Indices And Use of Calculator

Questions

Brackets
Indices
{ Division
{ Multiplication
{ Addition
{ Subtraction

Q1.

Work out $\sqrt{\dfrac{(2.5 \times \sin 43°)}{(8.2^2 - 50.5)}}$

Give your answer correct to 3 significant figures.

0.319

(Total for question = 2 marks)

Q2.

(i) Find the value of $\sqrt[5]{3.2 \times 10^{11}}$

$= (3.2 \times 10^{11})^{\frac{1}{5}} = 200$

(ii) Find the value of $10^{3/4}$
Give your answer correct to 1 decimal place.

5.623 = 5.6 to 1 dp

(Total for question = 2 marks)

Q3.

(a) Find the value of $\sqrt[3]{8 \times 10^6}$ = 200

(1)

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

$= 12 \times \frac{1}{\sqrt[3]{64}} = \frac{12}{4} = 3$

.....

(2)

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

$3^{2x} = \frac{1}{3^4}$

$3^{2x} = 3^{-4}$

$\Rightarrow 2x = -4$

$x = -2$

$x =$ -2

(2)

(Total for question = 5 marks)

Q4.

(a) Write down the value of $64^{\frac{1}{2}}$

8

.....

(1)

(b) Find the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

$= \left(\frac{125}{8}\right)^{2/3} \left(\sqrt[3]{\frac{125}{8}}\right)^2 = \left(\frac{5}{2}\right)^2 = \frac{25}{4}$

$\frac{25}{4}$

.....

(2)

(Total for question = 3 marks)

Q5.

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

.....

(3)

$$\frac{y^4 \times y^n}{y^2} = y^{-3}$$

$$\frac{y^4 \times y^n}{y^2} = \frac{y^{4+n}}{y^2} = y^{2+n} \quad \therefore \quad 2+n = -3$$

$$n = -3-2$$

$$n = -5$$

(b) Find the value of n.

.....

(2)

(c) Solve $5x^2 - 4x - 3 = 0$

Give your solutions correct to 3 significant figures.

.....

(3)

(Total for question = 8 marks)

Q6.

(a) Find the value of $\sqrt[4]{27 \times 3 \times 10^8}$

$$= \sqrt[4]{81 \times 10^8} = \sqrt[4]{3^4 \times 10^8}$$

$$= 3 \times 10^2$$

$$= 300$$

.....

(2)

(b) Find the value of $\left(\frac{216}{1000}\right)^{-\frac{2}{3}}$ $= \left(\frac{1000}{216}\right)^{2/3} = \left(\sqrt[3]{\frac{1000}{216}}\right)^2 = \left(\frac{10}{6}\right)^2 = \frac{100}{36}$

.....

(2)

(Total for question = 4 marks)

Q7.

(a) Write down the reciprocal of 5

$\frac{1}{5}$

.....

(1)

(b) Evaluate 3^{-2}

$= \frac{1}{3^2} = \frac{1}{9}$

.....

(1)

(c) Calculate $9\times10^4\times3\times10^3$

$= 27 \times 10^7$

Give your answer in standard form.

$= 2.7 \times 10^8$

.....

(2)

(Total for Question is 4 marks)

Q8.

$2.5 = \frac{5}{2}$

(a) Find the reciprocal of 2.5

$\frac{2}{5}$

.....

(1)

(b) Work out $\sqrt[3]{\frac{(4.3 \times \tan 39°)}{(23.4 - 6.06)}}$

$= 0.58559$

Give your answer correct to 3 significant figures.

0.586

.....

(2)

(Total for question is 3 marks)

Q9.

Write down the value of $125^{\frac{2}{3}}$

$= \left(\sqrt[3]{125}\right)^2 = 5^2 = 25$

.....

(Total for question is 1 mark)

Q10.

(a) Write $\frac{3^5 \times 3^4}{3^2}$ as a power of 3 $= \frac{3^9}{3^2} = 3^7$

.....

(2)

(b) Write down the value of 12^0

1

.....

(1)

(c) Write down the value of 3^{-2} $= \frac{1}{3^2} = \frac{1}{9}$

.....

(1)

(Total for question = 4 marks)

Q11.

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

.....

(Total for question = 2 marks)

Q12.

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

x = ...

$$(3^2)^{-\frac{1}{2}} = \frac{(3^3)^{\frac{1}{4}}}{3^{x+1}}$$

$$3^{-1} = \frac{3^{3/4}}{3^{x+1}}$$

$$3^{-1} = 3^{\frac{3}{4}-(x+1)}$$

$$\Rightarrow -1 = \frac{3}{4} - x - 1$$

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

$$x = \frac{3}{4}$$

(Total for question = 3 marks)

Q13.

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

.....

(2)

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

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

.....

(2)

(Total for question = 4 marks)

Q14.

(a) Simplify $n^3 \times n^5$

.....

(1)

(b) Simplify $\frac{c^3d^4}{c^2d}$

.....

(2)

(c) Solve $\frac{5x}{2} > 7$

.....

(2)

(Total for question = 5 marks)

Q15.

Write these numbers in order of size.
Start with the smallest number.

5^{-1} 0.5 -5 5^0

. . . . . .

