Newington College

Discover what's possible

Student Number

Class Teacher: TRO TCG KST VMA JNO EDV JIO

Name: _____

Mathematics Advanced

Year 11 Assessment Point 1 2021

General Instructions

- Reading time – 5 minutes
- Working time – 70 minutes
- Write using black or blue pen
- Calculators approved by NESA may be used
- A reference sheet is provided
- Answer all questions in the spaces provided

Total Marks 53 Marks

Section I – 22 Marks

Section II – 20 Marks

Section III – 11 Marks

OUTCOME	MARKS
ALGEBRA	/ 24
FUNCTIONS	/ 29

Section I

22 marks **Marks**

Question 1 **Simplify**

(a) $\dfrac{-12a^2b}{ab^3}$ **1**

(b) $\dfrac{m+1}{6} - \dfrac{8m}{5}$ **2**

(c) $4^{2x} \times 4^{x+1}$ **1**

Question 2 Find the value of x if $\sqrt{18} + \sqrt{8} = \sqrt{x}$ **2**

Question 3 Given that $f(x) = 6x^2 - 6$

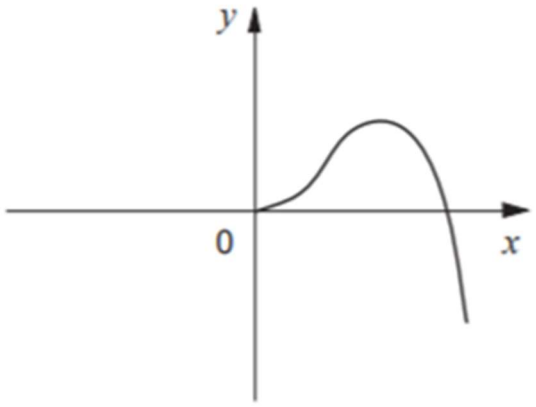
(a) Find the value of $f(-2)$ **1**

(b) Find the value of a if $f(a+1)=0$ **2**

Question 4 Solve $m^2 + 7m - 8 = 0$ **2**

Question 5 $3x^2 - 8x + 2 = 0$. Leave your answer in simplest surd form. **3**

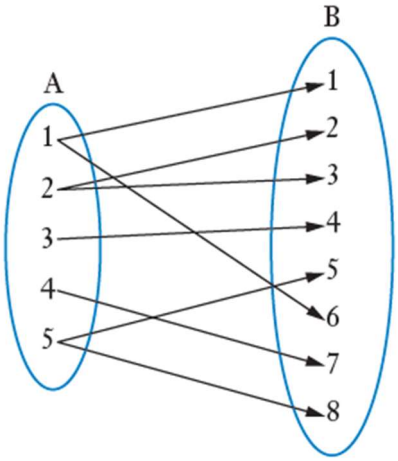
Question 6 Part of the graph of $y = f(x)$ is shown below. Complete the rest of the graph given the function is even. **1**



Question 7 Find the domain and range of the function **2**

$$f(x) = x^2 + 4$$

Question 8 The relation below **1**



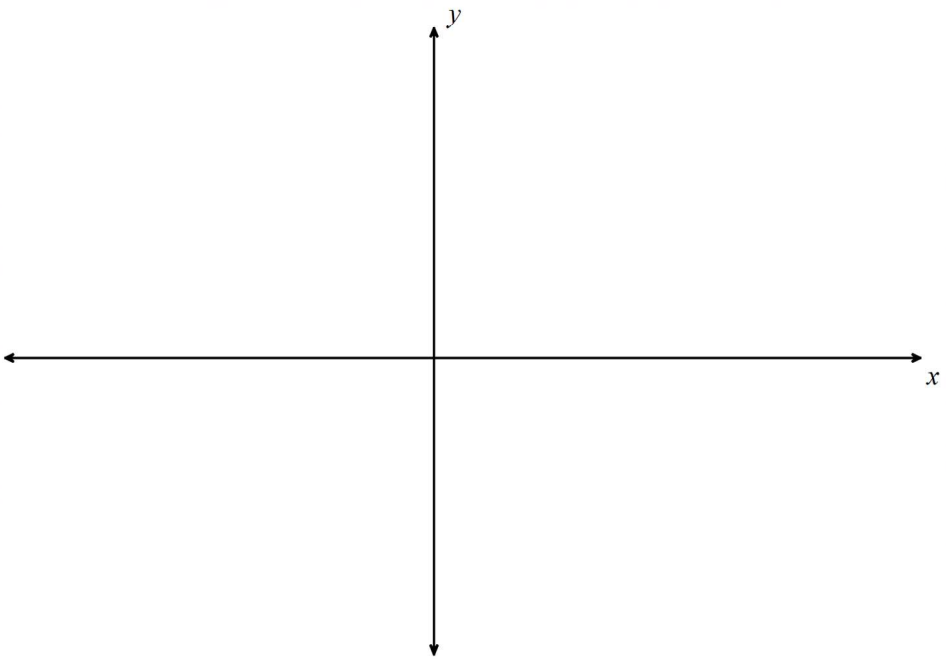
is classified as a:

