

Exponents (Level 2)

MCQ Test, Set 06

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. $\sqrt{5} \times \sqrt[3]{5} =$

A. $5^{\frac{1}{6}}$

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

C. $5^{\frac{5}{6}}$

D. $25^{\frac{5}{6}}$

2. $\left(\frac{1}{10}\right)^{-3} =$

A. 1000

B. $\frac{1}{1000}$

C. -30

D. -1000

3. $100^2 \times 10^{-5} =$

A. $\frac{1}{10}$

B. 10

C. $\frac{1}{1000000}$

D. 10^9

4. $(625)^{\frac{3}{4}} \div (27)^{\frac{2}{3}} =$

A. $\frac{125}{3}$

B. $\frac{125}{9}$

C. $\frac{9}{125}$

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

5. $\left(\frac{1}{4}\right)^{-\frac{1}{2}} + \left(\frac{8}{27}\right)^{-\frac{1}{3}} =$

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

B. $-\frac{7}{2}$

C. $\frac{7}{6}$

D. $\frac{7}{2}$

6. $\left(\frac{9}{4}\right)^{-\frac{1}{2}} + \left(\frac{1}{27}\right)^{-\frac{1}{3}} =$

A. $-\frac{11}{3}$

B. $\frac{11}{3}$

C. 1

D. $\frac{11}{6}$

7. $\frac{12^{\frac{4}{3}} \times 9^{\frac{1}{3}}}{2^{\frac{2}{3}}} =$

A. 9

B. 4

C. 72

D. 36

8. $\left(\frac{2^6}{2^2}\right)^{\frac{1}{12}} \times \left(\frac{2^2}{2^3}\right)^{\frac{1}{6}} \times \left(\frac{2^3}{2^6}\right)^{\frac{1}{18}} =$

A. 1

B. $2^{\frac{2}{3}}$

C. 0

D. 2

9. If $a + b + c = 0$, then $5^a \times 5^b \times 5^c =$

A. 1

B. 5^{abc}

C. 15^{abc}

D. 125^{abc}

10. If $\frac{3^{6x} \times 9^2 \times 27}{3^{2x}} = 3^3$, then $x =$

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

B. -4

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

D. -1

11. If $5^{2x} = 625$ and $10^y = 0.0001$, then $x + y =$

A. 0

B. 2

C. -2

D. 6

12. If $2^{x+1} \times 5^{x-2} = 80$, then $x =$
A. 6 **B.** 3 **C.** 4 **D.** 0
-
13. If $10^{2y} = 81$, then $10^y =$
A. 81 **B.** $\frac{81}{2}$ **C.** $\frac{1}{9}$ **D.** 9
-
14. If $\left(\frac{2}{7}\right)^{3x} \left(\frac{7}{2}\right)^x = \frac{16}{2401}$, then $x =$
A. 2 **B.** 1 **C.** 4 **D.** -2
-
15. If $3^{x+2} - 3^x = 216$, then $x =$
A. 4 **B.** 3 **C.** 2 **D.** -3
-
16. If $125^x = \frac{25}{5^x}$, then $x =$
A. $-\frac{1}{2}$ **B.** $\frac{1}{2}$ **C.** $\frac{2}{3}$ **D.** 1
-
17. $\frac{1}{1+x^a-b} - \frac{1}{1+x^b-a} =$
A. $\frac{x^b-x^a}{x^a+x^b}$ **B.** 0
C. $\frac{x^a-x^b}{x^a+x^b}$ **D.** 1
-
18. $\left(\frac{x^{a^2+b^2}}{x^{ab}}\right)^{a+b} \div x^{b^3} =$
A. 1 **B.** $x^{a^3+2b^3}$ **C.** x^{a^3} **D.** $x^{a^3-b^3}$
-
19. If $7^x = 2$, $2^y = 5$ and $5^z = \frac{1}{49}$, then $xyz =$
A. 1 **B.** $\frac{1}{49}$ **C.** -2 **D.** 2
-
20. If $3^x = 4^y = 12^z$, then $\frac{1}{x} + \frac{1}{y} =$
A. $\frac{1}{z}$ **B.** 0 **C.** $\frac{2}{z}$ **D.** z
-
21. $\sqrt[5]{32^{-4}} =$
A. $\frac{1}{2}$ **B.** 16 **C.** $\frac{1}{16}$ **D.** -16
-
22. $\left(\frac{\sqrt{2}}{3}\right)^9 \div \left(\frac{\sqrt{2}}{3}\right)^{12} =$
A. $\frac{2\sqrt{2}}{27}$ **B.** $\frac{8}{27}$ **C.** $\frac{27}{8}$ **D.** $\frac{27\sqrt{2}}{4}$
-
23. $(3^{\frac{1}{3}} + 5^{\frac{1}{3}})(3^{\frac{2}{3}} - 15^{\frac{1}{3}} + 5^{\frac{2}{3}}) =$
A. 2 **B.** 15 **C.** 8 **D.** 34
-
24. If $x^{1.5} = 0.008$ and $x > 0$, then $x =$
A. 0.2 **B.** 0.4 **C.** 0.04 **D.** 0.004
-
25. If $\left[\left\{\left(\frac{1}{3^2}\right)^{-3}\right\}^{\frac{1}{2}}\right]^{\frac{1}{3}} = 3^m$, then $m =$
A. -2 **B.** 1 **C.** 3 **D.** -1
-

