How many handshakes for 6 people to shake each other's hands ONCE

6 x 5 = **30**

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

This was a conjecture about the number of handshakes!

How many handshakes for the entire class of 20 people to shake each other's hands ONCE

19 + 18 + 17 + ...

This works because we saw the pattern
(1st person shakes 19 hands
2nd person shakes 18 hands...)

This can get tedious to count for large numbers of people

Here's another way to see the pattern:

For n people, we have $n(n-1) / 2$

This can be explained by seeing that for n people,
each of those people would shake hands with everyone
else (n-1).

we divide by 2 because we counted duplicate handshakes

A --> B and then B --> A

Logical Reasoning

-- How do you know something?
-- How are you convinced?
-- How do you convince someone else?

Conjecture:
-- A testable theory based on evidence
(that evidence can be a pattern you see)

Inductive Reasoning:
We draw a general conclusion from
conjectures (observing patterns and properties)

Inductive Reasoning:

-- make an observation – see a pattern -- generalize it as truth

Science and engineering is based on inductive reasoning

(but they cannot prove anything beyond all doubt because it is based on evidence)

1,000,000 pieces of evidence can all be proven false with ONE counterexample

Deductive Reasoning:

-- Another way of knowing and thinking
-- NOT based on evidence
-- Where mathematics and logical reasoning fit