

Exponents Quiz

Level 1 – 2

1. Simplify using $\frac{a^x}{a^y} = a^{x-y}$.

a) $\frac{5^7}{5^2}$

b) $\frac{7^9}{7}$

c) $\frac{x^{12}}{x^3}$

d) $\frac{y^2}{y^b}$

2. Simplify using $a^x \times a^y = a^{x+y}$.

a) $3^8 \times 3$

b) $7^2 \times 7^6$

c) $x^{10} \times x^2$

d) $y^2 \times y^n$

3. Simplify using $(a^x)^y = a^{xy}$.

a) $(5^5)^4$

b) $(2^2)^8$

c) $(x^2)^5$

d) $(2^x)^y$

4. Remove the brackets

a) $(xy)^3$

b) $(3a)^3$

c) $\left(\frac{a}{b}\right)^4$

d) $\left(\frac{2x}{y}\right)^5$

5. Evaluate, writing your answers as either an integer or a fraction.

a) 2^{-2}

b) 3^{-2}

c) 10^3

d) x^0

6. Write the following without brackets or negative indices.

a) x^{-2}

b) $(2ab)^{-1}$

c) xy^{-4}

d) $3(ab)^{-2}$

Level 3 – 4

7. Solve the following equations

a) $5^x = \frac{1}{5}$

b) $8^x = 64$

c) $2^x = 16$

d) $4^x = \frac{1}{16}$

e) $7^x = 1$

f) $8^{x-1} = 64$

8. Simplify the following

a) $\frac{4^{2x} + 4^x}{4^x}$

b) $\frac{3^{x+6}}{3^{3-x}}$

c) $\frac{9^{x+6}}{3^{3-x}}$

9. a) If $3^{100} = (3^x)^{25}$ determine the value of x .

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b) If $2^{200} = (2^y)^{25}$ determine the value of y .

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c) Hence, determine the larger value of 3^{100} and 2^{200} . Explain your method clearly.

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Level 5 – 6

10. If $\sqrt[n]{a} = b$ then $b^n = a$. Explain why $\sqrt[n]{x} = x^{\frac{1}{n}}$.

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11. Determine the value of $8^{\frac{2}{3}}$.

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12. Expand and simplify $5^x(5^{-x} + 125)$ writing your answer in the form $a + b^c$.

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13. Factorise $5^{2x} + 6 \times 5^x - 7$.

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14. Simplify $\frac{4^{2x} + 8^x}{4^x}$.

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Level 7 – 8

15. Solve $4^{2x} + 3 \times 4^x - 4 = 0$.

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16. Solve $2^{2x} - 2^{x+2} - 32 = 0$. *Hint: first rewrite it in a form that can be factorized.*

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17. Factorise $25^x - 4^x$.

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