Worked answers | Algebra

Algebraic fractions and restrictions

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. State the restriction for $\frac{7}{x-4}$. [2 marks]

Solve $x-4=0$.

Answer: $x \neq 4$

2. State all restrictions for $\frac{x+1}{x(x+2)}$. [2 marks]

Either factor makes the denominator zero.

Answer: $x \neq 0,\ -2$

3. Simplify $\frac{12a}{18a}$, retaining its restriction. [2 marks]

Cancel the nonzero a and reduce $\frac{12}{18}$.

Answer: $\frac{2}{3}$, $a \neq 0$

4. Simplify $\frac{4(x-5)}{2(x-5)}$, retaining its restriction. [2 marks]

Cancel $x-5$ only where it is nonzero.

Answer: 2, $x \neq 5$

5. Explain why $\frac{p+6}{p}$ is not equal to 7 for every allowed p. Give a counterexample. [3 marks]

The numerator is a sum, not a product with a factor p.

Its equivalent form is $1+\frac{6}{p}$, with $p \neq 0$.

Answer: For $p=2$, the fraction is 4, not 7.

6. A cost model is $C=\frac{20n+40}{n}$ dollars per person. Simplify it and state a sensible domain for n. [3 marks]

Split the numerator into $\frac{20n}{n}+\frac{40}{n}$.

Division excludes $n=0$; a head count is positive and integral.

Answer: $C=20+\frac{40}{n}$; n is a positive whole number.