

Exponents (Level 2)

MCQ Test, Set 01

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. $(-1)^{63} - (-1)^{48} =$

A. -1

B. -2

C. 2

D. 0

2. $\left(\frac{4}{7}\right)^{-2} =$

A. $-\frac{16}{49}$ B. $\frac{16}{49}$ C. $\frac{49}{16}$ D. $-\frac{49}{16}$

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

A. $\frac{1}{729}$

B. 3

C. $\frac{1}{3}$ D. 3^{15}

4. $(125)^{\frac{2}{3}} \times (16)^{\frac{3}{4}} =$

A. 50

B. 200

C. $\frac{1}{200}$

D. 10

5. $\left(\frac{4}{81}\right)^{-\frac{3}{2}} =$

A. $\frac{729}{8}$ B. $\frac{8}{729}$ C. $\frac{9}{2}$ D. $-\frac{729}{8}$

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

A. -4

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

C. 4

D. -2

7. $\frac{12^{\frac{6}{5}} \times 9^{\frac{2}{5}}}{8^{\frac{4}{5}}} =$

A. 18

B. 1

C. $\frac{1}{9}$

D. 9

8. $\left(\frac{2^7}{2^4}\right)^{11} \times \left(\frac{2^4}{2^9}\right)^{13} \times \left(\frac{2^9}{2^7}\right)^{16} =$

A. 2^{130}

B. 0

C. 2

D. 1

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

A. -90

B. -30

C. 0

D. 90

10. If $9^x = (3\sqrt{3})^4$, then $x =$

A. 1

B. 6

C. 2

D. 3

11. If $3^{6x} \div 3^{2x} = \sqrt[4]{3^{16}}$, then $x =$

A. 1

B. -1

C. 4

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

12. If $2^x \times 3^{x-2} = 24$, then $x =$

A. 4

B. 3

C. 5

D. 1

13. If $2^x = 160$, then $2^{x-5} =$

A. 155

B. 5120

C. 5

D. 32

14. If $4^{2x} = \frac{1}{8}$, then $x =$

A. $-\frac{3}{2}$

B. $-\frac{3}{4}$

C. $\frac{3}{4}$

D. $-\frac{4}{3}$

15. If $3^{x+1} + 3^{x-1} = 270$, then $x =$

A. 3

B. 5

C. -4

D. 4

16. If $8^{x-1} = 4^{x+1}$, then $3^{x-3} =$

A. 27

B. 9

C. $\frac{1}{9}$

D. 3

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

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

B. 1

C. $\frac{1}{9}$

D. $-\frac{2}{63}$

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

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

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

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

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

19. If $3^x = 7$, $7^y = 11$ and $11^z = 3$, then $xyz =$

A. 0

B. -1

C. 1

D. 3

20. If $2^x = 3^y = 6^z$, then $z =$

A. $x + y$

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

C. $\frac{xy}{x-y}$

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

21. $(0.027)^{\frac{1}{3}} =$

A. 0.3

B. 3

C. 0.03

D. 0.003

22. $\left(\frac{\sqrt{3}}{2}\right)^5 \div \left(\frac{\sqrt{3}}{2}\right)^9 =$

A. $\frac{16}{9}$

B. $\frac{9}{16}$

C. $\frac{81}{16}$

D. $\frac{16}{81}$

23. If $x = 6^{\frac{1}{3}} + 6^{\frac{2}{3}}$, then $x^3 - 18x =$

A. 7

B. 36

C. 6

D. 42

24. $(32)^{0.12} \times (32)^{0.08} =$

A. 16

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

C. 2

D. 4

25. If $\left[\left\{\left(\frac{1}{5^2}\right)^{-3}\right\}^{-\frac{1}{2}}\right]^{\frac{1}{3}} = 5^m$, then $m =$

A. -1

B. 1

C. -2

D. -3

Key sheet

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

Solutions

1. $(-1)^{63} - (-1)^{48} =$
 $(-1)^{63} = -1$ (63 is odd), $(-1)^{48} = 1$ (48 is even)
 $-1 - 1 = -2$
Ans: (B) -2

2. $\left(\frac{4}{7}\right)^{-2} =$
 $\left(\frac{4}{7}\right)^{-2} = \left(\frac{7}{4}\right)^2 = \frac{49}{16}$
Ans: (C) $\frac{49}{16}$

