East Doncaster Secondary College

EDSC East Doncaster

Year 9 ALPHA Pre-Methods Mathematics Semester 1 Exam, 2021

Name: _____

Teacher (Circle): RAB RAI

Date: _____

Reading Time: 10 Minutes

Writing Time: 90 Minutes

Section	Type	Questions	Total Marks for Section
A	**Multiple Choice**	**17**	**/17**
B	**Short Answer**	**14**	**/54**
C	**Extended Response**	**1**	**/9**
			/80

Information:

- Students **are not permitted** to bring mobile phones and/or any other unauthorised electronic devices into the examination room
- Students **are permitted** to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one bound reference book.
- Students **are not permitted** to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- A **scientific calculator** is allowed in this exam
- Answers to **Section A**, questions must be circled on the attached multiple-choice sheet. If a mistake is made clearly indicate correct response. Two responses for this section are not accepted.
- EAL students are allowed to bring into the examination room a hard copy dictionary; electronic dictionaries are **NOT** allowed.
- Express answers to 2 decimal places where necessary unless instructed otherwise.
- **Please use the detachable sheet at the back of the exam to answer the Multiple-Choice Section**

Section A – Multiple Choice

Linear Algebra

1	Which of the following is the solution to $\frac{x-4}{2} = 3$? **A** x = -2 **B** *x = 2* **C** *x=10* **D** *x=-10* **E** $x = \frac{11}{2}$	
2	A line with a gradient of $\frac{-3}{4}$. A line perpendicular to this line would have a gradient of **A** $\frac{-4}{3}$ **B** $\frac{4}{3}$ **C** $\frac{3}{4}$ **D** $\frac{3}{4}$ **E** 0	
3	The rule of a linear graph with gradient, $\frac{3}{4}$ and a y-intercept of $\frac{5}{8}$, in terms of $y = mx + c$ is: **A** $-8y = -6x - 5$ **B** $8y = 6x + 5$ **C** $-6y = 8x - 5$ **D** $6y = 8x + 5$ **E** $-8y = 5x - 6$	
4	Which of the following is the y-intercept to the graph of $12\mathrm{x} + 4\mathrm{y} = 8$? **A** y = -2 **B** y = 2 **C** y = 8 **D** y = -8 **E** None of the above	
5	The fully simplified version of $\frac{3\mathrm{x}-3\mathrm{y}}{5\mathrm{y}-5\mathrm{x}}$ is: **A** Cannot be simplified **B** $\frac{\mathrm{x}-\mathrm{y}}{\mathrm{y}-\mathrm{x}}$ **C** $\frac{3}{5}$ **D** $\frac{5}{3}$ **E** $-\frac{3}{5}$	
6	The point of intersection of *y = ax* and *x = –b* is: **A** (1, *–b*) **B** (*–b, ax*) **C** (b, ab) **D** (*–b, –ab*) **E** (*a, –b*)	

Functions and Non-Linear Algebra

7 Which of the following, is the expanded form of $(x-4)(x+3)$

A $x^2 - x - 12 = 0$ **B** $x^2 - x + 12 = 0$ **C** $x^2 + x - 12 = 0$

D $x^2 + x + 12 = 0$ **E** $-x^2 - x - 12 = 0$

8 Which of the following is the fully factorised form of $8x^2y^3 + 12x^3y$

A $8x^2y(y^2 + 4x)$ **B** $4x^2y(2y^2 + 3x)$ **C** $4xy(2xy^2 + 3x^2)$

D $4xy(2y^2 + 3x)$ **E** It cannot be factorised

9 Which statement about the graph of $y = -4x^2 + 4x - 3$, is **incorrect**?

A It is inverted **B** Has no x-intercepts **C** It is a maximum

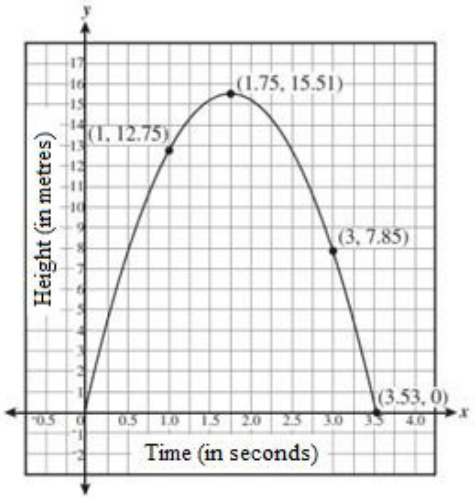
D y-intercept at (0,-3) **E** Turning point at (0.5,-4)

