1 (a) Factorise $6y^2 - y - 5$

.....

(2)

(b) Make f the subject of $w = \dfrac{2f + 3}{8 - f}$

.....

(3)

(c) Express $4x^2 - 8x + 7$ in the form $a(x + b)^2 + c$ where a, b and c are integers.

.....

(3)

(Total for Question 1 is 8 marks)

2 Make x the subject of the formula $y = \sqrt{\dfrac{3x - 2}{x + 1}}$

.....

(Total for Question 2 is 4 marks)

3

Make x the subject of $y = \sqrt{\dfrac{x+1}{x-4}}$

.....

(Total for Question 3 is 4 marks)

4 Make x the subject of $y = \dfrac{5 - 2x}{x + 3}$

.....

(Total for Question 4 is 4 marks)

5 (a) Solve $\frac{9a - 7}{5} - \frac{3a - 7}{4} = 4.55$

Show clear algebraic working.

$a =$ .....

(3)

(b) Make c the subject of the formula $p = \sqrt{\frac{ac + 8}{3 + c}}$

.....

(4)

(Total for Question 5 is 7 marks)

6 $a = \dfrac{14}{3x - 7}$ $\quad x = \dfrac{7}{4y - 3}$

Express a in the form $\dfrac{py + q}{ry + s}$ where p, q, r and s are integers.

Give your answer in its simplest form.

$a =$ .....

(Total for Question 6 is 3 marks)

7 Given that $x = \dfrac{5}{9y + 5}$ and that $y = \dfrac{5}{5a - 2}$

find an expression for x in terms of a.
Give your expression as a single fraction in its simplest form.

.....

(Total for Question 7 is 4 marks)

8 (a)

Show that $\frac{3x + 6}{x^2 - 3x - 10} \div \frac{x + 5}{x^3 - 25x}$ simplifies to ax where a is an integer.

(3)

(b) Show that $\frac{1}{6x^2 + 7x - 5} \div \frac{1}{4x^2 - 1}$ where a, b, c and d are integers.

.....

(3)

(Total for Question 8 is 6 marks)

9 Show that $\dfrac{7x-14}{x^2+4x-12} \div \dfrac{x-6}{x^3-36x}$ simplifies to ax where a is an integer.

(Total for Question 9 is 4 marks)

10 (a)

Simplify fully $\dfrac{6x^3 + 13x^2 - 5x}{4x^2 - 25}$

.....

(3)

(b)

Show that $\dfrac{3x + 6}{x^2 - 3x - 10} \div \dfrac{x + 5}{x^3 - 25x}$ simplifies to ax where a is an integer.

.....

(4)

(Total for Question 10 is 7 marks)

11 Express $\left(\frac{20}{x^2 - 36} - \frac{2}{x - 6}\right) \times \frac{1}{4 - x}$ as a single fraction in its simplest form.

.....

(Total for Question 11 is 3 marks)

10

Express $\dfrac{4x^2 - 25}{5x^2 + 2x - 7} \times \left(\dfrac{2}{x - 3} - \dfrac{3}{2x - 5} \right)$ as a single fraction in its simplest form.

(Total for Question 10 is 4 marks)

12 Express

$$\left(\frac{4}{2x-5}-\frac{3}{2x-3}\right)\div\frac{9x-4x^3}{6x^2-17x+5}$$

as a single fraction in its simplest form.

(Total for Question 12 is 4 marks)

13 Write $\dfrac{25x^2 - 64}{5x^2 - 13x - 6} \times \dfrac{x^2 - 8x + 15}{5x + 8} - (x - 7)$

as a single fraction in its simplest form.
Show clear algebraic working.

.....

(Total for Question 13 is 4 marks)

14 Write

$$\frac{4x^2 - 17x - 15}{2x - 1} \times \frac{2x^2 - 7x + 3}{x^2 - 25} + (29 - 4x)$$

as a single fraction in its simplest form.

.....

(Total for Question 14 is 4 marks)

15 Write

$$\frac{14}{3x-21}+\left[(x+4)\div\frac{2x^2-6x-56}{2x+3}\right]$$ in the form $\frac{ax+b}{cx+d}$ where a, b, c and d are integers.

.....

(Total for Question 15 is 4 marks)

16

Solve $\dfrac{45x^3 - 80x}{3x^2 + x - 4} \times \left(\dfrac{1}{3x - 4} + \dfrac{1}{x} \right) = \dfrac{4(x + 2)}{5x - 8}$

Show clear algebraic working.

$x =$ .....

(Total for Question 16 is 5 marks)

17

(a) Simplify fully $\dfrac{10x^2 + 23x + 12}{4x^2 - 9}$

.....

(3)

$2^{2y} \times 2^{3y+2} = \dfrac{8^{5y}}{4^n}$

(b) Find an expression for n in terms of y.
Show clear algebraic working and simplify your expression.

.....

(4)

(Total for Question 17 is 7 marks)

18 (a) Rationalise the denominator of $\dfrac{a+\sqrt{4b}}{a-\sqrt{4b}}$ where a is an integer and b is a prime number.

Simplify your answer.

(3)

(b) Given that $\left(\sqrt{\dfrac{y}{x}}\right)^{-5} = \dfrac{x^m}{y^m}$ where $x \neq y$

find the value of m.

$m =$

(1)

(Total for Question 18 is 4 marks)

19

$$\frac{18 \times \left(\sqrt{27}\right)^{4n+6}}{6 \times 9^{2n+8}} = 3^x$$

Express x in terms of n
Show your working clearly and simplify your expression.

$x =$ .....

(Total for Question 19 is 3 marks)

20

Given that $M = \dfrac{18^{4n} \times 2^{3(n^2-6n)} \times 3^{2(1-4n)}}{12^2}$

find the values of n for which $M = 2$

.....

(Total for Question 20 is 5 marks)

21 Find the values of n such that

$$\frac{10^{4n} \times 2^{3(n^2-5n)} \times 5^{2(1-2n)}}{20^2} = 1$$

Show clear algebraic working.

.....

(Total for Question 21 is 5 marks)

22 (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.

.....

(3)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

.....

(1)

(Total for Question 22 is 4 marks)

23 Express each of a, b and c in terms of q so that

$$q + 12x - qx^2$$

can be written as $a - b(x - c)^2$

$a =$ .....

$b =$ .....

$c =$ .....

(Total for Question 23 is 4 marks)