HORNSBY GIRLS HIGH SCHOOL

Mathematics Extension 1

Year 11 Assessment Task 1 Term 1 2019

STUDENT NUMBER: _____

General Instructions

- Working Time – 60 minutes
- Reading Time – 5 minutes
- Write using black or blue pen
  Black pen is preferred
- NESA-approved calculators may be used
- In Questions 6 – 9, show relevant mathematical reasoning and/or calculations
- Marks may be deducted for untidy and poorly arranged work
- Do not use correction fluid or tape
- Do not remove this paper from the examination
- Students are permitted to refer to one double- sided A4 page of handwritten topic summaries which they prepared prior to this assessment.

Total marks – 41

Section I Pages 3 – 4

5 marks

Attempt Questions 1 – 5. Answer on the Objective Response Answer Sheet

Section II Pages 5 – 13

37 marks

Attempt Questions 6 – 9.

Write your answers in the space provided.

Start each question in a new writing booklet.

Write your **full** student number and fill in the required information on this booklet

Question	***1-5***	***6***	***7***	***8***	***9***	***Total***
Total	*/5*	*/9*	*/9*	*/10*	*/9*	*/42*

*This assessment task constitutes **30%** of the Year 11 School Assessment for the ROSA grade*

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Section I
5 marks
Attempt Questions 1– 5

Answer on the Objective Response Answer Sheet

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1. For a quadratic solution $ax^2 + bx + c = 0$ to have no real roots, when $a > 0$,

   (A) $b^2 - 4ac \geq 0$

   (B) $-\frac{b}{2a} \geq 0$

   (C) $b^2 - 4ac < 0$

   (D) $b^2 - 4ac$ is a perfect square

2. The domain of $y = \frac{1}{\sqrt{x+3}} + \sqrt{16 - x^2}$ is:

   (A) (-3, 4]

   (B) [- 4, 4]

   (C) [-3, 4)

   (D) [- 4,-3)

3. The expansion of $\left(3x^2 - 2y\right)^3$ is:

   (A) $27x^6 - 18x^4y + 12x^2y^2 - 24y^3$

   (B) $27x^6 + 18x^4y + 12x^2y^2 + 8y^3$

   (C) $27x^6 - 54x^4y - 36x^2y^2 + 24y^3$

   (D) $27x^6 - 54x^4y + 36x^2y^2 - 8y^3$

4. Factorise fully: $x^6 - y^6$

(A) $\left(x^2 - y^2\right)\left(x^2 + y^2\right)\left(x^4 + x^2y^2 + y^4\right)\left(x^4 - x^2y^2 + y^4\right)$

(B) $\left(x^2 + y^2\right)\left(x^4 + x^2y^2 + y^4\right)\left(x^4 - x^2y^2 + y^4\right)$

(C) $(x - y)(x + y)\left(x^2 + y^2\right)\left(x^2 - xy + y^2\right)\left(x^2 + xy + y^2\right)\left(x^4 - x^2y^2 + y^4\right)$

(D) $(x - y)(x + y)\left(x^2 - xy + y^2\right)\left(x^2 + xy + y^2\right)$

5. The values of x for $x + \sqrt{2x^2 + 7} = 8$ are

(A) -3, 19

(B) -9, 13

(C) -19, 3

(D) -13, 9

Section II
39 marks
Attempt Questions 6 – 9

Begin each question in a new writing booklet, indicating the question number and number of booklets used. Extra writing booklets are available.

Question 6 (9 marks) Start a new writing booklet.

(a) Simplify: $\dfrac{3-\left|1-\left|5-11\right|\right|}{2}$. **1**

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(b) Solve $\left|2x-3\right|=5$ **2**

