

Lesson 5

GCSE Mathematics Algebraic Fractions

5.1 Difference Of Two Squares

The Theory

$$x^2 - y^2 = (x + y)(x - y)$$

Example 1

Factorise completely, $2x^2 - 18$

[2 marks]

Example 2

Factorise

Factorise completely, $4x^3 - x$

[2 marks]

Example 3

Simplify, $\frac{2x^2 + 5x + 3}{4x^2 - 9}$ $x \neq \pm \frac{3}{2}$

[3 marks]

Example 4

Factorise completely, $(3x + 1)^2 - (x + 2)^2$

[3 marks]

5.2 Exercise

Marks Available : 45

Question 1

(i) Factorise, $x^2 - 36$

[1 mark]

(ii) Hence, or otherwise, simplify $\frac{x^2 - 36}{x + 6}$ $x \neq -6$

[2 marks]

Question 2

(i) Factorise, $x^2 - 81$

[1 mark]

(ii) Hence, or otherwise, solve $\frac{x^2 - 81}{x - 9} = 14$ $x \neq 9$

[2 marks]

Question 3

Solve $\frac{x + 1}{x^2 - 1} = 5$ $x \neq \pm 1$

[2 marks]

Question 4

(i) Factorise $9x^2 - 16$

[1 mark]

(ii) Hence, or otherwise, simplify $\frac{3x^2 + 7x + 4}{9x^2 - 16}$ $x \neq \pm \frac{4}{3}$

[3 marks]

Question 5

Factorise, $2x^2 - 8$

[2 marks]

Question 6

Factorise $5x^3 - 20x$

[2 marks]

Question 7

Solve $\frac{x^2 - 1}{(x - 1)^2} = 5$

[3 marks]

Question 8

(i) Factorise $(5x + 3)^2 - (2x + 1)^2$

[3 marks]

(ii) Hence, or otherwise, solve $\frac{(5x + 3)^2 - (2x + 1)^2}{(3x + 2)} = 32$

[3 marks]

Question 9

GCSE Examination Question, 9th June 2016, Paper 4H, Q14 (Edexcel)

Simplify $\frac{x^2 - 25}{2x^2 - 9x - 5}$

[3 marks]

Question 10

GCSE Examination Question, January 2017, Paper 3H (R), Q16 (a) (Edexcel)

Solve $\frac{3x + 1}{5} - \frac{x - 4}{3} = 2$

Show clear algebraic working

[3 marks]

Question 11

GCSE Examination Question, January 2017, Paper 4H (R), Q15 (c) (Edexcel)

Simplify fully $\frac{3}{x + 1} - \frac{2}{x - 1}$

[3 marks]

Question 12

GCSE Examination Question, January 2018, Paper 3H, Q21 (Edexcel)

Factorise completely, $(10a - b)^2 - (2a - 5b)^2$

[3 marks]

Question 13

GCSE Examination Question, January 2018, Paper 4H, Q11(d) (Edexcel)

Factorise completely $3x^2 - 75y^2$

[2 marks]

Question 14

GCSE Examination Question, January 2018, Paper 3HR, Q17 (Edexcel)

(a) Show that $\frac{x + 1}{2x + 1} - \frac{1}{(2x + 1)(x + 1)} = \frac{x^2 + 2x}{(2x + 1)(x + 1)}$

[2 marks]

(b) Hence solve

$$\frac{x+1}{2x+1} - \frac{1}{(2x+1)(x+1)} = \frac{1}{(2x+1)(x+1)}$$

Hint: The equation $ax^2 + bx + c = 0$ has solutions given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

[4 marks]

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