

# Exponents (Level 2)

## MCQ Test, Set 04

Time: 30 minutes

Maximum marks: 25

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

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

1.  $\sqrt[7]{3^2} \times \sqrt[7]{3^5} =$

A.  $3^{\frac{10}{49}}$

B. 9

C.  $3^{\frac{10}{7}}$

D. 3

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

A. 1

B.  $\frac{4}{9}$

C.  $\left(\frac{2}{3}\right)^8$

D.  $\frac{9}{4}$

3.  $128^2 \times 4^{-6} =$

A.  $2^{26}$

B.  $\frac{1}{4}$

C.  $128^{-4}$

D. 4

4.  $(64)^{\frac{2}{3}} \times (25)^{\frac{3}{2}} =$

A. 80

B. 2000

C.  $\frac{1}{2000}$

D. 10

5.  $\left(\frac{49}{64}\right)^{-\frac{1}{2}} =$

A.  $\frac{64}{49}$

B.  $\frac{7}{8}$

C.  $-\frac{8}{7}$

D.  $\frac{8}{7}$

6.  $\left(\frac{25}{9}\right)^{-\frac{3}{2}} =$

A.  $\frac{27}{125}$

B.  $-\frac{27}{125}$

C.  $\frac{125}{27}$

D.  $\frac{3}{5}$

7.  $\frac{15^{\frac{1}{5}} \times 25^{\frac{2}{5}}}{3^{-\frac{4}{5}}} =$

A. 5

B. 3

C. 30

D. 15

8.  $\left(\frac{7^3}{7^5}\right)^8 \times \left(\frac{7^5}{7^6}\right)^{11} \times \left(\frac{7^6}{7^3}\right)^9 =$

A. 1

B. 7

C. 0

D.  $7^{54}$

9. If  $x + y + z = 0$ , then  $\frac{x^3 + y^3 + z^3}{xyz} =$

A. 1

B. 3

C.  $xyz$

D. 0

10. If  $8^x = (2\sqrt{2})^6$ , then  $x =$

A. 2

B. 9

C. 3

D. 1

11. If  $\frac{5^{3x} \times 25^3 \times 125}{5^x} = 5^{11}$ , then  $x =$

A.  $\frac{1}{2}$

B. 2

C. 1

D. 10

12. If  $2^{2x-1} \times 5^{x-1} = 40$ , then  $x =$

A. 2

B. 3

C. 4

D. 1

13. If  $5^x = 250$ , then  $5^{x-3} =$

A. 31250

B. 2

C. 247

D.  $\frac{250}{3}$

14. If  $32^x = \frac{1}{4}$ , then  $x =$

A.  $\frac{2}{5}$

B.  $-\frac{2}{5}$

C.  $-\frac{5}{2}$

D.  $-2$

15. If  $25^{x+1} - 5^{2x+1} = 500$ , then  $x =$

A. 0

B.  $-1$

C. 1

D. 2

16. If  $\sqrt{5^n} = 625$ , then  $2^{\frac{n}{2}} =$

A. 256

B. 16

C. 8

D. 4

17.  $\frac{1}{1+3^{-2}} + \frac{1}{1+3^2} =$

A.  $-\frac{1}{40}$

B.  $\frac{1}{5}$

C.  $\frac{9}{10}$

D. 1

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

A.  $x^{a^3+b^3}$

B.  $x^{(a+b)^3}$

C.  $x^{a^3-b^3}$

D.  $x^{a^3+b^3+2ab}$

19. If  $5^x = 3$ ,  $3^y = 2$  and  $2^z = 25$ , then  $xyz =$

A. 1

B.  $-2$

C. 2

D. 25

20. If  $5^x = 3^y = 45^z$ , then  $z =$

A.  $\frac{xy}{x+y}$

B.  $\frac{xy}{2y+x}$

C.  $\frac{xy}{y+2x}$

D.  $\frac{2xy}{x+y}$

21.  $\sqrt[4]{81^{-3}} =$

A.  $-27$

B. 27

C.  $\frac{1}{3}$

D.  $\frac{1}{27}$

22.  $\left(\frac{\sqrt{5}}{3}\right)^6 \div \left(\frac{\sqrt{5}}{3}\right)^8 =$

A.  $\frac{5}{9}$

B.  $\frac{9}{25}$

C.  $\frac{9}{5}$

D.  $\frac{25}{9}$

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

A.  $-\frac{8}{3}$

B.  $\frac{1}{3}$

C.  $\frac{10}{3}$

D. 3

24.  $(4096)^{0.15} \times (4096)^{0.1} =$

A. 8

B. 2

C. 1024

D. 64

25.  $\left[\left\{\left(\frac{1}{7}\right)^2\right\}^{-3}\right]^{\frac{1}{6}} =$

A. 7

B. 49

C.  $\frac{1}{49}$

D.  $\frac{1}{7}$

## Key sheet

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

## Solutions

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1.  $\sqrt[7]{3^2} \times \sqrt[7]{3^5} =$   
 $3^{\frac{2}{7}} \times 3^{\frac{5}{7}} = 3^{\frac{2}{7} + \frac{5}{7}} = 3^1 = 3$

