EXPRESSWALA ACADEMY

Exponents (Level 2)

MCQ Test, Set 09

Time: 30 minutes | Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. $\sqrt[6]{3^{12}} =$

A. 3^{72} **B.** 729 **C.** 9 **D.** $\sqrt{3}$

2. If $a^4 = 9^6$ and $a > 0$, then $a =$

A. 3 **B.** $9^{\frac{2}{3}}$ **C.** 81 **D.** 27

3. $121^3 \times 11^{-4} =$

A. $\frac{1}{121}$ **B.** 11^{10} **C.** 121 **D.** $\frac{1}{11}$

4. $(243)^{\frac{4}{5}} \times (4)^{\frac{3}{2}} =$

A. 6 **B.** 162 **C.** 648 **D.** $\frac{1}{648}$

5. $\left(\frac{1}{16}\right)^{-\frac{3}{4}} =$

A. 2 **B.** 8 **C.** -8 **D.** $\frac{1}{8}$

6. $\left(\frac{8}{343}\right)^{-\frac{2}{3}} =$

A. $-\frac{49}{4}$ **B.** $\frac{7}{2}$ **C.** $\frac{4}{49}$ **D.** $\frac{49}{4}$

7. $\frac{3^{\frac{4}{5}} \times 12^{\frac{1}{5}}}{8^{-\frac{1}{5}}} =$

A. 6 **B.** 3 **C.** 2 **D.** 12

8. $\left(\frac{x^3}{x}\right)^4 \times \left(\frac{x}{x^2}\right)^3 \times \left(\frac{x^2}{x^3}\right)^5 =$

A. 0 **B.** x **C.** x^{16} **D.** 1

9. If $a = 1$, $b = 6$ and $c = -7$, then $a^3 + b^3 + c^3 =$

A. -42 **B.** -126 **C.** 0 **D.** 126

10. If $2^{4x} = 256$ and $10^y = 0.001$, then $x - y =$

A. -1 **B.** 5 **C.** 11 **D.** -5

11. If $2^{9x} \div 2^{4x} = \sqrt[4]{2^{30}}$, then $x =$

A. $\frac{15}{2}$ **B.** $\frac{15}{26}$ **C.** 6 **D.** $\frac{3}{2}$

12. If $11^{x-1} \times 2^x = 44$, then $x =$

A. 2 **B.** 1 **C.** 3 **D.** -2

13. If $5^x = 2$, then $25^x =$

A. 50 **B.** 27 **C.** $\frac{2}{25}$ **D.** 4

14. If $\left(\frac{5}{2}\right)^x \left(\frac{2}{5}\right)^{4x} = \frac{8}{125}$, then $x =$

A. 1 **B.** 3 **C.** $\frac{3}{5}$ **D.** -1

15. If $7^{x+1} - 7^x = 294$, then $x =$

A. -2 **B.** 2 **C.** 3 **D.** 1

16. If $16^x = \frac{8}{2^x}$, then $x =$

A. $\frac{3}{8}$ **B.** $\frac{3}{4}$ **C.** $\frac{3}{5}$ **D.** $-\frac{3}{5}$

17. $\frac{2}{1+x^{a-b}} + \frac{2}{1+x^{b-a}} =$

A. 0 **B.** 4 **C.** 2 **D.** 1

18. If $a = 2$ and $b = 1$, then $\left(\frac{2^{a^2+b^2}}{2^{ab}}\right)^{a+b} =$

A. 2^9 **B.** 2^7 **C.** 2^{27} **D.** 2^{15}

19. If $6^x = 5$, $5^y = 11$ and $11^z = 6$, then $xyz =$

A. -1 **B.** 6 **C.** 1 **D.** 0

20. If $a^x = b^y = c^z$ and $b = ac$, then $y =$

A. $\frac{xz}{x+z}$ **B.** $x + z$ **C.** $\frac{2xz}{x+z}$ **D.** $\frac{x+z}{xz}$

21. $(0.729)^{\frac{2}{3}} =$

A. 8.1 **B.** 0.81 **C.** 81 **D.** 0.486

22. $\left(\frac{4}{\sqrt{3}}\right)^3 \div \left(\frac{4}{\sqrt{3}}\right)^5 =$

A. $\frac{16}{3}$ **B.** $\frac{3}{16}$ **C.** $\frac{16}{9}$ **D.** $\frac{9}{16}$

23. $(x^{\frac{1}{3}} + y^{\frac{1}{3}})(x^{\frac{2}{3}} - x^{\frac{1}{3}}y^{\frac{1}{3}} + y^{\frac{2}{3}}) =$