10 A quadratic has equation $y = (x + h)^2 + k$. If this quadratic has two x-intercepts and a turning point in the 2nd quadrant, we know that:

A $h < 0$ and $k < 0$ **B** $h > 0$ and $k < 0$ **C** $h < 0$ and $k > 0$

D $h > 0$ and $k > 0$ **E** $h < 0$ and $k = 0$

11 The height of a golf ball can be modelled using the graph below



Which of the following statements is true?

A The ball reaches a height of 17 metres.

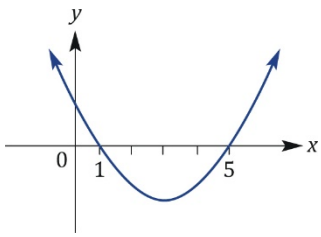
B The ball takes 2 seconds to get to its maximum height.

C The ball is at a height of 7.85 metres twice.

D The ball has a maximum height of 1.75 metres.

E The ball takes 4.9 seconds to hit the ground

12 The equation of this graph is of the form y = (x + a)(x + b). The values of a and b are respectively:



A $a = 1, b = 5$ **B** $a = -1, b = -5$ **C** $a = 5, b = -1$

D $a = -1, b = 5$ **E** a = –5, b = –1

Indices and Surds

13 What of the following surd expression, is equivalent to $\sqrt{35}$?

A $\sqrt{30} + \sqrt{5}$ **B** $7 \times \sqrt{5}$ **C** $\sqrt{5} \times \sqrt{7}$

D $5 \times \sqrt{7}$ **E** None of the above

14 The recurring decimal 0.3636... or $0.\dot{3}\dot{6}$ can be written as the fraction $\frac{4}{11}$.

This means it is a

A. Irrational fraction
B. Rational number
C. Both rational and irrational
D. Irrational number
E. Neither rational or irrational

