EXPRESSWALA ACADEMY

Exponents (Level 2)

MCQ Test, Set 10

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. $\left(\sqrt{3}\right)^{-4} =$

A. $\frac{1}{9}$ **B.** 9 **C.** $\frac{1}{81}$ **D.** -6

2. Which of these is undefined?

A. 5^0 **B.** 0^0 **C.** $(-5)^0$ **D.** 0^5

3. $216^2 \times 36^{-2} =$

A. 6^{10} **B.** $\frac{1}{36}$ **C.** 36 **D.** 1

4. $(36)^{\frac{3}{2}} \div (128)^{\frac{2}{7}} =$

A. $\frac{1}{54}$ **B.** 108 **C.** 3 **D.** 54

5. $\left(-\frac{32}{243}\right)^{-\frac{1}{5}} =$

A. $-\frac{2}{3}$ **B.** $-\frac{243}{32}$ **C.** $-\frac{3}{2}$ **D.** $\frac{3}{2}$

6. $\left(\frac{1}{9}\right)^{-\frac{1}{2}} - \left(\frac{1}{8}\right)^{-\frac{1}{3}} =$

A. -1 **B.** $\frac{5}{2}$ **C.** $-\frac{1}{6}$ **D.** 1

7. $\frac{4^{\frac{4}{5}} \times 6^{\frac{3}{5}}}{12^{\frac{3}{5}}} =$

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

8. $(x^{a-b})^{a+b} \div (x^{a-c})^{a+c} =$

A. $x^{b^2-c^2}$ **B.** $x^{2a^2-b^2-c^2}$ **C.** 1 **D.** $x^{c^2-b^2}$

9. If $a = -2$, $b = -3$ and $c = 5$, then $a^3 + b^3 + c^3 =$

A. 90 **B.** -90 **C.** 0 **D.** 30

10. If $\frac{7^{4x} \times 49^2 \times 343}{7^x} = 7^1$, then $x =$

A. $\frac{8}{3}$ **B.** -6 **C.** $-\frac{6}{5}$ **D.** -2

11. If $49^x = (7\sqrt{7})^2$, then $x =$

A. $\frac{1}{2}$ **B.** 3 **C.** 1 **D.** $\frac{3}{2}$

12. If $2^{x-3} \times 13^{x-4} = 52$, then $x =$

A. 5 **B.** -5 **C.** 6 **D.** 4

13. If $7^{2y} = 25$, then $7^{-y} =$

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

14. If $49^{x} = \frac{1}{343}$, then $x =$

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

15. If $4^{x} + 2^{2x+1} = 48$, then $x =$

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

16. If $4^{x+1} = 64$, then $5^{x+1} =$

A. $\frac{1}{125}$ **B.** 625 **C.** 125 **D.** 25

17. $\frac{1}{1+4^{\frac{1}{2}}} + \frac{1}{1+4^{-\frac{1}{2}}} =$

A. 2 **B.** 1 **C.** $\frac{2}{3}$ **D.** $\frac{1}{3}$

18. $\left(\frac{x^{p^2+q^2}}{x^{pq}}\right)^{p+q} \cdot \left(\frac{x^{q^2+r^2}}{x^{qr}}\right)^{q+r} =$

A. $x^{p^3+r^3}$ **B.** $x^{p^3+2q^3+r^3}$ **C.** $x^{p^3+q^3+r^3}$ **D.** $x^{p^3-r^3}$

19. If $2^{p} = 3$, $3^{q} = 5$, $5^{r} = 7$ and $7^{t} = \frac{1}{8}$, then $pqrt =$

A. 3 **B.** $\frac{1}{8}$ **C.** -3 **D.** 1

20. If $7^{x} = 2^{y} = 56^{z}$, then $\frac{1}{z} =$

A. $\frac{1}{x} + \frac{3}{y}$ **B.** $\frac{3}{x} + \frac{1}{y}$

C. $\frac{1}{x} + \frac{1}{y}$ **D.** $\frac{3}{x+y}$

21. $(0.04)^{\frac{3}{2}} =$

A. 0.008 **B.** 0.06 **C.** 0.08 **D.** 0.8

22. $\left(\frac{\sqrt{10}}{3}\right)^{4} \div \left(\frac{\sqrt{10}}{3}\right)^{6} =$

