1 Given that $\frac{3^x}{9^{3x}} = 81$

find the value of x.
Show clear algebraic working.

$x =$ .....

(Total for Question 1 is 3 marks)

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

.....

(4)

(Total for Question 2 is 4 marks)

3 $\sqrt{2} \times 16 = 2^x$

(a) Find the value of x.
Show your working clearly.

$x =$ .....

(2)

$$\frac{(11^{-6})^5}{11^4} = 11^n$$

(b) Find the value of n.
Show your working clearly.

$n =$ .....

(2)

(Total for Question 3 is 4 marks)

4 Simplify fully $\left(\frac{9x^4}{16y^{10}}\right)^{-\frac{1}{2}}$

.....

(Total for Question 4 is 3 marks)

5 (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 5 is 7 marks)

6 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x =$ .....

(Total for Question 6 is 2 marks)

7 Given that $\left(\sqrt[3]{\frac{1}{x}}\right)^4 = x^m$

(a) find the value of m

$m =$ .....

(1)

(Total for Question 7 is 1 marks)

8 $a = 6 \times 10^{40}$

Work out the value of a^3
Give your answer in standard form.

.....

(Total for Question 8 is 3 marks)

9 Solve $2^{-4x} = 32$

$x =$ .....

(Total for Question 9 is 2 marks)

10 Given that

$$2^n = 2^{x^2} \times 16^x \times 8$$

and

$$x > 0$$

find an expression for x in terms of n
State any restrictions on n

(Total for Question 10 is 5 marks)

11 Express $\left(\frac{m^6k^{10}}{25}\right)^{\frac{3}{2}}$ in the form $\frac{a}{b}$ where a, b and c are integers to be found.

.....

(Total for Question 11 is 2 marks)

12 (a) $\sqrt{2} \div \frac{8^3}{16^{\frac{3}{2}}} = 2^n$

Work out the value of n
Show your working clearly.

$n =$ .....

(3)

(b) Find 4% of 4.5×10^{157}
Give your answer in standard form.

.....

(3)

(Total for Question 12 is 6 marks)

13 (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 13 is 7 marks)