

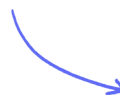
Exam Questions

Partial Fractions

Partial Fractions with Linear Denominators / Partial Fractions with Squared Linear Denominators

Easy (8 questions)	/36
Medium (9 questions)	/51
Hard (9 questions)	/53
Very Hard (9 questions)	/55
Total Marks	/195

Scan here to return to the course
or visit [savemyexams.com](https://www.savemyexams.com)



Easy Questions

1 Express

$$\frac{1}{x(x+1)}$$

as partial fractions.

(3 marks)

2 (i) Factorise $x^2 + 5x - 6$.

(ii) Hence, or otherwise, express

$$\frac{(5x+16)}{x^2+5x-6}$$

as partial fractions.

(4 marks)

3 Express

$$\frac{6x-13}{x^2-5x+6}$$

as partial fractions.

(4 marks)

4 Write

$$\frac{2(x-11)}{x^2+2x-15}$$

in the form

$$\frac{A}{x+5} + \frac{B}{x-3}$$

where A and B are integers to be found.

(3 marks)

5 Show that

$$\frac{3x+8}{(x+1)^2} \equiv \frac{A}{x+1} + \frac{B}{(x+1)^2}$$

where A and B are integers to be found.

(3 marks)

6 Express

$$\frac{5x^2 + 10x + 8}{x(x+2)^2}$$

in partial fractions.

(5 marks)

7 Write

$$\frac{3x^2 - 6x + 2}{x^3 - 3x^2 + 2x}$$

in the form

$$\frac{A}{x} + \frac{B}{x-1} + \frac{C}{x-2}$$

where A, B and C are integers to be found.

(5 marks)

8 (a) (i) Briefly explain why

$$\frac{x^2 + x - 4}{x^2 + 4x + 3}$$

is an improper (algebraic) fraction.

(ii) Show that

$$(x^2 + x - 4) \div (x^2 + 4x + 3) = 1 - \frac{(3x + 7)}{x^2 + 4x + 3}$$

(4 marks)

(b) Express

$$\frac{3x + 7}{x^2 + 4x + 3}$$

as partial fractions.

(3 marks)

(c) Hence, show that

$$\frac{x^2 + x - 4}{x^2 + 4x + 3} = 1 - \frac{2}{x + 1} - \frac{1}{x + 3}$$

(2 marks)

Medium Questions

- 1 Express $\frac{2}{x(x+2)}$ as partial fractions.

(3 marks)

- 2 Write $\frac{x-10}{(x+2)(x-1)}$ in the form $\frac{A}{x+2} + \frac{B}{x-1}$, where A and B are integers to be found.

(3 marks)

- 3 (a) It is given that

$$f(x) = x^3 - 13x + 12.$$

- (i) Show that $f(1) = 0$.
- (ii) Hence write down a factor of $f(x)$.

(3 marks)

- (b) (i) Show that $f(3) = 0$.
- (ii) Hence write down another factor of $f(x)$.

(3 marks)

(c) Fully factorise $f(x)$.

(2 marks)

(d) Express $\frac{3x^2 - 13}{x^3 - 13x + 12}$ as partial fractions.

(4 marks)

4 Express $\frac{7x + 34}{x^2 + 9x + 14}$ as partial fractions.

(4 marks)

5 (a) Use algebraic division to work out $(x^2 + 4x - 6) \div (x^2 - x - 6)$.

(2 marks)

(b) Write $\frac{5x}{(x+2)(x-3)}$ in the form $\frac{A}{x+2} + \frac{B}{x-3}$

(3 marks)

(c) Hence, or otherwise, show that $\frac{x^2+4x-6}{x^2-x-6} = 1 + \frac{2}{x+2} + \frac{3}{x-3}$

(3 marks)

6 Express $\frac{2x}{(x+1)(x-2)}$ as partial fractions.

(4 marks)

7 (a) Use the factor theorem to show that $(x+1)$ is a factor of $x^3 - 3x^2 + 4$.

(2 marks)

(b) Hence, or otherwise, fully factorise $x^3 - 3x^2 + 4$.

(2 marks)

- (c) Show that $\frac{19-8x}{x^3-3x^2+4}$ can be written in the form $\frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$, where A, B and C are integers to be found.

(4 marks)

- 8 Express $\frac{3x+11}{x^2+6x+9}$ as partial fractions.

(4 marks)

- 9 Express $\frac{x^2-5}{x^3-x^2-17x-15}$ as partial fractions.

