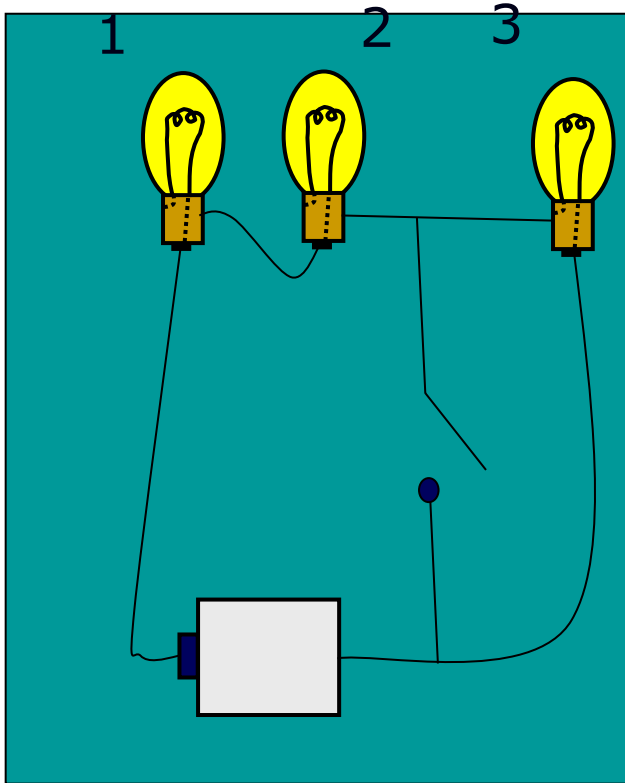


# NZ Scholarship Physics

## 2017

# Key Ideas and Strategies





When switch is closed, bulb 2 will

- a. stay same brightness
- b. get brighter
- c. get dimmer,
- d. go out.

# To Consider:

- > Why sit the scholarship examination?
- > What to expect in the exam
  - structure of the paper
  - nature of the questions

> What knowledge is required?

> **Level 2 and Level 3 Physics**

**But only content relevant to Level 3 can be assessed from level 2.**

## QUESTION FOUR: A MAGLEV TRAIN

### Theory

A current-carrying wire produces a magnetic field of magnitude  $B$  at a distance  $r$  from the wire. The direction of  $B$  is given by a right-hand rule and the magnitude of  $B$  is given by the equation below where  $I$  is the current in the wire and  $\mu_0 = 4\pi \times 10^{-7} \text{ N A}^{-2}$ .

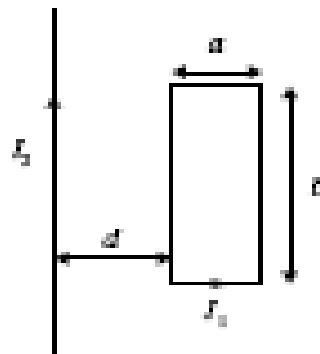
$$B = \frac{\mu_0 I}{2\pi r}$$

A wire carrying a current  $I$  in a magnetic field  $B$  experiences a force  $F$ . The direction of the force is given by an appropriate right-hand rule and the magnitude of  $F$  is calculated using the equation below, where  $l$  is the length of the wire.

$$F = BIl$$

### Situation

A long wire with current  $I_2$  lies in the plane of a rigid rectangular loop carrying current  $I_1$ . The rectangle has sides  $a$  and  $b$  and is a distance  $d$  from the long wire, as shown below:



- (i) Explain why there is a force acting on the loop.

# THE EXAMINATION

Look for resources at

[www.nzqa.govt.nz](http://www.nzqa.govt.nz)

Click on Scholarships

<http://www.nzqa.govt.nz/physics>

# Organisation of the Examination – 2017

maximum of 6 compulsory questions (only 5 since 2013)

**2017 - questions worth 8 marks**

## Marking criteria for 2015

7-8 outstanding performance

5-6 scholarship performance

3-4 demonstrates understanding

1-2 meagre understanding relevant to the topic

# SCHOLARSHIP CANDIDATES PROFILE

## Knowledge:

- Thorough grounding in the subject
- Outstanding understanding of the content knowledge
- Ability to make deductions - can apply the knowledge
- High literacy skills especially subject specific.

## Attributes:

- Analytical skills
- Critical thinking skills
- Evaluation skills
- Reflective skills
- Flair and innovation
- Problem-solving skills – especially in unfamiliar situations
- Literacy - ability to organize, develop and articulate ideas



## The best performing candidates most commonly demonstrated the following skills and/or knowledge:

- > Able to interpret an unfamiliar situation in context
- > Significant physical insight across a wide variety of situations
- > Ability to provide full but concise explanations
- > Coherent and structured mathematical approaches to calculations
- > Depth and breadth of conceptual understanding
- > Understanding of mechanics and how to apply Newton's laws correctly
- > A good understanding of the practical implications of their answers and were able to determine if their answers made sense
- > Recognised that scholarship calls for more than a superficial response.

# Some Scholarship Skills:

- Reasonable Literacy
- Planning
- Problem Solving
- Well documented /set out calculations

# How to achieve these targets

- > Focus on conceptual understanding before everything else
- > Practice doing really hard questions
- > Work together
- > Ask questions of everyone

# Some comments from the examiner

It seemed that the candidates had enough time to complete the exam but it was disappointing to see the number who left the exam early. Too many of the candidates did not give enough thought to the consequences of their answers and the extra time would have been ideal for them to have done this. Also, candidates seemed to write large amounts when it may have been better for them to sit and think about the question first, and note that if their calculations were longer than a few lines then they should stop and see if they could find an easier method. Perhaps candidates need to be taught how to explore ideas before committing to one in exam situations. It seems that many candidates need to learn how to express themselves with clear thinking instead of the “shot-gun” approach to problem solving. It might be better for candidates to write bullet points at the start of the problem to help organise their thoughts before writing formulae or essays.

# Sources of Practice Questions:

- > Old Scholarship Papers (Check at school)
- > 1<sup>st</sup> year University Texts
- > NZIP Scholarship Examinations
- > AME Scholarship Physics (Housden)
- > 2004 - 2016 NZQA Scholarship Papers

# Scholarship 2017 - strategies

- > Remember this is scholarship
- > This is a ranking examination for money

(b) Satellite TV uses geosynchronous satellites as transmitters.

Explain why satellite TV dishes on people's homes all point towards the same place in the sky.

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