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7 $\frac{2^k}{4^n} = 2^x$

Find an expression for x in terms of k and n

$x = \dots\dots\dots$

(Total for Question 7 is 2 marks)



10 $\frac{8}{2^7} = 2^n$

(a) Find the value of n .

$n = \dots\dots\dots$
(2)

$(13^{-6})^4 \times 13^5 = 13^k$

(b) Find the value of k .

$k = \dots\dots\dots$
(2)

(Total for Question 10 is 4 marks)

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11 $\sqrt{2} \times 16 = 2^x$

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

$x = \dots\dots\dots$
(2)

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

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

$n = \dots\dots\dots$
(2)

(Total for Question 11 is 4 marks)



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

find the value of x .
Show clear algebraic working.

$x = \dots\dots\dots$

(Total for Question 12 is 3 marks)



12 $2^7 \times 4^5 = 4^x$

(a) Calculate the value of x

$x = \dots\dots\dots$
(2)

(b) Simplify fully $(125p^6y^{24})^{\frac{2}{3}}$

$\dots\dots\dots$
(2)

(Total for Question 12 is 4 marks)

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

$x = \dots\dots\dots$

(Total for Question 12 is 2 marks)

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

.....
(2)

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

(c) Find the value of k .

$k =$
(2)

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

.....
(2)

(Total for Question 14 is 8 marks)



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14 $128 = 4^{2x} \times 2^x$

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 14 is 3 marks)



P 5 9 0 1 4 A 0 1 3 2 4

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

.....
(2)

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

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

$n =$
(2)

(Total for Question 14 is 4 marks)

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14 Given that $\frac{3^{2n+3}}{3^4} = 3^3 \times 3^{1-2n}$

find the value of n

Show your working clearly.

$$n = \dots\dots\dots$$

(Total for Question 14 is 3 marks)

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14 (a) Given that $a = 3^x$ and $b = 3^y$

express in terms of a or b or a and b ,

(i) 3^{2x}

(ii) 3^{x+4y}

(iii) 3^{y-1}

.....
.....
.....

(3)

$a = 3^x$ and $b = 3^y$

$ab = 2187$

$a^2b = 177147$

(b) Work out the value of x and the value of y .
Show your working clearly.

$x =$

$y =$

(3)

(Total for Question 14 is 6 marks)

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

Work out the value of n
Show your working clearly.

$n = \dots\dots\dots$ (3)

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21 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 21 is 5 marks)



21

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

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

.....
(4)



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23 Simplify $\frac{30 \times 25^{2x+7}}{\sqrt{180} \times (\sqrt{5})^{4x+9}}$

Give your answer in the form 5^w where w is an expression in terms of x
Show each stage of your working clearly.

.....
(Total for Question 23 is 3 marks)



24

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

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

$x = \dots\dots\dots$

(Total for Question 24 is 3 marks)

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24 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 24 is 5 marks)



26 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.

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(Total for Question 26 is 5 marks)