A. $x + y$ **B.** $x^3 + y^3$ **C.** $x^2 + y^2$ **D.** $x - y$

24. If $\frac{x^{2.5}}{x^{0.5}} = 49$ and $x > 0$, then $x =$

A. $\sqrt{7}$ **B.** 49 **C.** 2401 **D.** 7

25. $\left\{(10^2)^{-3}\right\}^{\frac{1}{2}} =$

A. $\frac{1}{1000000}$ **B.** 1000 **C.** $\frac{1}{100}$ **D.** $\frac{1}{1000}$

Key sheet

1. C	**2.** D	**3.** C	**4.** C	**5.** B
6. D	**7.** A	**8.** D	**9.** B	**10.** B
11. D	**12.** A	**13.** D	**14.** A	**15.** B
16. C	**17.** C	**18.** A	**19.** C	**20.** A
21. B	**22.** B	**23.** A	**24.** D	**25.** D

Solutions

1. $\sqrt[6]{3^{12}} =$

$\sqrt[6]{3^{12}} = 3^{\frac{12}{6}} = 3^2 = 9$

Ans: (C) 9

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2. If $a^4 = 9^6$ and $a > 0$, then $a =$

$a = 9^{\frac{6}{4}} = 9^{\frac{3}{2}} = (3^2)^{\frac{3}{2}} = 3^3 = 27$

Ans: (D) 27

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3. $121^3 \times 11^{-4} =$

$= (11^2)^3 \times 11^{-4}$

$= 11^6 \times 11^{-4}$

$= 11^{6-4} = 11^2$

$= 121$

Ans: (C) 121

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4. $(243)^{\frac{4}{5}} \times (4)^{\frac{3}{2}} =$

$(3^5)^{\frac{4}{5}} \times (2^2)^{\frac{3}{2}}$

$= 3^4 \times 2^3$

$= 81 \times 8 = 648$

Ans: (C) 648

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5. $\left(\frac{1}{16}\right)^{-\frac{3}{4}} =$

$\left(\frac{1}{16}\right)^{-\frac{3}{4}} = \left[\left(\frac{1}{2}\right)^4\right]^{-\frac{3}{4}}$

$= \left(\frac{1}{2}\right)^{-3} = (2)^3$

$= 8$

Ans: (B) 8

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6. $\left(\frac{8}{343}\right)^{-\frac{2}{3}} =$

$\left(\frac{8}{343}\right)^{-\frac{2}{3}} = \left[\left(\frac{2}{7}\right)^3\right]^{-\frac{2}{3}}$

$= \left(\frac{2}{7}\right)^{-2} = \left(\frac{7}{2}\right)^2$

$= \frac{49}{4}$

Ans: (D) $\frac{49}{4}$

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7. $\frac{3^{\frac{4}{5}} \times 12^{\frac{1}{5}}}{8^{-\frac{1}{5}}} =$

$= \frac{3^{\frac{4}{5}} \times (2^2 \times 3)^{\frac{1}{5}}}{(2^3)^{-\frac{1}{5}}}$

$= 2^{\frac{2}{5}+\frac{3}{5}} \times 3^{\frac{4}{5}+\frac{1}{5}}$

$= 2^1 \times 3^1$

$= 6$

Ans: (A) 6

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8. $\left(\frac{x^3}{x}\right)^4 \times \left(\frac{x}{x^2}\right)^3 \times \left(\frac{x^2}{x^3}\right)^5 =$

$= x^{2\times4} \times x^{-1\times3} \times x^{-1\times5}$

$= x^{8-3-5} = x^0 = 1$

Ans: (D) 1

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9. If $a = 1$, $b = 6$ and $c = -7$, then $a^3 + b^3 + c^3 =$

$a + b + c = 1 + 6 - 7 = 0$

So $a^3 + b^3 + c^3 = 3abc = 3 \times 1 \times 6 \times (-7) = -126$

Ans: (B) -126

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10. If $2^{4x} = 256$ and $10^y = 0.001$, then $x - y =$

$2^{4x} = 256 = 2^8 \Rightarrow 4x = 8 \Rightarrow x = 2$

$10^y = 0.001 = 10^{-3} \Rightarrow y = -3$

$x - y = 2 - (-3) = 5$

Ans: (B) 5

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11. If $2^{9x} \div 2^{4x} = \sqrt[4]{2^{30}}$, then $x =$

$\frac{2^{9x}}{2^{4x}} = 2^{\frac{30}{4}}$

$\Rightarrow 2^{9x-4x} = 2^{\frac{15}{2}}$

$\Rightarrow 5x = \frac{15}{2} \Rightarrow x = \frac{3}{2}$

Ans: (D) $\frac{3}{2}$

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12. If $11^{x-1} \times 2^x = 44$, then $x =$

$44 = 11^1 \times 2^2$

$\Rightarrow 11^{x-1} \times 2^x = 11^1 \times 2^2$

$\Rightarrow x - 1 = 1$ and $x = 2$

$\Rightarrow x = 2$ and $x = 2$

$\therefore x = 2$

Ans: (A) 2

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13. If $5^x = 2$, then $25^x =$

