

Supervision Instructions

Mathematics Methods (Unit 1-2)

Task #2

30th March 2021 – 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.



2021 Mathematical Methods (Unit 1-2)

Task 2

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 the following equation $8x^2 - 22x + 12 = 0$, in simplest exact form.

Question 2

2 marks

Solve the quadratic inequality $-x^2 + 3x + 4 < 0$.

Question 3

2 marks

Solve the inequality $x^4 - x^2 < 0$.

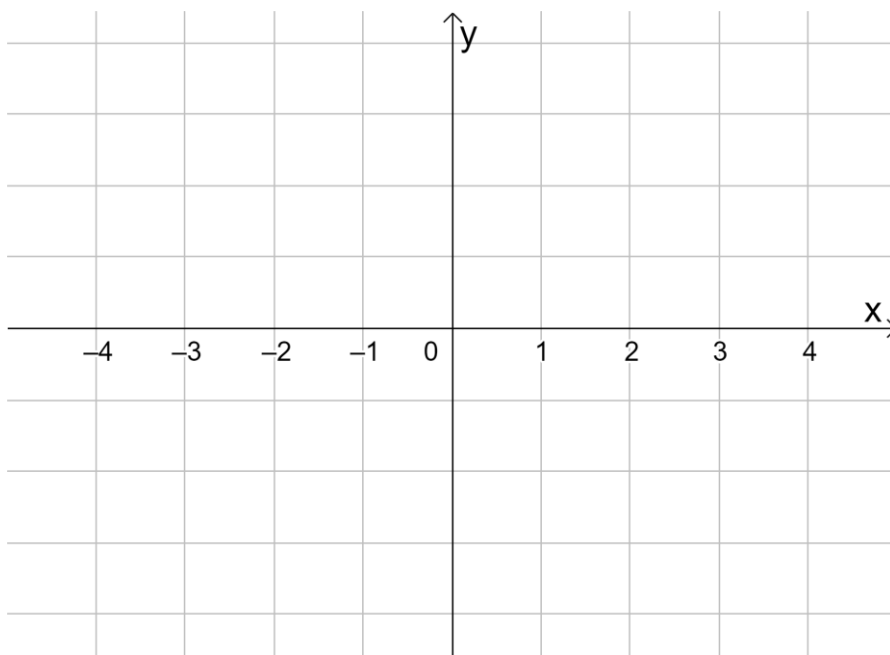
Question 4

a. Determine the x and y -intercepts of the cubic graph $y = -x^3 - 3x^2 + 16x + 48$.

3 marks

b. Hence sketch the graph, showing all intercepts with the coordinate axes.

1 mark





2021 Mathematical Methods (Unit 1-2)

Task 2

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

If $x^3 + 3x^2 - 5x - p$ and $2x^3 + 2px^2 - 18$ have the same remainder when divided by $x - 1$, then the value of p is

- A. 4
- B. 5
- C. 6
- D. 7
- E. 8

Question 2

If the graphs $y = 3x + 1$ and $y = x^2 - kx + 5$ intersect at one point only, then k must be equal to

- A. -7 or -1
- B. 7 or -1
- C. -1 or 6
- D. -7 or 1
- E. 1 or -6

Question 3

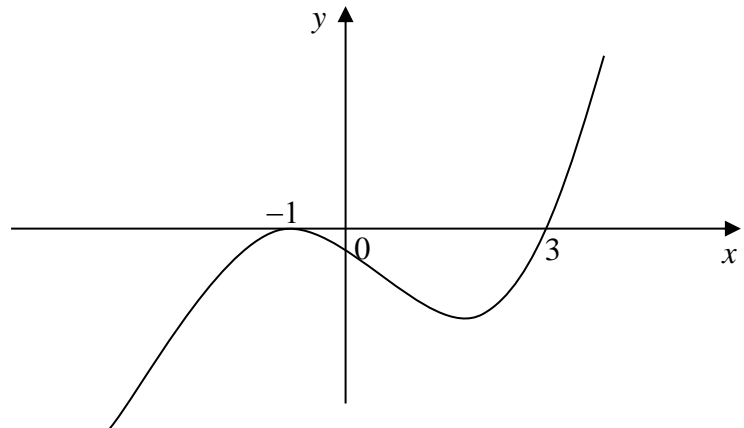
The quadratic equation $x^2 + ax + 3 = 0$ has no solution if

- A. $a = 3$
- B. $-3 < a < 3$
- C. $a < -2\sqrt{3}$ or $a > 2\sqrt{3}$
- D. $-2\sqrt{3} < a < 2\sqrt{3}$
- E. $-\sqrt{3} < a < \sqrt{3}$

Question 4

The equation of the graph shown could be

- A. $y = x(x-1)(x+3)$
- B. $y = x(x+1)(x-3)$
- C. $y = (x+1)^2(x-3)$
- D. $y = (x+1)(x-3)^2$
- E. $y = (x+1)^2(x-3)^2$



Question 5

The equation of the parabola that passes through the point (2, 11) and has its vertex at (-1, 4) is

- A. $y = \frac{7}{9}(x+1)^2 + 4$
- B. $y = (x+1)^2 + 4$
- C. $y = (x-1)^2 + 4$
- D. $y = (x-1)^2 - 4$
- E. $y = \frac{7}{9}(x-1)^2 + 4$

SECTION 2

Instructions for Section 2

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

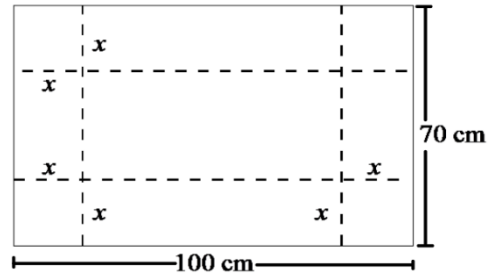
In all questions where a numerical answer is required, an exact value must be given unless otherwise specified.

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

An open box is constructed by cutting out square corners, with sides x cm, from a sheet of cardboard 100 cm by 70 cm as shown on the right and folding along the dotted line.



- a. Show that the volume (cm^3) of the box can be expressed as $V = x(7000 - 340x + 4x^2)$. 2 mark

- b. State the restrictions on the values of x . 2 marks

Question 2

Consider the equation $-0.27x^2 + bx - 6 = 0$.

- a. Express the discriminant in terms of b . 1 mark

b. Find the values of b such that the equation will have only one solution. Give your answer correct to 2 decimal places. 2 marks

c. Find the value(s) of x for which $-0.27x^2 + bx - 6 > 0$ if $b = 6$. Give your answer correct to 2 decimal places. 1 mark

Question 3 2 marks

Sketch the graphs of $y = 3x + 2$ and $y = x^3$, hence state the values of x for $3x + 2 \geq x^3$.