Ans: (D) 3

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2.  $\left(\frac{2}{3}\right)^5 \times \left(\frac{3}{2}\right)^3 =$   
 $\left(\frac{3}{2}\right)^3 = \left(\frac{2}{3}\right)^{-3}$   
 $\left(\frac{2}{3}\right)^{5-3} = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$

Ans: (B)  $\frac{4}{9}$

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3.  $128^2 \times 4^{-6} =$   
 $= (2^7)^2 \times (2^2)^{-6}$   
 $= 2^{14} \times 2^{-12}$   
 $= 2^{14-12} = 2^2$   
 $= 4$

Ans: (D) 4

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4.  $(64)^{\frac{2}{3}} \times (25)^{\frac{3}{2}} =$   
 $(2^6)^{\frac{2}{3}} \times (5^2)^{\frac{3}{2}}$   
 $= 2^4 \times 5^3$   
 $= 16 \times 125 = 2000$

Ans: (B) 2000

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5.  $\left(\frac{49}{64}\right)^{-\frac{1}{2}} =$   
 $\left(\frac{49}{64}\right)^{-\frac{1}{2}} = \left[\left(\frac{7}{8}\right)^2\right]^{-\frac{1}{2}}$   
 $= \left(\frac{7}{8}\right)^{-1} = \left(\frac{8}{7}\right)^1$   
 $= \frac{8}{7}$

Ans: (D)  $\frac{8}{7}$

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6.  $\left(\frac{25}{9}\right)^{-\frac{3}{2}} =$   
 $\left(\frac{25}{9}\right)^{-\frac{3}{2}} = \left[\left(\frac{5}{3}\right)^2\right]^{-\frac{3}{2}}$   
 $= \left(\frac{5}{3}\right)^{-3} = \left(\frac{3}{5}\right)^3$   
 $= \frac{27}{125}$

Ans: (A)  $\frac{27}{125}$

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$$\begin{aligned}
 7. \frac{15^{\frac{1}{5}} \times 25^{\frac{2}{5}}}{3^{-\frac{4}{5}}} &= \\
 &= \frac{(3 \times 5)^{\frac{1}{5}} \times (5^2)^{\frac{2}{5}}}{3^{-\frac{4}{5}}} \\
 &= 3^{\frac{1}{5} + \frac{4}{5}} \times 5^{\frac{1}{5} + \frac{4}{5}} \\
 &= 3^1 \times 5^1 \\
 &= 15
 \end{aligned}$$

Ans: (D) 15

$$\begin{aligned}
 8. \left(\frac{7^3}{7^5}\right)^8 \times \left(\frac{7^5}{7^6}\right)^{11} \times \left(\frac{7^6}{7^3}\right)^9 &= \\
 \text{Powers: } (3 - 5)(8) + (5 - 6)(11) + (6 - 3)(9) &= \\
 = -16 - 11 + 27 = 0 &= \\
 \text{Value} = 7^0 = 1 &= \\
 \text{Ans: (A) 1} &=
 \end{aligned}$$

$$\begin{aligned}
 9. \text{ If } x + y + z = 0, \text{ then } \frac{x^3 + y^3 + z^3}{xyz} &= \\
 x + y + z = 0 \Rightarrow x^3 + y^3 + z^3 = 3xyz &= \\
 \frac{3xyz}{xyz} = 3 &= \\
 \text{Ans: (B) 3} &=
 \end{aligned}$$

$$\begin{aligned}
 10. \text{ If } 8^x = (2\sqrt{2})^6, \text{ then } x &= \\
 2\sqrt{2} = 2^1 \times 2^{\frac{1}{2}} = 2^{\frac{3}{2}} &= \\
 (2^3)^x = \left(2^{\frac{3}{2}}\right)^6 &= \\
 \Rightarrow 2^{3x} = 2^9 &= \\
 \Rightarrow 3x = 9 \Rightarrow x = 3 &= \\
 \text{Ans: (C) 3} &=
 \end{aligned}$$

$$\begin{aligned}
 11. \text{ If } \frac{5^{3x} \times 25^3 \times 125}{5^x} = 5^{11}, \text{ then } x &= \\
 \frac{5^{3x}}{5^x} \times (5^2)^3 \times 5^3 = 5^{11} &= \\
 \Rightarrow 5^{2x} \times 5^6 \times 5^3 = 5^{11} &= \\
 \Rightarrow 5^{2x+9} = 5^{11} &= \\
 \Rightarrow 2x + 9 = 11 \Rightarrow 2x = 2 \Rightarrow x = 1 &= \\
 \text{Ans: (C) 1} &=
 \end{aligned}$$

$$\begin{aligned}
 12. \text{ If } 2^{2x-1} \times 5^{x-1} = 40, \text{ then } x &= \\
 40 = 2^3 \times 5^1 &= \\
 \Rightarrow 2^{2x-1} \times 5^{x-1} = 2^3 \times 5^1 &= \\
 \Rightarrow 2x - 1 = 3 \text{ and } x - 1 = 1 &= \\
 \Rightarrow x = 2 \text{ and } x = 2 &= \\
 \therefore x = 2 &= \\
 \text{Ans: (A) 2} &=
 \end{aligned}$$