$25^x = (5^2)^x = (5^x)^2$

$= 2^2 = 4$

Ans: (D) 4

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14. If $\left(\frac{5}{2}\right)^x \left(\frac{2}{5}\right)^{4x} = \frac{8}{125}$, then $x =$

$\left(\frac{5}{2}\right)^x = \left(\frac{2}{5}\right)^{-x}$

$\Rightarrow \left(\frac{2}{5}\right)^{-x} \cdot \left(\frac{2}{5}\right)^{4x} = \left(\frac{2}{5}\right)^3$

$\Rightarrow \left(\frac{2}{5}\right)^{3x} = \left(\frac{2}{5}\right)^3$

$\Rightarrow 3x = 3 \Rightarrow x = 1$

Ans: (A) 1

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15. If $7^{x+1} - 7^x = 294$, then $x =$

$7 \times 7^x - 7^x = 294$

$\Rightarrow 7^x (7 - 1) = 294$

$\Rightarrow 7^x \times 6 = 294$

$\Rightarrow 7^x = 294 \times \frac{1}{6} = 49 = 7^2$

$\Rightarrow x = 2$

Ans: (B) 2

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16. If $16^x = \frac{8}{2^x}$, then $x =$

$(2^4)^x \cdot 2^x = 2^3 \Rightarrow 2^{5x} = 2^3$

$\Rightarrow 5x = 3 \Rightarrow x = \frac{3}{5}$

Ans: (C) $\frac{3}{5}$

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17. $\frac{2}{1+x^{a-b}} + \frac{2}{1+x^{b-a}} =$

$= 2\left(\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}}\right) = 2 \times 1 = 2$

Ans: (C) 2

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18. If $a = 2$ and $b = 1$, then $\left(\frac{2^{a^2+b^2}}{2^{ab}}\right)^{a+b} =$

$\left(\frac{2^{a^2+b^2}}{2^{ab}}\right)^{a+b} = 2^{(a+b)(a^2-ab+b^2)} = 2^{a^3+b^3}$

$= 2^{8+1} = 2^9$

Ans: (A) 2^9

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19. If $6^x = 5$, $5^y = 11$ and $11^z = 6$, then $xyz =$

$11 = 5^y = (6^x)^y = 6^{xy}$

$6 = 11^z = (6^{xy})^z = 6^{xyz}$

$6^{xyz} = 6 = 6^1$

$\Rightarrow xyz = 1$

Ans: (C) 1

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20. If $a^x = b^y = c^z$ and $b = ac$, then $y =$

Let each $= k$: $a = k^{\frac{1}{x}}$, $b = k^{\frac{1}{y}}$, $c = k^{\frac{1}{z}}$

$b = ac \Rightarrow k^{\frac{1}{y}} = k^{\frac{1}{x}+\frac{1}{z}} \Rightarrow \frac{1}{y} = \frac{x+z}{xz}$

$y = \frac{xz}{x+z}$

Ans: (A) $\frac{xz}{x+z}$

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21. $(0.729)^{\frac{2}{3}} =$

$0.729 = \frac{729}{1000} = \left(\frac{9}{10}\right)^3 = (0.9)^3$

$(0.729)^{\frac{2}{3}} = \left[(0.9)^3\right]^{\frac{2}{3}} = (0.9)^2 = 0.81$

Ans: (B) 0.81

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22. $\left(\frac{4}{\sqrt{3}}\right)^3 \div \left(\frac{4}{\sqrt{3}}\right)^5 =$

$\frac{a^m}{a^n} = \frac{1}{a^{n-m}}$

$\left(\frac{4}{\sqrt{3}}\right)^3 \div \left(\frac{4}{\sqrt{3}}\right)^5 = \frac{1}{\left(\frac{4}{\sqrt{3}}\right)^2}$

$= \frac{3}{16}$

Ans: (B) $\frac{3}{16}$

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23. $(x^{\frac{1}{3}} + y^{\frac{1}{3}})(x^{\frac{2}{3}} - x^{\frac{1}{3}}y^{\frac{1}{3}} + y^{\frac{2}{3}}) =$

$(a+b)(a^2+b^2-ab) = a^3+b^3$ with $a = x^{\frac{1}{3}}$, $b = y^{\frac{1}{3}}$

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

Ans: (A) $x + y$

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24. If $\frac{x^{2.5}}{x^{0.5}} = 49$ and $x > 0$, then $x =$

$x^{2.5-0.5} = x^2 = 49$

$x = 7$

Ans: (D) 7

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25. $\left\{\left(10^2\right)^{-3}\right\}^{\frac{1}{2}} =$

$= 10^{2\times(-3)\times\frac{1}{2}}$

$= 10^{-3}$

$= \frac{1}{1000}$

Ans: (D) $\frac{1}{1000}$