



2.4 – Indices

Student name: _____ Score: _____

1. Find the value of the following.

(a) $16^{\frac{3}{2}}$

64 [1]

(b) $(\cos 30^\circ)^2$

$\frac{3}{4}$ [2]

2. (a) Find the value of

(i) 3^0 ,

1 [1]

(ii) $36^{\frac{1}{2}}$.

± 6 [1]

(b) $2^8 \div 2 = 2^x$

Find the value of x .

$x = 7$ [1]

3. $\left(\frac{81}{16}\right)^{-\frac{3}{4}}$

$\frac{8}{27}$ [2]

4. (a) Work out $27^{\frac{2}{3}}$.

9 [1]

(b) Simplify $(9c)^{\frac{1}{2}} \times c^{\frac{3}{2}}$.

$3c^2$ [2]

5. (i) $3^p = 81$

Write down the value of p .

4 [1]

(ii) $2^q = \frac{1}{8}$

Write down the value of q .

-3 [1]

6. (a) Find the value of $49^{-\frac{1}{2}}$.

$\frac{1}{7}$
..... [1]

(b) When $x^{-2} = 4$ write down the values of x .

$x = -\frac{1}{2}$ or $x = \frac{1}{2}$ [2]

7. (a) Simplify.

$$16x^{16} \div 2x^2$$

$8x^{14}$
..... [2]

(b) $8^n = \frac{1}{2}$

$n = -\frac{1}{3}$
..... [2]

8. Find the value of the following.

(a) 4^0

1
..... [1]

(b) $27^{-\frac{2}{3}}$

$\frac{1}{9}$
..... [2]

9. $a = 3^4 \times 5^2$ $b = 2^2 \times 3^3 \times 5^2$ $c = 3^2 \times 5^3 \times 7$

(a) Find

(i) $\sqrt{a}$,

$3^2 \times 5$ or 45
..... [1]

(ii) $\frac{b}{a}$.

$\frac{4}{3}$
..... [1]

10. (a) Find 125^0 .

1
..... [1]

(b) Simplify $\sqrt[3]{27y^{27}}$.

$3y^9$
..... [2]

11. Find the exact value of $27^{-\frac{1}{3}}$.

$\frac{1}{3}$
..... [2]

12. Simplify $(16x^8y^2)^{\frac{1}{2}}$.

$4x^4y$
..... [2]



13. Work out $(0.3)^2$.

0.09 [1]

14. Simplify $(64x^{12})^{\frac{1}{6}}$.

$2x^2$ [2]

15. (a) Find the value of

(i) 25^0 ,

1 [1]

(ii) $100^{\frac{3}{2}}$.

10 [1]

(b) Write as a single power of 5.

$$\frac{5^{12}}{5^3 \times 5^2}$$

5^7 [1]

16. (a) $x^3 \div x^p = x^5$

Find the value of p .

$p = -2$ [1]

(b) Work out.

(i) $(\sqrt{2})^6$

8 [1]

(ii) $\frac{1}{8^{-\frac{1}{3}}}$

2 [2]

17. Simplify $\left(\frac{3}{2}\right)^{-3}$.

Give your answer as a fraction.

$\frac{8}{27}$ [2]

18. Simplify.

(a) $8y^8 \div 2y^2$

$4y^6$ [2]

(b) $(2w^2)^5$

$32w^{10}$ [2]

19. Write down the value of 16^0 .

.....1..... [1]

20. Simplify the following.

(a) $2y^2 \times 3y^3$

..... $6y^5$ [2]

(b) $\sqrt[3]{27p^{27}}$

..... $3p^9$ [2]

21. (a) Write down the value of $8^{\frac{1}{3}}$.

.....2..... [1]

(b) Find the exact value of $\left(\frac{4}{3}\right)^{-2}$.

..... $\frac{9}{16}$ [2]

22. Find the value of

(a) 5^0 ,

.....1..... [1]

(b) $8^{-\frac{2}{3}}$.

..... $\frac{1}{4}$ [2]

23. Find the value of $\left(\frac{16}{9}\right)^{-\frac{3}{2}}$.

..... $\frac{27}{64}$ [2]

24. Find the value of $16^{\frac{3}{4}}$.

.....8..... [1]

25. (a) Simplify $25^{-\frac{3}{2}}$, giving your answer as a fraction.

