

Conceptual Multiple Choice Questions: Partial Fractions (Exercise 5.2)

Class 11 Mathematics (Chapter 5)

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MCQs

1. **(Low)** For $\frac{1}{(x-1)^3}$, the number of partial fraction terms is:
 - (a) 3
 - (b) 2
 - (c) 4
 - (d) 1
2. **(Low)** The partial fraction form of $\frac{1}{(x+1)^2(x-1)}$ includes a term:
 - (a) $\frac{A}{(x+1)^2}$
 - (b) $\frac{Ax+B}{(x+1)^2}$
 - (c) $\frac{A}{(x+1)^3}$
 - (d) $\frac{A}{x^2-1}$
3. **(Low)** A proper fraction for Exercise 5.2 is:
 - (a) $\frac{1}{(x-3)^2(x+1)}$
 - (b) $\frac{x^2}{(x-1)^3}$
 - (c) $\frac{2x^4}{(x-3)(x+2)^2}$
 - (d) $\frac{x^3}{(x+1)^2}$
4. **(Low)** The first step for $\frac{2x^4}{(x-3)(x+2)^2}$ is:
 - (a) Polynomial division
 - (b) Set up partial fractions
 - (c) Factor the numerator
 - (d) Equate coefficients
5. **(Medium)** The coefficient C in $\frac{2x^2-3x+4}{(x-1)^3} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{(x-1)^3}$ when $x = 1$ is:
 - (a) 3
 - (b) 2
 - (c) 1
 - (d) 4

6. (Medium) The coefficient A in $\frac{4x}{(x+1)^2(x-1)} = \frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{x-1}$ is:

- (a) -1
- (b) 1
- (c) 2
- (d) -2

7. (Medium) The partial fraction of $\frac{9}{(x+2)^2(x-1)}$ includes a term:

- (a) $\frac{-3}{(x+2)^2}$
- (b) $\frac{3}{(x+2)^2}$
- (c) $\frac{-1}{(x+2)^2}$
- (d) $\frac{1}{(x+2)^2}$

8. (Medium) The coefficient B in $\frac{1}{(x-3)^2(x+1)} = \frac{A}{x-3} + \frac{B}{(x-3)^2} + \frac{C}{x+1}$ when $x = 3$ is:

- (a) $\frac{1}{4}$
- (b) $\frac{1}{16}$
- (c) $-\frac{1}{4}$
- (d) 1

9. (Medium) The coefficient B in $\frac{x^2}{(x-2)(x-1)^2} = \frac{A}{x-2} + \frac{B}{x-1} + \frac{C}{(x-1)^2}$ is:

- (a) $\frac{5}{9}$
- (b) $\frac{4}{9}$
- (c) $\frac{1}{9}$
- (d) $-\frac{5}{9}$

10. (Medium) The polynomial part of $\frac{2x^4}{(x-3)(x+2)^2}$ after division is:

- (a) $2x - 2$
- (b) $x + 2$
- (c) $2x + 2$
- (d) $x - 3$

11. (High) The coefficient D in $\frac{x^2}{(x-1)^3(x+1)} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{(x-1)^3} + \frac{D}{x+1}$ when $x = -1$ is:

- (a) $-\frac{1}{8}$
- (b) $\frac{1}{8}$
- (c) $-\frac{1}{4}$
- (d) $\frac{1}{4}$

12. (High) The coefficient A in $\frac{x-1}{(x-2)(x+1)^3} = \frac{A}{x-2} + \frac{B}{x+1} + \frac{C}{(x+1)^2} + \frac{D}{(x+1)^3}$ when $x = 2$ is:

- (a) $\frac{1}{27}$
- (b) $\frac{1}{9}$
- (c) $\frac{2}{27}$
- (d) $\frac{1}{3}$

13. (High) The partial fraction of $\frac{4x^3}{(x-1)(x+1)^3}$ includes a term:

- (a) $\frac{7}{2(x+1)}$
- (b) $\frac{1}{2(x+1)}$
- (c) $\frac{5}{(x+1)}$
- (d) $\frac{3}{(x+1)}$

14. (High) The coefficient C in $\frac{2x+1}{(x+3)(x-1)(x+2)^2} = \frac{A}{x+3} + \frac{B}{x-1} + \frac{C}{x+2} + \frac{D}{(x+2)^2}$ is:

- (a) $-\frac{4}{3}$
- (b) $\frac{4}{3}$
- (c) $-\frac{1}{3}$
- (d) $\frac{5}{4}$

15. (High) The remainder after dividing $\frac{2x^4}{(x-3)(x+2)^2}$ is:

- (a) $18x^2 + 8x - 24$
- (b) $x^2 + 2x - 3$
- (c) $2x + 1$
- (d) $18x^2 - 8x + 24$

16. (High) The coefficient A in $\frac{2x^4}{(x-3)(x+2)^2} = 2x - 2 + \frac{A}{x-3} + \frac{B}{x+2} + \frac{C}{(x+2)^2}$ is:

- (a) $\frac{162}{25}$
- (b) $\frac{288}{25}$
- (c) $\frac{32}{5}$
- (d) $\frac{18}{5}$

17. (Medium) The coefficient C in $\frac{1}{(x-1)^2(x+1)} = \frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{x+1}$ when $x = -1$ is:

- (a) $\frac{1}{4}$
- (b) $\frac{1}{2}$
- (c) $-\frac{1}{4}$
- (d) $\frac{1}{8}$

18. (Medium) The partial fraction of $\frac{x^2}{(x-2)(x-1)^2}$ includes a term:

- (a) $\frac{4}{9(x-2)}$
- (b) $\frac{5}{9(x-2)}$

- (c) $\frac{4}{9(x-1)}$
 (d) $\frac{1}{9(x-2)}$

19. (Low) The denominator factorization for $\frac{4x^3}{(x^2-1)(x+1)^2}$ is:

- (a) $(x-1)(x+1)^3$
 (b) $(x-1)(x+1)^2$
 (c) $(x^2-1)(x+1)^2$
 (d) $(x-1)^2(x+1)^2$

20. (Low) The method to solve for constants in partial fractions with repeated factors is:

- (a) Substitution and equating coefficients
 (b) Synthetic division
 (c) Completing the square
 (d) Factoring the numerator

Answers and Explanations

1. Answer: a

Explanation: For $(x-1)^3$, include terms for each power: $\frac{A}{x-1} + \frac{B}{(x-1)^2} + \frac{C}{(x-1)^3}$, so 3 terms (Q.1, page 358). Option (a) is correct.

2. Answer: a

Explanation: For $(x+1)^2(x-1)$, the form is $\frac{A}{x+1} + \frac{B}{(x+1)^2} + \frac{C}{x-1}$. Term $\frac{B}{(x+1)^2}$ is included (Q.3, page 360). Option (a) is correct; others are incorrect forms.

3. Answer: a

Explanation: $\frac{1}{(x-3)^2(x+1)}$ has degree 0 in numerator, 3 in denominator, so it's proper (Q.5, page 362). Others have numerator degree \geq denominator degree.

4. Answer: a

Explanation: $\frac{2x^4}{(x-3)(x+2)^2}$ is improper (degree 4 vs. 3), so divide first (Q.12, page 369). Option (a) is correct; others are incorrect initial steps.

5. Answer: a

Explanation: Set $x = 1$: $2(1)^2 - 3(1) + 4 = C \Rightarrow C = 3$ (Q.1, page 358). Option (a) is correct.

6. Answer: a

Explanation: Equate coefficients of x^2 : $A+C=0 \Rightarrow A+1=0 \Rightarrow A=-1$ (Q.3, page 360). Option (a) is correct.

7. Answer: a

Explanation: Set $x = -2$: $9 = -3B \Rightarrow B = -3$. Term: $\frac{-3}{(x+2)^2}$ (Q.4, page 361). Option (a) is correct.

8. Answer: a

Explanation: Set $x = 3$: $1 = 4B \Rightarrow B = \frac{1}{4}$ (Q.5, page 362). Option (a) is correct.

9. Answer: a

Explanation: Equate coefficients of x^2 : $A + B = 1 \Rightarrow \frac{4}{9} + B = 1 \Rightarrow B = \frac{5}{9}$ (Q.6, page 363). Option (a) is correct.

10. Answer: a

Explanation: Divide: $\frac{2x^4}{(x-3)(x+2)^2} = 2x - 2 + \frac{18x^2 + 8x - 24}{(x-3)(x+2)^2}$ (Q.12, page 369). Option (a) is correct.

11. Answer: a

Explanation: Set $x = -1$: $1 = -8D \Rightarrow D = -\frac{1}{8}$ (Q.8, page 365). Option (a) is correct.

12. Answer: a

Explanation: Set $x = 2$: $1 = 27A \Rightarrow A = \frac{1}{27}$ (Q.9, page 366). Option (a) is correct.

13. Answer: a

Explanation: Partial fraction includes $\frac{7}{2(x+1)}$ (Q.10, page 368). Option (a) is correct; others do not match.

14. Answer: a

Explanation: Equate coefficients of x^3 : $A + B + C = 0 \Rightarrow \frac{5}{4} + \frac{1}{12} + C = 0 \Rightarrow C = -\frac{4}{3}$ (Q.11, page 370). Option (a) is correct.

15. Answer: a

Explanation: Remainder is $18x^2 + 8x - 24$ (Q.12, page 369). Option (a) is correct; others are incorrect.

16. Answer: a

Explanation: Set $x = 3$: $162 = 25A \Rightarrow A = \frac{162}{25}$ (Q.12, page 371). Option (a) is correct.

17. Answer: a

Explanation: Set $x = -1$: $1 = 4C \Rightarrow C = \frac{1}{4}$ (Q.7, page 364). Option (a) is correct.

18. Answer: a

Explanation: Term is $\frac{4}{9(x-2)}$ (Q.6, page 363). Option (a) is correct; others do not match.

19. Answer: a

Explanation: $\frac{4x^3}{(x^2-1)(x+1)^2} = \frac{4x^3}{(x-1)(x+1)(x+1)^2} = \frac{4x^3}{(x-1)(x+1)^3}$ (Q.10, page 367). Option (a) is correct.

20. Answer: a

Explanation: Use substitution (e.g., set $x = a$) and equate coefficients for repeated factors (all questions, e.g., Q.1). Option (a) is correct; others are unrelated.