Key sheet

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

Solutions

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

$$\sqrt{5} \times \sqrt[3]{5} = 5^{\frac{1}{2}} \times 5^{\frac{1}{3}}$$
$$= 5^{\frac{1}{2} + \frac{1}{3}} = 5^{\frac{5}{6}}$$

Ans: (C) $5^{\frac{5}{6}}$

2. $\left(\frac{1}{10}\right)^{-3} =$

$$\left(\frac{1}{10}\right)^{-3} = 10^3 = 1000$$

Ans: (A) 1000

3. $100^2 \times 10^{-5} =$

$$= (10^2)^2 \times 10^{-5}$$
$$= 10^4 \times 10^{-5}$$
$$= 10^{4-5} = 10^{-1}$$
$$= \frac{1}{10^1} = \frac{1}{10}$$

Ans: (A) $\frac{1}{10}$

4. $(625)^{\frac{3}{4}} \div (27)^{\frac{2}{3}} =$

$$(5^4)^{\frac{3}{4}} \div (3^3)^{\frac{2}{3}}$$
$$= 5^3 \div 3^2$$
$$= 125 \div 9 = \frac{125}{9}$$

Ans: (B) $\frac{125}{9}$

5. $\left(\frac{1}{4}\right)^{-\frac{1}{2}} + \left(\frac{8}{27}\right)^{-\frac{1}{3}} =$

$$\left(\frac{1}{4}\right)^{-\frac{1}{2}} = \left[\left(\frac{1}{2}\right)^2\right]^{-\frac{1}{2}} = 2$$
$$\left(\frac{8}{27}\right)^{-\frac{1}{3}} = \left[\left(\frac{2}{3}\right)^3\right]^{-\frac{1}{3}} = \frac{3}{2}$$
$$2 + \frac{3}{2} = \frac{7}{2}$$

Ans: (D) $\frac{7}{2}$

6. $\left(\frac{9}{4}\right)^{-\frac{1}{2}} + \left(\frac{1}{27}\right)^{-\frac{1}{3}} =$

$$\left(\frac{9}{4}\right)^{-\frac{1}{2}} = \left[\left(\frac{3}{2}\right)^2\right]^{-\frac{1}{2}} = \frac{2}{3}$$
$$\left(\frac{1}{27}\right)^{-\frac{1}{3}} = \left[\left(\frac{1}{3}\right)^3\right]^{-\frac{1}{3}} = 3$$
$$\frac{2}{3} + 3 = \frac{11}{3}$$

