EXPRESSWALA ACADEMY

Exponents (Level 2)

MCQ Test, Set 02

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. $\sqrt[4]{5^3} =$

A. $5^{\frac{3}{4}}$ **B.** 5^{-1} **C.** 5^{12} **D.** $5^{\frac{4}{3}}$

2. If $a^5 = 3^{20}$ and $a > 0$, then $a =$

A. 81 **B.** 3^{100} **C.** $3^{\frac{1}{4}}$ **D.** 3^{15}

3. $8^4 \times 2^{-11} =$

A. 8^{-7} **B.** $\frac{1}{2}$ **C.** 2 **D.** 2^{23}

4. $(81)^{\frac{3}{4}} \div (32)^{\frac{3}{5}} =$

A. $\frac{8}{27}$ **B.** $\frac{27}{8}$ **C.** $\frac{27}{2}$ **D.** $\frac{3}{2}$

5. $\left(\sqrt[3]{27}\right)^{-\frac{1}{2}} =$

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

6. $\left(\frac{16}{81}\right)^{-\frac{3}{4}} =$

A. $-\frac{27}{8}$ **B.** $\frac{8}{27}$ **C.** $\frac{27}{8}$ **D.** $\frac{3}{2}$

7. $\frac{8^{\frac{1}{2}} \times 25^{-\frac{1}{4}}}{10^{-\frac{1}{2}}} =$

A. 4 **B.** 1 **C.** $\frac{1}{4}$ **D.** 8

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

A. 1 **B.** 0 **C.** 5^{12} **D.** 5

9. If $a + b + c = 0$ and $abc = 4$, then $a^3 + b^3 + c^3 =$

A. 0 **B.** 12 **C.** 4 **D.** 64

10. If $\frac{2^{4x} \times 16^2 \times 32}{2^x} = 2^7$, then $x =$

A. -6 **B.** $-\frac{6}{5}$ **C.** -2 **D.** $\frac{20}{3}$

11. If $25^x = (5\sqrt{5})^6$, then $x =$

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

12. If $3^{x-3} \times 2^{2x-4} = 48$, then $x =$

A. 4 **B.** 5 **C.** $\frac{5}{2}$ **D.** 7

13. If $3^x = 7$, then $9^x =$

A. 63 **B.** 14 **C.** $\frac{7}{9}$ **D.** 49

14. If $\left(\sqrt{\frac{3}{2}}\right)^{x-2} = \frac{4}{9}$, then $x =$

A. 0 **B.** 6 **C.** -2 **D.** -6

15. If $9^x + 3^{2x+1} = 324$, then $x =$

A. 2 **B.** 3 **C.** 4 **D.** 1

16. If $4^x = \frac{32}{2^x}$, then $x =$

A. $\frac{5}{2}$ **B.** $\frac{5}{3}$ **C.** $-\frac{5}{3}$ **D.** 5

17. $\frac{1}{1+x^{p-q}} + \frac{1}{1+x^{q-p}} =$

A. x^{p-q} **B.** 1 **C.** 0 **D.** 2

18. $\left(x^{a^2+ab+b^2}\right)^{a-b} =$

A. $x^{a^3+b^3}$ **B.** $x^{a^2-b^2}$ **C.** $x^{(a-b)^3}$ **D.** $x^{a^3-b^3}$

19. If $2^x = 7$, $7^y = 3$ and $3^z = 8$, then $xyz =$

A. -3 **B.** 3 **C.** 8 **D.** 1

20. If $2^x = 5^y = 10^{-z}$, then $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} =$

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

21. $\sqrt[3]{125^{-2}} =$

A. -25 **B.** $\frac{1}{5}$ **C.** 25 **D.** $\frac{1}{25}$

22. $\left(\frac{2}{\sqrt{5}}\right)^7 \div \left(\frac{2}{\sqrt{5}}\right)^{10} =$

