

Supervision Instructions

Mathematics Methods (Unit 1-2)

Task #1

1st of March 2022 – Period 4

Task consists of two papers: **Paper 1** and **Paper 2**. Students will have access to only one paper at a time.

Paper 1:

- 15 minutes
- Calculator is not allowed

After 15 minutes **Paper 1** is to be collected and **Paper 2** will be given.

Paper 2:

- 25 minutes
- Calculator is allowed

After 25 minutes **Paper 2** is to be collected.

Check that students put their names.



2022 Mathematical Methods (Unit 1-2)

Task 1

Paper 1 – Calculator not allowed

Number of marks: 10

Writing time: 15 minutes

Name:

Marks:

Instructions

Answer **all** questions in the spaces provided.

In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

2 marks

Solve for x where $x \in R \setminus \{-1, 0\}$.

$$\frac{5}{6x} - \frac{1}{x+1} = \frac{1}{3x}$$

Question 2

2 marks

Simplify

$$\frac{x^2 + 8x + 12}{3x^2 + 6x + 12} \div \frac{5x^2 - 20}{3x^3 - 24}$$

Question 3

2 marks

Find the equation of the line, which passes through the point $(6, -10)$, and is perpendicular to the line $4y - 3x + 20 = 0$.

Question 4

2 marks

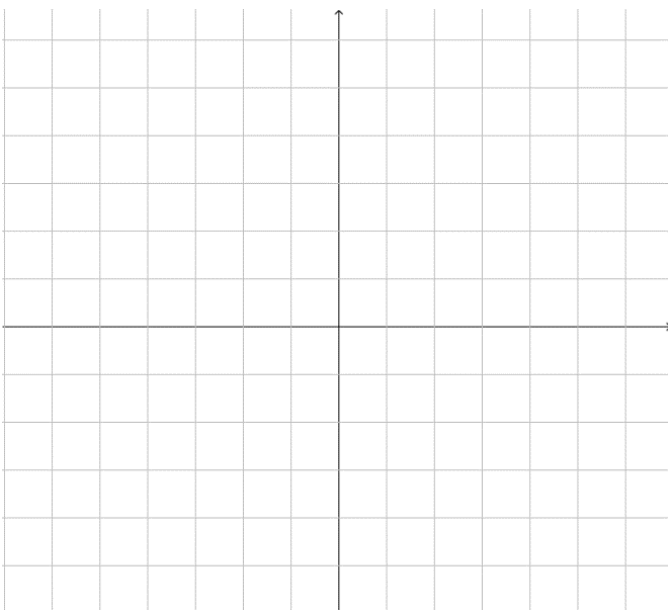
Solve for a .

$$\frac{\sqrt{a}}{\sqrt{a}-\sqrt{3}} + \frac{\sqrt{a}}{\sqrt{a}+\sqrt{3}} = \frac{7}{2}$$

Question 5

2 marks

On the Cartesian plane below, sketch the region described by $\frac{x}{3} - 2y \leq 2$.





2022 Mathematical Methods (Unit 1-2)

Task 1

Paper 2 – Calculator allowed

Number of marks: 15

Writing time: 25 minutes

Name:

Marks – Section 1:

Section 2:

SECTION 1

Instructions for Section 1

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** for the question.

A correct answer scores 1, an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Question 1

A money jar has only 10 cent and 20 cent coins with a total amount of \$11.50. The number of 20 cent coins is five more than two thirds of 20 cent coins. Let x be the number of 10 cent coins and y be the number of 20 cent coins. Which of the following is true?

A $10x + 20y = 11.50$

B $3y - 2x = 15$

C $y + \frac{2}{3}x = 5$

D $x + y = 11.50$

E $3x - 2y = 5$

Question 2

For what values of x , $\frac{x^2 - 4}{(x^2 - 9)(x^3 + 4x^2 - 21x)}$ is undefined?

A $x = 0, \pm 2, \pm 3, 7$

B $x = 0, \pm 1, \pm 2, 7$

C $x = 0, \pm 3, -7$

D $x = 0, \pm 4, \pm 9 - 21$

E $x = 0, \pm 3, -21$

Question 3

The simultaneous linear equations

$$(1-k)x - y = -3$$

$$2x + ky = 7$$

where k is a real constant, has no solution provided

- A $k \in \{-2, 1\}$
- B $k \in R \setminus \{-1, 2\}$
- C $k = -7$
- D $k \in R \setminus \{-2, 1\}$
- E $k \in \{-1, 2\}$

Question 4

The set of numbers $R \setminus [-2, 5)$ can be described as:

- A $\{x : -2 \leq x < 5\}$
- B $\{-2, -1, 0, 1, 2, 3, 4, 5\}$
- C $(-\infty, -2] \cup (5, \infty)$
- D $(-\infty, -2] \cup [5, \infty)$
- E $\{x : x < -2\} \cup \{x : x \geq 5\}$

Question 5

The value of the angle to the nearest degree between the line $5y = 4 - 9x$ and the positive direction of the x -axis is

- A 60°
- B 61°
- C 84°
- D 119°
- E 120°

SECTION 2

Instructions for Section 2

Answer **all** questions in the spaces provided.

In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

Question 1

GreenBud, a small company that manufactures garden shovels, has overhead expenses of \$27000 per year. In addition, it costs \$12 to manufacture each shovel.

- a. Write a rule which determines the total cost, C , of manufacturing x shovels per year. 1 mark
- b. GreenBud sells each shovel for \$40. What is the minimum number of shovels that must be produced for GreenBud to make a profit each year? 1 mark

Question 2

2 marks

Show that $\frac{x^5 - xy^2}{x^3 - yx} + \frac{x^4 - 2yx^2 + y^2}{y - x^2} = 2y$

Question 3

A triangle ABC drawn on a Cartesian plane where AB is perpendicular to BC. The vertex A touches the y -axis at $y = 1$ and the vertex B touches the x -axis at $x = 7$.

a. Find the equation of AB.

2 marks

b. Find the equation of BC.

2 marks

c. Vertex C intersects with the line $y + 2x = 23$. Find the equation of AC.

2 marks