1.1 Rational Expressions

Question Paper

Course	Edexcel IAL Maths: Pure 3
Section	1. Algebra & Functions
Topic	1.1 Rational Expressions
Difficulty	Easy

Time allowed: 50

Score: /42

Percentage: /100

Question 1

Simplify

(i) $\dfrac{x^2}{x}$

(ii) $\dfrac{x(x-1)}{x}$

(iii) $\dfrac{6x+2}{2}$

[3 marks]

Question 2

(i) Factorise $x^2 + 7x + 12$.

(ii) Hence simplify $\dfrac{x^2 + 7x + 12}{2(x+3)}$

[3 marks]

Question 3

(a) Simplify fully $\dfrac{2x^2 + 10x}{2(x + 5)}$

[2 marks]

Question 3

(b) Simplify fully $\dfrac{3x^2}{x + 4} \times \dfrac{x^2 + 5x + 4}{x}$

[3 marks]

Question 4

(i) Fully factorise $x^3 - 9x^2 + 20x$.

(ii) Hence simplify $\dfrac{x^3 - 9x^2 + 20x}{x^2 - 5x}$

[4 marks]

Question 5

The function $f(x)$ is given by $\qquad f(x) = 2x^3 + 7x^2 - 4x$.

(a) Show that $f(x) = x(2x - 1)(x + 4)$.

[2 marks]

Question 5

(b) Hence, or otherwise, write down the real solutions to the equation

$$\frac{f(x)}{x + 1} = 0.$$

[2 marks]

Question 6

The function $f(x)$ is given by

$$f(x) = x^3 - 4x^2 - 7x + 10$$

(a) Work out $f(1)$ and hence write down a factor of $f(x)$.

[2 marks]

Question 6

(b) Work out $f(x) \div (x + 2)$.

[2 marks]

Question 6

(c) Write $f(x)$ in the form $(x + a)(x + b)(x + c)$ where a, b and c are integers to be found.

[3 marks]

Question 7

Which one of the following algebraic fractions is improper? Explain your answer.

$$\frac{x^2 + 5x - 1}{x^3 - 2} \qquad \frac{x^2 + 3x + 2}{x^2 - 3x + 2} \qquad \frac{x + 1}{(x - 1)^2}$$

[2 marks]

Question 8

Find the remainder when $x^3 + 2x^2 - 5x + 8$ is divided by $(x - 3)$.

[3 marks]

Question 9

Given that $(x^2 - 8x - 20) \div (x - 2) = Ax + B + \dfrac{C}{x-2}$

where A, B and C are integer constants.

(a) In terms of A, B and/or C as appropriate
    (i)   write down the divisor,
    (ii) write down the quotient,
    (iii) write down the remainder.

[3 marks]

Question 9

(b) Find the values of A, B and C.

[4 marks]

Question 10

The function $f(x)$ is given by

$$f(x) = x^2 + ax + b$$

where a and b are integer constants.

It is also given that $f(3) = f(-8) = 0$.

Find the values of a and b.

[4 marks]