..... $\frac{1}{125}$ [2]

(b) Simplify.

(i) $(x^3)^4$

..... x^{12} [1]

(ii) $\sqrt{\frac{x^{10}}{x^4}}$

..... x^3 [2]

26. Work out.

$(-2)^3$

.....-8..... [1]



27. Find the value of each of the following.

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

Answer(b) 2 [1]

28. (a) Find the value of 6^0 .

Answer(a) 1 [1]

(b) Write 5^{-2} as a fraction.

Answer(b) $\frac{1}{25}$ [1]

29. Find the exact value of

(a) 3^{-3} ,

Answer(a) $\frac{1}{27}$ [1]

(b) $16^{\frac{3}{4}}$,

Answer(b) 8 [1]

(c) $\cos 30^\circ$.

Answer(c) $\frac{\sqrt{3}}{2}$ [1]

30. Find the value of $25^{-\frac{3}{2}}$.

..... $\frac{1}{125}$ [2]

31. x is positive and $x^8 = 3^4$.

Find the exact value of x .

$x =$ $\sqrt{3}$ [2]

32. Find the value of $64^{\frac{1}{3}}$.

..... 4 [1]

33. $(0.2)^3$

..... 0.008 [1]

34. (a) Find the value of $27^{\frac{2}{3}}$.

..... 9 [1]

(b) Simplify $18h^{18} \div 3h^3$.

..... $6h^{15}$ [2]

35. Write down the value of 17^0 .

..... 1 [1]

36. Work out the value of $\left(\frac{1}{27}\right)^{-\frac{1}{3}}$.

.....3..... [1]

37. Simplify.

(a) $\frac{15w^{15}}{3w^3}$

.....5w¹²..... [2]

(b) $(125y^6)^{\frac{2}{3}}$

.....25y⁴..... [2]

38. Simplify.

$$\frac{a^2 \times a^5}{a^3}$$

.....a⁴..... [2]

39. Find the value of

(a) 64^0 ,

.....1..... [1]

(b) $64^{\frac{1}{3}}$.

.....4..... [1]

40. Find the value of $49^{\frac{1}{2}}$.

.....7..... [1]

41. Simplify.

(a) $\frac{12x^{12}}{4x^4}$

.....3x⁸..... [2]

(b) $(16x^{16})^{\frac{1}{4}}$

.....2x⁴..... [2]

42. Write 3^{-2} as a fraction.

..... $\frac{1}{9}$ [1]

43. Simplify.

$$(5x^4y^3)^2$$

.....25x⁸y⁶..... [2]

44. Find $\sqrt[3]{3\frac{3}{8}}$.

..... $\frac{3}{2}$ or $1\frac{1}{2}$ or 1.5..... [2]

45. Find the value of $8^{\frac{4}{3}}$.

.....16..... [1]



46. (a) $2^3 \div 2^7 = 2^p$
Find the value of p .

..... -4 [1]

(b) $\sqrt{2^5} = 2^q$
Find the value of q .

..... -4 [1]

47. Simplify.

(a) $12v^{12} \times 3v^3$

..... $36v^{15}$ [2]

(b) $(100x^{100})^{\frac{3}{2}}$

..... $1000x^{150}$ [2]

48. Simplify $(t^{27})^{\frac{1}{3}}$.

..... t^9 [1]

49. Work out $4^{-\frac{3}{2}}$.

..... $[\pm] \frac{1}{8}$ [2]

50. Work out $(64)^{-\frac{2}{3}}$.

..... $\frac{1}{16}$ [2]

51. Find the value of $\left(\frac{1}{2}\right)^{-3}$,

..... 8 [1]

52. Simplify $4x^4 \times 5x^5$.

..... $20x^9$ [2]

53. Work out the value of $32^{\frac{2}{5}}$.

..... 4 [1]

54. $3^x = 27^{x+2}$

Find the value of x .

$x =$ -3 [2]

55. Work out $4^{\frac{3}{2}}$.

..... 8 [1]

56. Find the value of $125^{-\frac{1}{3}}$.

..... $\frac{1}{5}$ or 0.2 [1]

57. Simplify.

$30t^{30} \div 5t^5$

..... $6t^{25}$ [2]

58. $8^{\frac{4}{3}} = 32^x$

Find the value of x .

$x = \frac{4}{5} \text{ or } 0.8$ [2]