ALGEBRA 1- ALGEBRAIC MANIPULATION

(expanding, Factoring, proofs, simplifying fractions, completing the square)

You must write down all the stages in your working.

Q1

(a) Factorise fully $4p + 6pq$

.....

(2)

(b) Expand and simplify $(e + 3)(e - 5)$

.....

(2)

(c) Solve $y = \frac{2y + 1}{5}$

Show clear algebraic working.

$y =$ .....

(3)

Q2

Express $\frac{5}{3} - \frac{x+2}{2x}$ as a single fraction in its simplest terms.

[3]

Q3

(a) Express $\frac{4}{x-2} - \frac{3}{x+1}$ as a single fraction.

Give your answer in its simplest form.

(3)

(b) Expand and simplify $2x(x - 5)(x - 3)$

(3)

Q4

(a) Express $7 + 12x - 3x^2$ in the form $a + b(x + c)^2$ where a, b and c are integers.

(3)

C is the curve with equation $y = 7 + 12x - 3x^2$
The point A is the maximum point on **C**

(b) Use your answer to part (a) to write down the coordinates of A

(1)

Q5

Expand and simplify $3x(2x - 5)^2$
Show clear algebraic working.

(3)

Q6

) Factorise fully $15w^2x^5 + 25w^3x^2$

(2)

Q7

Make y the subject of $p = \sqrt{\dfrac{y + w}{3y - t}}$

(4)

Q8

Express $5x^2 - 20x + 23$ in the form $a(x - b)^2 + c$ where a, b and c are integers.

(3)

Q9

$$a = \frac{2x + 5}{1 - x} \qquad x = \frac{5 - 2y}{3y}$$

Write a in the form $\frac{m + ny}{p(y - 1)}$ where m, n and p are integers.

Show your working clearly.

(4)

Q10

Expand and simplify $2n(4n+3)+n(n-4)$

.....

(2)

Q11

(a) Factorise fully $6y^2-5y-4$

.....

(2)

(b) Express $\frac{2x+1}{4x}+\frac{7-5x}{3x}$ as a single fraction in its simplest form.

(3)

Q12

$f(x) = 17 - 3x^2 + 12x$

Write $f(x)$ in the form $a - b(x - c)^2$ where a, b and c are constants.

(3)

Q13

Factorise fully $2e^2 - 18$

.....

(2)

Q14

Make r the subject of $m = \sqrt{\dfrac{6a + r}{5r}}$

(4)

Q15

Make c the subject of the formula $p = \sqrt{\dfrac{ac + 8}{3 + c}}$

.....

(4)

Q16

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.

(4)

Q17

Prove that when the sum of the squares of any two consecutive odd numbers is divided by 8, the remainder is always 2
Show clear algebraic working.

(3)

Q18

Make t the subject of the formula $c = \dfrac{t^2 + 3}{7 - 8t^2}$

(4)

Q19

$$\frac{4x^2-4x-120}{5x^2-180} \div \frac{x^2+5x}{10x^2+60x} = p \text{ where } p \text{ is an integer.}$$

Find the value of p

Show clear algebraic working.

(4)

Q20

Expand and simplify $(2x + 3)(x - 5)(x + 4)$

(3)

Q21

Make g the subject of $e = \sqrt{\frac{7g + 5}{11 + 2g}}$

(4)

Q22

Given that $k = x - y$ and $x = \frac{1}{4y}$

express $\frac{5k}{x+2}$ in the form $\frac{a - by^2}{c + dy}$ where a, b, c and d are integers.

(4)