15 Fully simplified, $5x^3y^0 \times y^5 \times 3x^2y$ equals

A $8x^5y^6$ **B** $15x^5y^5$ **C** $3x^2y^6$

D $15x^5y^6$ **E** $8x^5y^5$

16 $\frac{18x^3y^4}{12(xy)^2 \times 3x^4y^{-5}}$ simplifies to

A $\frac{y^7}{2x^3}$ **B** $\frac{3y^7}{x^3}$ **C** $\frac{1}{2x^3y^7}$

D $\frac{y^7}{2x^2}$ **E** $\frac{y^7}{24x^3}$

17 Fully simplified, $3\sqrt{14} \times 5\sqrt{16}$ equates to:

A $30\sqrt{21}$ **B** $60\sqrt{14}$ **C** $20\sqrt{14}$

D $15\sqrt{21}$ **E** $8\sqrt{84}$

Section B – Short Answer

Linear Algebra

1 Solve the following for x

A. $2(5x - 7) = 4x$ **(2 Marks)**

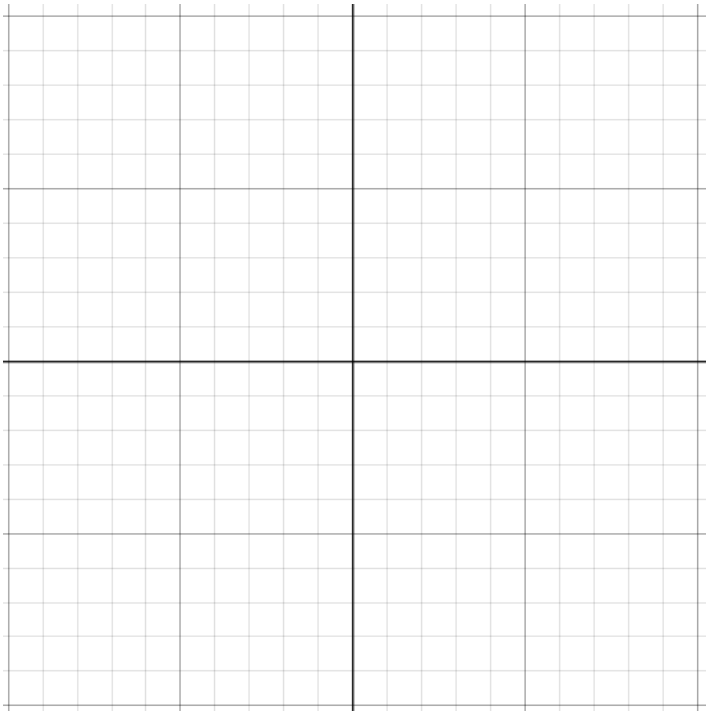
B. $\frac{7x+3}{5} = \frac{9x-8}{3}$ **(2 Marks)**

2 Solve each of the following inequalities

A. $3(15x - 7) \geq 6x$ **(2 Marks)**

B. $\frac{1-2x}{5} \leq \frac{x+2}{3}$ **(2 Marks)**

3 Pat is 20 years older than his son James. In two years Pat will be twice as old as James.
How old are they now? **(3 Marks)**

4	Sketch the graph of the following equation, $4y = -7x + 21$ on the Cartesian Plane given **(4 Marks)** 	
5	Solve these pairs of simultaneous equations and state the solution as an ordered pair. **(3 Marks)** $$7x + 2y = -8$$ $$4x + 3y = 1$$	
6	Donovan states that the simultaneous equations $y = 2x - 3$ and $4x - 2y = 6$ have no solutions while Mark states that they have an infinite number of solutions. Which one of the students is correct, and provide algebraic evidence to justify this. **(3 Marks)**	

Non-Linear Algebra and Further Graphing

7 Factorise each of the following expressions

A. $121x^2 - 5$ **(2 Marks)**

B. $\frac{2x^2+6x}{x-2} \div \frac{x^2-9}{x^2-5x+6}$ **(3 Marks)**

8 For the following equation: $f(x) = -12x^2 + 144x - 432$

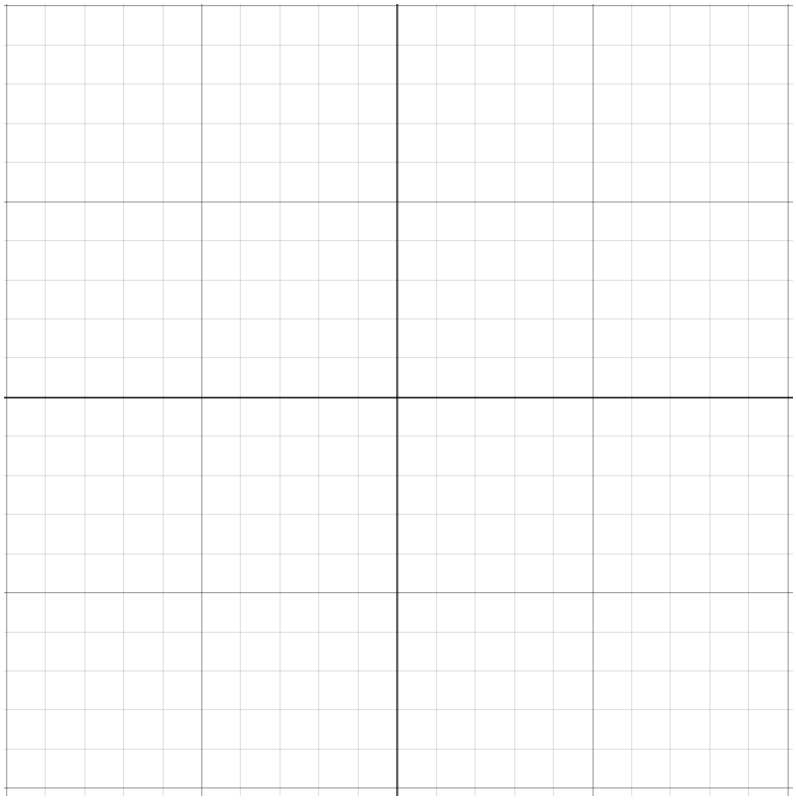
A. Factorise the **function**, and hence, determine the value/s of *x* for which f(*x*) = 0. **(2 Marks)**

