1.2 Exploring the Validity of Conjectures

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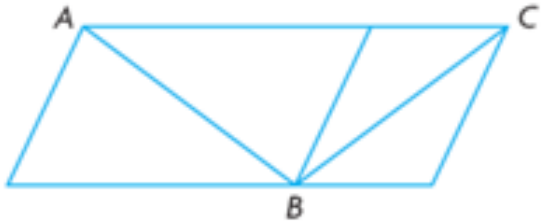
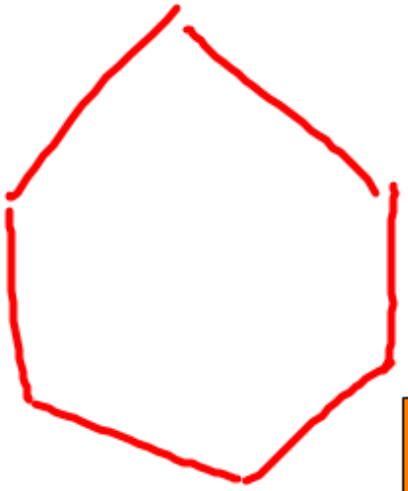


Make a conjecture about diagonal AB and diagonal BC.

Make a conjecture about the circles in the centre.

Make a conjecture about the lines.

Make a conjecture about the number of triangles.



Assignment
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Regular Polygon has equal side lengths and equal interior angles