3. $9^4 \times 3^{-7} =$
 $= (3^2)^4 \times 3^{-7}$
 $= 3^8 \times 3^{-7}$
 $= 3^{8-7} = 3^1$
 $= 3$
Ans: (B) 3

4. $(125)^{\frac{2}{3}} \times (16)^{\frac{3}{4}} =$
 $(5^3)^{\frac{2}{3}} \times (2^4)^{\frac{3}{4}}$
 $= 5^2 \times 2^3$
 $= 25 \times 8 = 200$
Ans: (B) 200

5. $\left(\frac{4}{81}\right)^{-\frac{3}{2}} =$
 $\left(\frac{4}{81}\right)^{-\frac{3}{2}} = \left[\left(\frac{2}{9}\right)^2\right]^{-\frac{3}{2}}$
 $= \left(\frac{2}{9}\right)^{-3} = \left(\frac{9}{2}\right)^3$
 $= \frac{729}{8}$
Ans: (A) $\frac{729}{8}$

6. $\left(-\frac{1}{8}\right)^{-\frac{2}{3}} =$
 $\left(-\frac{1}{8}\right)^{-\frac{2}{3}} = \left[\left(-\frac{1}{2}\right)^3\right]^{-\frac{2}{3}}$
 $= \left(-\frac{1}{2}\right)^{-2} = (-2)^2$
 $= 4$
Ans: (C) 4

$$\begin{aligned}
 7. \frac{12^{\frac{6}{5}} \times 9^{\frac{2}{5}}}{8^{\frac{4}{5}}} &= \\
 &= \frac{(2^2 \times 3)^{\frac{6}{5}} \times (3^2)^{\frac{2}{5}}}{(2^3)^{\frac{4}{5}}} \\
 &= 2^{\frac{12}{5} - \frac{12}{5}} \times 3^{\frac{6}{5} + \frac{4}{5}} \\
 &= 2^0 \times 3^2 \\
 &= 9
 \end{aligned}$$

Ans: (D) 9

$$\begin{aligned}
 8. \left(\frac{2^7}{2^4}\right)^{11} \times \left(\frac{2^4}{2^9}\right)^{13} \times \left(\frac{2^9}{2^7}\right)^{16} &= \\
 \text{Powers: } (7-4)(11) + (4-9)(13) + (9-7)(16) &= \\
 = 33 - 65 + 32 = 0 & \\
 \text{Value} = 2^0 = 1 &
 \end{aligned}$$

Ans: (D) 1

$$\begin{aligned}
 9. \text{ If } a = 3, b = -5 \text{ and } c = 2, \text{ then } a^3 + b^3 + c^3 &= \\
 a + b + c = 3 - 5 + 2 = 0 & \\
 \text{So } a^3 + b^3 + c^3 = 3abc = 3 \times 3 \times (-5) \times 2 = -90 &
 \end{aligned}$$

Ans: (A) -90

$$\begin{aligned}
 10. \text{ If } 9^x = (3\sqrt{3})^4, \text{ then } x &= \\
 3\sqrt{3} = 3^1 \times 3^{\frac{1}{2}} = 3^{\frac{3}{2}} & \\
 (3^2)^x = \left(3^{\frac{3}{2}}\right)^4 & \\
 \Rightarrow 3^{2x} = 3^6 & \\
 \Rightarrow 2x = 6 \Rightarrow x = 3 &
 \end{aligned}$$

Ans: (D) 3

$$\begin{aligned}
 11. \text{ If } 3^{6x} \div 3^{2x} = \sqrt[4]{3^{16}}, \text{ then } x &= \\
 \frac{3^{6x}}{3^{2x}} = 3^{\frac{16}{4}} & \\
 \Rightarrow 3^{6x-2x} = 3^4 & \\
 \Rightarrow 4x = 4 \Rightarrow x = 1 &
 \end{aligned}$$

Ans: (A) 1

$$\begin{aligned}
 12. \text{ If } 2^x \times 3^{x-2} = 24, \text{ then } x &= \\
 24 = 2^3 \times 3^1 & \\
 \Rightarrow 2^x \times 3^{x-2} = 2^3 \times 3^1 & \\
 \Rightarrow x = 3 \text{ and } x - 2 = 1 & \\
 \Rightarrow x = 3 \text{ and } x = 3 & \\
 \therefore x = 3 &
 \end{aligned}$$

