Year 11 Mathematics Specialist

Test 1 – 5.5%

MELVILLE
SENIOR HIGH SCHOOL

Student Name : _____

Part One – Resource Free

Part One contains 10 questions worth 34 marks

Time Allowed : 35 minutes

INSTRUCTIONS TO STUDENTS:
You are required to attempt ALL questions,
Write answers in the spaces provided beneath each question.
Marks are shown with the questions.

Show all working clearly, in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks.

Question 1 **1 mark**

How many different debating teams of 3 people can be chosen from 6 people?

Question 2 **3 marks**

Let $n \in \mathbb{Z}$. Consider the statement : If $5n+3$ is even, then n is odd.

a) Write the inverse of this statement

b) Write the converse of this statement

c) Write the contrapositive of this statement

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Question 3 **2 marks**

How many four character passwords can be formed using the digits using 2 letters followed by two numbers if :

a) repetition is not allowed (Do not evaluate)

b) repetition is allowed? (Do not evaluate)

Question 4 **2, 3 – 5 marks**

a) Find n and r given ${}^{n}C_{r} = \frac{5!}{4!1!} + \frac{5!}{3!2!}$.

b) Simplify $\frac{1}{n!} + \frac{1}{(n+1)!}$

Question 5 **1, 3 - 4 marks**

Two forces have magnitudes of 15 N and 25N and the angle between them is 60°.

a) Draw a diagram to represent the situation

b) Find the exact magnitude of the resultant.

Question 6 **2 marks**

A small child puts his hand into a container of 10 different lollies. Given that neither the container nor his hand is empty when he removes it, how many different handfuls of lollies could he have chosen?

Question 7 **2, 4 - 6 marks**

How many arrangements can be made from the letters of the word NEEDLE?

How many 3-letter arrangements can be made from the letters of the word NEEDLE?

Question 8 **3 marks**

Show that in any collection of 5 counting numbers, at least two will have the same remainder when divided by four.

Question 9 **5 marks**

Given the set of numbers {1, 2, 3, …, 80}, how many of these are not divisible by 4 or 5 or 10?

Question 10 **3 marks**

An aircraft is flying on a bearing of 240° at 300 km/h. An 80 km/h wind is blowing from a bearing of 150°.

Draw a diagram to represent this situation, clearly indicating all relevant magnitudes and angles and the final velocity vector. No calculations are necessary.

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SENIOR HIGH SCHOOL

Student Name : _____

Part Two – Resource Allowed

Part Two contains 4 questions worth 22 marks

Time Allowed : 25 minutes

TO BE PROVIDED BY THE STUDENT

A maximum of one A4 page of notes, one sided.
Standard Items : Pens, pencils, eraser, sharpener, correction tape/fluid, highlighters, ruler.

Special Items: Drawing instruments, templates.
A maximum of three CAS calculators satisfying the conditions set by the SCSA.

INSTRUCTIONS TO STUDENTS:

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Write answers in the spaces provided beneath each question.
Marks are shown with the questions.
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Question 1 **1, 1, 2, 2 - 6 marks**

a) How many ways can the letters of the word BEHAVIOUR be arranged?

b) How many of these arrangements begin with the letter H followed by the letter A?

c) How many of the arrangements have the vowels next to each other?

d) How many arrangements do not have A and H adjacent?

Question 2 **3 marks**

Mrs Greenaway's book shelf contains 3 books by Alan Sadler and 6 other books. How many ways can the books be arranged if none of the Sadler books are placed next to teach other?

Question 3 **3, 3 - 6 marks**

The air speed of a plane is 210 km/h. A steady wind is blowing from the south-west at 45 km/h.

a) In what direction should the plane head to fly to B, which is due West of the plane's initial position A?

b) How long will the flight take if B is 400 km away from A?

Question 4 **1, 1, 2, 1, 2 - 7 marks**

Five boys and eight girls have nominated to participate in a mixed netball team of seven.
How many ways can this be done if:

a) there are no restrictions

b) there are four girls and three boys on the team

c) there must be at least two boys on the team

d) Ben must be on the team

e) Francesca and Maen cannot be on the team together?