1 Work out the value of $\dfrac{3^7 \times 3^{-2}}{3^3}$

.....

(Total for Question 1 is 2 marks)

2 Patrick has to work out the exact value of $64^{\frac{1}{4}}$

Patrick says,

"$\frac{1}{4}$ of 64 is 16 so $64^{\frac{1}{4}} = 16$"

Explain what is wrong with what Patrick says.

.....

.....

.....

(Total for Question 2 is 1 mark)

---

3 (a) Write down the value of 7^0

.....

(1)

(b) Find the value of $3 \times 3^6 \times 3^{-6}$

.....

(1)

(c) Find the value of 2^{-4}

.....

(1)

(d) Find the value of $27^{\frac{1}{3}}$

.....

(1)

(Total for Question 3 is 4 marks)

4 $p^3 \times p^x = p^9$

(a) Find the value of x.

$x =$ .....

(1)

$(7^2)^y = 7^{10}$

(b) Find the value of y.

$y =$ .....

(1)

$100^a \times 1000^b$ can be written in the form 10^w

(c) Show that $w = 2a + 3b$

(2)

(Total for Question 4 is 4 marks)

5 (a) Write down the value of $36^{\frac{1}{2}}$

.....

(1)

(b) Write down the value of 23^0

.....

(1)

(c) Work out the value of $27^{-\frac{2}{3}}$

.....

(2)

(Total for Question 5 is 4 marks)

6 (a) Write down the value of $100^{\frac{1}{2}}$

.....

(1)

(b) Find the value of $125^{\frac{2}{3}}$

.....

(2)

(Total for Question 6 is 3 marks)

---

7 (a) Find the value of $81^{-\frac{1}{2}}$

.....

(2)

(b) Find the value of $\left(\frac{64}{125}\right)^{\frac{2}{3}}$

.....

(2)

(Total for Question 7 is 4 marks)

8 Work out the value of $\left(\frac{8}{27}\right)^{\frac{4}{3}}$

.....

(Total for Question 8 is 2 marks)

9 Work out the value of $27^{\frac{2}{3}} + \left(\frac{1}{2}\right)^{-3}$

.....

(Total for Question 9 is 3 marks)

10 Work out the value of $\dfrac{\left(5\frac{4}{9}\right)^{-\frac{1}{2}} \times \left(4\frac{2}{3}\right)}{2^{-3}}$

You must show all your working.

.....

(Total for Question 10 is 4 marks)

11

(a) Work out an estimate for the value of $\sqrt{63.5 \times 101.7}$

.....

(2)

$(2.3)^6 = 148$ correct to 3 significant figures.

(b) Find the value of $(0.23)^6$ correct to 3 significant figures.

.....

(1)

(c) Find the value of 5^{-2}

.....

(1)

(Total for Question 11 is 4 marks)

12 (a) Express $\sqrt{\frac{10^{360}}{10^{150} \times 10^{90}}}$ as a power of 10

.....

(3)

Liam was asked to express $(12^{50})^2$ as a power of 12

Liam wrote $(12^{50})^2 = 12^{50^2} = 12^{2500}$

Liam's method is wrong.

(b) Explain why.

.....

.....

.....

(1)

(Total for Question 12 is 4 marks)

13 Here is a list of five numbers.

98^{53} 98^{64} 98^{73} 98^{88} 98^{91}

Find the lowest common multiple of these five numbers.

.....

(Total for Question 13 is 1 mark)

14

(a) Find the value of $\sqrt[3]{8 \times 10^6}$

.....

(1)

(b) Find the value of $144^{\frac{1}{2}} \times 64^{-\frac{1}{3}}$

.....

(2)

(c) Solve $3^{2x} = \frac{1}{81}$

$x =$ .....

(2)

(Total for Question 14 is 5 marks)

15

(a) Find the value of $\sqrt[4]{81 \times 10^8}$

.....

(2)

(b) Find the value of $64^{-\frac{1}{2}}$

.....

(2)

(c) Write $\frac{3^n}{9^{n-1}}$ as a power of 3

.....

(2)

(Total for Question 15 is 6 marks)

16

$16^{\frac{1}{5}} \times 2^x = 8^{\frac{3}{4}}$

Work out the exact value of x.

.....

(Total for Question 16 is 3 marks)

17

$(ax^6)^{\frac{1}{n}} = 7x^3$

Work out the value of a and the value of n.

$a =$ .....

$n =$ .....

(Total for Question 17 is 2 marks)

18 Given that $9^{-\frac{1}{2}} = 27^{\frac{1}{4}} \div 3^{x+1}$
find the exact value of x.

$x =$ .....

(Total for Question 18 is 3 marks)

19 (a) Work out the value of $\left(\frac{16}{81}\right)^{\frac{3}{4}}$

.....

(2)

$3^a = \frac{1}{9}$ $3^b = 9\sqrt{3}$ $3^c = \frac{1}{\sqrt{3}}$

(b) Work out the value of $a + b + c$

.....

(2)

(Total for Question 19 is 4 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

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

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

.....

(Total for Question 21 is 4 marks)

22

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

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

$x =$ .....

(Total for Question 22 is 3 marks)