Unit 11 · Algebraic Fraction

HARDER PRACTICE QUESTIONS

Full marks 29

Write your answers on separate paper. Show your working. Factorize first, and give every answer in its lowest terms.

1 No value, and zero [3]

For $\frac{x+1}{x^2-5x+6}$:

i. For which values of x has the fraction no value?

ii. For which value of x is the fraction equal to 0?

iii. Find its value when $x = 4$.

2 Two at a time [3]

Simplify $\frac{1}{x-1} - \frac{1}{x+1} - \frac{2}{x^2+1}$.

3 Signs that turn round [4]

Show that $\frac{1}{(a-b)(a-c)} + \frac{1}{(b-a)(b-c)} + \frac{1}{(c-a)(c-b)} = 0$.

4 Brackets first [3]

Simplify $\left(\frac{x}{x-2} - \frac{x}{x+2} \right) \div \frac{4x}{x^2-4}$.

5 Spot the error [3]

Each line has a mistake. Find it and correct it.

i. $\frac{x^2+3x}{x^2+5} = \frac{3x}{5}$

ii. $\frac{5}{x-1} - \frac{x+4}{x-1} = \frac{5-x+4}{x-1} = \frac{9-x}{x-1}$

6 Simplify, then put the number in [2]

Find the value of $\frac{x^2-4}{x^2-x-2}$ when $x = 99$.

7 In a real setting [4]

A bus goes d km from Hetauda to a town at u km per hour, and comes back the same way at v km per hour.

i. Write the total time as one fraction.

ii. The average speed is the total distance divided by the total time. Show that it is $\frac{2uv}{u+v}$.

iii. Find the average speed when $u = 40$ and $v = 60$. Why isn't it 50?

8 A sum that collapses [3]

i. Show that $\frac{1}{x} - \frac{1}{x+1} = \frac{1}{x(x+1)}$.

ii. Use it to find $\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \ldots + \frac{1}{9\times10}$ without adding nine fractions.

9 Think [2]

Is $\frac{x^2 - 4}{x - 2}$ exactly the same as $x + 2$? Work out both at $x = 3$ and at $x = 2$, and explain.

10 Make your own [2]

Find two fractions with different denominators whose sum is $\frac{2x}{x^2 - 1}$. Then find two whose difference is the same fraction.