(Total for Question is 2 marks)

Q16.

(a) Rationalise the denominator of $\frac{12}{\sqrt{3}}$

.....

(2)

(b) Work out the value of $(\sqrt{2} + \sqrt{8})^2$

.....

(2)

(Total for Question is 4 marks)

Q17.

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

Work out the exact value of x.

.....

(Total for question = 3 marks)

Q18.

Given that $3^{-n} = 0.2$

find the value of $(3^4)^n$

.....

(Total for question = 2 marks)

Q19.

(a) Solve $3x^2 = 147$

.....

(2)

(b) Work out the value of 2^{-3}

.....

(1)

(c) Simplify $(3x^2)^3$

.....

(2)

$w = 4p - 16$

(d) Make p the subject of this formula.

.....

(2)

(Total for question = 7 marks)

Q20.

A virus on a computer is causing errors.
An antivirus program is run to remove these errors.

An estimate for the number of errors at the end of t hours is $10^6 \times 2^{-}t$

(a) Work out an estimate for the number of errors on the computer at the end of 8 hours.

.....

(2)

(b) Explain whether the number of errors on this computer ever reaches zero.

.....

.....

.....

(1)

(Total for question is 3 marks)

Q21.

(a) Write down the value of $27^{1/3}$

. . . . . .

(1)

(b) Find the value of $25^{-1/2}$

. . . . . .

(2)

(Total for Question is 3 marks)

Q22.

Richard's car uses 1 litre of petrol every 8 miles.
Petrol costs £1.30 per litre.

Richard drives 240 miles.

Work out the total cost of the petrol the car uses.

£ . . . . . .

(Total for Question is 3 marks)

Q23.

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

.....

(1)

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

.....

(2)

(Total for question = 3 marks)

Q24.

(a) Simplify $a^4 \times a^5$

. . . . . .

(1)

(b) Simplify $\frac{45\,e^6f^8}{5ef^2}$

. . . . . .

(2)

(c) Write down the value of $9^{\frac{1}{2}}$

. . . . . .

(1)

(Total for Question is 4 marks)

Q25.

(a) Simplify $m^5 \div m^3$

. . . . . .

(1)

(b) Simplify $5x^4y^3 \times x^2y$

. . . . . .

(2)

(Total for Question is 3 marks)

Q26.

(a) Simplify $5^4 \times 5^6$

.....

(1)

(b) Simplify $7^5 \div 7^2$

.....

(1)

(Total for Question is 2 marks)

Q27.

(a) Simplify $a^4 \times a^3$

.....

(1)

(b) Simplify $(b^2)^7$

.....

(1)

(c) Write down the value of 3^0

.....

(1)

(d) Write down the value of 4^{-1}

.....

(1)

(Total for question = 4 marks)

Q28.

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

(a) Find the value of x.

x = ...

(1)

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

(b) Find the value of y.

y = ...

(1)

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

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

(2)

(Total for question = 4 marks)

Q29.

(a) Write down the value of

(i) 7^0

.....

(ii) 5^{-2}

.....

(iii) $16^{\frac{1}{2}}$

.....

(3)

(b) Simplify fully

$$\frac{10a^7b^4}{2a^3b}$$

.....

(2)

(Total for question = 5 marks)

Q30.

(a) Write down the value of 10^0

.....

(1)

(b) Write down the value of 10^{-2}

.....

(1)

(c) Write these numbers in order of size.
Start with the smallest number.

2.73×10^3 $\quad$ 27.3×10^{-3} $\quad$ 273×10^2 $\quad$ 0.00273

.....

(2)

(Total for Question is 4 marks)

Q31.

(a) Write down the value of 6^0

.....

(1)

(b) Work out $64^{-\frac{2}{3}}$

.....

(2)

(Total for question = 3 marks)

Q32.

Find the value of $64^{-\frac{2}{3}}$

.....

(Total for question = 1 mark)

Q33.

(a) Write down the value of 10^{-1}

. . . . . .

(1)

(b) Find the value of $27^{\frac{2}{3}}$

. . . . . .

(2)

(c) Write $\sqrt{75}$ in the form $k\sqrt{3}$, where k is an integer.

. . . . . .

(2)

(Total for Question is 5 marks)

Q34.

(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 = 4 marks)

Q35.

(a) Write down the value of 7^0

.....

(1)

(b) Write down the value of 2^{-4}

.....

(1)

(c) Rationalise the denominator of $\frac{14}{\sqrt{7}}$

Give your answer in its simplest form.

.....

(2)

(Total for question = 4 marks)

Q36.

(a) Find the value of 5°

. . . . . .

(1)

(b) Find the value of $27^{1/3}$

. . . . . .

(1)

(c) Find the value of 2^{-3}

. . . . . .

(1)

(Total for Question is 3 marks)

Q37.

(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 = 4 marks)

Q38.

(a) Write 0.0078 in standard form.

.....

(1)

(b) Write 6.71×10^6 as an ordinary number.

.....

(1)

(c) Write these numbers in order of size.

Start with the smallest number.

$9^{\frac{1}{2}}$ $\quad$ 0.9 $\quad$ -9 $\quad$ 9^0

.....

(2)

(Total for question = 4 marks)