

Consider the following pattern:

$$1 + 2 + 3 + 4 + 5 = 15$$

$$(-15) + (-14) + (-13) + (-12) + (-11) = -65$$

$$(-3) + (-2) + (-1) + 0 + 1 = -5$$

What conjecture can you make from these three examples?

When you add up 5 consecutive integers...
what do we get?

Try some of your own examples:
(remember, variety is good)

$$170 + 171 + 172 + 173 + 174 = 860$$

$$25 + 26 + 27 + 28 + 29 = 135$$

What conjecture can you make from these three examples?

**When you add up 5 consecutive integers...
what do we get? A multiple of 5**

This is your conjecture! How do you know for sure it is always true so that you can generalize
“EVERY time you add 5 consecutive integers, you get a multiple of 5”

We have provided 5 examples and we may feel fairly confident that our conjecture is always true

BUT remember that inductive reasoning (support by evidence and examples) cannot prove a conjecture

We can actually **PROVE** our conjecture by **deductive reasoning**

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A mathematical proof using deductive reasoning is based on claims and assumptions that are verified to be always TRUE along the way

Proof for: The sum of 5 consecutive integers is a multiple of 5

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1. Let x represent the median of the 5 numbers

2. We can rewrite the LEFT side to be and set it to S :

$$(x-2) + (x-1) + x + (x+1) + (x+2) = S$$

3. We simplify the equation:

$$x - 2 + x - 1 + x + x + 1 + x + 2 = S$$

$$5x - 2 - 1 + 1 + 2 = S$$

$$5x = S$$

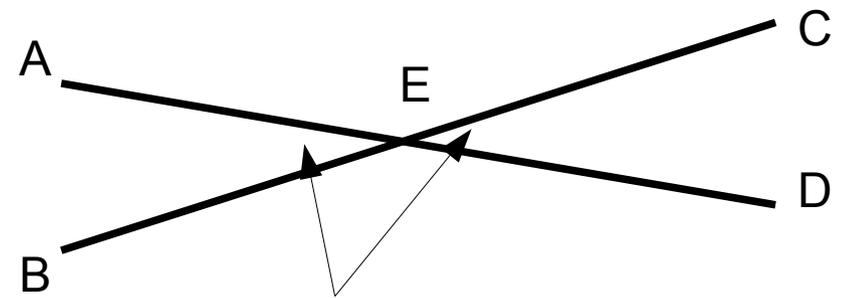
We have determined that the sum S is 5 times the median so
Therefore, the sum S is a multiple of 5.



Organizing proofs using the TWO Column method

Conjecture: When two straight lines intersect, the opposite angles are equal to each other.

Claim	Justification
1. $\angle AEB + \angle AEC = 180^\circ$	supplementary angles
2. $\angle AEB = 180^\circ - \angle AEC$	algebraic subtraction
3. $\angle CED + \angle AEC = 180^\circ$	supplementary angles
4. $\angle CED = 180^\circ - \angle AEC$	algebraic subtraction
$\angle AEB = \angle CED$	transitive property (if $A=B$ and $C=B$ then $A=C$)



The conjecture states that
These two angles are equal

