

Exponents (Level 2)

MCQ Test, Set 03

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. $\sqrt[3]{5^{12}} =$

A. 5^{36} B. 5^{15}

C. 625

D. 5^9

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

A. 36

B. 17

C. 72

D. $\frac{1}{72}$

3. $625^2 \times 5^{-7} =$

A. 5

B. 5^{15} C. 625^{-5} D. $\frac{1}{5}$

4. $(49)^{\frac{1}{2}} \times (27)^{\frac{2}{3}} =$

A. 16

B. 21

C. 63

D. $\frac{1}{63}$

5. $\left(\frac{1}{32}\right)^{-\frac{2}{5}} =$

A. 4

B. -4

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

D. 2

6. $\left(-\frac{8}{125}\right)^{-\frac{1}{3}} =$

A. $\frac{5}{2}$ B. $-\frac{5}{2}$ C. $-\frac{125}{8}$ D. $-\frac{2}{5}$

7. $\frac{4^{\frac{4}{3}} \times 9^{\frac{4}{3}}}{6^{\frac{4}{3}}} =$

A. 9

B. 36

C. 4

D. 72

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

A. $x^{a^2+c^2}$

B. 1

C. $x^{(a-c)^2}$ D. $x^{a^2-c^2}$

9. If $a = 4$, $b = 1$ and $c = -5$, then $a^3 + b^3 + c^3 =$

A. 0

B. -20

C. -60

D. 60

10. If $4^{3x} = 64$ and $10^y = 0.01$, then $x + y =$

A. 1

B. 3

C. -2

D. -1

11. If $2^{7x} \div 2^{3x} = \sqrt[3]{2^{24}}$, then $x =$

A. 2

B. 6

C. 8

D. $\frac{4}{5}$

12. If $5^{x+1} \times 3^{x-1} = 25$, then $x =$

A. -1

B. 2

C. 3

D. 1

13. If $10^{2y} = 36$, then $10^{-y} =$

A. 6

B. $\frac{1}{6}$

C. $\frac{1}{36}$

D. -6

14. If $\left(\frac{4}{5}\right)^x \left(\frac{5}{4}\right)^{3x} = \frac{625}{256}$, then $x =$

A. 1

B. 2

C. 4

D. -2

15. If $8^x + 2^{3x+1} = 192$, then $x =$

A. 3

B. 1

C. 2

D. 6

16. If $125^x = 25^{x+2}$, then $2^{x-1} =$

A. 4

B. 8

C. $\frac{1}{8}$

D. 16

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

A. 0

B. x^{a+b+c}

C. 3

D. 1

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

A. x^{3abc}

B. $x^{2(a^3+b^3+c^3)}$

C. $x^{a^3+b^3+c^3}$

D. 1

19. If $a^x = b^2$, $b^y = c^2$ and $c^z = a^2$, then $xyz =$

A. 8

B. 6

C. 2

D. 1

20. If $3^x = 2^y = 12^z$, then $\frac{1}{z} =$

A. $\frac{1}{x} + \frac{1}{y}$

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

C. $\frac{1}{x} + \frac{2}{y}$

D. $\frac{2}{x} + \frac{1}{y}$

21. $(0.0016)^{\frac{1}{4}} =$

A. 0.2

B. 2

C. 0.002

D. 0.02

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

A. $\frac{2}{9}$

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

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

D. $\frac{9}{2}$

23. $(2^{\frac{1}{3}} + 5^{\frac{1}{3}})(2^{\frac{2}{3}} - 10^{\frac{1}{3}} + 5^{\frac{2}{3}}) =$