A. $\frac{100}{9}$ **B.** $\frac{10}{9}$ **C.** $\frac{9}{10}$ **D.** $\frac{9}{100}$

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

A. $x - \frac{1}{x}$ **B.** 1 **C.** $x + \frac{1}{x}$ **D.** $x^2 + \frac{1}{x^2}$

24. $(9)^{0.75} \times (9)^{0.75} =$

A. 27 **B.** 81 **C.** 3 **D.** 9

25. $\left[\left\{\left(\frac{1}{11}\right)^{2}\right\}^{-3}\right]^{\frac{1}{2}} =$

A. 121 **B.** 11 **C.** $\frac{1}{1331}$ **D.** 1331

Key sheet

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

Solutions

1. $\left(\sqrt{3}\right)^{-4} =$

$\left(\sqrt{3}\right)^{-4} = \left(3^{\frac{1}{2}}\right)^{-4} = 3^{-2} = \frac{1}{9}$

Ans: (A) $\frac{1}{9}$

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2. Which of these is undefined?

$a^0 = 1$ only when $a \neq 0$; the notes say 0^0 is undefined

Ans: (B) 0^0

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3. $216^2 \times 36^{-2} =$

$= (6^3)^2 \times (6^2)^{-2}$

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

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

$= 36$

Ans: (C) 36

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4. $(36)^{\frac{3}{2}} \div (128)^{\frac{2}{7}} =$

$(6^2)^{\frac{3}{2}} \div (2^7)^{\frac{2}{7}}$

$= 6^3 \div 2^2$

$= 216 \div 4 = 54$

Ans: (D) 54

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5. $\left(-\frac{32}{243}\right)^{-\frac{1}{5}} =$

$\left(-\frac{32}{243}\right)^{-\frac{1}{5}} = \left[\left(-\frac{2}{3}\right)^5\right]^{-\frac{1}{5}}$

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

$= -\frac{3}{2}$

Ans: (C) $-\frac{3}{2}$

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6. $\left(\frac{1}{9}\right)^{-\frac{1}{2}} - \left(\frac{1}{8}\right)^{-\frac{1}{3}} =$

$\left(\frac{1}{9}\right)^{-\frac{1}{2}} = \left[\left(\frac{1}{3}\right)^2\right]^{-\frac{1}{2}} = 3$

$\left(\frac{1}{8}\right)^{-\frac{1}{3}} = \left[\left(\frac{1}{2}\right)^3\right]^{-\frac{1}{3}} = 2$

$3 - 2 = 1$

Ans: (D) 1

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7. $\frac{4^{\frac{4}{5}} \times 6^{\frac{3}{5}}}{12^{\frac{3}{5}}} =$

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

$= 2^{\frac{8}{5}+\frac{3}{5}-\frac{6}{5}} \times 3^{\frac{3}{5}-\frac{3}{5}}$

$= 2^1 \times 3^0$

$= 2$

Ans: (B) 2

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8. $(x^{a-b})^{a+b} \div (x^{a-c})^{a+c} =$

$= x^{a^2-b^2} \div x^{a^2-c^2}$

$= x^{a^2-b^2-a^2+c^2} = x^{c^2-b^2}$

Ans: (D) $x^{c^2-b^2}$

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9. If $a = -2$, $b = -3$ and $c = 5$, then $a^3 + b^3 + c^3 =$

$a + b + c = -2 - 3 + 5 = 0$

So $a^3 + b^3 + c^3 = 3abc = 3 \times (-2) \times (-3) \times 5 = 90$

Ans: (A) 90

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10. If $\frac{7^{4x} \times 49^2 \times 343}{7^x} = 7^1$, then $x =$

$\frac{7^{4x}}{7^x} \times (7^2)^2 \times 7^3 = 7^1$

$\Rightarrow 7^{3x} \times 7^4 \times 7^3 = 7^1$

$\Rightarrow 7^{3x+7} = 7^1$

$\Rightarrow 3x + 7 = 1 \Rightarrow 3x = -6 \Rightarrow x = -2$

Ans: (D) -2

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11. If $49^x = (7\sqrt{7})^2$, then $x =$

$7\sqrt{7} = 7^1 \times 7^{\frac{1}{2}} = 7^{\frac{3}{2}}$

$(7^2)^x = \left(7^{\frac{3}{2}}\right)^2$

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

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

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

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12. If $2^{x-3} \times 13^{x-4} = 52$, then $x =$

$52 = 2^2 \times 13^1$

$\Rightarrow 2^{x-3} \times 13^{x-4} = 2^2 \times 13^1$

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

$\Rightarrow x = 5$ and $x = 5$

$\therefore x = 5$

Ans: (A) 5

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13. If $7^{2y} = 25$, then $7^{-y} =$

