 dots

Regions: _____



4 dots

Regions: _____

Part 2 Find the pattern

Write your counts: 1 dot → _____ 2 dots → _____ 3 dots → _____ 4 dots → _____

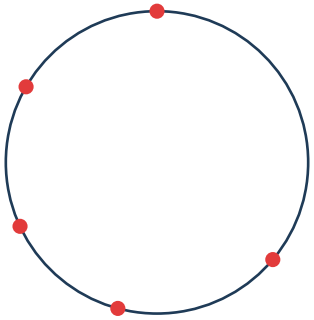
What's the pattern? Each number is _____ times the one before it.

Use the pattern to PREDICT (before drawing!):

5 dots → _____ 6 dots → _____

Part 3 Test 5 dots

Draw all the lines and count carefully.

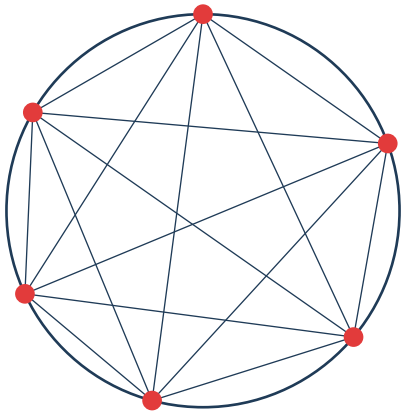


Regions for 5 dots: _____

Did it match your prediction? YES / NO

Part 4 The big test: 6 dots

You predicted 6 dots → _____ . All the lines are drawn for you below — they get messy! Count the regions **very** carefully. Tip: lightly shade each region as you count it.



Real number of regions for 6 dots: _____

Part 5 Think about it

1. Did the pattern hold? What did you **predict** for 6 dots, and what was the **real** answer?

   _____

2. If a pattern works for the first few cases, does that **prove** it will always work? Why or why not?

   _____

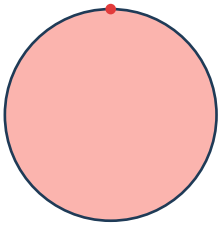
3. We checked 1, 2, 3, 4, and 5 dots and the pattern looked perfect. What would it take to be truly **sure** about what happens for 6 dots — or for 100 dots?

   _____

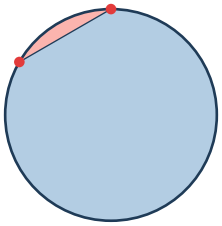
Big idea: Checking examples can SUGGEST a pattern — only a PROOF can make us sure.

Answer Key (for the teacher)

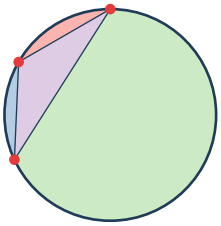
Pattern: 1, 2, 4, 8, 16, ... looks like doubling, so everyone predicts **32** for 6 dots. The real answer is **31** — the pattern breaks! (This only works if the 6 dots are *not* evenly spaced; a regular hexagon gives 30. The dots on this worksheet are placed to give the true 31.)



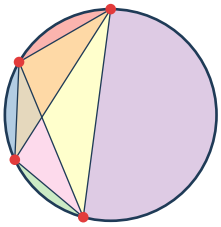
1 dot → 1 regions



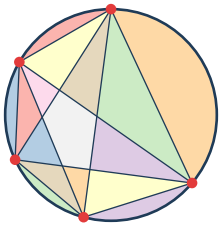
2 dots → 2 regions



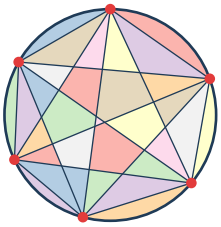
3 dots → 4 regions



4 dots → 8 regions



5 dots → 16 regions



6 dots → 31 regions

Discussion answers

- **Q2:** No. A pattern holding for a few cases never proves it always holds — 1, 2, 4, 8, 16 is the perfect example. The next term "should" be 32 but is actually 31.
- **Q3:** To be sure, you need a proof — an argument that covers *every* case at once, not just the ones you happened to check. (This is exactly the "checking isn't proving" idea from today.)