#2

$1^2 = 1$

$11^2 = 121$

$111^2 = 12321$

$1111^2 = 1234321$

$11111^2 = 123454321$

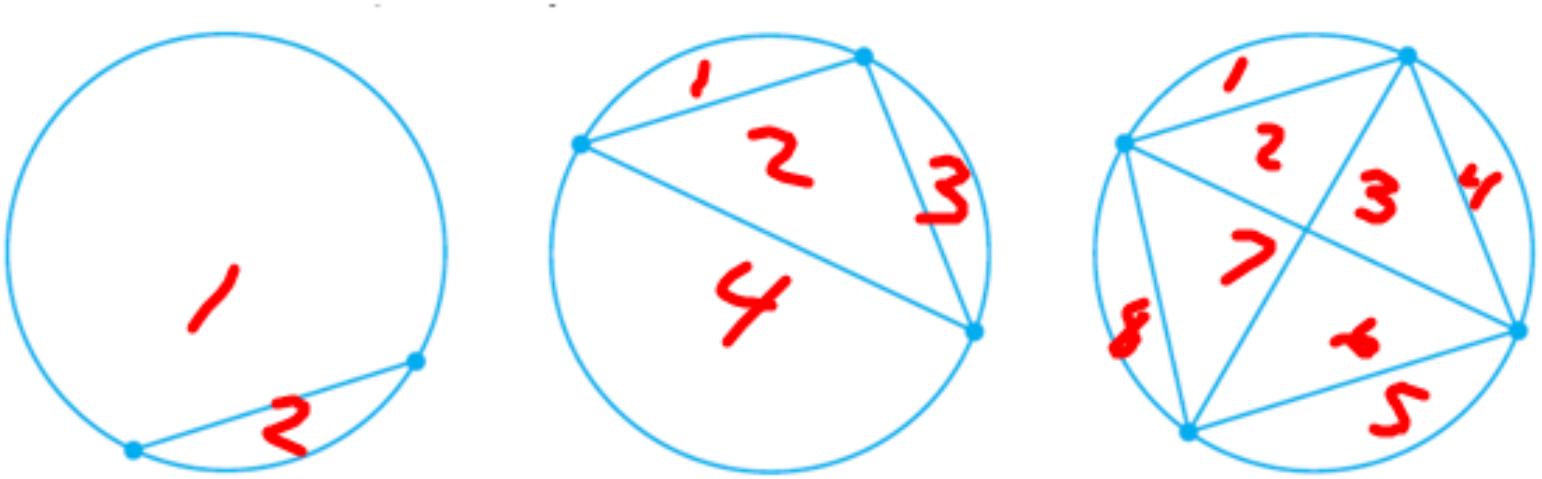
$111111111^2 =$

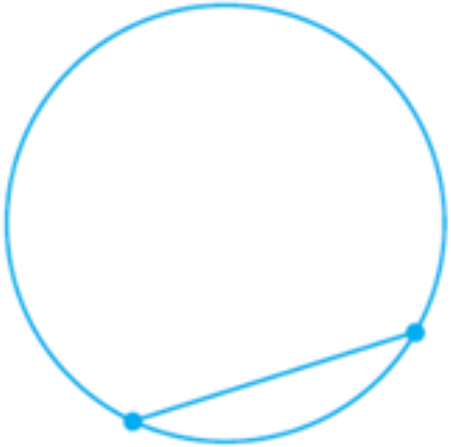
1.3 Using Reasoning to Find a Counterexample to a Conjecture

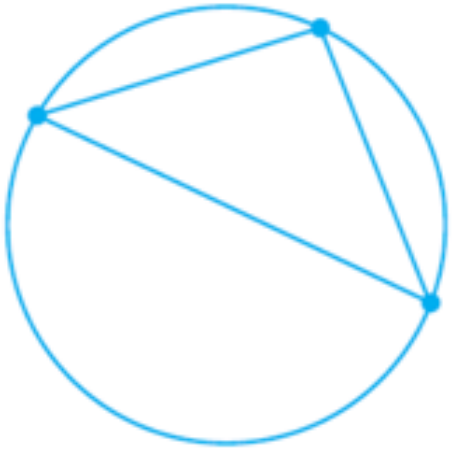
Finding Counter Example to a Conjecture

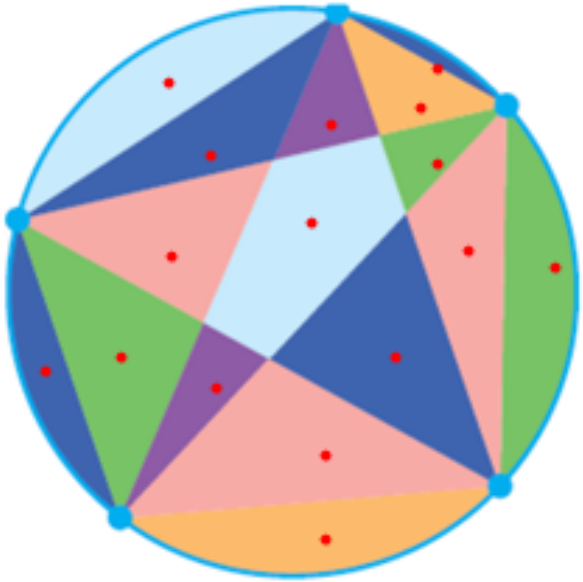
Example 1 (p.18)

Make a conjecture about the number of regions created within the circle as more points are added

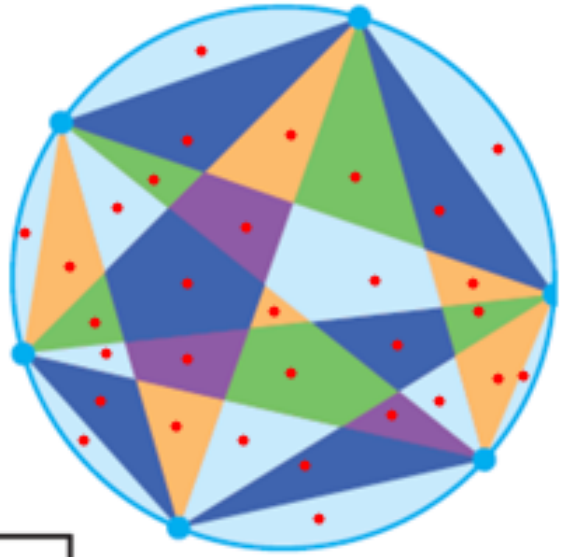








Counter example



Number of Points	2	3	4	5	6
Number of Regions	2	4	8	16	31

Assignment

P. 22-25

1, 2, 3, 4, 6, 10, 12, 17, 21*

1. Show that each statement is false by finding a counterexample.

a) A number that is not negative is positive. 0

b) All prime numbers are odd. 2

c) All basketball players are tall. Steve Nash

d) The height of a triangle lies inside the triangle.

e) On maps, the north arrow always points up.

f) The square root of a number is always less than the number. $\sqrt{\frac{1}{4}} = \frac{1}{2}$

g) The sum of two numbers is always greater than the greater of the two numbers.

h) As you travel north, the climate gets colder.