Ans: (B) $\frac{11}{3}$

$$\begin{aligned}
 7. \frac{12^{\frac{4}{3}} \times 9^{\frac{1}{3}}}{2^{\frac{2}{3}}} &= \\
 &= \frac{(2^2 \times 3)^{\frac{4}{3}} \times (3^2)^{\frac{1}{3}}}{2^{\frac{2}{3}}} \\
 &= 2^{\frac{8}{3} - \frac{2}{3}} \times 3^{\frac{4}{3} + \frac{2}{3}} \\
 &= 2^2 \times 3^2 \\
 &= 36
 \end{aligned}$$

Ans: (D) 36

$$\begin{aligned}
 8. \left(\frac{2^6}{2^2}\right)^{\frac{1}{12}} \times \left(\frac{2^2}{2^3}\right)^{\frac{1}{6}} \times \left(\frac{2^3}{2^6}\right)^{\frac{1}{18}} &= \\
 \text{Powers: } (6-2)\left(\frac{1}{12}\right) + (2-3)\left(\frac{1}{6}\right) + (3-6)\left(\frac{1}{18}\right) &= \\
 = \frac{1}{3} - \frac{1}{6} - \frac{1}{6} = 0 & \\
 \text{Value} = 2^0 = 1 &
 \end{aligned}$$

Ans: (A) 1

$$\begin{aligned}
 9. \text{ If } a + b + c = 0, \text{ then } 5^{a^3} \times 5^{b^3} \times 5^{c^3} &= \\
 a^3 + b^3 + c^3 = 3abc & \\
 5^{a^3+b^3+c^3} = 5^{3abc} = (5^3)^{abc} = 125^{abc} &
 \end{aligned}$$

Ans: (D) 125^{abc}

$$\begin{aligned}
 10. \text{ If } \frac{3^{6x} \times 9^2 \times 27}{3^{2x}} = 3^3, \text{ then } x &= \\
 \frac{3^{6x}}{3^{2x}} \times (3^2)^2 \times 3^3 = 3^3 & \\
 \Rightarrow 3^{4x} \times 3^4 \times 3^3 = 3^3 & \\
 \Rightarrow 3^{4x+7} = 3^3 & \\
 \Rightarrow 4x + 7 = 3 \Rightarrow 4x = -4 \Rightarrow x = -1 &
 \end{aligned}$$

Ans: (D) -1

$$\begin{aligned}
 11. \text{ If } 5^{2x} = 625 \text{ and } 10^y = 0.0001, \text{ then } x + y &= \\
 5^{2x} = 625 = 5^4 \Rightarrow 2x = 4 \Rightarrow x = 2 & \\
 10^y = 0.0001 = 10^{-4} \Rightarrow y = -4 & \\
 x + y = 2 + (-4) = -2 &
 \end{aligned}$$

Ans: (C) -2

$$\begin{aligned}
 12. \text{ If } 2^{x+1} \times 5^{x-2} = 80, \text{ then } x &= \\
 80 = 2^4 \times 5^1 & \\
 \Rightarrow 2^{x+1} \times 5^{x-2} = 2^4 \times 5^1 & \\
 \Rightarrow x + 1 = 4 \text{ and } x - 2 = 1 & \\
 \Rightarrow x = 3 \text{ and } x = 3 & \\
 \therefore x = 3 &
 \end{aligned}$$

