

Polynomial and Cubic Equations

Name:	Date: Duration: 50 minutes
Class:	Score: / 30 marks

Answer ALL questions. Use a black or dark blue pen. You should use a calculator where appropriate. Show your workings clearly; no marks will be given to unsupported answer from a calculator. Give non-numerical answers correct to 3 significant figures unless a different level of accuracy is specified in the question.

1. (a) For what value of a is $(x + 3)$ a factor of $x^3 + ax^2 + x - 6$?

Answer: _____ [2]

(b) Given that $a = -3$, is $x^3 + ax^2 + x - 6$ divisible by $x - 2$? State your reason clearly.

Answer: _____ [1]

2. Evaluate the value of A , B , and C if

$$3x^3 - 13x^2 + 56x + 56 \equiv A(x - 2)^3 + Bx(x + 4) + C$$

Answer: _____ [5]

3. Express the function in the form $f(x) = (px - q)Q(x) + R$ where $Q(x)$ is the quotient on dividing $f(x) = 2x^5 + 4x^2 - 7$ by $x^2 - 1$ and R is the remainder.

Answer: _____ [4]

4. (a) Show that 1 is the root of $f(x) = x^4 - 2x^3 - 16x^2 + 2x + 15$.

Answer: _____ [1]

(b) Factorize $f(x) = x^4 - 2x^3 - 16x^2 + 2x + 15$ completely.

Answer: _____ [5]

5. When the expression $3x^3 + px^2 + qx + 8$ is divided by $x^2 - 4x + 5$, the remainder is $61x - 82$. Find the value of p and of q .

Answer: _____ [4]

6. The expression $x^{2n} - k$ has $x + 2$ as a factor and leaves a remainder of -255 when divided by $x + 1$. Calculate the value of n and of k .

Answer: _____ [3]

7. The revenue and the cost of a badminton club are modelled by $R(t) = t^3 + 6t^2 + 10t + 15$ and $C(t) = -t^2 + 6t + 27$ respectively, where t is the number of years. Find:

(a) The function of the profit, $P(t)$, made by the club.

Answer: _____ [2]

(b) In which year was the club having $P(t) = 0$

Answer: _____ [2]

(c) In which years was the club making a loss

Answer: _____ [1]

END OF PAPER