Clasic conundrums in Mathematics

An infinite series of puzzles and amusements
so that you may become
one of the
E N L I G H T E N E D

$$\frac{A}{F} + \frac{\sqrt{L}}{R} \times \frac{G}{A^2} - \left(\frac{E}{C!} \div \frac{B}{T} \right) = \frac{R}{I} + \frac{A}{O^0} \times \sqrt{\left(\frac{I}{N} \right)} + \frac{C^{0.5}}{S}$$

The Curious Mystery Of The Algebraic Fractions

$$\frac{A}{F} + \frac{\sqrt{L}}{R} \times \frac{G}{A^2} - \left(\frac{E}{C!} \div \frac{B}{T} \right) = \frac{R}{I} + \frac{A}{O^0} \times \sqrt{\left(\frac{I}{N} \right)} + \frac{C^{0.5}}{S}$$

GCSE Mathematics

A L G E B R A I C F R A C T I O N S

Lesson 1

GCSE Mathematics
Algebraic Fractions

1.1 FOIL

Two methods of expanding brackets

METHOD 1

$(4x + 7)(3x - 5)$

METHOD 2

$(4x + 7)(3x - 5)$

[2, 2 marks]

1.2 Factorisation

This is the reverse of expanding the brackets.

GCSE Examination Question from November 2010, 3H, Q13 (Edexcel)

(a) Factorise $x^2 - 8x + 15$

[2 marks]

(b) Factorise $x^2 - 49$

[1 mark]

1.3 An Algebraic Fraction

Simplify the following algebraic expressions by first factorising the quadratics:

$$\frac{x^2 + 5x - 66}{x^2 + 2x - 48}$$

[3 marks]

1.4 Proof of "A difference of two squares"

[3 marks]

1.5 Mental Arithmetic

Without using a calculator, what is $47^2 - 43^2$?

[2 marks]

1.6 Exercise

Marks Available : 55

Question 1

Expand the brackets and simplify;

(i) $(x-6)(x+3)$ **(ii)** $(x+4)(x-10)$

(iii) $(x+5)(x-4)$ **(iv)** $(x-8)(x+3)$

(v) $(x+11)(x-8)$ **(vi)** $(x-4)(x+13)$

[6 marks]

Question 2

Expand the brackets and simplify;

(i) $(3x - 7)(4x + 3)$

(ii) $(4x + 3)(5x - 2)$

(iii) $(9x + 7)(x + 4)$

(iv) $(5x - 7)(3x - 4)$

(v) $(13x + 5)^2$

(vi) $(11x - 8)(9x - 2)$

[12 marks]

Question 3

Simplify the following algebraic expressions by first factorising the quadratics:

(i) $\dfrac{x^2 + 6x + 8}{x^2 + 7x + 10}$

[3 marks]

(ii) $\dfrac{x^2 + 3x - 18}{x^2 + 5x - 24}$

[3 marks]

(iii) $\dfrac{x^2 + x - 90}{x^2 + 2x - 80}$

[3 marks]

(iv) $\dfrac{x^2 + 4x - 21}{x^2 + 2x - 15}$

[3 marks]

(v) $\dfrac{x^2 + x - 20}{x - 4} + \dfrac{x^2 + 5x - 6}{x + 6}$

[3 marks]

Question 4

Simplify the following algebraic expressions by first factorising the quadratics:

(i) $\dfrac{x^2 + 8x - 9}{x - 1} + \dfrac{x^2 + x - 30}{x + 6}$

[3 marks]

(ii) $\dfrac{x^2 + 3x - 28}{x^2 + 5x - 14}$

[3 marks]

(iii) $\dfrac{x^2 + 10x - 24}{x^2 + 9x - 22}$

[3 marks]

(iv) $\dfrac{x^2 + 7x - 44}{x - 4} + \dfrac{x^2 + 10x - 39}{x - 3}$

[3 marks]

(v) $\dfrac{x^2 + 3x - 54}{x - 6} + \dfrac{x^2 + 4x - 5}{x - 1}$

[3 marks]

Question 5

GCSE Examination Question from November 2008, 4H, Q17 (Edexcel)

(a) Factorise $2x^2 + 5x + 3$

[2 marks]

(b) Factorise $4y^2 - 9$

[2 marks]

Question 6

GCSE Examination Question from June 2010, 3H, Q18 (Edexcel)

Simplify fully

$$\frac{x^2 + 6x}{x^2 - 36}$$

[3 marks]