



### Goals

$$P \Rightarrow Q$$

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

- direct
- contraposition
- contradiction (De Morgan's)

### Theoretical Components

**STEP 1:**

Readings:

Read examples: ABOUT/RESOURCES/2018 S1

**It is vital that you watch the following videos to get an insight into Logic and Truth tables before attempting the exercises.**

Logic Truth tables:

- <https://goo.gl/NZkJmA>
- <https://goo.gl/5vhLv9>
- <https://goo.gl/hxup4d>
- 

Direct Proof:

- <http://goo.gl/TEu4C6>
- <https://goo.gl/RvndtG>

Proof by Contradiction:

- <https://goo.gl/GyJdY4>
- <https://goo.gl/Cnn2BJ>

Proof by Case:

- <https://goo.gl/NLHE3Z>

### Practical Components

**STEP 2:**

Attempt all the questions:

- Check Google Classroom
- Exercises on Direct Proof:  
<http://goo.gl/TEu4C6>

### Investigation

**STEP 4:**

A: Prove that  $\sqrt{5}$  is irrational.

B: Prove this theorem using an appropriate method.

“There are infinitely many prime numbers.”

(This theorem has been attributed to Euclid about 2300 years ago).

C: Prove the following universal statement:

“The product of any two rational numbers is a rational number.”

(20 marks – see the rubric for mark breakdown)

**STEP 3:**

Complete this quiz:

<https://mathspace.co/student/tasks/TopicCustomTask-182456/>

You may take notes for future reference.

Q/F/O

(Quiz/Forum/Other)