1 (a) Simplify n^0

(1)

(b) Simplify $(3x^2y^5)^3$

(2)

(c) Factorise fully $2e^2 - 18$

(2)

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

(4)

(Total for Question 1 is 9 marks)

2 (a) Expand and simplify $(x + 4)(x - 2)(x + 1)$

(3)

(b) Express $x^2 - 10x + 40$ in the form $(x + a)^2 + b$, where a and b are integers.

(2)

(Total for Question 2 is 5 marks)

3 (a) Simplify $(64p^9q^{12})^{\frac{2}{3}}$

.....

(2)

(b) Write as a single fraction $\frac{2}{3x} + \frac{4}{5x} - \frac{9}{10x}$

Give your answer in its simplest form.

.....

(2)

(c) Expand and simplify $4x(x - 5)(2x + 3)$
Show your working clearly.

.....

(3)

(Total for Question 3 is 7 marks)

4 Simplify fully $\left(\frac{9t^4w^9}{18t^6w^{10}}\right)^{-2}$

.....

(Total for Question 4 is 3 marks)

5 Expand and simplify $4x(3x + 1)(2x - 3)$
Show your working clearly.

.....

(Total for Question 5 is 3 marks)

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

(3)

(b) Simplify completely $\left(\frac{16w^8}{y^{20}}\right)^{-\frac{3}{4}}$

(3)

(Total for Question 6 is 6 marks)

7 (a) Simplify fully $(8e^{15})^{\frac{2}{3}}$

.....

(2)

(b) Express $\left(\frac{y}{2}\right)^{-4}$ in the form ay^n where a and n are integers.

.....

(2)

(c) Solve $\frac{4x-2}{3} - \frac{5-3x}{4} = 6$

Show clear algebraic working.

$x =$ .....

(4)

(Total for Question 7 is 8 marks)

8 (a) Expand and simplify $(2x - 1)(x + 3)(x - 5)$

.....

(3)

(b) Solve $3x^2 + 6x - 5 = 0$
Show your working clearly.
Give your solutions correct to 3 significant figures.

.....

(3)

(Total for Question 8 is 6 marks)

9 (a) Expand and simplify $(3x - 1)(x + 2)(3x + 1)$

.....

(3)

(b) Simplify fully $\left(\frac{2x^5}{8xy^2}\right)^{-2}$

.....

(3)

(Total for Question 9 is 6 marks)

10 (a) Expand and simplify $(5 - x)(2x + 3)(x + 4)$
Show your working clearly.

(3)

(b) Make c the subject of $g = \dfrac{c + 3}{4 + c} - 7$

(4)

(Total for Question 10 is 7 marks)

11 Expand and simplify $(4x + 1)(x - 3)(5x + 6)$

(Total for Question 11 is 3 marks)

12 (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)

(Total for Question 12 is 6 marks)

13 (a) Expand and simplify $(x + 2)(2x + 3)(x - 7)$
Show your working clearly.

(3)

(b) Make m the subject of $p^2 = \dfrac{x + m}{2m - y}$

(3)

(Total for Question 13 is 6 marks)

14 (a) Simplify $(3x^2y^5)^4$

(2)

(b) Expand and simplify $4n(n - 3)(n + 5)$

(2)

(c) Factorise $4c^2 - 9d^2$

(1)

(d) Simplify fully $\dfrac{x^2 - 7x + 12}{4x - x^2}$

(3)

(Total for Question 14 is 8 marks)

15 (a) Expand and simplify $n(n - 4)(3n + 5)$

(2)

(b) Express

$$\frac{3}{x} + \frac{x + 2}{2x} + \frac{1}{4}$$

as a single fraction in its simplest form.

(3)

(Total for Question 15 is 5 marks)

16 (a) Simplify fully $\left(\frac{256x^{20}}{y^8}\right)^{-\frac{1}{4}}$

(2)

(b) Express $\frac{1}{9x^2 - 25} - \frac{1}{6x + 10}$ as a single fraction in its simplest form.

(3)

(Total for Question 16 is 5 marks)

17 (a) Simplify fully $(x^{12}y^{8})^{\frac{3}{4}}$

.....

(2)

Given that $3^{n} = \dfrac{3^{x}}{9^{y}}$

(b) find an expression for n in terms of x and y.

$n =$ .....

(2)

(Total for Question 17 is 4 marks)

18 (a) Simplify $(2e^2 f^3)^3$

.....

(2)

(b) Expand and simplify $(3x - 4y)(x + 3y)$

.....

(2)

$\dfrac{\sqrt{a} \times a}{a^{-2}}$ can be written in the form a^k

(c) Find the value of k.

$k =$ .....

(2)

(d) Simplify $\dfrac{2^n - 1}{4^n - 1}$

.....

(2)

(Total for Question 18 is 8 marks)

19 (a) Simplify $(16e^{10}f^{6})^{\frac{1}{2}}$

.....

(2)

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

.....

(3)

Given that $4^{k+3}=16\times 2^{k}$

(c) find the value of k.
Show your working clearly.

$k =$ .....

(4)

(Total for Question 19 is 9 marks)

20 (a) Simplify $8^2 \times \sqrt[3]{4^6}$

Give your answer in the form 2^a where a is an integer.

Show each stage of your working clearly.

.....

(3)

Given that $n^{\left(-\frac{4}{5}\right)} = \left(\frac{1}{2}\right)^4$ where $n > 0$

(b) find the value of n.

$n =$ .....

(4)

(Total for Question 20 is 7 marks)

21 (a) Show that $\left(6 + 2\sqrt{12}\right)^2 = 12\left(7 + 4\sqrt{3}\right)$

Show each stage of your working.

(3)

(b) Simplify fully $\left(\frac{27a^{12}}{t^{15}}\right)^{-\frac{2}{3}}$

(3)

(Total for Question 21 is 6 marks)

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

Give your answer in the form $\frac{p\pm\sqrt{q}}{2}$ where p and q are integers.

.....

(Total for Question 22 is 4 marks)

23

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

Give your answer in the form $a \pm b\sqrt{2}$ where a and b are fractions.

.....

(Total for Question 23 is 5 marks)

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

.....

(Total for Question 24 is 4 marks)

25 (a) (i) Write $x^2 - 8x + 3$ in the form $(x - a)^2 - b$ where a and b are integers.

.....

(2)

(ii) Hence, write down the coordinates of the turning point on the graph of $y = x^2 - 8x + 3$

(..... , ...)

(1)

(b) Solve $7x^2 + 8x - 5 = 0$
Give your solutions correct to 3 significant figures.

.....

(3)

Alex has to find the solutions of the quadratic equation $3k^2 + 10k - 8 = 0$
Here is his working and answer.

$(3k - 2)(k + 4) = 0$

$k = 2$ or $k = -4$

(c) What mistake has Alex made?

.....

.....

.....

(1)

(Total for Question 25 is 7 marks)

26

(a) Simplify fully $\left(32a^{15}\right)^{\frac{3}{5}}$

.....

(2)

(b) Express $\left(\frac{1}{10x}\right)^{-3}$ in the form px^n where p and n are integers.

.....

(2)

(c) Solve $\frac{1-2y}{3} = \frac{4}{5} - \frac{2y-1}{2}$

Show clear algebraic working.

$y =$ .....

(3)

(Total for Question 26 is 7 marks)