9 For the equation $f(x) = -\frac{1}{6}(x+2)^2 - 5$;

State the correct order of transformations that occur from the graph of $f(x) = x^2$ **(3 Marks)**

10	Factorise the following quadratic equations by grouping, and hence solve them to find the values of x A. $2x^2 + 11x + 12$ **(2 Marks)** B. $6x^2 + 10x + 4$ **(2 Marks)**	
11	Find the exact solutions to the equation, $2x^2 + 8x + 5 = 0$ by first completing the square. **(3 Marks)**	
12	Find the discriminant to the equation, $3x^2 + 8x - 15 = 0$, and hence, find the 2 exact solutions to the equation by using the quadratic formula. **(3 Marks)**	

13 Sketch the graph of the equation, $y = x^2 - 12x + 11$ **(3 Marks)**



Indices and Surds

14 Simplify the following surds

A. $3\sqrt{72}$ **(2 Marks)**

B. $6\sqrt{250}$ **(2 Marks)**

13	Simplify the following and express the answer with positive indices. A. $\left(\frac{x^4}{y^4z^2}\right)^3$ **(1 Mark)** B. $\frac{a^{-5}}{b^{-4}} \times \left(\frac{b^2}{2a}\right)^{-3}$ **(2 Marks)**	
14	Rationalise each of the following A. $\frac{4\sqrt{10}}{\sqrt{6}}$ **(2 Marks)** B. $\frac{5}{2\sqrt{3}} - \frac{4}{5\sqrt{2}}$ **(3 Marks)**	

Section C – Extended Response

Algebra

1 At St Louis, USA, there is a giant steel archway called Gateway Arch, which can be closely modelled as a parabola. The width (at ground level) is 160 m and height is 187 m.

A. Sketch a graph of the arch. Label and scale the axes and give coordinates for both the turning point and intercepts. Note: The arch must start at the origin on the Cartesian Plane below. **(3 Marks)**

B. State the horizontal distance at which the arch is at the highest point? **(1 Mark)**

C. Determine the equation that models the arch, in terms of h, which is the height in metres above the ground and x, which is the horizontal distance from each endpoint of the arch. Write the equation in the form $h = a(x - c)^2 + k$ by finding the constants a, c and k. **(3 Marks)**

D. Suppose a small plane with a wingspan (i.e. wingtip to wingtip) of 19.8 metres attempts to fly centrally through the arch at a height of 170 metres above the ground level. Will the plane fit through the arch at this height? Justify your answer with the appropriate calculations. **(2 Marks)**

Year 10 Pre-Mathematical Methods **Student's Name:**_____

2021 Exam

Multiple Choice Answer Sheet

Teacher (please circle): **LLO** **MCN** **RAB** **ROS**

THIS SHEET MAY BE DETACHED.

CIRCLE ONLY ***ONE*** ANSWER PER QUESTION.

If you make a mistake make sure it is completely rubbed out.

Question 1	A	B	C	D	E
Question 2	A	B	C	D	E
Question 3	A	B	C	D	E
Question 4	A	B	C	D	E
Question 5	A	B	C	D	E
Question 6	A	B	C	D	E
Question 7	A	B	C	D	E
Question 8	A	B	C	D	E
Question 9	A	B	C	D	E
Question 10	A	B	C	D	E
Question 11	A	B	C	D	E
Question 12	A	B	C	D	E
Question 13	A	B	C	D	E
Question 14	A	B	C	D	E
Question 15	A	B	C	D	E
Question 16	A	B	C	D	E
Question 17	A	B	C	D	E