Ans: (B) 3

13. If $10^{2y} = 81$, then $10^y =$

$$(10^y)^2 = 9^2$$

$$\Rightarrow 10^y = 9$$

Ans: (D) 9

14. If $\left(\frac{2}{7}\right)^{3x} \left(\frac{7}{2}\right)^x = \frac{16}{2401}$, then $x =$

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

$$\Rightarrow \left(\frac{2}{7}\right)^{3x} \cdot \left(\frac{2}{7}\right)^{-x} = \left(\frac{2}{7}\right)^4$$

$$\Rightarrow \left(\frac{2}{7}\right)^{2x} = \left(\frac{2}{7}\right)^4$$

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

Ans: (A) 2

15. If $3^{x+2} - 3^x = 216$, then $x =$

$$9 \times 3^x - 3^x = 216$$

$$\Rightarrow 3^x (9 - 1) = 216$$

$$\Rightarrow 3^x \times 8 = 216$$

$$\Rightarrow 3^x = 216 \times \frac{1}{8} = 27 = 3^3$$

$$\Rightarrow x = 3$$

Ans: (B) 3

16. If $125^x = \frac{25}{5^x}$, then $x =$

$$(5^3)^x \cdot 5^x = 5^2 \Rightarrow 5^{4x} = 5^2$$

$$\Rightarrow 4x = 2 \Rightarrow x = \frac{1}{2}$$

Ans: (B) $\frac{1}{2}$

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

$$= \frac{x^b}{x^b+x^a} - \frac{x^a}{x^a+x^b}$$

$$= \frac{x^b-x^a}{x^a+x^b}$$

Ans: (A) $\frac{x^b-x^a}{x^a+x^b}$

18. $\left(\frac{x^{a^2+b^2}}{x^{ab}}\right)^{a+b} \div x^{b^3} =$

$$\left(\frac{x^{a^2+b^2}}{x^{ab}}\right)^{a+b} = x^{(a+b)(a^2-ab+b^2)} = x^{a^3+b^3}$$

$$x^{a^3+b^3} \div x^{b^3} = x^{a^3}$$

Ans: (C) x^{a^3}

19. If $7^x = 2$, $2^y = 5$ and $5^z = \frac{1}{49}$, then $xyz =$

$$5 = 2^y = (7^x)^y = 7^{xy}$$

$$\frac{1}{49} = 5^z = (7^{xy})^z = 7^{xyz}$$

$$7^{xyz} = \frac{1}{49} = 7^{-2}$$

$$\Rightarrow xyz = -2$$

Ans: (C) -2

20. If $3^x = 4^y = 12^z$, then $\frac{1}{x} + \frac{1}{y} =$

Let each = k : $3 = k^{\frac{1}{x}}$, $4 = k^{\frac{1}{y}}$, $12 = k^{\frac{1}{z}}$

$12 = 3 \times 4$, so $\frac{1}{z} = \frac{1}{x} + \frac{1}{y}$

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

21. $\sqrt[5]{32^{-4}} =$

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

$\sqrt[5]{32^{-4}} = 32^{-\frac{4}{5}} = (2^5)^{-\frac{4}{5}}$

$= 2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

Ans: (C) $\frac{1}{16}$

22. $\left(\frac{\sqrt{2}}{3}\right)^9 \div \left(\frac{\sqrt{2}}{3}\right)^{12} =$

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

$\left(\frac{\sqrt{2}}{3}\right)^9 \div \left(\frac{\sqrt{2}}{3}\right)^{12} = \frac{1}{\left(\frac{\sqrt{2}}{3}\right)^3}$

$= \frac{27\sqrt{2}}{4}$

Ans: (D) $\frac{27\sqrt{2}}{4}$

23. $(3^{\frac{1}{3}} + 5^{\frac{1}{3}})(3^{\frac{2}{3}} - 15^{\frac{1}{3}} + 5^{\frac{2}{3}}) =$

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

$= 3 + 5 = 8$

Ans: (C) 8

24. If $x^{1.5} = 0.008$ and $x > 0$, then $x =$

$x^{\frac{3}{2}} = 0.008 = (0.2)^3$

$x = [(0.2)^3]^{\frac{2}{3}} = (0.2)^2 = 0.04$

Ans: (C) 0.04

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

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

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

$= 3^1$

$\Rightarrow m = 1$

Ans: (B) 1