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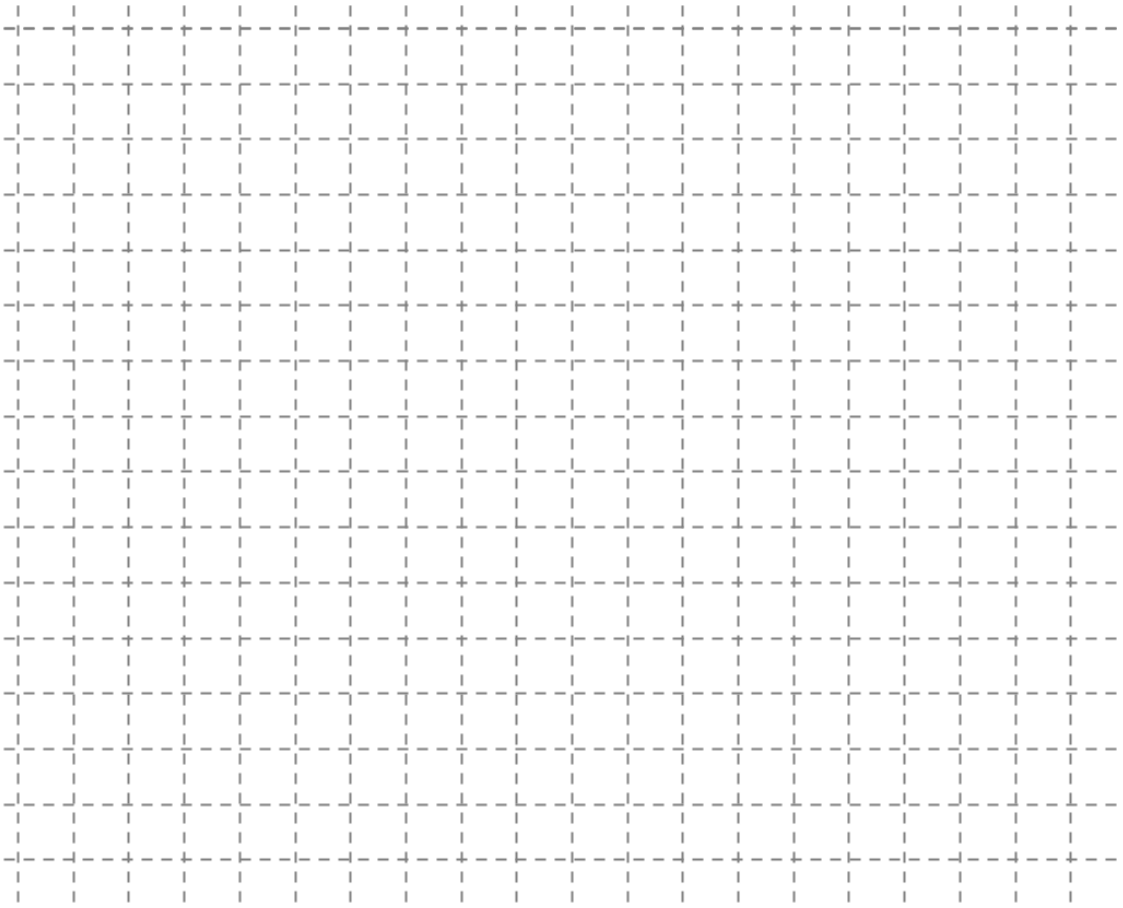
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Question 6 continues

(c) (i) Sketch the graph of $y = |x - 2|$. **2**



(ii) Hence, or otherwise, solve $|x - 2| = 3x + 2$. **2**

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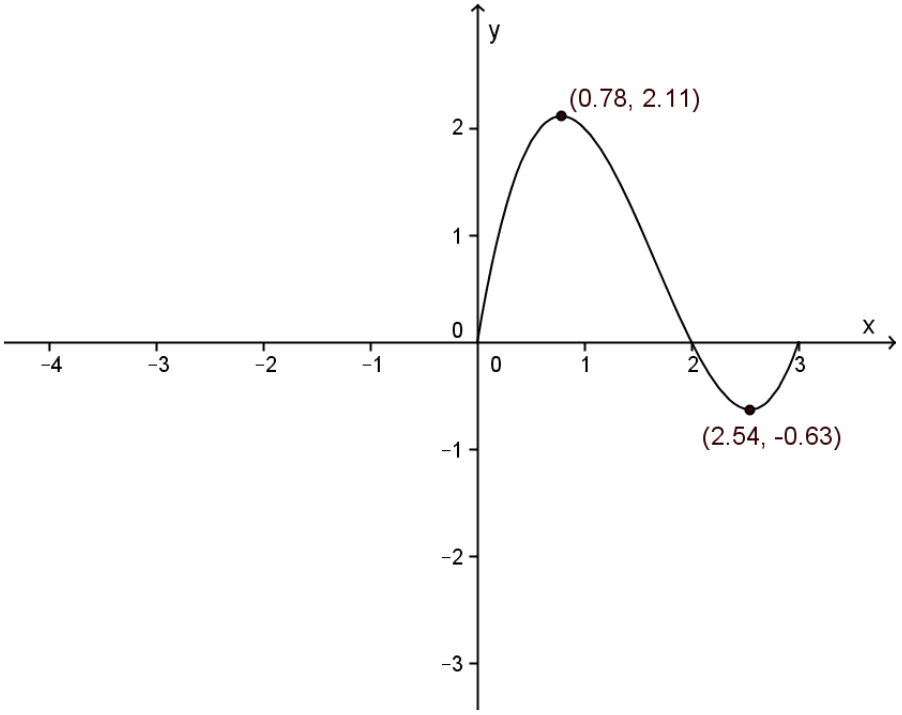
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(d) The graph below is part of a function $f(x)$. Complete the graph to form an odd function. **2**



End of Question 6

Question 7 (9 marks) Start a new writing booklet.

