2.4 – Indices

Student name: _____ Score: _____

1. Find the value of the following.

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

    .... [1]

    (b) $(\cos 30°)^2$

    .... [2]

2. (a) Find the value of

    (i) 3^0,

    .... [1]

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

    .... [1]

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

    Find the value of x.

    $x = $ .... [1]

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

    .... [2]

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

    .... [1]

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

    .... [2]

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

    Write down the value of p.

    .... [1]

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

    Write down the value of q.

    .... [1]

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

.... [1]

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

$x =$ ....or $x =$ .... [2]

7. (a) Simplify.
$$16x^{16} \div 2x^2$$

.... [2]

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

Find the value of n.

$n =$ .... [2]

8. Find the value of the following.

(a) 4^0

.... [1]

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

.... [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) $\sqrt{a}$,

.... [1]

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

.... [1]

10. (a) Find 125^0 .

.... [1]

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

.... [2]

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

.... [2]

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

.... [2]

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

.... [1]

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

.... [2]

15. (a) Find the value of

    (i) 25^0,

.... [1]

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

.... [1]

  (b) Write as a single power of 5.

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

.... [1]

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

    Find the value of p.

$p =$ .... [1]

  (b) Work out.

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

.... [1]

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

.... [2]

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

  Give your answer as a fraction.

.... [2]

18. Simplify.

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

.... [2]

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

.... [2]

19. Write down the value of 16^0.

.... [1]

20. Simplify the following.

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

.... [2]

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

.... [2]

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

.... [1]

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

.... [2]

22. Find the value of

(a) 5^0,

.... [1]

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

.... [2]

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

.... [2]

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

.... [1]

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

.... [2]

(b) Simplify.

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

.... [1]

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

.... [2]

26. Work out.

$(-2)^3$

.... [1]

27. Find the value of each of the following.

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

Answer(b) .... [1]

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

Answer(a) .... [1]

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

Answer(b) .... [1]

29. Find the exact value of

(a) 3^{-3},

Answer(a) .... [1]

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

Answer(b) .... [1]

(c) $\cos 30°$.

Answer(c) .... [1]

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

.... [2]

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

Find the exact value of x.

$x =$ .... [2]

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

.... [1]

33. $(0.2)^3$

.... [1]

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

.... [1]

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

.... [2]

35. Write down the value of 17^0.

.... [1]

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

.... [1]

37. Simplify.

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

.... [2]

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

.... [2]

38. Simplify.

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

.... [2]

39. Find the value of

(a) 64^0,

.... [1]

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

.... [1]

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

.... [1]

41. Simplify.

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

.... [2]

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

.... [2]

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

.... [1]

43. Simplify.

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

.... [2]

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

.... [2]

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

.... [1]

46. (a) $2^3 \div 2^7 = 2^p$

Find the value of p.

.... [1]

(b) $\sqrt{2^5} = 2^q$

Find the value of q.

.... [1]

47. Simplify.

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

.... [2]

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

.... [2]

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

.... [1]

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

.... [2]

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

.... [2]

51. Find the value of

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

.... [1]

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

.... [2]

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

.... [1]

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

Find the value of x.

$x =$ .... [2]

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

.... [1]

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

.... [1]

57. Simplify.

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

.... [2]

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

Find the value of x.

$x =$ .... [2]