A. 10

B. 3

C. 29

D. 7

24. If $\frac{x^2}{x^{1.5}} = 5$ and $x > 0$, then $x =$

A. 125

B. $\sqrt{5}$

C. 25

D. 5

25. $\left\{9^{-\frac{3}{2}} \div 3^{-5}\right\}^{\frac{1}{2}} =$

A. 9

B. 3

C. 27

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

Key sheet

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

Solutions

1. $\sqrt[3]{5^{12}} =$

$$\sqrt[3]{5^{12}} = 5^{\frac{12}{3}} = 5^4 = 625$$

Ans: (C) 625

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

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

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

$$8 \times 9 = 72$$

Ans: (C) 72

3. $625^2 \times 5^{-7} =$

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

$$= 5^8 \times 5^{-7}$$

$$= 5^{8-7} = 5^1$$

$$= 5$$

Ans: (A) 5

4. $(49)^{\frac{1}{2}} \times (27)^{\frac{2}{3}} =$

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

$$= 7 \times 3^2$$

$$= 7 \times 9 = 63$$

Ans: (C) 63

5. $\left(\frac{1}{32}\right)^{-\frac{2}{5}} =$

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

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

$$= 4$$

Ans: (A) 4

6. $\left(-\frac{8}{125}\right)^{-\frac{1}{3}} =$

$$\left(-\frac{8}{125}\right)^{-\frac{1}{3}} = \left[\left(-\frac{2}{5}\right)^3\right]^{-\frac{1}{3}}$$

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

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

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

$$\begin{aligned}
 7. \frac{4^{\frac{4}{3}} \times 9^{\frac{4}{3}}}{6^{\frac{2}{3}}} &= \\
 &= \frac{(2^2)^{\frac{4}{3}} \times (3^2)^{\frac{4}{3}}}{(2 \times 3)^{\frac{2}{3}}} \\
 &= 2^{\frac{8}{3} - \frac{2}{3}} \times 3^{\frac{8}{3} - \frac{2}{3}} \\
 &= 2^2 \times 3^2 \\
 &= 36
 \end{aligned}$$

Ans: (B) 36

$$\begin{aligned}
 8. (x^{a+b})^{a-b} \cdot (x^{b+c})^{b-c} &= \\
 &= x^{(a+b)(a-b)} \cdot x^{(b+c)(b-c)} = x^{a^2-b^2} \cdot x^{b^2-c^2} \\
 &= x^{a^2-b^2+b^2-c^2} = x^{a^2-c^2}
 \end{aligned}$$

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

$$\begin{aligned}
 9. \text{ If } a = 4, b = 1 \text{ and } c = -5, \text{ then } a^3 + b^3 + c^3 &= \\
 a + b + c &= 4 + 1 - 5 = 0 \\
 \text{So } a^3 + b^3 + c^3 &= 3abc = 3 \times 4 \times 1 \times (-5) = -60
 \end{aligned}$$

Ans: (C) -60

$$\begin{aligned}
 10. \text{ If } 4^{3x} = 64 \text{ and } 10^y = 0.01, \text{ then } x + y &= \\
 4^{3x} = 64 = 4^3 &\Rightarrow 3x = 3 \Rightarrow x = 1 \\
 10^y = 0.01 = 10^{-2} &\Rightarrow y = -2 \\
 x + y &= 1 + (-2) = -1
 \end{aligned}$$

Ans: (D) -1

$$\begin{aligned}
 11. \text{ If } 2^{7x} \div 2^{3x} &= \sqrt[3]{2^{24}}, \text{ then } x = \\
 \frac{2^{7x}}{2^{3x}} &= 2^{\frac{24}{3}} \\
 \Rightarrow 2^{7x-3x} &= 2^8 \\
 \Rightarrow 4x &= 8 \Rightarrow x = 2
 \end{aligned}$$

Ans: (A) 2

$$\begin{aligned}
 12. \text{ If } 5^{x+1} \times 3^{x-1} &= 25, \text{ then } x = \\
 25 &= 5^2 \times 3^0 \\
 \Rightarrow 5^{x+1} \times 3^{x-1} &= 5^2 \times 3^0 \\
 \Rightarrow x + 1 &= 2 \text{ and } x - 1 = 0 \\
 \Rightarrow x &= 1 \text{ and } x = 1 \\
 \therefore x &= 1
 \end{aligned}$$

Ans: (D) 1

$$\begin{aligned}
 13. \text{ If } 10^{2y} &= 36, \text{ then } 10^{-y} = \\
 (10^y)^2 &= 6^2 \\
 \Rightarrow 10^y &= 6 \\
 10^{-y} &= \frac{1}{10^y} = \frac{1}{6}
 \end{aligned}$$

