Equations with algebraic fractions and rational coefficients

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Solve $\frac{x}{3}+\frac{1}{2}=\frac{7}{6}$. [2 marks]

Multiply every term by 6: $2x+3=7$.

Answer: $x=2$

2. Solve $\frac{5}{x-2}=1$. [2 marks]

$x\neq 2$; multiply by $x-2$ to get $5=x-2$.

Check $5/(7-2)=1$.

Answer: $x=7$

3. Solve $\frac{2}{x+1}=\frac{3}{x+4}$. [2 marks]

$x\neq -1,\ -4$; $2(x+4)=3(x+1)$.

This gives $2x+8=3x+3$, hence $x=5$.

Answer: $x=5$

4. Solve $\frac{x-1}{x+2} = \frac{-3}{x+2}$. [2 marks]

$x \neq -2$. Clearing gives $x - 1 = -3$, hence $x = -2$.

The candidate is excluded.

Answer: No solution

5. A cost of 72 dollars is shared equally. Adding two people reduces each share from $72/n$ to $72/(n+2)$. If the original share is 12 dollars, find n and the new share. [3 marks]

$72/n = 12$ gives $n = 6$, a positive whole number.

The new group has 8 people, so the new share is $72/8 = 9$.

Answer: $n = 6$; new share 9.

6. Solve $\frac{2x+4}{x+2} = 2$ and state the full solution set. [3 marks]

The denominator requires $x \neq -2$.

The numerator is $2(x+2)$, so both sides are 2 for every allowed value.

Answer: All real x except -2.