13. If  $5^x = 250$ , then  $5^{x-3} =$

$$\begin{aligned} 5^{x-3} &= \frac{5^x}{5^3} \\ &= \frac{250}{125} = 2 \end{aligned}$$

Ans: (B) 2

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14. If  $32^x = \frac{1}{4}$ , then  $x =$

$$\begin{aligned} (2^5)^x &= \frac{1}{2^2} \\ \Rightarrow 2^{5x} &= 2^{-2} \\ \Rightarrow 5x &= -2 \\ \Rightarrow x &= -\frac{2}{5} \end{aligned}$$

Ans: (B)  $-\frac{2}{5}$

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15. If  $25^{x+1} - 5^{2x+1} = 500$ , then  $x =$

$$\begin{aligned} (5^2)^{x+1} - 5^{2x+1} &= 500 \\ \Rightarrow 5^{2x+2} - 5^{2x+1} &= 500 \\ \Rightarrow 25 \times 5^{2x} - 5 \times 5^{2x} &= 500 \\ \Rightarrow 5^{2x} (25 - 5) &= 500 \\ \Rightarrow 5^{2x} \times 20 &= 500 \\ \Rightarrow 5^{2x} &= 500 \times \frac{1}{20} = 25 = 5^2 \\ \Rightarrow 2x &= 2 \Rightarrow x = 1 \end{aligned}$$

Ans: (C) 1

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16. If  $\sqrt{5^n} = 625$ , then  $2^{\frac{n}{2}} =$

$$\begin{aligned} 5^{\frac{n}{2}} &= 625 = 5^4 \Rightarrow \frac{n}{2} = 4 \Rightarrow n = 8 \\ 2^{\frac{8}{2}} &= 2^4 = 16 \end{aligned}$$

Ans: (B) 16

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17.  $\frac{1}{1+3^{-2}} + \frac{1}{1+3^2} =$

$$\frac{1}{1+\frac{1}{9}} + \frac{1}{1+9} = \frac{9}{10} + \frac{1}{10} = 1$$

Ans: (D) 1

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

$$\begin{aligned} &= x^{(a+b)(a^2-ab+b^2)} \\ &= x^{a^3-a^2b+ab^2+a^2b-ab^2+b^3} = x^{a^3+b^3} \end{aligned}$$

Ans: (A)  $x^{a^3+b^3}$

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19. If  $5^x = 3$ ,  $3^y = 2$  and  $2^z = 25$ , then  $xyz =$

$$\begin{aligned} 2 &= 3^y = (5^x)^y = 5^{xy} \\ 25 &= 2^z = (5^{xy})^z = 5^{xyz} \\ 5^{xyz} &= 25 = 5^2 \\ \Rightarrow xyz &= 2 \end{aligned}$$

Ans: (C) 2

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20. If  $5^x = 3^y = 45^z$ , then  $z =$

Let each  $= k$ :  $5 = k^{\frac{1}{x}}$ ,  $3 = k^{\frac{1}{y}}$ ,  $45 = k^{\frac{1}{z}}$

$45 = 5 \times 3^2$ , so  $\frac{1}{z} = \frac{1}{x} + \frac{2}{y} = \frac{y+2x}{xy}$ ,  $z = \frac{xy}{y+2x}$

Ans: (C)  $\frac{xy}{y+2x}$

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21.  $\sqrt[4]{81^{-3}} =$

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

$$\sqrt[4]{81^{-3}} = 81^{-\frac{3}{4}} = (3^4)^{-\frac{3}{4}}$$

$$= 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$$

Ans: (D)  $\frac{1}{27}$

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22.  $\left(\frac{\sqrt{5}}{3}\right)^6 \div \left(\frac{\sqrt{5}}{3}\right)^8 =$

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

$$\left(\frac{\sqrt{5}}{3}\right)^6 \div \left(\frac{\sqrt{5}}{3}\right)^8 = \frac{1}{\left(\frac{\sqrt{5}}{3}\right)^2}$$

$$= \frac{9}{5}$$

Ans: (C)  $\frac{9}{5}$

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

$$= \frac{1}{3} + 3 = \frac{10}{3}$$

Ans: (C)  $\frac{10}{3}$

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24.  $(4096)^{0.15} \times (4096)^{0.1} =$

$$= (4096)^{0.15+0.1} = (4096)^{0.25}$$

$$0.25 = \frac{1}{4}$$

$$= (2^{12})^{\frac{1}{4}} = 8$$

Ans: (A) 8

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25.  $\left[\left\{\left(\frac{1}{7}\right)^2\right\}^{-3}\right]^{\frac{1}{6}} =$

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

$$= 7^{(-1) \times 2 \times (-3) \times \frac{1}{6}}$$

$$= 7^1$$

$$= 7$$

Ans: (A) 7

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