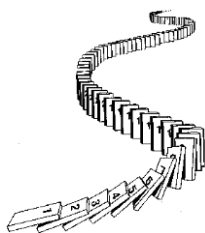


## Goals



By the end of this unit, students:

- understand the concepts and techniques in combinatorics, geometry and vectors
- apply reasoning skills and solve problems in combinatorics, geometry and vectors
- communicate their arguments and strategies when solving problems
- construct proofs in a variety of contexts including algebraic and geometric
- interpret mathematical information and ascertain the reasonableness of their solutions to problems.

**This week's focus:**

Nature of Proof

- Mathematical Induction
- Use the quantifiers 'for all' and 'there exists'

## Theoretical Components

STEP 1:

Read examples:

- <http://goo.gl/9GoSW4>
- <https://goo.gl/iE2bSe>
- <http://goo.gl/WoS6j7>
- <http://goo.gl/ngez5G>

Proof by Induction:

- <https://goo.gl/4EqNNp>
- <https://goo.gl/GUirvl>

Use the quantifiers 'for all' and 'there exists'

- <https://goo.gl/qK6Cf7>
- <https://goo.gl/W5GI3Q>

## Practical Components

STEP 2:

Attempt all the questions:

ABOUT/RESOURCES/ WKo4\_o5/

## Investigation

A: Show that

$$\left(1 - \frac{1}{2}\right)\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{5}\right)\cdots\left(1 - \frac{1}{n+1}\right) = \frac{1}{n+1}, \forall n \in \mathbb{Z}^+$$

B: Use the principle of mathematical induction to prove that

$$\frac{2^n - (-1)^n}{3}$$

is an odd number for all  $n \in \mathbb{Z}^+$ .

[Hint: An odd number has form  $2m+1$  where  $m$  is an integer.]

Show clear working to get full marks.

“Understand every line that you write, and do not make bogus claims.”

20 marks – see the rubric.

Q/F/O

(Quiz/Forum/Other)

Complete this quiz on CambridgeGO.