A. $\frac{125}{8}$ **B.** $\frac{8\sqrt{5}}{25}$ **C.** $\frac{5\sqrt{5}}{8}$ **D.** $\frac{8}{125}$

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

A. 2 **B.** $\frac{17}{4}$ **C.** $\frac{5}{2}$ **D.** $\frac{3}{2}$

24. $(81)^{0.3} \times (81)^{0.45} =$

A. 3 **B.** $\frac{1}{27}$ **C.** 9 **D.** 27

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

A. 64 **B.** 2 **C.** 4 **D.** $\frac{1}{4}$

Key sheet

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

Solutions

1. $\sqrt[4]{5^3} =$

$\sqrt[n]{a^m} = a^{\frac{m}{n}}$, so $\sqrt[4]{5^3} = 5^{\frac{3}{4}}$

Ans: (A) $5^{\frac{3}{4}}$

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2. If $a^5 = 3^{20}$ and $a > 0$, then $a =$

$a^m = b^n \Rightarrow a = b^{\frac{n}{m}}$

$a = 3^{\frac{20}{5}} = 3^4 = 81$

Ans: (A) 81

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3. $8^4 \times 2^{-11} =$

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

$= 2^{12} \times 2^{-11}$

$= 2^{12-11} = 2^1$

$= 2$

Ans: (C) 2

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4. $(81)^{\frac{3}{4}} \div (32)^{\frac{3}{5}} =$

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

$= 3^3 \div 2^3$

$= 27 \div 8 = \frac{27}{8}$

Ans: (B) $\frac{27}{8}$

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5. $\left(\sqrt[3]{27}\right)^{-\frac{1}{2}} =$

$\sqrt[3]{27} = 3$

$\left(\sqrt[3]{27}\right)^{-\frac{1}{2}} = 3^{-\frac{1}{2}}$

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

Ans: (D) $\frac{1}{\sqrt{3}}$

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6. $\left(\frac{16}{81}\right)^{-\frac{3}{4}} =$

$\left(\frac{16}{81}\right)^{-\frac{3}{4}} = \left[\left(\frac{2}{3}\right)^4\right]^{-\frac{3}{4}}$

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

$= \frac{27}{8}$

Ans: (C) $\frac{27}{8}$

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7. $\frac{8^{\frac{1}{2}} \times 25^{-\frac{1}{4}}}{10^{-\frac{1}{2}}} =$

$= \frac{(2^3)^{\frac{1}{2}} \times (5^2)^{-\frac{1}{4}}}{(2\times5)^{-\frac{1}{2}}}$

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

$= 2^2 \times 5^0$

$= 4$

Ans: (A) 4

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

Powers: $(4-2)(3) + (2-3)(4) + (3-4)(2)$

$= 6 - 4 - 2 = 0$

Value $= 5^0 = 1$

Ans: (A) 1

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9. If $a + b + c = 0$ and $abc = 4$, then $a^3 + b^3 + c^3 =$

$a + b + c = 0 \Rightarrow a^3 + b^3 + c^3 = 3abc$

$= 3 \times 4 = 12$

Ans: (B) 12

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10. If $\frac{2^{4x} \times 16^2 \times 32}{2^x} = 2^7$, then $x =$

$\frac{2^{4x}}{2^x} \times (2^4)^2 \times 2^5 = 2^7$

$\Rightarrow 2^{3x} \times 2^8 \times 2^5 = 2^7$

$\Rightarrow 2^{3x+13} = 2^7$

$\Rightarrow 3x + 13 = 7 \Rightarrow 3x = -6 \Rightarrow x = -2$

Ans: (C) -2

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11. If $25^x = (5\sqrt{5})^6$, then $x =$

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

$(5^2)^x = \left(5^{\frac{3}{2}}\right)^6$

$\Rightarrow 5^{2x} = 5^9$

$\Rightarrow 2x = 9 \Rightarrow x = \frac{9}{2}$

Ans: (B) $\frac{9}{2}$

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12. If $3^{x-3} \times 2^{2x-4} = 48$, then $x =$

$48 = 3^1 \times 2^4$

$\Rightarrow 3^{x-3} \times 2^{2x-4} = 3^1 \times 2^4$

$\Rightarrow x - 3 = 1$ and $2x - 4 = 4$

$\Rightarrow x = 4$ and $x = 4$

$\therefore x = 4$

Ans: (A) 4

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13. If $3^x = 7$, then $9^x =$

