

**Mathematics Specialist Year 11**

Student name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: Monday 10 August 2020

**Task type: Response + Investigation**

**Time allowed: 45 minutes (for the entire booklet)**

**Number of questions: 5**

**Materials required:** Calculator with CAS capability (to be provided by the student)

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, templates, notes on two unfolded sheets of
A4 paper, and up to three calculators approved for use in the WACE examinations

**Marks available: 40 marks**

**Task weighting: 14% combined (8% for Test 2 and 6% for investigation 2)**

**Formula sheet provided: Yes**

**Note: All part questions worth more than 2 marks require working to obtain full marks.**

**Question 1 {1.3.4, 1.3.5} (4 marks)**

1. Let Prove that that is false by giving a counterexample. (1 mark)
2. Disprove the following statement: There exists such that (3 marks)

**Question 2 {2.1.1} (5 marks)**

Solve given that . Show your working.

**Question 3 {2.3.4, 2.3.6} (7 marks)**

Use mathematical induction to prove that that is divisible by 3 for all

**Question 4 {2.1.2} (8 marks)**

1. The function has been graphed below. Determine the values of the constants and . (4 marks)



1. Sketch the graph of (4 marks)



**Investigation Validation {2.1.3, 2.3.4, 2.3.5} (16 marks)**

1. Use the identity

(or otherwise) to show that

 (4 marks)

1. Given that prove, by mathematical induction, that for all positive integers *n*,

You may find the identity useful.

 (12 marks)

(additional working space)