(5 marks)

Hard Questions

- 1 Express $\frac{12}{x^2 + 4x - 5}$ as partial fractions.

(3 marks)

- 2 Write $\frac{12x - 6}{(x - 3)(x + 2)(x - 1)}$ in the form $\frac{A}{x - 3} + \frac{B}{x + 2} + \frac{C}{x - 1}$, where A, B and C are integers to be found.

(4 marks)

- 3 (a) It is given that

$$f(x) = x^3 + 3x^2 - 4x - 12.$$

(i) Show that $f(-3) = 0$

(ii) Hence write down a factor of $f(x)$.

(3 marks)

- (b) Fully factorise $f(x)$.

(4 marks)

(c) Express $\frac{3x^2 - 8x - 36}{x^3 + 3x^2 - 4x - 12}$ as partial fractions.

(3 marks)

4 Express $\frac{2x^2 + 16x - 24}{x^3 - 2x^2 - 8x}$ as partial fractions.

(4 marks)

5 (a) Show that $\frac{x^2 + x + 5}{x^2 + 3x + 2}$ can be written in the form $A - \frac{2x - 3}{(x + 1)(x + 2)}$, where A is an integer to be found.

(2 marks)

(b) Express $\frac{2x - 3}{(x + 1)(x + 2)}$ in the form $\frac{B}{x + 1} + \frac{C}{x + 2}$ where B and C are integers to be found.

(3 marks)

(c) Using your values for A, B and C write $\frac{x^2 + x + 5}{x^2 + 3x + 2}$ in the form $A + \frac{B}{x+1} + \frac{C}{x+2}$

(3 marks)

6 Express $\frac{2x}{x^2 - 9x - 52}$ as partial fractions.

(5 marks)

7 (a) Use the factor theorem to show that $(x - 2)$ is a factor of $x^3 + 4x^2 - 3x - 18$.

(2 marks)

(b) Hence, or otherwise, fully factorise $x^3 + 4x^2 - 3x - 18$.

(3 marks)

- (c) Show that $\frac{7x^2 + 32x + 8}{x^3 + 4x^2 - 3x - 18}$ can be written in the form $\frac{A}{x-2} + \frac{B}{x+3} + \frac{C}{(x+3)^2}$,
where A, B and C are integers to be found.

(4 marks)

- 8 Express $\frac{3x^2 - 22x + 25}{x^3 - 7x^2 + 8x + 16}$ as partial fractions.

(5 marks)

- 9 Express $\frac{2x^2 - 3}{x^3 + 4x^2 - 3x - 18}$ as partial fractions.

(5 marks)

Very Hard Questions

- 1 Express $\frac{8}{x^3 - 6x^2 + 8x}$ as partial fractions.

(5 marks)

- 2 Write $\frac{13x^2 - 10}{x^3 - x^2 - 2x}$ in the form $\frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-2}$, where A, B and C are integers to be found.

(5 marks)

- 3 Show that $\frac{34 - 3x^2 - x}{x^3 - 5x^2 + 3x + 9}$ can be written in the form $\frac{A}{x+1} + \frac{B}{x-3} + \frac{C}{(x-3)^2}$, where A, B and C are integers to be found.

(5 marks)

4 Express $\frac{x^2 - 3}{(x - 3)(x + 2)^2}$ as partial fractions.

(4 marks)

5 Write $\frac{x^2 + 3x + 10}{x^2 + 8x + 15}$ in the form $A + \frac{B}{x + 3} + \frac{C}{x + 5}$, where A, B and C are integers to be found.

(4 marks)

6 (a) It is given that

$$f(x) = x^3 + 3x^2 - 4x - 12.$$

(i) Show that $f(-3) = 0$.

(ii) Hence, fully factorise $f(x)$.

(6 marks)

(b) Express $\frac{3x^2 - 8x - 36}{f(x)}$ as partial fractions.

(4 marks)

7 Express $\frac{2x - 5}{x^3 - 3x^2 - 13x + 15}$ as partial fractions.

(10 marks)

8 Express $\frac{2(3x^3 + x^2 - 17x + 4)}{x(x - 1)(x - 4)(x + 2)}$ as partial fractions.

(5 marks)

- 9 Given that $x^4 - 4x^3 - 2x^2 + 12x + 9 = (x^2 - 6x + 9)(x^2 + 2x + 1)$, express $\frac{5x^3 - 15x^2 + 19x + 7}{x^4 - 4x^3 - 2x^2 + 12x + 9}$ as partial fractions.

(7 marks)