$(7^y)^2 = 5^2$

$\Rightarrow 7^y = 5$

$7^{-y} = \frac{1}{7^y} = \frac{1}{5}$

Ans: (A) $\frac{1}{5}$

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14. If $49^x = \frac{1}{343}$, then $x =$

$(7^2)^x = \frac{1}{7^3}$

$\Rightarrow 7^{2x} = 7^{-3}$

$\Rightarrow 2x = -3$

$\Rightarrow x = -\frac{3}{2}$

Ans: (B) $-\frac{3}{2}$

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15. If $4^x + 2^{2x+1} = 48$, then $x =$

$(2^2)^x + 2^{2x+1} = 48$

$\Rightarrow 2^{2x} + 2^{2x+1} = 48$

$\Rightarrow 2^{2x} + 2 \times 2^{2x} = 48$

$\Rightarrow 2^{2x}\,(1 + 2) = 48$

$\Rightarrow 2^{2x} \times 3 = 48$

$\Rightarrow 2^{2x} = 48 \times \frac{1}{3} = 16 = 2^4$

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

Ans: (B) 2

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16. If $4^{x+1} = 64$, then $5^{x+1} =$

$(2^2)^{x+1} = 2^6 \Rightarrow 2x + 2 = 6 \Rightarrow x = 2$

$5^{2+1} = 5^3 = 125$

Ans: (C) 125

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17. $\frac{1}{1+4^{\frac{1}{2}}} + \frac{1}{1+4^{-\frac{1}{2}}} =$

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

$\frac{1}{1+2} + \frac{1}{1+\frac{1}{2}} = \frac{1}{3} + \frac{2}{3} = 1$

Ans: (B) 1

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18. $\left(\frac{x^{p^2+q^2}}{x^{pq}}\right)^{p+q} \cdot \left(\frac{x^{q^2+r^2}}{x^{qr}}\right)^{q+r} =$

$= x^{(p+q)(p^2-pq+q^2)} \cdot x^{(q+r)(q^2-qr+r^2)}$

$= x^{p^3+q^3} \cdot x^{q^3+r^3} = x^{p^3+2q^3+r^3}$

Ans: (B) $x^{p^3+2q^3+r^3}$

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19. If $2^p = 3$, $3^q = 5$, $5^r = 7$ and $7^t = \frac{1}{8}$, then $pqrt =$

$5 = 3^q = (2^p)^q = 2^{pq}$

$7 = 5^r = (2^{pq})^r = 2^{pqr}$

$\frac{1}{8} = 7^t = (2^{pqr})^t = 2^{pqrt}$

$2^{pqrt} = \frac{1}{8} = 2^{-3}$

$\Rightarrow pqrt = -3$

Ans: (C) -3

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20. If $7^x = 2^y = 56^z$, then $\frac{1}{z} =$

Let each $= k$: $7 = k^{\frac{1}{x}}$, $2 = k^{\frac{1}{y}}$, $56 = k^{\frac{1}{z}}$

$56 = 7 \times 2^3$, so $\frac{1}{z} = \frac{1}{x} + \frac{3}{y}$

Ans: (A) $\frac{1}{x} + \frac{3}{y}$

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21. $(0.04)^{\frac{3}{2}} =$

$0.04 = \frac{4}{100} = \left(\frac{2}{10}\right)^2 = (0.2)^2$

$(0.04)^{\frac{3}{2}} = \left[(0.2)^2\right]^{\frac{3}{2}} = (0.2)^3 = 0.008$

Ans: (A) 0.008

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22. $\left(\frac{\sqrt{10}}{3}\right)^4 \div \left(\frac{\sqrt{10}}{3}\right)^6 =$

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

$\left(\frac{\sqrt{10}}{3}\right)^4 \div \left(\frac{\sqrt{10}}{3}\right)^6 = \frac{1}{\left(\frac{\sqrt{10}}{3}\right)^2}$

$= \frac{9}{10}$

Ans: (C) $\frac{9}{10}$

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

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

$= x + x^{-1} = x + \frac{1}{x}$

Ans: (C) $x + \frac{1}{x}$

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24. $(9)^{0.75} \times (9)^{0.75} =$

$= (9)^{0.75+0.75} = (9)^{1.5}$

$1.5 = \frac{3}{2}$

$= (3^2)^{\frac{3}{2}} = 27$

Ans: (A) 27

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25. $\left[\left\{\left(\frac{1}{11}\right)^2\right\}^{-3}\right]^{\frac{1}{2}} =$

$\frac{1}{11} = 11^{-1}$

$= 11^{(-1)\times 2\times(-3)\times\frac{1}{2}}$

$= 11^3$

$= 1331$

Ans: (D) 1331