

1 Express $\frac{x+5}{(x+2)(x+3)}$ in the form $\frac{A}{(x+2)} + \frac{B}{(x+3)}$

(Total for question 1 is 3 marks)

2 Express $\frac{9x-5}{2(2x-1)(x-1)}$ in partial fractions

(Total for question 2 is 3 marks)

3 Express $\frac{5x-13}{(x-1)(x-3)^2}$ in the form $\frac{A}{(x-1)} + \frac{B}{(x-3)} + \frac{C}{(x-3)^2}$

(Total for question 3 is 4 marks)

4 Express $\frac{5x^2-12x-1}{(x+3)(x-1)^2}$ in partial fractions

(Total for question 4 is 4 marks)

5 Express $\frac{6x^2-x+1}{(3x-1)(x+1)}$ in the form $A + \frac{B}{(3x-1)} + \frac{C}{(x+1)}$

(Total for question 5 is 5 marks)

6 Express $\frac{2x^3+7x^2+8x+2}{(x+1)(x+2)}$ in the form $Ax + B + \frac{C}{(x+1)} + \frac{D}{(x+2)}$

(Total for question 6 is 5 marks)

7 Express $\frac{6(x^2+4x+1)}{(2x+3)(3x-1)}$ in partial fractions

(Total for question 7 is 4 marks)

8 Express $\frac{9-4x^2-x}{(2x-1)(2-x)}$ in the form $A + \frac{B}{(2x-1)} + \frac{C}{(2-x)}$

(Total for question 8 is 4 marks)

9 Express $\frac{3x^2+2x-23}{(x+3)}$ in the form $Ax + B + \frac{C}{(x+3)}$

(Total for question 9 is 4 marks)

10 Express $\frac{5x-7}{(x-1)^2}$ in the form $\frac{A}{(x-1)} + \frac{B}{(x-1)^2}$

(Total for question 10 is 3 marks)

- 11** A student attempts to write $\frac{4x^2-5x}{(x+1)(x-2)^2}$ in partial fractions with constant numerators.

Their incorrect attempt is shown below:

Step 1 $\frac{4x^2-5x}{(x+1)(x-2)^2} \equiv \frac{A}{(x+1)} + \frac{B}{(x-2)^2}$

Step 2 $4x^2 - 5x \equiv A(x-2)^2 + B(x+1)$

Step 3 Let $x = 2 \Rightarrow B = 2$ Let $x = -1 \Rightarrow A = 1$

Answer $\frac{1}{(x+1)} + \frac{2}{(x-2)^2}$

Explain the mistake that the student has made in step 1.

(Total for question 11 is 1 mark)

- 12** Express $\frac{4x^2+12x+11}{(x-1)(x+2)^2}$ in partial fractions

(Total for question 12 is 5 marks)

- 13** Use proof by contradiction to show that there exist no integers x and y for which $6x + 9y = 1$.

(Total for question 13 is 4 marks)

- 14** Use proof by contradiction to show that there exist no integers x and y for which $30x + 20y = 7$.

(Total for question 14 is 4 marks)

15 Prove by contradiction that $\sqrt{3}$ is irrational

(Total for question 15 is 6 marks)

16 Prove by contradiction that $\sqrt{2}$ is irrational

(Total for question 16 is 6 marks)

17 Prove by contradiction that the sum of a rational number and an irrational number is irrational

(Total for question 17 is 6 marks)

18 Prove by contradiction that there are infinitely many prime numbers

(Total for question 18 is 6 marks)