(a) (i) Solve for x and y where $\begin{cases} y = \dfrac{1}{4-x} \\ y + \dfrac{1}{x} = 1 \end{cases}$. **2**

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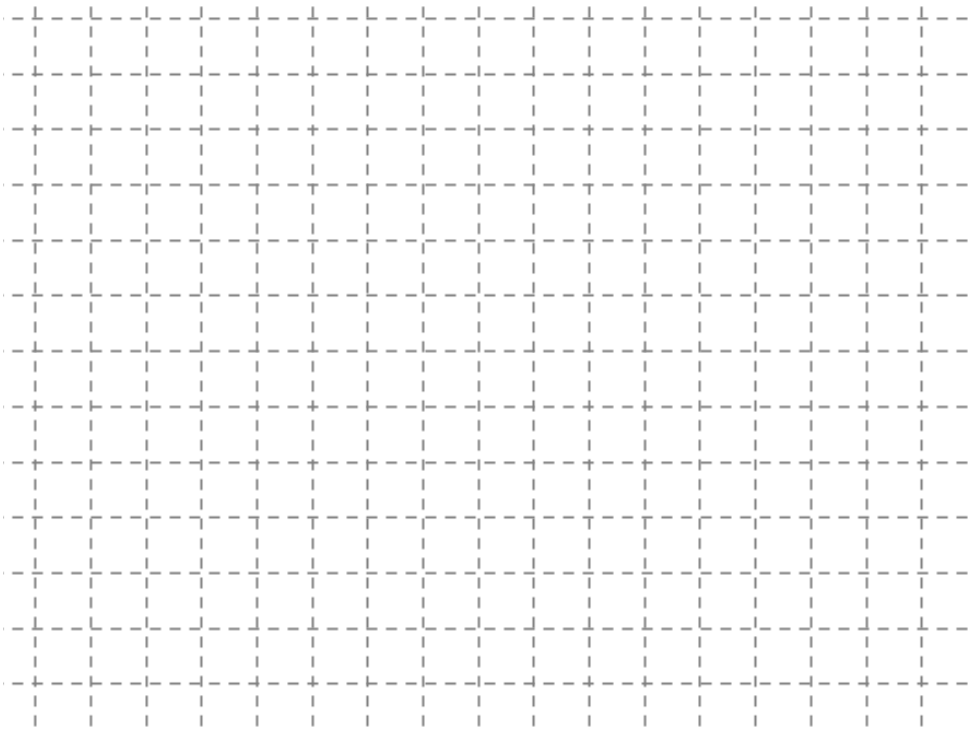
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(ii) Sketch the graphs of $y = \dfrac{1}{4-x}$ and $y = 1 - \dfrac{1}{x}$ on the same axes. **3**



(a) (iii) Hence, solve $\frac{1}{4-x} > 1 - \frac{1}{x}$. **1**

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(b) Solve: $\frac{2x-1}{x+2} \geq 1$ **3**

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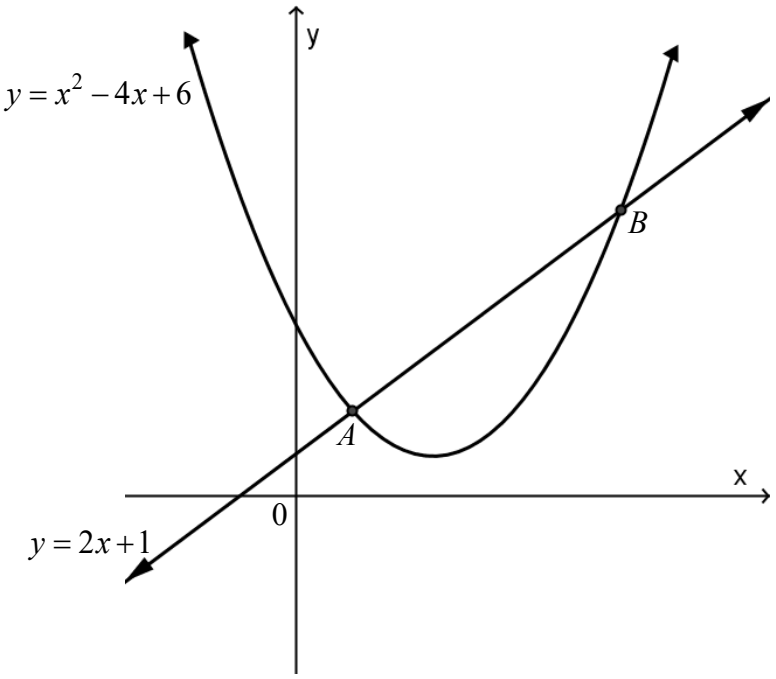
End of Question 7

Question 8 (10 marks) Start a new writing booklet.

