

# The New Zealand Young Physicists Tournament NZYPT 2017

## Details

Regional NZYPT tournaments will be held in Auckland, Wellington and Christchurch on

**Saturday 11<sup>th</sup> March 2017.**

The NZYPT National Final will be held in Christchurch on

**Saturday 25<sup>th</sup> March 2017**

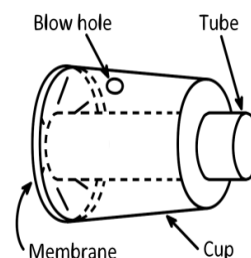
The 7 problems for the NZYPT competition in 2017 are :

### 1. Invent Yourself

Construct a passive device that will provide safe landing for an uncooked hen's egg when dropped onto a hard surface from a fixed height of 2.5 m. The device must fall together with the egg. What is the smallest size of the device you can achieve?

### 2. Balloon Airhorn

A simple airhorn can be constructed by stretching a balloon over the opening of a small container or cup with a tube through the other end (see Figure). Blowing through a small hole in the side of the container can produce a sound. Investigate how relevant parameters affect the sound.



### 3. Single Lens Telescope

A telescope can be built using a single lens, provided that a small aperture is used instead of an eyepiece. How do the parameters of the lens and the hole influence the image (e.g. magnification, sharpness and brightness)?

### 4. Fast Chain

A chain consisting of wooden blocks inclined relative to the vertical and connected by two threads (see Figure) is suspended vertically and then released. Compared to free fall, the chain falls faster when it is dropped onto a horizontal surface. Explain this phenomenon and investigate how the relevant parameters affect the motion.



### 5. Resonating Glass

A wine glass partially filled with liquid will resonate when exposed to the sound from a loudspeaker. Investigate how the phenomenon depends on various parameters.

### 6. Gee -Haw Whammy Diddle

A gee-haw whammy diddle is a mechanical toy consisting of a simple wooden stick and a second stick that is made up of a series of notches with a propeller at its end. When the wooden stick is pulled over the notches, the propeller starts to rotate. Explain this phenomenon and investigate the relevant parameters.

### 7. Vacuum Bazooka

A 'vacuum bazooka' can be built with a simple plastic pipe, a light projectile, and a vacuum cleaner. Build such a device and maximise the muzzle velocity.

End.