NSW Education Standards Authority

2022 **HIGHER SCHOOL CERTIFICATE EXAMINATION**

Mathematics Extension 1

General Instructions

* Reading time -- 25 minutes
* Working time -- 300 minutes
* Write using black pen
* Calculators approved by NESA may be used
* A reference sheet is provided at the back of this paper
* For questions in Section II, show relevant mathematical reasoning and/or calculations
* Write your Centre Number and Student Number on all Writing Booklets attached

Total marks: 175

Section I -- 25 marks

* Attempt Questions 1-25
* Allow about 25 minutes for this section

Section II -- 150 marks

* Attempt Questions 26-30
* Allow about 275 minutes for this section

Section I

25 marks
Attempt Questions 1--25
Allow about 25 minutes for this section

Use the multiple-choice answer sheet for Questions 1--25.

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1. The polynomial $x^3 - 5x^2 - 2x + 24$ does not have a root at which value of x?

(A) 4

(B) -2

(C) 3

(D) 5

2. Given that the vector OP> = (4, 3) and the vector OQ> = (-1, 5), what is the vector PQ>?

(A) (0, -2)

(B) (4, 2)

(C) (3, 8)

(D) (-5, 2)

3. (combs) The polynomial $x^3 - 19x - 30$ does not have a root at which value of x?

(A) -2

(B) 5

(C) 1

(D) -3

4. Given that the vector OP> = (-3, -4) and the vector OQ> = (2, -2), what is the vector PQ>?

(A) (-1, -6)

(B) (-3, -5)

(C) (0, -2)

(D) (5, 2)

5. Given that the vector OP> = (3, 2) and the vector OQ> = (5, -3), what is the vector PQ>?

(A) (8, -1)

(B) (2, -5)

(C) (0, -2)

(D) (3, 1)

6. (combs) The polynomial $x^3 - 3x^2 - 10x + 24$ does not have a root at which value of x?

(A) 4

(B) -3

(C) 3

(D) 2

7. (combs) The polynomial $x^3 - 3x^2 - 13x + 15$ does not have a root at which value of x?

(A) -3

(B) 5

(C) -4

(D) 1

8. (combs) The polynomial $x^3 + 5x^2 - 2x - 24$ does not have a root at which value of x?

(A) -4

(B) 3

(C) -3

(D) 2

9. Given that the vector OP> = (3, 5) and the vector OQ> = (-2, -3), what is the vector PQ>?

(A) (-5, -8)

(B) (0, -2)

(C) (1, 2)

(D) (3, 4)

10. (combs) The polynomial $x^3 + 5x^2 - 2x - 24$ does not have a root at which value of x?

(A) -3

(B) 2

(C) -4

(D) 4

11. The polynomial $x^3 - 3x^2 - 16x + 48$ does not have a root at which value of x?

(A) -4

(B) 1

(C) 3

(D) 4

12. (combs) The polynomial $x^3 - 6x^2 - x + 30$ does not have a root at which value of x?

(A) -2

(B) 3

(C) 5

(D) 2

13. The polynomial $x^3 - 3x^2 - 16x + 48$ does not have a root at which value of x?

(A) 3

(B) -4

(C) 4

(D) 1

14. What is the remainder when the polynomial $x^3 - 13x + 12$ is divided by $x + 2$?

(A) 33

(B) 31

(C) 30

(D) 26

15. Given that the vector OP> = (3, -4) and the vector OQ> = (4, -3), what is the vector PQ>?

(A) (1, 1)

(B) (0, -2)

(C) (7, -7)

(D) (3, -5)

16. (combs) The polynomial $x^3 - 6x^2 - 7x + 60$ does not have a root at which value of x?

(A) 2

(B) -3

(C) 4

(D) 5

17. What is the remainder when the polynomial $x^3 - 8x^2 + 19x - 12$ is divided by $x + 4$?

(A) -280

(B) -277

(C) -276

(D) -279

18. The polynomial $x^3 - 2x^2 - 16x + 32$ does not have a root at which value of x?

(A) 2

(B) -3

(C) 4

(D) -4

19. Given that the vector OP> = (2, -2) and the vector OQ> = (4, 5), what is the vector PQ>?

(A) (2, 7)

(B) (0, -2)

(C) (2, -3)

(D) (6, 3)

20. (combs) The polynomial $x^3 + x^2 - 10x + 8$ does not have a root at which value of x?

(A) -4

(B) -2

(C) 2

(D) 1

21. What is the remainder when the polynomial $x^3+5x^2-2x-24$ is divided by $x-1$?

(A) -24

(B) -20

(C) -23

(D) -18

22. Given that the vector OP> = (-3, -4) and the vector OQ> = (4, -1), what is the vector PQ>?

(A) (-3, -5)

(B) (7, 3)

(C) (0, -2)

(D) (1, -5)

23. (combs) The polynomial $x^3-4x^2-17x+60$ does not have a root at which value of x?

(A) -4

(B) 1

(C) 5

(D) 3

24. The polynomial $x^3-3x^2-18x+40$ does not have a root at which value of x?

(A) 5

(B) 2

(C) -4

(D) 3

25. The polynomial $x^3 - 3x^2 - 16x + 48$ does not have a root at which value of x?

(A) 5

(B) -4

(C) 3

(D) 4

Marking Guide

25 marks
Questions 1--25

Question	Answer
1	D
2	D
3	C
4	D
5	B
6	C
7	C
8	B
9	A
10	D
11	B
12	D
13	D
14	C
15	A
16	A
17	A
18	B
19	A
20	B
21	B
22	B
23	B
24	D
25	A