Mathematics Book One - Chapter One Assessment

Marking guide and explained answers

Modules 1-5 | 20 questions | 30 marks | 60 minutes

Examination instructions

- Answer every question and show complete working for written responses.
- Do not view the marking guide until the examination is complete.
- Check conditions, signs and final conclusions before submitting.

Curriculum and mark balance

1	Binomial theorem	4	6
2	Polynomial division	4	6
3	Rational expressions	4	6
4	Identities and proofs	4	6
5	Inequalities	4	6

Section A: Objective questions - 15 marks

Choose the correct answer, then complete the true-or-false items.

1. Find the coefficient of x^3 in (x + 4)^4. [1 marks]

A) 256 B) 20

C) 16 D) 12

Answer: 16

The selected term is C(4,3)·x^3·4^1; therefore the coefficient is C(4,3)·4^1 = 16.

2. Find the coefficient of x^1 in (x + 4)^4. [1 marks]

A) 16 B) 260

C) 256 D) 252

Answer: 256

The selected term is C(4,1)·x^1·4^3; therefore the coefficient is C(4,1)·4^3 = 256.

3. What is the remainder when P(x) = x^2 + x + 2 is divided by x - 2? [1 marks]

A) -8 B) 10

C) 8 D) 5

Answer: 8

By the Remainder Theorem, substitute x=2: P(2)=8.

4. What is the remainder when P(x) = x^2 - x - 10 is divided by x - 3? [1 marks]

A) 4 B) -1

C) -4 D) -6

Answer: -4

By the Remainder Theorem, substitute x=3: P(3)=-4.

5. For x ≠ 6, evaluate (x^2 - 36)/(x - 6) at x = 11. [1 marks]

A) 5 B) 85

C) 17 D) 18

Answer: 17

Factor x²-36=(x-6)(x+6); cancel only because x≠6. The value is 11+6=17.

6. For x ≠ 7, evaluate (x^2 - 49)/(x - 7) at x = 9. [1 marks]

A) 2 B) 32

C) 16 D) 17

Answer: 16

Factor x²-49=(x-7)(x+7); cancel only because x≠7. The value is 9+7=16.

7. Use an identity to evaluate (9+6)^2 - (9-6)^2 without expanding both squares separately. [1 marks]

A) 108 B) 60

C) 216 D) 220

Answer: 216

Use (u+v)²-(u-v)²=4uv. Thus 4·9·6=216.

8. Use an identity to evaluate (4+6)^2 - (4-6)^2 without expanding both squares separately. [1 marks]

A) 48 B) 40

C) 96 D) 100

Answer: 96

Use (u+v)²-(u-v)²=4uv. Thus 4·4·6=96.

9. For t>0, find the minimum value of t + 25/t. [1 marks]

A) 5 B) 25

C) 10 D) 12

Answer: 10

AM-GM gives t+25/t ≥ 2√25=10, with equality at t=5.

10. For t>0, find the minimum value of t + 81/t. [1 marks]

A) 9 B) 81

C) 18 D) 20

Answer: 18

AM-GM gives t+81/t ≥ 2√81=18, with equality at t=9.

11. True or false: Both exponents in a selected term are equal to r. [1 marks]

□ True □ False

Answer: False

False. A term in (a+b)^n has the form C(n,r)a^(n-r)b^r.

12. True or false: The remainder may have the same degree as the divisor. [1 marks]

□ True □ False

Answer: False

False. For dividend A and nonzero divisor B, A=BQ+R with deg(R)<deg(B).

13. True or false: Division is performed by dividing numerators and denominators separately without inversion. [1 marks]

□ True □ False

Answer: False

False. Multiply rational expressions after factoring; divide by multiplying by the reciprocal.

14. True or false: Only constant terms need to match. [1 marks]

□ True □ False

Answer: False

False. Equal polynomials have equal coefficients for corresponding powers.

15. True or false: A square can be negative when its inside is negative. [1 marks]

□ True □ False

Answer: False

False. A square is nonnegative for every real input and gives a universal bound.

Section B: Written solutions - 15 marks

Show a complete, justified method. Each question is worth 3 marks.

16. Find the coefficient of x^3 in (x + 5)^4. Show a complete method. [3 marks]

Answer: 20

The selected term is C(4,3)·x^3·5^1; therefore the coefficient is C(4,3)·5^1 = 20.

Rubric: valid method 1 | correct substitution/calculation 1 | clear checked result 1

17. What is the remainder when P(x) = x^2 - x - 4 is divided by x - 3? Show a complete method. [3 marks]

Answer: 2

By the Remainder Theorem, substitute x=3: P(3)=2.

Rubric: valid method 1 | correct substitution/calculation 1 | clear checked result 1

18. For x ≠ 5, evaluate (x^2 - 25)/(x - 5) at x = 12. Show a complete method. [3 marks]

Answer: 17

Factor $x^2-25=(x-5)(x+5)$; cancel only because $x\neq5$. The value is 12+5=17.

Rubric: valid method 1 | correct substitution/calculation 1 | clear checked result 1

19. Use an identity to evaluate (5+6)^2 - (5-6)^2 without expanding both squares separately. Show a complete method. [3 marks]

Answer: 120

Use $(u+v)^2-(u-v)^2=4uv$. Thus $4\cdot5\cdot6=120$.

Rubric: valid method 1 | correct substitution/calculation 1 | clear checked result 1

20. For t>0, find the minimum value of t + 36/t. Show a complete method. [3 marks]

Answer: 12

AM-GM gives $t+36/t \geq 2\sqrt{36}=12$, with equality at t=6.

Rubric: valid method 1 | correct substitution/calculation 1 | clear checked result 1

Mark summary and follow-up

27-30	Mastery	Begin Chapter Two with an extension challenge.
23-26	Secure	Review and retry two missed questions.
18-22	Developing	Redo the weakest module sheets before retesting.
0-17	Needs support	Return to instruction and worked examples with a teacher.

Strongest module: _____

Module to revisit: _____

Retest date: _____