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.

Name: Marks:

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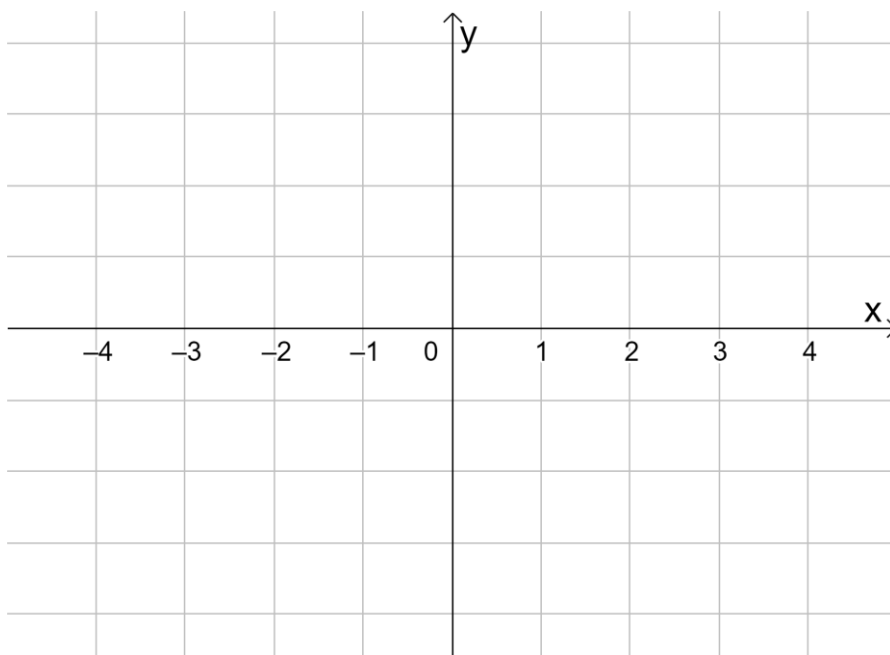
Solve the inequality $x^4 - x^2 < 0$.

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

Name: Marks – Section 1:   Section 2:

SECTION 1

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
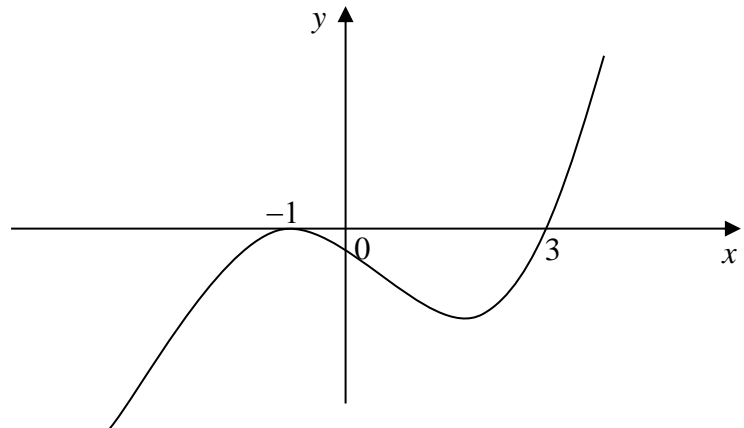
Question 3

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. $y = \dfrac{7}{9}(x+1)^2 + 4$

B. $y = (x+1)^2 + 4$

C. $y = (x-1)^2 + 4$

D. $y = (x-1)^2 - 4$

E. $y = \dfrac{7}{9}(x-1)^2 + 4$

SECTION 2

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.
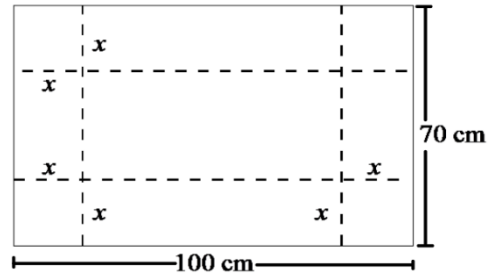
a. Show that the volume (cm³) of the box can be expressed as $V = x(7000 - 340x + 4x^2)$. 2 mark

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

Question2

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 $3x + 2 \geq x^3$.