$9^x = (3^2)^x = (3^x)^2$

$= 7^2 = 49$

Ans: (D) 49

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14. If $\left(\sqrt{\frac{3}{2}}\right)^{x-2} = \frac{4}{9}$, then $x =$

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

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

$\Rightarrow \frac{x-2}{2} = -2$

$\Rightarrow x - 2 = -4$

$\Rightarrow x = -2$

Ans: (C) -2

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15. If $9^x + 3^{2x+1} = 324$, then $x =$

$(3^2)^x + 3^{2x+1} = 324$

$\Rightarrow 3^{2x} + 3^{2x+1} = 324$

$\Rightarrow 3^{2x} + 3 \times 3^{2x} = 324$

$\Rightarrow 3^{2x}(1 + 3) = 324$

$\Rightarrow 3^{2x} \times 4 = 324$

$\Rightarrow 3^{2x} = 324 \times \frac{1}{4} = 81 = 3^4$

$\Rightarrow 2x = 4 \Rightarrow x = 2$

Ans: (A) 2

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16. If $4^x = \frac{32}{2^x}$, then $x =$

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

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

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

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17. $\frac{1}{1+x^{p-q}} + \frac{1}{1+x^{q-p}} =$

$= \frac{x^q}{x^q+x^p} + \frac{x^p}{x^p+x^q}$

$= \frac{x^q+x^p}{x^p+x^q} = 1$

Ans: (B) 1

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18. $\left(x^{a^2+ab+b^2}\right)^{a-b} =$

$= x^{(a-b)(a^2+ab+b^2)}$

$= x^{a^3+a^2b+ab^2-a^2b-ab^2-b^3} = x^{a^3-b^3}$

Ans: (D) $x^{a^3-b^3}$

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19. If $2^x = 7$, $7^y = 3$ and $3^z = 8$, then $xyz =$

$3 = 7^y = (2^x)^y = 2^{xy}$

$8 = 3^z = (2^{xy})^z = 2^{xyz}$

$2^{xyz} = 8 = 2^3$

$\Rightarrow xyz = 3$

Ans: (B) 3

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20. If $2^x = 5^y = 10^{-z}$, then $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} =$

Let each $= k$: $2 = k^{\frac{1}{x}}$, $5 = k^{\frac{1}{y}}$, $10 = k^{-\frac{1}{z}}$

$10 = 2 \times 5$, so $\frac{1}{x} + \frac{1}{y} = -\frac{1}{z}$, so the sum is 0

Ans: (D) 0

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21. $\sqrt[3]{125^{-2}} =$

$\sqrt[n]{a^m} = a^{\frac{m}{n}}$

$\sqrt[3]{125^{-2}} = 125^{-\frac{2}{3}} = (5^3)^{-\frac{2}{3}}$

$= 5^{-2} = \frac{1}{5^2} = \frac{1}{25}$

Ans: (D) $\frac{1}{25}$

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22. $\left(\frac{2}{\sqrt{5}}\right)^7 \div \left(\frac{2}{\sqrt{5}}\right)^{10} =$

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

$\left(\frac{2}{\sqrt{5}}\right)^7 \div \left(\frac{2}{\sqrt{5}}\right)^{10} = \frac{1}{\left(\frac{2}{\sqrt{5}}\right)^3}$

$= \frac{5\sqrt{5}}{8}$

Ans: (C) $\frac{5\sqrt{5}}{8}$

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

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

$ab = x^{\frac{1}{3}} \cdot x^{-\frac{1}{3}} = x^0 = 1$

So the value $= (x^{\frac{1}{3}})^3 + (x^{-\frac{1}{3}})^3 = x + \frac{1}{x}$

$= 2 + \frac{1}{2} = \frac{5}{2}$

Ans: (C) $\frac{5}{2}$

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24. $(81)^{0.3} \times (81)^{0.45} =$

$= (81)^{0.3+0.45} = (81)^{0.75}$

$0.75 = \frac{3}{4}$

$= (3^4)^{\frac{3}{4}} = 27$

Ans: (D) 27

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

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

$= 2^2$

$= 4$

Ans: (C) 4