

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

.....
(2)

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

.....
(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 $y = \sqrt{\frac{3x-2}{x+1}}$

.....
(Total for Question 2 is 4 marks)

3

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

(Total for Question 3 is 4 marks)

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

(Total for Question 4 is 4 marks)

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

Show clear algebraic working.

$a = \dots\dots\dots$
(3)

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

$\dots\dots\dots$
(4)

(Total for Question 5 is 7 marks)

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

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

Give your answer in its simplest form.

$a = \dots\dots\dots$

(Total for Question 6 is 3 marks)

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

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

(Total for Question 9 is 4 marks)

10 (a)

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

.....
(3)

(b)

Show that $\frac{3x + 6}{x^2 - 3x - 10} \div \frac{x + 5}{x^3 - 25x}$ 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 $\frac{4x^2 - 25}{5x^2 + 2x - 7} \times \left(\frac{2}{x - 3} - \frac{3}{2x - 5} \right)$ 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 $\frac{25x^2 - 64}{5x^2 - 13x - 6} \times \frac{x^2 - 8x + 15}{5x + 8} - (x - 7)$

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

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

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

.....
(3)

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

.....
(4)

(Total for Question 15 is 7 marks)

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

Simplify your answer.

(3)

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

find the value of m .

$m =$

(1)

(Total for Question 16 is 4 marks)

17

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

Express x in terms of n

Show your working clearly and simplify your expression.

$x =$

(Total for Question 17 is 3 marks)

18

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

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

(Total for Question 18 is 5 marks)

19 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 19 is 5 marks)

20 (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 20 is 4 marks)

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

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

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

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots$$

(Total for Question 21 is 4 marks)