Ans: (B) $\frac{1}{6}$

14. If $\left(\frac{4}{5}\right)^x \left(\frac{5}{4}\right)^{3x} = \frac{625}{256}$, then $x =$

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

Ans: (B) 2

15. If $8^x + 2^{3x+1} = 192$, then $x =$

$$\begin{aligned}(2^3)^x + 2^{3x+1} &= 192 \\ \Rightarrow 2^{3x} + 2^{3x+1} &= 192 \\ \Rightarrow 2^{3x} + 2 \times 2^{3x} &= 192 \\ \Rightarrow 2^{3x} (1 + 2) &= 192 \\ \Rightarrow 2^{3x} \times 3 &= 192 \\ \Rightarrow 2^{3x} &= 192 \times \frac{1}{3} = 64 = 2^6 \\ \Rightarrow 3x &= 6 \Rightarrow x = 2\end{aligned}$$

Ans: (C) 2

16. If $125^x = 25^{x+2}$, then $2^{x-1} =$

$$\begin{aligned}(5^3)^x &= (5^2)^{x+2} \Rightarrow 5^{3x} = 5^{2x+4} \\ \Rightarrow 3x &= 2x + 4 \Rightarrow x = 4 \\ 2^{4-1} &= 2^3 = 8\end{aligned}$$

Ans: (B) 8

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

Write $x^{a-b} = \frac{x^a}{x^b}$ and so on; multiply the first fraction by x^{-a} above and below

$$\begin{aligned}&= \frac{x^{-a}}{x^{-a}+x^{-b}+x^{-c}} + \frac{x^{-b}}{x^{-b}+x^{-c}+x^{-a}} + \frac{x^{-c}}{x^{-c}+x^{-a}+x^{-b}} \\ &= \frac{x^{-a}+x^{-b}+x^{-c}}{x^{-a}+x^{-b}+x^{-c}} = 1\end{aligned}$$

Ans: (D) 1

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

$$\begin{aligned}&= x^{a^3-b^3} \cdot x^{b^3-c^3} \cdot x^{c^3-a^3} \\ &= x^{a^3-b^3+b^3-c^3+c^3-a^3} = x^0 = 1\end{aligned}$$

Ans: (D) 1

19. If $a^x = b^2$, $b^y = c^2$ and $c^z = a^2$, then $xyz =$

$$\begin{aligned}b &= a^{\frac{x}{2}} \\ c^2 &= b^y = a^{\frac{xy}{2}} \Rightarrow c = a^{\frac{xy}{4}} \\ a^2 &= c^z = a^{\frac{xyz}{4}} \Rightarrow \frac{xyz}{4} = 2 \Rightarrow xyz = 8\end{aligned}$$

Ans: (A) 8

20. If $3^x = 2^y = 12^z$, then $\frac{1}{z} =$

Let each = k : $3 = k^{\frac{1}{x}}$, $2 = k^{\frac{1}{y}}$, $12 = k^{\frac{1}{z}}$

$12 = 3 \times 2^2$, so $\frac{1}{z} = \frac{1}{x} + \frac{2}{y}$

Ans: (C) $\frac{1}{x} + \frac{2}{y}$

21. $(0.0016)^{\frac{1}{4}} =$

$0.0016 = \frac{16}{10000} = \left(\frac{2}{10}\right)^4 = (0.2)^4$

$(0.0016)^{\frac{1}{4}} = [(0.2)^4]^{\frac{1}{4}} = 0.2$

Ans: (A) 0.2

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

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

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

$= \frac{2}{9}$

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

23. $(2^{\frac{1}{3}} + 5^{\frac{1}{3}})(2^{\frac{2}{3}} - 10^{\frac{1}{3}} + 5^{\frac{2}{3}}) =$

$(a + b)(a^2 + b^2 - ab) = a^3 + b^3$ with $a = 2^{\frac{1}{3}}$, $b = 5^{\frac{1}{3}}$

$= 2 + 5 = 7$

Ans: (D) 7

24. If $\frac{x^2}{x^{1.5}} = 5$ and $x > 0$, then $x =$

$x^{2-1.5} = x^{0.5} = x^{\frac{1}{2}} = 5$

$x = 5^2 = 25$

Ans: (C) 25

25. $\left\{9^{-\frac{3}{2}} \div 3^{-5}\right\}^{\frac{1}{2}} =$

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

$= \left\{\frac{3^{-3}}{3^{-5}}\right\}^{\frac{1}{2}} = \{3^2\}^{\frac{1}{2}}$

$= 3^1 = 3$

Ans: (B) 3