Ans: (B) 3

13. If $2^x = 160$, then $2^{x-5} =$

$$\begin{aligned} 2^{x-5} &= \frac{2^x}{2^5} \\ &= \frac{160}{32} = 5 \end{aligned}$$

Ans: (C) 5

14. If $4^{2x} = \frac{1}{8}$, then $x =$

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

Ans: (B) $-\frac{3}{4}$

15. If $3^{x+1} + 3^{x-1} = 270$, then $x =$

$$\begin{aligned} 3 \times 3^x + \frac{3^x}{3} &= 270 \\ \Rightarrow 3^x \left(3 + \frac{1}{3}\right) &= 270 \\ \Rightarrow 3^x \times \frac{10}{3} &= 270 \\ \Rightarrow 3^x &= 270 \times \frac{3}{10} = 81 = 3^4 \\ \Rightarrow x &= 4 \end{aligned}$$

Ans: (D) 4

16. If $8^{x-1} = 4^{x+1}$, then $3^{x-3} =$

$$\begin{aligned} (2^3)^{x-1} &= (2^2)^{x+1} \Rightarrow 2^{3x-3} = 2^{2x+2} \\ \Rightarrow 3x - 3 &= 2x + 2 \Rightarrow x = 5 \\ 3^{5-3} &= 3^2 = 9 \end{aligned}$$

Ans: (B) 9

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

$$\frac{1}{1+8} + \frac{1}{1+\frac{1}{8}} = \frac{1}{9} + \frac{8}{9} = 1$$

Ans: (B) 1

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

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

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

19. If $3^x = 7$, $7^y = 11$ and $11^z = 3$, then $xyz =$

$$\begin{aligned} 11 &= 7^y = (3^x)^y = 3^{xy} \\ 3 &= 11^z = (3^{xy})^z = 3^{xyz} \\ 3^{xyz} &= 3 = 3^1 \\ \Rightarrow xyz &= 1 \end{aligned}$$

Ans: (C) 1

20. If $2^x = 3^y = 6^z$, then $z =$

Let each $= k$: $2 = k^{\frac{1}{x}}$, $3 = k^{\frac{1}{y}}$, $6 = k^{\frac{1}{z}}$

$6 = 2 \times 3$, so $\frac{1}{z} = \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy}$, $z = \frac{xy}{x+y}$

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

21. $(0.027)^{\frac{1}{3}} =$

$0.027 = \frac{27}{1000} = \left(\frac{3}{10}\right)^3 = (0.3)^3$

$(0.027)^{\frac{1}{3}} = [(0.3)^3]^{\frac{1}{3}} = 0.3$

Ans: (A) 0.3

22. $\left(\frac{\sqrt{3}}{2}\right)^5 \div \left(\frac{\sqrt{3}}{2}\right)^9 =$

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

$\left(\frac{\sqrt{3}}{2}\right)^5 \div \left(\frac{\sqrt{3}}{2}\right)^9 = \frac{1}{\left(\frac{\sqrt{3}}{2}\right)^4}$

$= \frac{16}{9}$

Ans: (A) $\frac{16}{9}$

23. If $x = 6^{\frac{1}{3}} + 6^{\frac{2}{3}}$, then $x^3 - 18x =$

$(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

$x^3 = 6 + 6^2 + 3 \cdot 6^{\frac{1}{3}} \cdot 6^{\frac{2}{3}} \cdot x = 42 + 18x$

$x^3 - 18x = 42$

Ans: (D) 42

24. $(32)^{0.12} \times (32)^{0.08} =$

$= (32)^{0.12+0.08} = (32)^{0.2}$

$0.2 = \frac{1}{5}$

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

Ans: (C) 2

25. If $\left[\left\{\left(\frac{1}{5^2}\right)^{-3}\right\}^{-\frac{1}{2}}\right]^{\frac{1}{3}} = 5^m$, then $m =$

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

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

$= 5^{-1}$

$\Rightarrow m = -1$

Ans: (A) -1