(a) A parabola with equation $y = x^2 - 4x + 6$ is intersected by a line $y = 2x + 1$

At the points A and B, as shown in the diagram below.

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(i) Find the coordinates of points A and B. **2**

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Question 8(a) continues

(ii) Show that the midpoint, M, of AB is (3, 7). **1**

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(iii) Find the equation of the circle with centre M, with diameter AB. **2**

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Question 8 continues

(b) Find the values of m in the quadratic equation for which the roots of x are real. **2**

$$4x^2 + 4(m+1)x + m^2 - 1 = 0.$$

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(c) Solve for x in terms of a and b where a and b are constants: **3**

$$x - \frac{ax}{a+b} + a = \frac{a^2}{a-b} - \frac{b^2 x}{a^2 - b^2}.$$

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End of Question 8

Question 9 (9 marks) Start a new writing booklet.

(a) (i) Write the domain and range of the function $f(x) = x^2$. **2**

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(ii) Write the domain and range of the function $g(x) = -1 - \sqrt{1-x}$. **2**

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(iv) Find $g[f(x)]$ and state its domain and range. **3**

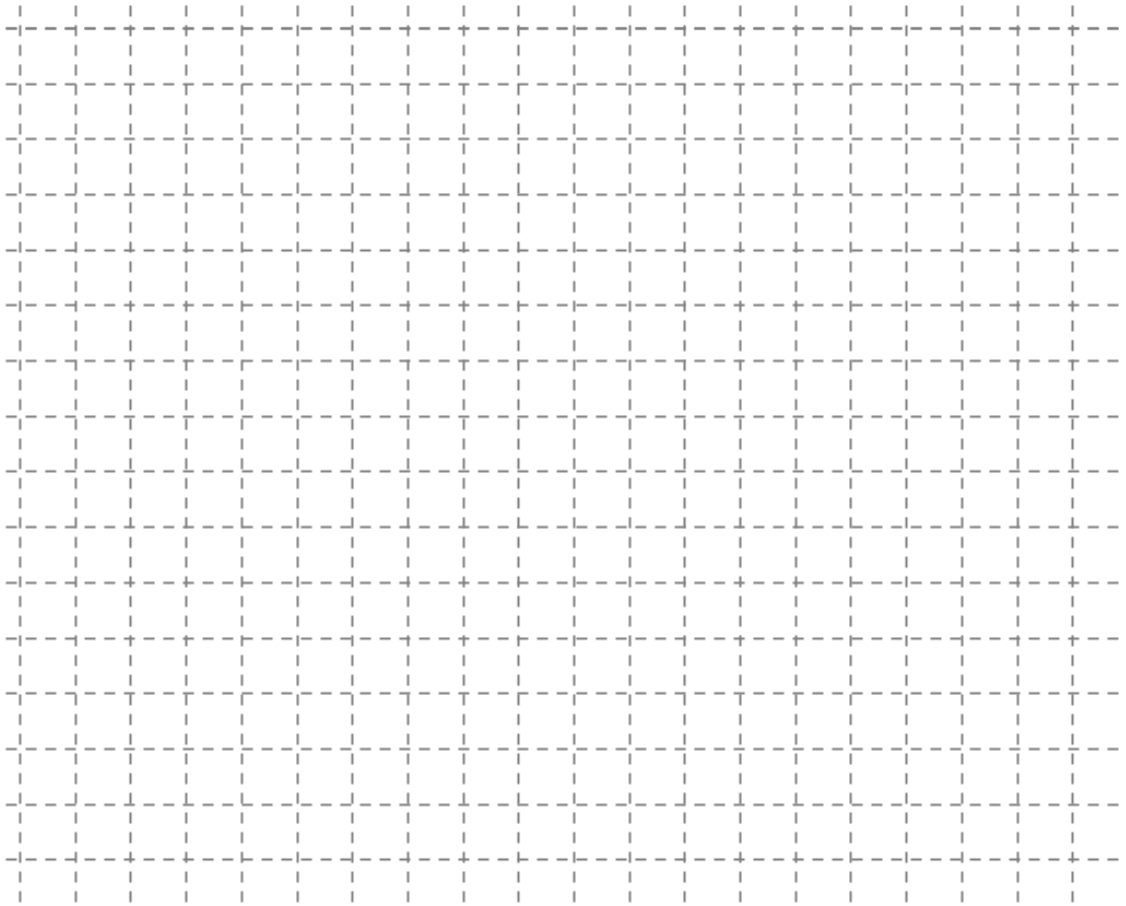
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(v) Sketch the function $g[f(x)]$. **2**



End of Assessment

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