A one-to-one **B** one-to-many **C** many-to-one **D** many-to-many

Circle the correct answer.

Question 9 Sketch the function $f(x) = \dfrac{1}{x-2}$ on the number plane below. **2**

Show all intercepts and any asymptotes if they exist.



End of Section I

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Circle your teacher

Section II

20 marks **Marks**

Question 1 Simplify $\frac{9x^2}{x+3} \div \frac{3x}{x^2-9}$ **2**

Question 2 Simplify $\frac{4}{x^2+x} - \frac{5}{x+1}$ **3**

Question 3 Solve for x given $16^{5-x} = 8^{x}$ **3**

Question 4 The expression $\dfrac{3\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ can be written in the form $a\sqrt{6}+b$. **3**

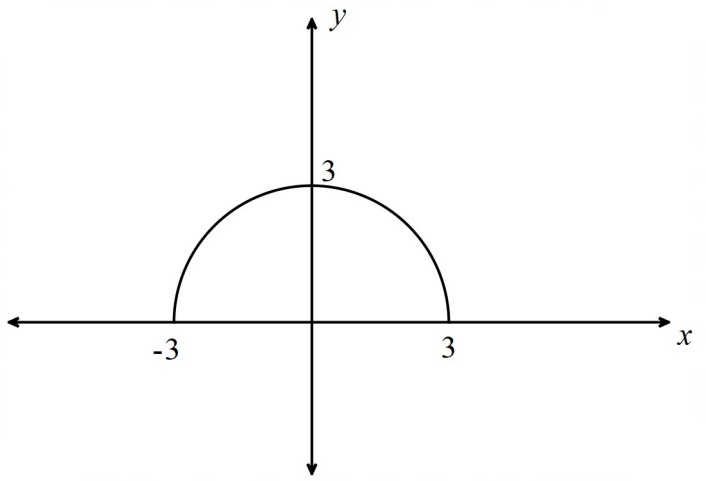
Find the value of a and b.

Question 5 Given $f(x) = 2x + 1$ and $g(x) = 1 - x^2$,

(a) Find $f(g(4))$ **2**

(b) Show that $g(f(x)) = -4x^2 - 4x$ **2**

Question 6 Given the following relation,



(a) Determine whether the relation is also a function. **1**
Give a reason for your answer.

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(b) Categorise this graph as either a one-to-one, one-to-many, many-to-one or many-to-many relation. **1**

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(c) State the range of this relation in interval notation. **1**

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Question 7 Let $f(x) = \dfrac{x}{x^2 + 1}$. Show that $f\left(\dfrac{1}{x}\right) = f(x)$. **2**

End of Section II

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Circle your teacher

Section III

11 marks **Marks**

Question 1 Find the natural domain of the function **1**

$$f(x) = \frac{1}{\sqrt{x+1}}$$

Question 2 Show that $f(x) = 4x - x^3$ is an odd function. **2**

Question 3 A function is defined as:

$$f(x) = \begin{cases} \sqrt{4 - x^2} & \text{for } -2 \le x < 0 \\ -x + 2 & \text{for } 0 \le x < 2 \\ x^2 - 4 & \text{for } x \ge 2 \end{cases}$$

(a) Evaluate $f(0) - 2f(-1) + f\left(3\frac{1}{2}\right)$, leaving your answer in exact form. **2**

(b) Find an expression for $f(a^2 + 2)$. **2**

Question 4 Find the value of a and b given that $x^2 - 6x + a = 0$ and $x^2 - ax + b = 0$ are perfect squares. **2**

Question 5 If $f(x) = \sqrt{x+4}$ and $g(x) = x + 5$, state the domain and range for which $f(g(x))$ is defined. **2**

Question 6 Given $f(x) = \sqrt{x^2 - 9}$ and $g(x) = x + 5$, find integers c and d **2**

such that

$$f(g(x)) = \sqrt{(x + c)(x + d)}$$

End of Assessment