2. Seth claims that all quadrilaterals with four equal sides are squares. Do you agree or disagree? Justify your decision.

Rhombus

$2 + 3 = 5$

$11 + 23 = 34$

$3 + 0 = 3$

$-9 + 10 = 1$

3. Jim claims that whenever you multiply two whole numbers, the product is greater than either of the two factors. Do you agree or disagree? Justify your decision.

4. Rachelle claims that the sum of a multiple of 3 and a multiple of 6 must be a multiple of 6. Do you agree or disagree? Justify your decision.

5. Hannah examined these multiples of 9: 18, 45, 63, 27, 81, 108, 216. She claimed that the sum of the digits in any multiple of 9 will add to 9. Do you agree or disagree? Justify your decision.

(3) $1 \cdot 10 = 10$

$2 \cdot 0 = 0$

(6) 3, 6, 9, ...

6, 12, 18

$3 + 6 = (9)$

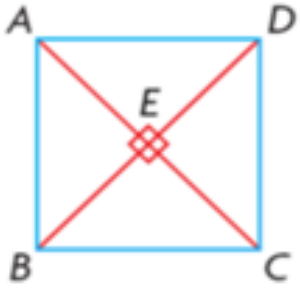
6. Colin made the following conjecture: If a quadrilateral has two opposite angles that are right angles, the quadrilateral is a rectangle. Do you agree or disagree? Justify your decision.

10. Patrice studied the following table and made this conjecture: The sums of the squares of integers separated by a value of 2 will always be even.

$(-1)^2 + 1^2 = 2$	$2^2 + 4^2 = 20$	$(-3)^2 + (-5)^2 = 34$	$4^2 + 6^2 = 52$	$0^2 + 2^2 = 4$

Is Patrice's conjecture reasonable? Explain.

11. Geoff made the following conjecture: If the diagonals of a quadrilateral are perpendicular, then the quadrilateral is a square. Determine the validity of his conjecture. Explain your results.



12. Amy made the following conjecture: When any number is multiplied by itself, the product will be greater than this starting number. For example, in $2 \cdot 2 = 4$, the product 4 is greater than the starting number 2. Meagan disagreed with Amy's conjecture, however, because $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ and $\frac{1}{4}$ is less than $\frac{1}{2}$. How could Amy's conjecture be improved? Explain the change(s) you would make.

$(2)^2 + (4)^2 = 20$

$(-2)^2 + (-4)^2$

$0^2 + (2)^2$

$(1)^2 + (3)^2 = 10$

14. Tim conjectured that all natural numbers can be written as the sum of consecutive natural numbers, based on these examples:

$10 = 1 + 2 + 3 + 4$ $\qquad$ $12 = 3 + 4 + 5$

$9 = 4 + 5$ $\qquad$ $94 = 22 + 23 + 24 + 25$

Do you agree or disagree with Tim's conjecture? Justify your decision.

15. Blake claimed that all odd numbers can be expressed as the sum of three prime numbers. Explain, with evidence, the reasonableness of his claim.

17. Jarrod discovered a number trick in a book he was reading:
Choose a number. Double it. Add 6. Double again. Subtract 4.
Divide by 4. Subtract 2.

a) Try the trick several times. Make a conjecture about the relation between the number picked and the final result.

b) Can you find a counterexample to your conjecture? What does this imply?

7

= 14

= 20

= 40

36

9

7

21. Mohammed claims that the expression $n^2 + n + 2$ will never generate an odd number for a positive integer value of n. Do you agree or disagree? Justify your decision.

Even

$(2)^2+2+2$

$= 8$

$(6)^2+6+2$

$=44$

ODD

$(3)^2+3+2$

$= 14$

$= 9^2+9+2$

$= 81+11$